

competitors shall be placed in the order in which any part of their bodies (i.e. torso, as distinguished from the heads neck, arms, legs, hands or feet) reaches the vertical plane of the nearer edge of the finish line.

B. MIDDLE DISTANCE RUNNING

Distance running can be split into two groups, Middle distance and Long distance. For middle distance running the athlete needs to both speed and stamina. For long distance running, stamina is the most important thing. Stamina means building up our body so that it can be last the race distance, but at race speed.

Middle Distance Events

1. 800 mts
2. 1500 mts
3. 3000 mts

The middle distance runner must apply his effort correctly throughout the race; this can be achieved only by a knowledge of pace and tactics.

The events which fall into the middle distance category range from 800m to 3000m. With the relentless advance in performance in athletics the 800 meter race now attracts athletes who in the past would have been sprinters. His running style is a model of mechanical efficiency, and even

UNIT - I

INTRODUCTION

A. Meaning of Athletics

Athletics comprise of a wide range of skills and can be divided in two broad categories of track and field events. Track events include sprint races, middle distance races, long distance races, relays and hurdles. The field events are those which are being played either inside or outside the track area or outside the stadium, which include throwing events and jumping events.

The track events include races of 100m, 200m, 400m, 800m, 1500m, 5000, 10000m, and relay races of 4x100m, 4x400m in both men and women categories. In all races shorter than 800m the competitors have to run the length in their respective lanes. The competitors of relay races are required to carry a baton and pass over the same to his/her partner within the take over zone. The starting points are arranged in such false a way that distance from start to finish is same for each competitor. In case of two false starts, the athletes declared disqualified. The competitor who jostles, runs across, or obstructs other competitor(s) can also be disqualified. Timings of competitors are recorded by the official time keeper from stop watches or through electronic time keeping equipment. The hurdle events include 110m and 400m for men and 100m and 400m for women. The competitors are required to jump over specified number of hurdles, which are made of metal with

a wooden top bar. The steeplechase hurdle event comprises of 28 hurdle jumps and 7 water jumps spread over a 3000m run-way.

The throwing events include throw of shot-put, javelin, discus and hammer. Each competitor generally gets six trials and the winner is decided on the best distance covered in any one of his six trials. The Jumping events comprise of High Jump, Pole Vault, Long Jump and Triple Jump. In the first two events, athletes are required to jump over a crossbar. In Triple jump the competitors are required to complete a hop, step and Jump sequence. Winner of jumping event is decided based on the distance measured between the take-off line and the nearest break in the landing area lead by the competitor's body part.

A standard international track is 400 mts in circumference. It has 8 lanes and the width of each lane is 1.22 mts. Track and field events include Sprints, Middle distance running, Long distances race, Hurdles, Steeple Chase, Relay races, throwing events and jumping events. Track and field events are conducted by International Association of Athletic Federation (**IAAF**).

Athletics

The term "Athletics" is derived from the Greek word "Athlon" which means a contest. The word "Athlete" denotes a person who takes part in contests which involve physical activity. "Athletics" is the oldest forms of the organized sport contested between individuals and or teams.

3. Run through

A forward dip during the last stride before the finish line is the most commonly used technique.

Photo Finish Camera

It is impossible for the naked eye to be able to determine accurately the finishing sequence of runners for in a blanket finish. The problem has been solved by photo-finish cameras. A photo-finish camera has very narrow slit lens which photograph an area of the finish line not more than 5-10cm across. It uses a continuous strip of film that moves across the lens at a speed proportionate to the speed of athletes and records the arrival of each competitor at the finish line. The space between each athlete shown in the film exhibits the time elapsed between the arrivals of each of them at the finish line. Photo – finish camera also doubles up as an electronic timing device, recording finishing timings of athletes up to one hundredth of a second. The camera gives a developed photograph that gives positions of athletes and time when their torso reached the finish line.

FINISH POSTS

Except where their use may interfere with the photo finish equipment, two white posts may be placed along the prolongation of the finish line at least 0.30 mts from the edge of the track. They should be of rigid construction and approximately 1.40m high, 8 cm wide and 2 cm thick. The

the foot to push against at the start of the race. The foot plates shall be slopped to suit the starting position of the athlete and can be either flat or slightly concave. To monitor the false starts the blocks can be connected with a devise. The blocks can be used up to and including 400 meters (including the first) leg of the 4x200m and 4x400m).

TYPES OF FINISHING

The finish line should be 5cm in width drawn across the track at right angles to the inner edge. Two white posts of rigid material (80mm in width and 20mm in thickness) shall be placed at a 30cm distance from the edge of the track. Competitors are place in the order in which any part of their torso (as distinguished from the head, neck, arms, legs, hands, or feet) reaches the vertical plane of the edge of the finish line nearest to the star.

Technique

There are three finishing technique used particularly during the sprint events. They are as follows.

1. Lunge finish

The torso reached the finish line first, i.e. leaning torso forward.

2. Diagonal finish (or) Shoulder Shrug

At the finish line crossing it by making the shoulder in diagonal, towards midline of the finish line. It is more difficult type.

B. IAAF

The IAAF (International Association of Athletic Federation) is the supreme governing body controlling international athletics throughout the word. It was founded in Stockholm on July 17th, 1912, to draw up and enforce rules and regulations and a common amateur definition, and to recognize world records, The IAAF now promotes its own World Champions in track and field every four years, with annual World Cross- Country Champions for men and women every march.

IAAF- Structure and Functions

In 1912, two days after the Olympic games a congress was held in Stockholm for the formation of an International Association of Athletic Federation. Seventeen countries were attended the historic meeting. The meeting was urged the Athletics to develop and promote international competitions and the Olympic games. The meeting was also urged the importance of having universal code of rules and regulation and a common definition for Amateur and also an athletic register of world and Olympic records.

One year later in 1963 at Berlin the congress once again met and accepted the first constitution and 34 nations figured on the most membership list. J.Sigfrid Edstrom (Sweden) was elected as first president and Kristvan Hailstorm as honorary secretary. The technical rules for International and domestic competition were framed and presented for approval in 1914 at the third congress in France.

In 1946 the IAAF Head Quarters moved from Stockholm to London. Over the years, the IAAF grew into a huge and dynamic organization as the world governing body of track and field athletics, road running, race walking and cross country. The congress decided to move the head quarters once again from London to Morte Carlo in 1993. The Steady growth of the Federation accelerated in the last decades. By 1997 member countries in addition numbered 209. The IAAF council comprising of 27 members from various countries.

AFI (Athletic Federation of India)

Athletics in its present form was born in our country during past decade of 19th century. Nothing much is known of its early stages till first known participation of Norman G.Pitchard in 2nd Olympic games in 1900 at Paris, where he won a Silver medal in 200mts run. The Indian Olympic Association (IOA) was formed in 1926 and its control athletics. But India unofficially participated in the 1920 and 1924 Olympic games under the leadership of H.C.Buck of Y.M.C.A Madras. The official participation of Indian athletes started in the 1928 Olympic games at Amsterdam till 1936 Berlin Olympics. India participated in the Olympics under the IOA BANNER. Then 1940 and 1944 Olympic Games were not conducted because of second World War.

Structure and Functions

Amateur Athletic Federation of India was formed in 1946 at the initiative of Maharaja Yadindra Singh then

in a natural relaxed position. An angle of about 90° at the front knee and of about 110° to 130° at the rear knee will be appropriate.

(iii) The Long Start (or) Elongated Start

The front starting block is situated 3 foot lengths from the starting line and there is one foot length between the starting blocks. The angle of rear leg about 110°. The long starting position is certainly the most difficult one. It should be applied carefully. Any athletes find this position rather ineffective. The long start, although still known, is hardly used nowadays.

For good starts a sprinter must,

- a) push back against the blocks
- b) moving the hands and arms as quickly as possible in reaction to the gun.
- c) move the hips quickly from the starting position to running position.
- d) run out of the blocks, do not jump.

STARTING BLOCKS

The starting blocks should be made of rigid material. It should be adjustable, but must be without springs. The blocks are fixed to the track, so that it provide firm base for

'On your marks' – position – his body weight resting comfortably on the legs in the crouch position. The hands are shoulder width apart to touch the ground behind the starting line with fingers and thumb pointing away from each other. The eyes are focused downward and forward.

Set position

The block settings should result, the athletes having a 90° angle at the front knee and 110° to 120° angle in the back of the knee. That gives a set position with the hips just slightly higher than shoulders slightly forward. The hands are placed just slightly wider than shoulder width apart, with the fingers and thumbs in a **"high bridge"** position. The shoulders are above and slightly ahead of the hands, the arms are straight, but not locked. He should feel pressure against rear block in the set position since the center of gravity is located high, the first strides are shorter and less powerful.

(ii) The Middle Start (or) Medium Start.

The front starting block is located two foot lengths (21 inches) from the starting line and the rear starting block is one foot length further. Kneel down with the right knee against the instep or toe of the left foot, and keep the trunk erect. The angle for the rear leg is about 130°. The slope of the body from the hips to the shoulders is not very steep. The body weight is on the legs and arms. The head remains

president of IOA with prof.G.D.Sondhi as its first president. The AAFI got affiliated to IAAF in the year 1946. The AAFI for the first time selected 8 athletes who participated in 1948 Olympic games at London. Indian women competed in the Olympic games for the first time in 1948.

Mr.M.C.Dhawn was elected by secretary of AAFI in 1950 and was the technical secretary in the first Asian games held at New Delhi in 1951. Raja Bhalendra Singh become the president of AAFI in 1952 and continued of guide athletic till 1968 along with Mr.M.C.Dhawn. This team acted a yeoman service to athletics in India and strengthened the AAFI to make it the leading federation. The federation produced by group competitors open national championship, Zonal and Inter Zonal Competition.

Many distinguished personalities are acted as president and secretary of AAFI till 1987 from 1988 to till date Mr.Suresh Kalmadi and Mr.Lalit K.Bhanot formed the new team of president and secretary respectively. The main function of AAFI is to prepare a year long sports calendar at the state and national level. They are sending teams to international level competitions based on merit.

D. AGE GROUPS

Under the Jurisdiction of the IAAF is split into five age groups.

1. Men and women there is no age limit
2. Seniors - 19 Years
3. Juniors - 17 and 18 Years
4. Youths - 15 and 16 Years
5. Boys - 13 and 14 Years

UNIT - II

TRACK EVENTS

Athletics is great fun and people of all ages, can enjoy it. Athletic activities can be traced back of the ancient Greeks, who used to take part in games of running, jumping and throwing. Track events include sprint races, middle distance races, long distance races, relays and hurdles.

The track events include races of 100m, 200m, 400m, 800m, 1500m, 5000, 10000m, and relay races of 4x100m, 4x400m in both men and women categories. In the track events all races are run with the competitor's left hand side of the track and finish in the same position. The competitors are required to wear their numbers on their vests.

A. SPRINT EVENTS

Sprints

"To cover the distance in the shortest time with maximum speed"

A. Sprint Events

1. 100 mts
2. 200 mts
3. 400 mts

1. Bunch start (or) Bullet start
2. Medium start
3. Elongated start

Three types of foot spacing bullet, medium and elongated starts. Each sprinter will have his own particular measurements so the following procedure is suggested to enable him to get into a correct starting position.

Block placement

The three block placement positions are determined by the location of the blocks relative to the starting line.

(i) The Bunch or Bullet Start

Stand with the right toe beside the rear of the left heel. Kneel down with trunk erect and rock forward in the same way. In this starting position the starting blocks are close to the starting line. The front block should be placed one foot length (16 inches) from the starting line, with 11 inches between the blocks results in low velocity and fast block clearance Track events, up to and including 400 meters, run at full speed for the entire race distance. Sprinter press their feet against two blocks, which are spaced apart and connected to a shaft, to improve their initial movement. The main features to look for in the sprinter's highly distinctive running action are the high knee-lift, the long strides, the thrusting arm action and the controlled breathing.

should immediately rise to final starting position retaining the contact of the hands with the ground and of the feet with the foot plates of the blocks.

A competitor shall not touch either the starting line or the ground in front of it with his hands or his feet on his marks. The three starting positions are measured from the starting line to the front leg of the starting block. Starting is the first stages in all the running events, should be conducted either track or road. There are only two types of starting should be followed by the athletes.

1. Crouch start
2. Arc start (Standing start)

CROUCH START

Crouch start can be used by the athletes those who are run up to and including 400mts and even the first runner of 4 x 100mts Relay and 4 x 400mts Relay.

In crouch start the following commands to be used,

1. On your mark
2. Set
3. The gun fire or clapping with clap board

It has three (divisions) method should be used according to the height of the individuals.

Sprinter

There is no ideal shape or size for the sprinter. He must, however, be well built and have good all-round muscular development and a quick reaction time. Regular, even and relaxed arm action must be learned first. The legs follow the arms, and the faster the arms are moved the faster the leg action will become. In the arm action emphasis should be on a forward and upward motion.

Most important factors for sprinting

1. Reaction time
2. Starting position
3. Powerful Muscles
4. Acceleration Technique.
5. Effective stride length
6. Curve running technique (200 mts, and 400 mts).
7. Technique at the finish line.
8. The condition of the Track surface
9. Wind and Weather conditions.

Stride Length

“It is the distance between touchdown of the toe of one foot and the touchdown of the toe of the other foot”. Stride length may and usually will be vary from left to right

or right to left on individual at the same velocity. This variance may be influenced by dominance, weakness, injuries and even leg length. Stride length will be vary with the speed of running and during the various phases of a race.

Stride Cadence or Stride frequency

"It is the number of strides per second". The stride cadence for sprinters is 4.5 to 10 strides per second with little difference found between the strides. The method of determining stride rate is to divide the number of strides in a race by the elapsed time for the race.

STARTING

There are varieties of running events for which the track is used . The finishing line for all races must be the same. But the starting line of all the races cannot be the same. It will vary from race to race. While 100mts race, 100mts hurdles and 110mts, hurdles races have to be run in straight courses, appropriate distance shall be measured backward from the beginning of home stretch and starting lines are marked. The extended lines are broken.

The start and finish of a race shall each be denoted by a white line 5 cm wide. The distance of the race shall be measured from the edge of the starting line farther from the finish, to the edge of the finish line nearer to the start.

All races shall be started by the report of the starter's gun or approved starting apparatus fixed upwards after he has ascertained that competitors are steady and in the correct starting position.

At all international sports competitions meetings, the commands of the starter in his own language shall, in races up to and including 400m be "on your marks", "set", and when all competitors are "set" the gun shall be fired, or approved starting apparatus activated.

In races longer than 400m, the commands shall be, "on your marks" and when all competitors are steady, the gun shall be fired, or approved starting apparatus activated. A competitors shall not touch the ground with his hands.

In all races up to and including 400m, and 4 x 100 mts Relay, 4 x 400mts relay first runner a crouch start and the use of starting blocks are compulsory. In competition held under IAAF, competitors must use starting blocks provided by the organizers of the meet. In other meet on all weather tracks, the organizers may insist that only starting blocks provided by them may be used. After the "on your marks" command, the competitor shall approach the starting line, assume a position completely within his allocated lane and behind the starting line. Both hands and one knee shall be in contact with the ground and both feet, in contact with the starting blocks. At the "set" command, the competitor

decreases. A study of the body movements involved in these activities pinpoints the causes. In normal walking and running the knee of the supporting leg is bent as it passes through the vertical position (i.e. when the centre of mass passes vertically over the foot), but in race walking the knee of this leg is straight in the vertical position. The technique is such a way that race walking does not become a modified run. Briefly, contact with the ground must be maintained at all times, a heel-and-toe action must be used, and the supporting leg must be straight at the knee as it passes through the vertical position.

Judging a fast walk is an extremely difficult skill, since it is almost impossible to see whether a walker has a foot on the ground at all times or that the knee is straight through the vertical for it takes only a fraction of a second to pass through the position. Race walking is not a natural skill as normal walking and running are, because the latter are the locomotion skills learnt from very early childhood.

As in most other athlete events, flexibility is an asset and hip mobility especially is an important factor in stride length in normal walking in which the line through the hip of the forward swinging leg is allowed to twist forward with the leg, the stride length is increased considerably. Stride length is also maximized, if the feet move along a straight line.

in the later stages of a race when fatigue is sapping his strength his skill does not break down.

C.LONG DISTANCE EVENTS

1. 5000 mts
2. 10000 mts
3. Marathon

The three main long distance events are 5,000m 10,000m and the marathon. Stamina is the basic quality needed by a long-distance runner, but speed has also become an essential requirement for would-be world beaters.

However, in the long distance the steady pacer must beware of the fast finisher who sits on his shoulder, until the final run-in. the steady runner without an equivalent fast finish must attempt to put himself far enough ahead of the sprint finishers by either a punishing pace throughout the race or by putting in bursts of speed during several laps from the finish. There is nothing more motivating for the training runner than to see his rival a few strides in front of him, but also nothing more demoralizing than for his rival to be 20 meters or more in front.

D.HURDLES – VARIOUS STAGES

MEANING

Running over the barriers (or) obstacles are known as Hurdles. The Hurdle race should be conducted for men and

women, senior boys and senior girls in various height and distance. Every hurdle race is based on certain conditions laid down in the rules of the International Association of Athletic Federation (IAAF).

The hurdles are made of steel with wooden top bar. The height of hurdles can be adjusted as per the length of the race and sex of the athlete. The hurdles are made in such a way that when force of 3.6-4kg. is being applied to the centre of the top, it should overturn automatically. The height required for, men's 110m race is 106.7 cm. The women's 100m sprint hurdles are 84 cm in height. In 400 m race the men's hurdle is 91.4 cm high and women's is 76.2 cm. The length of the wood used for the top bar should be 1.20m and width at least 7cm. The top bar should be striped in black or white or in some other contrasting colors.

The following are the standard distances, it can be classified into two categories,

- Men - 110 & 400 mts
- Women - 100 & 400 mts

Distance of Hurdles	Category	Height of the Hurdles	Distance Start to first Hurdle	Distance Between the Hurdles	Distance Last Hurdle to Finish
100mts	Women	0.840mts	13mts	8.50mts	10.50mts
110mts	Men	1.067mts	13.72mts	9.14mts	14.02mts
400mts	Men	0.914mts	45mts	35mts	40mts
400mts	Women	0.762mts	45mts	35mts	40mts

Substitution

Once a relay team has participated in a competition only two additional athletes may be used as substitutes in the composition of the team for subsequent rounds. Once an athlete, who has participated in a previous round has been replaced by a substitute, he may not return to the team.

RELAY BATON

The relay baton is made of a rigid material. It should be a single piece of smooth, circular and hollow tube of 280-300 mm length. The minimum weight required for baton is 50 grams and its circumference should be between 120-130mm. The batons should be colored so that it can be easily visible during the race.

Specification

- Weight of the baton : not less than 50 gm
- Length of the baton : 28 to 30 cm
- Circumference of the baton : 10 cm
- Color of the baton : Visible color
- Minimum baton required : 6 Nos.
- Maximum baton required : 8 Nos.

D. WALKING

Race walking may appear to be the natural link between ordinary walking and running, and in some respects this is true-with increase in speed, the force-time

runner only. The baton should not be exchanged within the acceleration zone(Advance Zone).

During the exchange the baton must be delivered firmly and safely into the hands of the receiving runner. When the incoming runner has approached his partner within 2 to 3 mts he indicated to him by a signal when to extend his receiving arm backwards. The signal comes too early or too late, or the runner receiving the baton moves his arm up, down or to the side, the results in an unsteady baton pass and consequently in a loss of time. The baton should be put firmly into the grasping hand between the spread thumb and the four locked fingers.

2. 4 x 400 mts Relay

The runners use a visual pass. The incoming runner carries the baton in the right hand and passes to the outgoing runner's left hand. The primary responsibility for the pass rests on the outgoing runner due to fatigue on the part of the passer. Once the baton has been taken, the athlete immediately transfer it to the other hand.

The four athletes shall run 400mts each to cover 1600mts distance by means exchanging a baton. The first leg of the 4x 400 mts relay run in lanes and so is the first curve of the second leg; only after crossing the line making the exit from the first curve, runners free to move to the inside of the track.

110mts Hurdles

There shall be Ten flights of hurdles in each lane, set out in accordance with the below table.

Starting line to First Hurdle	:	=13.72mts
" "	Second Hurdle	: 13.72+9.14 =22.86mts
" "	Third Hurdle	: 22.86+9.14 =32.00mts
" "	Fourth Hurdle	: 32.00+9.14 =41.14mts
" "	Fifth Hurdle	: 41.14+9.14 =50.28mts
" "	Sixth Hurdle	: 50.28+9.14 =59.42mts
" "	Seventh Hurdle	: 59.42+9.14 =68.56mts
" "	Eight Hurdle	: 68.56+9.14 =77.70mts
" "	Ninth Hurdle	: 77.50+9.14 =86.84mts
" "	Tenth Hurdle	: 86.84+9.14 =95.98mts
" "	Finishing line	: 95.98+9.14=110mts

VARIOUS STAGES

110mts Hurdles the Hurdling Technique is classified into the following:

1. Starting
2. Approach to the First Hurdle
3. Hurdle Clearance (Departure)

4. Running between the hurdles
5. The finish

1.Starting

Hurdling is basically a sprinting event, the mechanics of the starting do not vary much from that of the sprint start. In order to get eight (8) strides to the first hurdle to take – off foot should be placed in the first block. If the hurdler wants seven (7) strides to the first hurdle, take – off foot should be placed in the rear block.

2. Approach to the First Hurdle

The distance from the starting line to the first hurdle is 13.72 mts. The first three strides out of the blocks are the same as in a sprinter’s start. On the fourth stride, the hurdler begins to concentrate on the first hurdle. In perfecting the approach to the first hurdle make any adjustments on the 4th, 5th and 6th strides. The first three and last two should be kept constant. The last stride is slightly shorter to permit to get his centre of gravity slightly ahead of the take-off foot. This approach sets the pattern for the entire race.

3. Hurdle clearance

The take – off distance from the hurdle depends on four factors. The height of the athlete, speed of the approach length of the lead leg speed of the lead leg action. Each

The baton must be carried by hand throughout the race, if dropped, it must be recovered by the athlete who dropped it. He may leave his own lane to retrieve the baton provided this procedure is adopted and no other athlete is impeded, dropping the baton shall not result in disqualification.

Stages of Relay Running

The start

The starting of the 4 x 100 mts Relay is basically same as for the 400 mts. The starting blocks are placed close to the outer line of the track. The baton lies between the forefinger and the thumb is enclosed by the other fingers. After a successful start the runner quickly passes to the inside of his lane.

Checkmarks

The second, third and fourth runners place a checkmarks on their lanes just behind their starting positions. This is a check mark for the out going runner. The distance between the checkmark and the starting position depends on the speed of the incoming runner and on the acceleration of the outgoing runner.

The Baton exchange

The relay baton should be exchanged from one to another competitor with in the take over zone. The exchange is completed when the baton is in the hand of the receiving

when hearing the signal from the incoming runner moves the appropriate arm backwards in a positive and slightly angled manner to a level not higher than the shoulder line. The upper arm is straight at the elbow, the back of the hand is facing down wards the thumb and index fingers are widely spaced forming obtuse angle. The baton is received into such a palm from the incoming runner with an outstretched arm. In the final phase of the change over the elbow joint locks quickly and the baton is passed in a down sweep action.

The best result in both techniques the change over should occur when both runners are traveling at maximum speed and the actual change over should be as quick as possible. The majority of experts consider that the speediest change over occurs when the baton is actually changed over a distance of 2 to 4 mts from the end of the exchange zone.

Acceleration Zone

The acceleration zone lets the outgoing runner accelerate properly and allows the athletes more time to reach top speed at the exchange.

Exchange Zone or Take over Zone

The incoming runner can signals the exchange with verbal commands at a specific point when the incoming runner ready to pass the baton. The incoming runners can also use nonverbal signals. The outgoing runner can count the incoming runner's stride from the check mark to the exchange point.

hurdler must be cleared quickly and safely. The first prerequisite of movements much as in the ordinary running stride. For this action the lead leg is slightly flexed at the knee joint, and leading foot to track beyond the hurdle.

The average take-off distance from the hurdle in men's hurdles will be 1.90 mts to 2.20 mts to allow the leading leg to sweep forward and upward in a straight line. Too short a distance for the take-off results in a "jump" over the hurdle. The hurdle clearance are having the following factors.

Action of the Leading leg

The complete action consists of a quick forward and upward thrust of the leading leg in the direction of the leading of introduces the sequences.

Once the take-off foot leaves the track it becomes the trail leg. The heel of the trail leg moves actively toward the buttocks as the knee moves in a exaggerated motion upward and to the side to avoid hitting the hurdle. For the clearance of the hurdle, the trailing leg must be stretched away from the body when clearing the hurdle. This movement requires good mobility of the hip. The sequence of the athlete's movements should be as follows: after a rigorous push from the ground follows a phase of relaxation for the take-off leg. An action forward movement of the high should begin only when the foot of the leading leg has reached the edge of the hurdle.

Action of the Arms

The usual movements during running are also executed during hurdle clearance. With the sole difference that in the hurdle stride the arms perform additional functions. The arms contribute in a greater degree to maintaining body balance. When the trailing leg comes forward, the trailing arm swings backward to counter balance this movement. It is either almost stretched or flexed at the elbow.

4. Running between the hurdles (The three-step Rhythm)

In the 110 mts hurdle run the distance between the hurdles is 9.14 mts. If we reduce from the length of the hurdle stride, there remains for three strides between the hurdles or three-step rhythm a distance of about 5.065 meters. So that is 1.88 mts for each step. But practice shows clearly that the three steps are not of equal length. The first stride after the landing which is of about 1.55 to 1.60 mts follows a wide second stride measuring 2.00 to 2.20 meters and this is the longest between the hurdles. The last stride before the hurdle is always slightly shorter than the previous one.

5. Finish

The athlete has to use any one technique similar to sprint to finish the race.

Baton Exchange

There are two methods of baton (Exchange) passing

1. Up sweep method
2. Down sweep method

1. The up sweep method

In this method the passing of the baton occurs in an upward movement by a straight arm. At the same time the baton is received by an arm which is pointing backward and locked at the elbow. The outgoing runner upon hearing the agreed signal from the incoming runner, quickly extends his arm backwards locking it at the elbow, the thumb and fingers are separated and pointing downwards forming an obtuse angle. The time that he receives the baton the outgoing runner tries to keep his arm as still as possible. This outstretched arm the incoming runner quickly moves his straight arm upwards and in such a way that the outgoing runner can grasp the baton as near to the incoming runner's palm as is possible. In the upsweep method the baton is passed from the right hand to the left hand and then the left hand passing it to the right.

2. Down sweep method

In the down sweep method the baton – exchange takes place over a distance of 2 to 3 mts. The out-going runner

2. The baton must be passed inside a short distance to be covered by some three to four strides and without unnecessary loss of time.
3. The baton must be exchanged by non – visual method.

Visual Method

The visual method of baton exchange is used only in 4x400 mts relay. When the out going runner receive the baton, he must see the incoming runner while receiving the baton. The incoming runner gripping the baton at its base, then passes the baton into the receiver hand with a forward down sweep motion. The outgoing runner reaches arm straight back, palm facing upward and takes the baton, gripping the upper portion.

Non Visual Method

The non-visual method of baton exchange is used only in 4x400 mts relay. When the out going runner receive the baton, he doesn't to see the incoming runner while receiving the baton. The incoming runner gripping the baton at its base, incoming alerts the receiver, then passes the baton into his or her hand with a forward pushing, down sweep motion. The outgoing runner reaches arm back, palm facing upward and takes the baton, gripping the upper portion. then rotates the receiving arm down, under and forward, to ready the baton for the next exchange.

400 mts Hurdles

Hurdling is a sprinting, rhythmic event. In this race a full circuit of the track is run with 10 hurdles, 91.4 cm high, placed 35 mts apart. The distance from the starting to the first hurdle is 45 mts, while the last hurdle to the finish line measures 40 mts. There are ten flights of hurdles in each lane, set out in accordance with the below table.

Placement of Hurdles in 100mts Hurdle race

Starting line to First Hurdle	:	=13.00mts
" "	Second Hurdle	: 13+8.50 =21.50mts
" "	Third Hurdle	: 21.5+8.50=30.00mts
" "	Fourth Hurdle	: 30+8.50 =38.50mts
" "	Fifth Hurdle	: 38.5+8.50=47.00mts
" "	Sixth Hurdle	: 47+8.50 =55.50mts
" "	Seventh Hurdle	: 55.5+8.50 =64.00mts
" "	Eight Hurdle	: 64 +8.50 =72.50mts
" "	Ninth Hurdle	: 72.5+8.50=81.00mts
" "	Tenth Hurdle	: 81+8.50 =89.50mts
" "	Finishing line	: 89.5+10.5=100mts

Placement of 400mts Hurdles in Standard Track

(Men and Women)

Starting line to First Hurdle	:	=45.00mts
" "	Second Hurdle	: 45+35 =80mts
" "	Third Hurdle	: 80+35=115mts

"	"	Fourth Hurdle :115+35=150mts
"	"	Fifth Hurdle : 50+35=185mts
"	"	Sixth Hurdle : 185+35=220mts
"	"	Seventh Hurdle : 220+35=255mts
"	"	Eight Hurdle : 255 +35=290mts
"	"	Ninth Hurdle : 290+35=325mts
"	"	Tenth Hurdle : 325 +35=360mts
"	"	Finishing line: 360+40=400mts

E. RELAY

There are two relay events comprising of 4x100m for men and women, and 4x400m for men and women. All the four members of a team are required to run one stage of the race along with the relay baton in their hands throughout the race. The baton must be picked up by the athlete who dropped it. He/She may leave the lane in order to retrieve the baton, provided no other player is impeded.

4x100m relay races are run entirely in respective lanes with staggered starts. In 4x400m relay races the first lap and the same part, of the track, of the second lap shall be run in lanes. The position of the teams at the start shall be retained at each take- over zone, except in case of races where lanes are not used. The waiting runners can move to inside zone, after handing over the baton, until the course is clear to avoid obstruction to other competitors.

Relay races are a popular and exciting feature of track and field. It is a team event in an individual oriented sport. They give the opportunity for team work and cooperation is not available in the other events. The key to good relay racing is the baton exchange. Commonly the relay events are as mentioned below,

1. 4 x 100 mts
2. 4 x 400 mts

1. 4 x 100 mts Relay

The 4 x 100 relay is undoubtedly the most beautiful and one of the most difficult events of the athletics spectrum. This relay uses four sprinters running a complete lap of the track, passing on a baton which has to arrive at the finish line with the runner of the last leg.

The main objective in the baton pass is to keep the baton moving at top speed throughout the relay. The baton must be passed only within a 20 meters take – over zone (exchange zone). This zone begins 10 mts before the scratch line (100 mts marking) and ends 10 mts after it. A good baton – exchange needs to satisfy the following three conditions.

1. The baton – exchange must take place after some 12 to 16 mts running, measured from the beginning of the take – over zone.

forward and upward. Then he goes upward the body position is in vertical (or) hanging and elbows are flexed.

5. Clearing the bar

When the body is in hanging position lift and swings upward both the legs, at the same time the pole straightened, turn the upside down. Then pushing the pole down by hands the legs are throw over the cross bar. After clearing the cross bar push the pole away from the pit with the wrist action to avoid foul or touching the bar.

6. Landing

Safe landing is required on the landing area.

B.THROWING EVENTS

General conditions

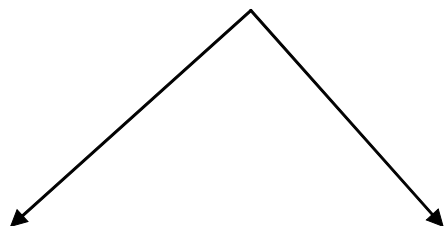
The person who has more body weight and mass of the muscles can choose throwing events. The following qualities are essential for throwers.

1. Body weight
2. Height
3. Leg power
4. Shoulder strength
5. Flexibility
6. Co-ordination
7. Speed

Race walking, of course, involves a rapid leg cadence and if the arms too are no maintain their synchronous swings they have to be bent at the elbows to reduce their moments of inertia, as in running. However, more emphasis is placed on the arm and shoulder action in race walking than in running, because of the need to counterbalancing the exaggerated eccentric thrust of the legs and movements of the hips. But in addition to counterbalancing the leg action, they also aid the forward drive with their swinging the strong upward swing of both arms evokes extra forces from the ground through the driving leg.

UNIT- III

FIELD EVENTS



DISTANCE EVENTS

1. Long Jump
2. Triple Jump
3. Shot Put
4. Discus
5. Javelin
6. Hammer

HEIGHT EVENTS

1. High Jump
2. Pole Vault

A. JUMPING EVENTS

1. LONG JUMP

The following techniques should involve while doing long jump.

1. Approach run
2. Penultimate stride
3. Take – off

1. Grip

Athletes who take off with the left foot, the pole must be carried on the right hand side, the left arm, half bent, supports the pole with the palm of the same hand turned downwards, while the right arm grips about 60-70cm higher with the hand lightly turned out. Keep the pole straight near the cross bar on the uprights. Hold the pole slightly lower than the height of the cross bar. Keep the pole parallel to the ground pointing to the pit or above the right hand palm facing upward and with left hand palm facing down ward.

2. Carry the Pole

The pole should be raised at 50° or 45° to the ground and keep right side. The left hand should be kept flexed at chest level and the right hand at the back. While carrying the pole, the body balance is very important.

3. Approach run

20 to 30 mts away from the vaulting box to start the running with the pole steadily and high knee action. When you reach the check mark, plant the pole in the vaulting box and kick the floor to go up.

4. Planting the pole

When the competitor reaches the check mark he should plant the pole into the box. Join the left hand with the right hand, push the right shoulder and both the hands

(iii) Supports for the cross bar

The cross bar shall rest on pegs pointing in the direction towards the landing area. The supports shall extend not more than 5.5 cm and not more than 1.3 cm in diameter, which should extend 35 – 40 mm above the pegs.

The distance between supports is minimum of 4.30 meters and maximum of 4.37 meters.

(iv) End Pieces of Cross Bar

It shall have 30 mm to 35 mm in diameter, square the length of the end piece is between 15 cm to 20 cm and should be semi circular.

(v) Landing (Pit) Area

The minimum dimensions of the landing area is 5 x 5 meters, for international competitions the length, width and height of the landing area will be 7 x 6 meters. The front pieces must be 2 m long.

VARIOUS STAGES

1. Grip
2. Carry the pole
3. Approach run
4. Planting
5. Crossing the bar
6. Landing

4. Flight in the air
5. Landing

1. Approach run

The length of the un-up is determined by the height of the jumper and his ability to accelerate in the run. According to analyzes carried out at recent Olympic Games, the best athletes use a run-up from 37-50m in length (incase for women 33-40). The athlete should mark the starting check mark 14 to 16 strides from the take – off board. If the athlete who is taking off with left leg, he should start running with right leg. Then he starts the approach run steadily and gradually increase the speed towards the take – off board.

2. Penultimate stride

The last two strides before the take off is called penultimate stride. In this time, the athlete shrugs his body little downward and the length of the stride decreases. That is easy way to fly in the air.

3. Take – off

The length of the jump depends not only on horizontal speed but also on the speed and power of the take-off. After completion of Approach run (penultimate stride), step on the take off board with the stronger foot and jump up in the air by pushing the take off board. After take off (or) jumping in the air the hands should be vertically raised. The Non-

take off leg should be raised high. The last step is executed more quickly and the whole foot is placed on the board, ahead of the projection of the center of gravity.

Plasticine Indicator (No Jump indicator)

Plasticine indicator is called no jump indicator, it is placed at the inner edge of the Take-off board. The judge at the take off board must watch the competitors does not overstep the scratch line. If a no jump indicator is not available the judge should build one moist sand which will clearly show if it is touched by toe or spike. It is a foul only if contact is made with the ground or the no jump indicator.

4. Flight

Jumping styles vary according to the development of the athlete and his muscular characteristics and the bone structure. The most common techniques are,

1. The Sail (common among beginners)
2. The Hitch kick (1-2-3 strides and a half in the air)
3. Hang (extended jump or glide)

(i) Hitch Kick

After jumping in the air from the take off board the athlete swing (or) rotate their legs like pedaling in cycle in the air into 2 or 3 pedaling style, and the legs are closed together before landing. When legs are pedaling the arms alternatively with legs movement.

4. POLE VAULT

Runway

The minimum length of the runway shall be 40 meters, when the conditions permit it is 45 meters.

1. The width of the runway is 1.22 meters.
2. The runway should be marked by white lines with 5cm as width.

Implements

(i) Upright

Any style of uprights or posts may be used provided they are rigid.

(ii) Cross Bar

It is made up of Fiber glass, Metal or other suitable material.

1. The length of the cross bar is 4.48 mts to 4.52 mts.
2. The maximum weight of the cross bar is 2.25 kg.
3. The circular shape of the cross bar is 30 mm diameter.
4. It should have the gap of maximum 3 mm

3.Fosbury Flop

The Fosbury flop was introduced by Dick Fosbury, who won the high jump at the Mexico Olympics in 1968. His technique for clearing the bar, his run up was also very notable because it was in the form of a semi- circle, and he took off with his foot at an angle of about 20 degree relative to the plane of the uprights. At the point of take – off Dick Fosbury with a vigorous bending action and driving up of the free leg, supported by an alternated movement of the upper limbs, rose completing a rotation on the longitudinal axis of the body and then prepared for flight with his back to the cross-bar.

Next he performed his rotation on the transverse axis of the body and at the extreme point of the parabola, he arched himself and continued his trajectory on this position until, so as not to knock down the cross - bar, he straightened his leg and landed on his back bowing his head on to his trunk so that the impact was taken by the top part of the back, avoiding unpleasant injuries to the cervical part of the spinal column.

4. Landing

Safe landing is required on the landing area.

(ii) Hang style

After the take off the athlete do the back arch the arms should be vertically raised above the head, the legs are straighten back, and before landing brings the legs and arms to extend forward, and the legs are closed together before landing.

5. LANDING

After completion of his style in the air, before landing, the athletes should extend both the legs forward / straightened. While landing both the heels should be landed first on the pit. There are three landing techniques should be used to come out of the landing area. They are as follows.

1. Collapsed landing
2. Swing out landing
3. Scoop landing

1. Collapsed landing

While landing both the heels should be touched first on the pit and then toe, the whole body should brought forward and place the knees on the pit, at the same time the buttocks should be kept back on both the heels.

2. Swing out landing

After landing in the pit the athletes should turn his body 45° either right or left in forward and fall down on the ground with shoulder, first then buttocks and so on.

3. Scoop landing

Landing by heels on the pit and push forcefully the sand and makes a dig and place the buttocks on the dig by extending the legs straight.

The competitor commits fouls if he;

1. Take off beyond the take off line.
2. Delaying more than 60 seconds.
3. After landing walking back towards the run way.
4. Performing acrobatics during the jump.
5. Uses illegal style of jump.

Rules

1. The order in which the competitors make their attempts must be decided by drawing lots.
2. Each competitor will be placed according to his best jump.
3. When there are more than eight competitors, each one is given 3 attempts and the 8 competitors with the best jumps are given further three jumps.
4. In case of a tie for the eight position, each competitor involved in the tie has three additional attempts.
5. When there are eight or less competitors, each one is allowed six trials.

3. Clearing the bar

1.The scissors

Towards the end of the 19th century, an American named Mike Sweeny proposed the scissors jump as an alternative to the frontal clearance. The scissors involved passing one leg over after the other at the same time bending the trunk towards the knees when clearing the bar. It consisted of the following movement:

1. While the forward leg was the cross – bar the other one kicked upwards, causing the chest to rotate towards the direction of jumping and a landing on the feet.
2. With the use of this style the world record began to rise this style, the world high-jumpers introduced minor adjustments to the technique according to their physical characteristics and talents.

2.The Straddle

Towards the middle of the 1930s another American Dave Albritton, proposed a radical new technique for clearing the bar, involving the body being parallel to the bar, but with the stomach downwards rather than with the body sideways. Thus the straddle was born, which was clearly demonstrated by the Soviet trainer Vladimir Mihailovic Dyachkov and put to good effect by Valeri Brumel, who took the world record to 2.28m in 1963.

1. Scissors
2. Straddle Roll (or) Belly Roll
3. Fosbury Flop

Various stages

1. Approach run
2. Take – off
3. Crossing the bar/ clearing the bar
4. Landing

1. Approach run

The jumper can approach either from the left side or right side of the cross bar with 25 mts long and medium speed. The angle of approach run and the number of steps vary according to the level of the athlete.

2. Take off

Jumper can stand either right or left one arm away from the cross bar. Then down vertically draw the line that may be considered as take off line. When the jumper start to approach towards crossbar, used his power leg on the take off line for make a jump.

6. Once the competition is under way, competitors are not allowed to use the runway for trail attempts.
7. All jumps must be measured from the nearest mark in the landing area made by any part of the body or limbs of the athlete to the take-off line or its extension and at right angles with the take-off line.
8. If a competitor takes off before the board or the line this does not constitute a foul.

2. TRIPLE JUMP

The triple jump shall consist of a Hop, step and jump in that order. This is the English definition of the jump. The hop must be executed on the same leg which was used for the take off (right-right or left-left). In the step the support is transferred to the other leg. The final jump is a proper long jump.

1. It shall not be considered a failure if the competitor, while jumping, touches the ground, with the “sleeping” leg.
2. There are six stages when taking Triple jump. They are as follows
 - (1) Approach run
 - (2) Take – off
 - (3) Hop

(4) Step

(5) Flight

(6) Landing

1. Approach run

The length of the run-up is determined by the height of the jumper and his ability to accelerate in the run. According to analyzes carried out at recent Olympic Games, the best athletes use a run-up from 37-50m in length (in case for women 33-40). The athlete should mark the starting check mark 14 to 16 strides from the take – off board. If the athlete who are taking off with left leg, he should start running with right leg. Then he start the approach run steadily and gradually increase the speed towards the take – off board.

2. Take – off

The length of the jump depends not only on horizontal speed but also on the speed and power of the take-off. After completion of Approach run (penultimate stride), step on the take off board with the stronger foot and jump up in the air by pushing the take off board. After take off (or) jumping in the air the hands should be vertically raised. The Non-take off leg should raised highly. The last step is executed more quickly and the whole foot is placed on the board, ahead of the projection of the center of gravity.

3. Hopping

The athlete should be used to land on the ground which he was used to take off. For example: The athlete has take off for his left leg means he should land or hop in the same leg. During hopping the non take off leg (or) rear leg has no movement, that's why it is called sleeping leg.

4. Step

After completion of hopping the athlete used to take one more step with his non take – off, foot before landing is called step. Here the athlete does the bounding action to do the step.

5. **Flight** and

6. **Landing** procedures are similar to long jump.

3. HIGH JUMP

The high jump as we know it today first became popular in the 19th century. Subsequent perfecting of the jumping technique took place in the development stages, but it has depended particularly on modification of the rules for the event and on the elimination of some restrictive conditions.

Various techniques should be used by the jumper to cross the bar. Depends upon their ability they used any one of the following techniques.

c) High carry

High carry method is associated with those throwers who tend to use a direct over the shoulder type withdrawal which ends with a turning back of the shoulders at the arm and javelin is reaching near full backward extension (To held on above the head).

A thrower must develop his carry position to suit his technique of withdrawal of the javelin in preparation for the delivery stride.

2. Approach run

During approach run the thrower has to mark the point of starting and the point of check mark with javelin. While running the javelin should move front and back, and slowly increase the running speed still you reach you the check mark.

The Run-up : The run – up has two parts. They are

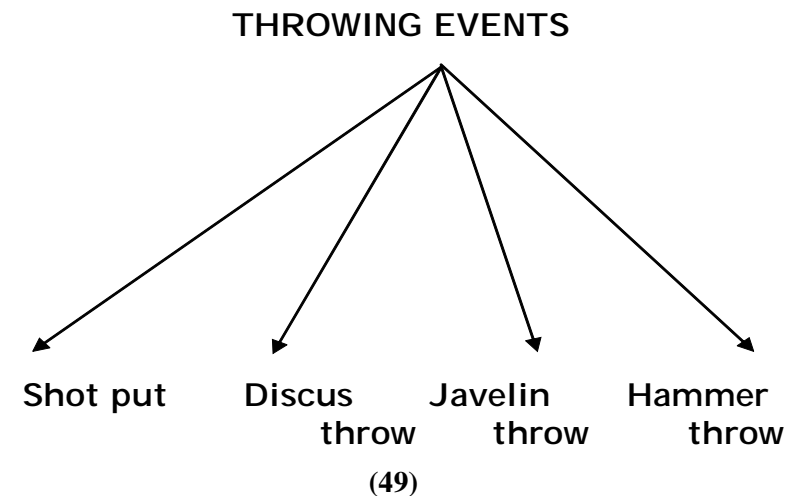
- (i) The cyclic part
- (ii) The acyclic part

The cyclic part speed is built up sufficiently so as to allow for a further increase over the last strides. The run-up should be easy and relaxed, heading the thrower to a powerful explosive all-out release.

- 8. Arm length
- 9. Balance
- 10. Endurance

The competitors are allowed three to six trails and three to eight of the best competitors are allowed three more trails. Incase of a tie for the final place, the competitor shall be allowed three additional trails. The conditions of the competition must be explained to the competitors before its commencement. The best throw of the competition out of all trails taken by the competitors shall be credited in resolving a first place tie. No markers or marks are allowed to be put in the throwing sector.

Competitors may use an adhesive substance on their hands for better grip, and can also wear a belt of leather or some other material to protect the spine from injury. However, taping of the fingers or use of any other devise on their hand which might assist in throwing is not allowed.



1. THROWING THE SHOT PUT

The competitor must begin the throw from a stationary position within the circle. The shot shall be put from the shoulder with one hand only and, shall touch or be in close contact with the chin. The hand shall not be dropped below this position during the act of putting.

Practice trials are not allowed after the commencement of the competition. Competitors are not allowed to put on gloves nor are they allowed to spray or spread any substance either on the surface of the throwing circle or on their shoes.

Basic Principles

1. Forces must be applied along a straight line.
2. Newton's 3rd law – Action and Reaction are equal and opposite.

Specifications

1. Weight of the shot for men - 7.260 Kg
2. Weight of the shot for women - 4.00 Kg
3. Diameter of the shot put circle- 2.135 m
4. Angle of the shot put sector - 34.92
5. Dimension of the sector - 20 x 12 m

a) Normal grip

The above thumb and middle finger is behind the edge of the grip cord and the index finger is partly curled around and behind on the javelin's shaft.

b) Middle and Thumb grip

The index finger and thumb is behind the edge of the cord binder and the rest of the fingers around the cord itself.

c) 'V' grip (or) Glow grip

The Javelin is held between the index and the middle fingers at the edge of the cord binder and rest of the fingers around the cord itself.

Carry

The javelin is carried above the shoulder of the throwing arm. Three commonly used methods of carrying the javelin during the approach run's cyclic phase.

a) Low carry

The low carry is generally associated with a circular type arm action in the 'withdrawal' (To held on waist level).

b) Medium carry

The medium carry is generally favored expansion in the withdrawal. (To held on eye level).

1. A head
2. A shaft and
3. A cord grip

The javelin throw comprises the following technical elements.

1. The grip and carry
2. The Approach run
3. The withdrawal
4. The impulse stride
5. The throwing stride
6. The release
7. The recovery

1. Grip

When executing their throws, javelin throwers may hold the javelin only by the whipcord grip. They may hold the javelin at the end of the cord grip with one or more fingers and the thumb touching the javelin shaft. Javelin throwers have some leeway in how they grip the javelin. It has three types how they can hold the javelin. The javelin is held behind the cord binder the rear edge of which offers a slightly raise border for gripping the javelin.

Stages / Method

1. Holding of the shot
2. Tucking (or) Placement of the shot
3. Stance
4. Glide
5. Release

1. Holding the shot

- a. The shot rest on the root of the fingers, and should not touch the palm.
- b. All the fingers are carry the shot except the little finger which is only support.

2. Placing (Tucking) the shot

1. The shot must be placed between chin and clavicle.
2. The shot does not go beyond the shoulder line.
3. The hand should be parallel to the ground.

3. Stance

The stance varied according to the using the style of Athletes.

Techniques (Style Of Putting)

The thrower can be used 3 style when putting the shot

1. Standing throw
2. 'O' Brien technique (or) Gliding
3. Rotation (or) Disco put

1. The 'O' Brien Technique

The distance a shot travels depends upon its height of release, velocity at the moment of release and the Angle of projection. The optimum angle of projection will vary depending on the height of the release, and the distance of the put, it will be approximately 34.95. The correct technique is the one that will result in the greatest velocity at release. The motion of a projected object is influenced by the exact point of application of the propelling force.

Holding the shot

The procedure for gripping the shot is to hold it in the left hand and lay the right hand loosely on top with the fingers spread slightly. The putter holds the shot in his right hand. Where it rests on the "base" of the fingers. The three middle fingers are only slightly splayed while the thumb and the little finger give the shot lateral support, securing a safe position of the shot.

The Reverse

The reversal is to serve as a follow through after the thrust and to retain balance in order to avoid fouling. After the discus has left the hand the thrower will have to reverse the feet rapidly and lower the body weight to maintain balance. The right leg must be brought forward quickly and planted firmly close to the rim of the circle, mean time the left leg swings back the body is bent at hips and right knee flexes to drop the centre of gravity into a stable position.

3. THROWING THE JAVELIN

The javelin throw distinguishes itself from other throwing events of shot-put, discus throw and hammer throw. These throwing events must be from a circle, the javelin must be thrown from behind the arc of a sector drawn with a radius of 8 mts. Due to the aerodynamic nature of the implement and its relative weight, the event does not require great strength. The event does require few less technique in order to achieve high level results.

Javelin consists of three parts namely the head, shaft and grip. The shaft is made up of either Aluminium or fiber. At the tip of the shaft a sharp head is fixed. At the center a grip made of thread is fixed. The Javelin is round and broad at the center. The circumference is small in the front and rear. It has three main parts

athlete drives off the left foot. The effective throwing position is one of "muscular wind" the hips displaced from the feet, shoulders from the hips and discus from the shoulders.

The run across the circle is initiated by the driving action of the left leg. Synchronized with the swing of the right leg. This drives carries the thrower halfway across the circle. The right foot landing approximately on the centre line with the leg well bent and the shoulder and body weight back. His left leg is pointing toward the direction of the throw, his right shoulder is facing the rear, his throwing arm is well behind the shoulder his left arm is curled and the discus is flat.

The Release

The throw begins with a forward and upward drive from the right foot. The shoulder should now come in slightly after the hip and the arm strikes from the low point, the thrower reaching out as far as possible to give as much distance from axis of rotation as he can. The left leg should now straighten, as the arm strikes. The discus will leave the hand in line with the right shoulder and should be squeezed out of fingers, each digit applying its force in turn and spinning of the first fingers last. The discus is spun clockwise. A good thrower will release the discus at a 35°-40° angle. The release must be smooth and rhythmic using the force generated from the lower body.

The stance

He should stand facing the rear of the ring with his back in the direction that he is going to throw. The shot should be held in right hand, supported by thumb and fingers. The hand holding the shot will be placed into the hollow of the collar bone in such a manner that it does not rest on such a manner that it does not rest on the shoulder but against the right side of the neck and the jaw. The elbow of the right arm is slightly raised and pressed forward. The upper arm points forward and downward. The head remains in its normal position. The eyes should be focused on a point to the rear of the ring and about five to ten yards away. He should stand erect in a telexed attitude, the left arm is held either out in front of the face or relaxed above the head the left front behind the right about one foot with just the toes touching for balance.

The glide or drive

The purpose of the glide is to gain momentum while moving across the ring and to lead into the correct position for the delivery. The initial movement is to lower the trunk and raise the left leg causing the body to form a "T" shape with all weight carried on the right leg. The head, shoulders and hip remain square to the rear of the circle, and the right leg flexes in preparation for the drive across the ring proper balance at this point is extremely important.

2. The Rotation or Disco-put Technique

The Starting Position

The putter stands at the rear of the circle facing 180° away from the throwing direction. The left foot is along the centre line of the circle and the right foot is placed laterally to the right of the centre line about shoulder width apart or just this point in most cases. The grounding of the left foot at the stop board denotes the arrival of the thrower into the delivery stance.

Preliminary Movements

To start the turn, the putter begins by swinging the shoulders, trunk and left arm along with the left and then to the right, as the body weight shifts correspondingly from leg to leg in coordination with the rhythm of the shoulders, trunk and left arm. Both knees are semi – flexed while this side to side swaying movement is taking place to break the inertia and set the pattern of movement to follow.

Turn

The double support phase of the turn begins at the end of the preliminary movements. The thrower is completely over his right leg with the trunk and shoulders well twisted to the right. From this position the thrower begins unwinding his upper body in the direction of turning with a wide

throwing arm bang to the right side along the thrower's thigh with the head and eyes focused to a point about 5 meters behind the circle. There are generally three positions that a thrower may adopt in relation to the line of direction. The experience, technical skill and comfort of the thrower must decide which of the three starting positions suit their ability.

The left foot is generally placed a few centimeters back from the rim of the circle, in order to avoid fouling by bursting the sole of the foot on the top edge of the rim of the circle as the pivot is executed.

The preliminary swings

The thrower should position himself at the rear edge of the circle with his back to the generally facing the direction of throw and his feet slightly wider than hips. The discus should be flat and facing downwards on the arm swung at shoulder height so that the arm and discus go well behind the right shoulder. The free arm rests comfortably across the chest. The thrower's weight should move easily from one foot to the other. On the final preliminary swing, the arm is swung back as far as possible so that the body weight is over a straight right leg.

Coming across the circle

The initial movement is begun the hips are turned and a pivot is made on the ball of the right foot as the

Specification of discus

1. Weight of the discus for men : 2 kg to 2.025 kg
2. Weight of the discus for women : 1 kg to 1.025 kg
3. Diameter of the discus for men : 21.9 cm to 22.1 cm
4. Diameter of the discus for women: 18 cm to 18.2 cm
5. Angle of sector is : 34.92°

Various Stages

Hold

The hand is placed flat against the discus surface, the upper joints of the fingers grasp the rim of the discus. Its center of gravity lies between the index and middle finger. Due to a slight bending at the wrist the upper face of the discus touches the arm, because it prevents the discus from falling out of the hand in the subsequent movements.

Starting position

The starting position at the rear of the circle is with the thrower facing 180 degrees away from the throwing direction. The two feet are usually placed about shoulder width apart or slightly more in the case of very tall throwers. The toes point naturally outwards with the weight of the body evenly distributed over both feet. The discus and

sweeping left arm action parallel to the ground, a slight forward tilt to trunk in a semi sitting position. The single support phase of the initial part of the turn is followed by a brief non support phase when both feet are off the ground and the whole body is turning on its vertical axis, and continues turning after the right foot lands around about the center of the circle.

Follow through (or) Reverse

When the right leg has driven really well and effectively and the action has been timed correctly the athlete will be well over the left foot as the arm strikes. Immediately after the shot has left the hand, he will find himself falling over the stop – board. In order to prevent himself fouling, the left foot is rapidly withdrawn and the right leg brought forward, the toe of the right foot striking the inside edge of the stop – board. At the same time the body weight is lowered in order to be more on balance by lowering the centre of gravity.

Valid Trial

For a valid trial, the shot shall fall completely within the inner edges of the landing sector.

Fouls

1. Throwing the shot from behind the shoulder
2. Touching outside the circle or the top of the stop Board

3. Shot landing on the sector line or outside the sector line
4. Delaying more than 60 seconds to throw.

Rules

1. The use of gloves is not allowed
2. At the competition area, each competitor may have a maximum of two practice trials which should be made in draw order, under the supervision of the judges.
3. Once the competition has begun, competitors are not permitted to use implements for practice purposes or to use the runway or ground within the sector for practice trials, with or without implements.
4. No device of any kind – i.e., taping of two or more fingers together, which in anyway assists a competitor when making a throw, shall be allowed. The use of tape on the hand shall not be allowed except in the case of the need to cover an open cut or wound.
5. A better grip, competitors are permitted to use a suitable substance on their hands only.
6. To protect the spine from injury, a competitor may wear a belt of feather or other suitable material.

7. For a valid trail, the tip of the javelin shall fall completely within the inner edges of the landing sector.
8. If the implements breaks during a throw or while in the air, and if the competitor thereby loses his balance and contravenes, it shall not count as a foul throw, provided one attempt was made in accordance with the Rule.
9. Implements shall be carried back to the starting line and never thrown back.
10. The competitor shall not leave the runway until the implement has touched the ground.

2. THROWING THE DISCUS

The object of the spin in the discus throw is to generate power and speed within the circle to apply to the discus itself, and the more power that is applied to the discus, then further it will go the angle to release of discus, the position of the discus during its flight are important factors. It has three types,

1. Half rotation
2. Full rotation
3. One and half rotation

6. 5000m Run – Arc start **or** Group start
7. 10000m Run – Arc start **or** Group start
8. 400mts Hurdles - Full stagger distance
9. 4 x 100m Relay – Full stagger distance
10. 4 x 400m Relay – One and Half stagger distance with diagonal distance.

2.Non- Standard Track

The track which is not satisfying the conditions of standard track is called as Non-standard track and the 400mts track without curb (raised border) is also treated as Non-standard track. Usually 200mts track is called as Non – standard track.

Some of the disadvantages of Non-standard track:

- a) Sprinters very difficult to show their real capacity.
- b) Very difficult to run more than 6 competitors at a time.
- c) Very difficult to conduct Hurdles and Relay races.
- d) Very difficult to conduct both track and field events simultaneously.

Method of finding Running Distance Radius for 200 mts track if 36 mts as straight.

3. Five – stride – Rhythm

The three known stride Rhythms – the three stride rhythm. The five stride Rhythm and seven stride rhythm. It is five stride – Rhythm which is the most widely accepted, which comprises the following phases:

- (i) The withdrawal of the javelin
- (ii) The impulse stride
- (iii) The throwing position
- (iv) The release
- (v) The recovery

(i) Withdrawal of the javelin

The withdrawal starts at the second stride of the five-stride rhythm and ends at the third stride. The throwing arm is drawn back in alignment with the shoulder axis. The palm of the hand is turned upward and extend the forearm, when the withdrawal is completed, the athlete's body has a marked backward lean.

(II) Impulse stride /Cross step / Three step (or) Five step Rhythm

When an athlete reaches the check mark with the left leg the action of throwing should be starts. The right hand is stretched backward with the javelin and left hand is brought in forward in front of chest. That is otherwise called "with drawl of the javelin".

The toe of the right foot must be deviate more than 30° from the run up direction. The left leg presses the body down low into the fourth stride, preventing the body's centre of gravity from lifting at the landing of the right leg, which must be allowed to bend when it receives the body weight.

(iii) Throwing Position

The throwing position starts at the moment when the athletes right foot makes contact with the ground after the impulse stride. The right leg can start to extend and doing s introduce the release, the full extension of the forearm by the hand is important under no circumstances must the arm be flexed at the wrist.

(iv) The Release

The release is initiated by a forward and upward stretching of the right leg at the knee and ankle joints, driving the right hip forward. The shoulder and the hip axes now run parallel and almost at right angles to the direction of the throw. The throwing arm is not yet stretched while the right leg is extended, the heel is raised, allowing the pressure of the ball of the foot to act longer on the body. The throwing arm now comes into its sphere of action. When the throwing arm begins to strike, the elbows are raised until it is level with the heed and pointing in the throwing direction.

Method of Finding Running Distance Radius for 400 mts if 80 mts as straight.

$$2pr = 240 \text{ (Circumference of two curves)}$$

$$r = 240/2 \pi$$

$$240/2 \times 3.1416 = \frac{240}{2 \times 3.1416} = \frac{240}{6.2832}$$

$$= 38.20 \text{ mts}$$

For Standard Track (With Kerb)

Marking Distance Radius (MDR or CR) = RDR – 0.30 m

MDR = 38.20 – 0.30 = 37.90m

For Non-standard Track (without kerb)

MDR = RDR – 0.20 m = 38.20 – 0.20 m = 38.00m

Starting points in 400 mts Track

1. 100m Run Men & Women
100m Hurdles for Women - Parallel Method
110m Hurdles for Men
2. 200m Run – Half stagger distance
3. 400m Run – Full stagger distance
4. 800m Run – Half stagger with diagonal excess **Or** Arc start / group start
5. 1500m Run – Arc start **or** Group start

Running Distance Radius (RDR)

RDR is the path in which an athlete has to run in the curve to cover the exact distance. The chart below shows that RDR, CDR and area required to lay 400mts raised bordered track when the straights length varies.

Straight length in mts	Rdr in mts	Cdr in mts
79MTS	38.50	38.20
80MTS	38.18	37.88
84.39mts	36.80	36.50

The chart below shows that RDR, CDR and area required to lay 200mts Non raised bordered track when the straights length varies.

Straight length in mts	Rdr in mts	Cdr in mts
37.50MTS	19.89	19.67
40.00MTS	19.09	18.89

During the release the left side of the body must be in a flexed position. This is achieved by a sudden arrest of the backward movement of the left arm just when the right side of the body overtakes the left side the angle of release is between 30 and 36 degrees.

(v) The recovery

A distance of at least two meters from the arc will be required merely checks the forward speed of the body. Thus preventing from fouling. After the release, the right leg is forward in a springing movement. The reverse takes places to avoid stepping over the right foot must be planted transversely to the throwing direction, the upper body must be lean forward, the left leg is raised and brought back into the direction of the run-up. Javelin consists of three parts namely the head, shaft and grip. The shaft is made up of either Aluminium or fiber. At the tip of the shaft a sharp head is fixed. At the center a grip made of thread is fixed. The Javelin is round and broad at the center. The circumference is small in the front and rear.

Follow throw

After releasing the javelin the thrower to avoid his forward momentum (or) foul, then he placed his rear leg to brought forward for his rear leg and placed nearer to the board and to do hopping twice or threes. Then he come back behind the runway should not make foul.

Correct throw

The javelin should be caught in the grip. The javelin must be thrown forward from behind the shoulders. While throwing thrower should not cross the line of runway either in front or side. After releasing, the javelin should fall within the sector lines with the tip first touching the ground. The thrower still remains (leave) the runway only after the javelin lands on the ground.

6. THROWING THE HAMMER

The technique of hammer throwing is determined by the specific nature of the implement and the measurement of the throwing circle, which comply with the international rules. A complete throw consists of two preliminary swings and three turns on the left foot with an active push-off from the right leg at each turn. The following are the parts of hammer throw:

1. The Grip
2. The Initial position
3. The preliminary Arm swings
4. The Transition
5. The turns

Top Layer

Now-a-days all international competitions are being held on synthetic tracks. The thickness and material used for various layers of a synthetic track depend upon the product and preference of the particular firm (construction agency). Although, the material used for top layer by all the firms are synthetic tracks, but of different variations. It is advisable that whenever 8 lane synthetic tracks are being laid, efforts should be made for laying of another 4 lane synthetic track of the same material for training purposes.

Lane

Lane is the space between the two parallel lines.

Kerb

Kerb is the raised border (both inner and outer line) which is fixed permanently through the inner line of the first line and outer line of the last lane. Dimensions of curb is 5 x 5 cm (5 cm height, 5 cm width).

Curb Radius (CR)

Curb radius is the radius which is used to draw the curve. It is otherwise known as Marking Distance Radius (MDR). The curb radius varies according into the nature of the track.

TRACK MARKING

Track must be prepared according to the rules and regulations laid by **International Association Of Athletic Federation** (IAAF). The inner raised border should be 5cm in height and width by using brick, wood or any other suitable material. There shall be a minimum of 8 lanes and width of lane is 1.22mts and width of the line is 5cm. The straight lines are always marked by north to south direction and finishing line must be same for all races.

a) TYPES OF TRACK

The track is classified into two types based on its specifications.

1. Standard Track (with curb)
2. Non- standard Track (without curb)

1. Standard Track

The tracks are made either on plan surface (grass) or with the help of cinder/synthetic material which is skid proof and not too hard. To get maximum benefit from the cinder/right synthetic tracks, it is essential that proper care be taken at the time of the construction so that right materials are mixed in various layers as per required thickness.

6. The Release

7. The Recovery

The Grip

The inside grip of the hammer handle is laid against the pads of the middle phalanges of the left hand fingers. The right hand cuffs the left by putting the four fingers over the back of the middle and basal phalanges of the left hand fingers. The hammer must be held firmly but not tensely.

The initial position

The thrower stands at the rear edge of the circle with his back facing in the direction of the throw his feet are a little more than shoulder width apart and his knees are bent for stability during the arm swings. The thrower now places the hammer head behind his right leg as far to his rear as possible. He then turns to the right until the right shoulder points in the direction of throwing. The hammer wire forms a straight line with the extended left arm.

The preliminary arm swings

The main function of the preliminary swings is to break the inertia of the thrower and hammer and to set a rhythmic pattern of movement by which initial acceleration is transmitted to the hammer. During the preliminary swings, the arms are kept long and relaxed and form and extension

of the hammer wire. They begin with this movement when the hammer is at its lowest point and end it by turning the trunk to the right. The thrower must counteract the increasing centrifugal force.

When the hammer moves backwards, he presses his hips forward. After the first arm swing the thrower keeps the lowest point of his hammer well to the right, at around 290 to 300 degrees, and the highest point somewhere around 120 degrees.

The Release

The delivery phase begins when the right foot touches the ground after the third turn. The landing of the right foot must be fast and firm in order to match the acceleration of the implement, which is racing down to the lowest point with the beginning of the active straightening of the legs. Just before the hammer is released, the left knee straightens. When the implement leaves the hand, the vertical line of projection of the thrower's head should not go beyond the right heel. If the feet are in a stationary position, thus is a clear proof of a correctly executed delivery. The hammer is released at shoulder height. The left shoulder points in throwing direction and back is well arched. The most valuable angle of release in the hammer throw is 42 and 44°.

1st Day Events

1. 100 mts Hurdles
2. High Jump
3. Shot put
4. 200 mts Run

2. Decathlon

Decathlon consist of 10 events which shall be conducted on 2 consecutive days in the following order.

1st Day Events

1. 100 mts Run
2. Discuss throw
3. Pole vault
4. Javelin throw
5. 400 mts Run

2nd Day Events

5. Long Jump
6. Javelin
7. 800 mts Run

2nd Day Events

6. 100 mts Hurdles
7. Long Jump
8. Shot put
9. High Jump
10. 1500 mts Run

Note :

1. Winners will be decided based on the points of all events.
2. There is no heats in the running events and every running events are treated as finals.
3. Three attempts only will be given to field events.
4. Two false start should be permitted.

3. Decathlon

Decathlon consist of 10 events which shall be conducted on two consecutive days in the following order, with minimum 30 minutes interval between two consecutive events and 10 hours interval for last event of first day and first event of second day.

1st Day Events

1. 100 mts Run
2. Long Jump
3. Shot put
4. High Jump
5. 400 mts Run

2nd Day Events

6. 110 mts Hurdles
7. Discus throw
8. Pole vault
9. Javelin throw
10. 1500 mts Run

Combined Events For Women

Combined events for women there are two category mentioned as follows.

1. Heptathlon
2. Decathlon

1. Heptathlon

Heptathlon consist of 7 events which shall be conducted on 2 consecutive days in the following order.

The Recovery or Follow Through

To avoid stepping over to thrower must absorb the impact by reversing the legs and lowering the body's centre of gravity, thus increasing stability.

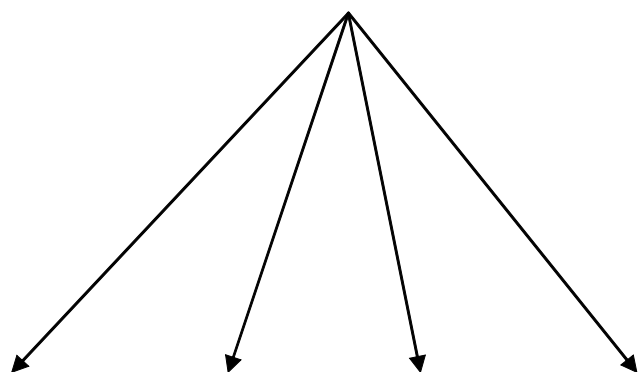
C.COMBINED EVENTS

Multi-discipline events has been included in athletics programmes since eight century B.C. though originally the five events for men included a run, long jump, discus throw, javelin throw and wrestling. The 10 events with we are familiar today were practiced first in Scandinavia, and the event is now developed in importance for the genuine all – rounder, who may not be one event, but who can maintain a high overall standard. Today it is an event for the decathlon or heptathlon specialist who prepares for it and competes in the event as a whole rather than in series of separate competitions. The decathlete or heptathlete needs to be a balanced personality with well –rounded physical development.

The Combined events are an individual events consist of several number of events of different category. For men and women combined events are classified into 4 types according to the level of competitors. The events are held over two days, and they are chose as a true test of skill, stamina and technique. The decathlon combines sprints with middle distance running, throwing, jumping, hurdling and vaulting.

There is a rest period of 30minutes between each event. A competitor is awarded points for his best performance in each event, as calculated by reference to scoring tables produced by the IAAF. The decathlon entered the Olympic programme in 1912.

COMBINED EVENTS



Pentathlon

Heptathlon

Octathlon

Decathlon

They are as follows.

1. Pentathlon - 5 events
2. Heptathlon - 7 events
3. Octathlon - 8 events
4. Decathlon - 10 events

The Combined events such as pentathlon, which shall be conducted on one day, and other combined events such as Heptathlon, Decathlon and Octathlon should be conducted on two consecutive days as in the prescribed order.

Combined Events for Men

1. Pentathlon
2. Octathlon (Youth Boys)
3. Decathlon

1. Pentathlon

The pentathlon is a five-events test of all-round ability. The men's version comprises the long jump, javelin, 200m., discus and 1500 m in that order on one day. Scoring is on the same basis as the decathlon. The pentathlon has long been a most popular women's event, and was introduced into the Olympic schedule in 1964.

2. Octathlon (Youth Boys)

Octathlon consist of 8 events which shall be conducted on consecutive two days in the following order.

1st day Events

1. 100 m Hurdle
2. Long Jump
3. Shot put
4. 400 mts Run

2nd day Events

5. 110mts Hurdles
6. High Jump
7. Javelin
8. 1000 mts Run

i) By seeing their timing in 1/100 of second. If the tie still remains.

ii) Lot shall be used to decide the best loser.

b) Field events

During horizontal or distance events, where there are more than eight competitors, each competitor shall be allocated three trials and the competitors with the best valid performances shall be allowed three additional trials.

In the event of a tie for the last qualifying place it shall be resolved by seeing the second and third best performance among the tied competitors and if tie still remains, the tied competitors shall also be allowed to for the three additional trials.

In the event of a tie for any position, it shall be decided first by using the available rules. If the tie still remains it concerns for the first place, the competition shall be re-run to decide the swimmer which is known as concerns any other place, the result will stand. That means the tied competitors shall be awarded the same place.

Note; Its best performance as achieved during field braking, it shall also be considered.

$$2\pi r = 128 \text{ (Circumference of two curves = } 200 - 72 \text{ (} 2 \times 36 \text{))}$$

$$2 \times 3.14 \times r = 128$$

$$\text{RDR or 'r' = } 128 \times \frac{1}{2} \times \frac{1}{3.14} = 20.37 \text{ m}$$

$$\text{MDR = RDR - 0.20 m}$$

$$\text{MDR = } 20.37 - 0.20 = 20.17 \text{ m}$$

b) TYPES OF RUNNING SURFACE

1. Mud
2. Grass
3. Cinder
4. Synthetic Track

c) NEED FOR A STANDARD TRACK

1. Track must be prepared according to the rules and regulations laid by International Association of Athletic Federation (IAAF).
2. The length of the standard track shall be 400 mts.
3. The track should be laid out from North to South direction.
4. Track shall consist of two parallel straights and two curves of same radius. The length of the curve will be more than the straight.

5. The track should have minimum of 6 lanes and maximum of 8 lanes.
6. The inside and outside of the track shall be bordered by a kerb. That is raised border of maximum 5 x 5 cm.
7. The track should have common finishing point.
8. To conduct all the running events up to 10,000 mts within a track and also the jumping and the throwing events simultaneously with the track events.
9. The track should have proper drainage system.
10. The track should be leveled without any ups and downs.
11. The running direction is such that the athlete's left hand side is towards the centre of the track.
12. The synthetic material will be used as the surface of the track.

STAGGER DISTANCE

1. There will be no stagger for the first lane athlete.
2. As and when the width of the lanes changes, the stagger distance also changes.
3. Staggers are needed only when the athletes are required to run in curves also in their lane.
4. Staggers will not change according to the increase in the length of curves.

6. Angle sector is : 34.92°
7. Wire : Single up broken and straight length of string steel wire 3 mm in diameter
8. Handle : Curved or straight grip with maximum width inside of 130 mm and maximum length inside of 110mm.

BREAKING TIES IN ATHLETICS

Tie breaking in can be steadied separately during preliminary rounds and finals to decide the positions.

1) Preliminary rounds;

a) Track events

Preliminary rounds (heats) shall be held in track events when the number of competitors is more in number to reduce the number of competitors to 6 or 8 to conduct the finals. In all preliminary rounds at least first and second in each heat shall qualify for the next round and it possible at least three in each heat shall qualify. The qualification for the next race shall be decided either according to their placings or according to their times (best losers). During this selection if there is a tie among the best loser, the following steps shall be applied to decide the best loser for the next round.

The Ring

The ring shall be placed to the level of outside ground. It must have a height of 1.4cm to 2.6 cm from the inside floor of the circle and 6mm thickness.

Specification of Hammer

The hammer consist of three parts, a metal head, a wire and a grip. The head shall be of solid iron or other metal not softer than brass. The head should be spherical in shape with smooth surface. A steel wire, with a diameter of 3mm, is attached with the head at one end and with a handle on the other end.

Overall weight of the hammer

1. Men : 7.26 kg to 7.285 kg
2. Women : 4 kg to 4.025 kg

Overall length of the hammer

1. Men : 117.5 cm to 121.5 cm
2. Women : 116 cm to 119.5 cm
3. Diameter for men : 11 cm to 13 cm
4. Diameter for women : 95 cm to 110 cm
5. Head : Solid or other suitable material

5. When staggers are marked, the diagonal excess distance also to be taken into consideration.

Formula

$$\text{Half stagger} = [W (N-1) - \alpha 0.10 \text{ m}] \pi$$

$$\text{Full stagger} = [W (N-1) - \alpha 0.10 \text{ m}] 2\pi$$

$$\text{One and Half stagger} = [W(N-1) - 0.10\text{m}] \times 3\pi$$

Where,

W – Width of the lane,

N – Number of the lane

π – 3.1416 (Standard value)

Stagger distances for Non- standard Track

$$\text{Half stagger} = W (N-1) \times \pi$$

$$\text{Full stagger} = W(N-1) \times 2\pi$$

$$\text{One and Half stagger} = W (N-1) \times 3\pi$$

Diagonal (excess) Distance

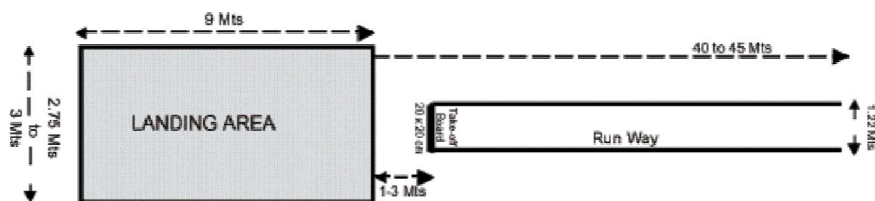
The excessive distance run by the athletes other than the first lane runner for 800mts and 4 x 400mts relay to reach the first lane after the first and three curve respectively is called diagonal excess. This diagonal distance should be calculated for each lane and it should be added with half stagger, and 1½ stagger respectively in the starting point itself.

UNIT - V

FIELD MARKING

Layout of Area for all Field Events with all Specifications

a) LONG JUMP



Specifications

Runway

Approach run - 40-45mts

Width of the lane - 1.22

Width of the line - 5cm

Jumping pit

Length - 9 mts

Width - 2.75 mts to 3 mts

Distance of the take off Board from the nearest edge - 1 – 3 mts of landing area

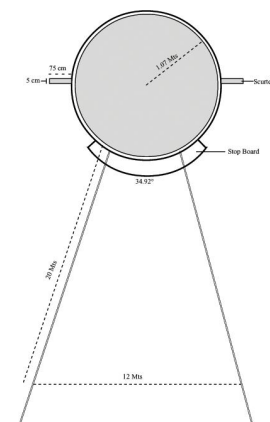
(84)

9. Width of the cord grip : 150 mm to 160 mm for men

10. Width of the cord grip : 140 mm to 150 mm for women

11. Angle of sector is : 29°

h) THROWING THE HAMMER CIRCLE



The hammer is thrown from a circle, shielded on three sides by a netting a cage on a metal frame, and must land within the marked sector. The competitor who achieves the best distance with his throw is declared winner. A total number of five judges watch for infringement within the circle, the other three judges supervise the field. If the hammer breaks while attempting a throw, then the attempt shall not be counted. Under such circumstances, if the competitor loses his balance and commits a foul, it won't go against him.

(93)

The javelin is made of wood or metal shaft with a sharp metal head. There shall be a cord grip around the centre of gravity of javelin. The cord grip should not exceed the diameter of the shaft by more than 8mm. The grip shall be of uniform thickness.

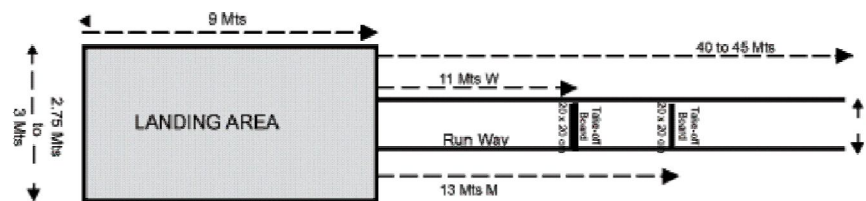
SPECIFICATIONS

1. Length of the runway : 30 to 36.5 mts
2. Width of the runway : Two parallel White lines 5 cm wide and. 4 mts apart
3. Width of the arc : 7 cm extended by 75cm long and 7 cm wide.
4. Weight of the javelin : 800gms to 825 gms for men
5. Weight of the javelin : 600gms to 625gms for women
6. Over all length of the javelin : 2.60 mts to 2.70 mts for men
7. Over all length of the javelin : 2.20 mts to 2.30 mts for women
8. Metal head : 250 mm to 330 mm for men and women

Dimension of the Take- off Board (Wooden Board)

- Length - 1.20 mts to 1.21 mts
 Width - 20 cm
 Depth- 10 cm

b) TRIPLE JUMP



Specifications

Runway

- Approach run - 40-45mts
 Width of the lane - 1.22
 Width of the line - 5cm

Jumping pit

- Length - 9 mts
 Width - 2.75 mts to 3 mts
 Distance of the take off board from the nearest edge of landing area - 11m (w) 13m (m)

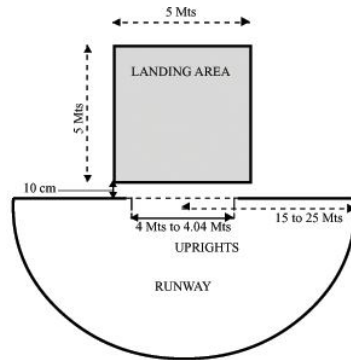
Dimension of the take off board

Length - 1.20 mts to 1.21 mts

Width - 20 cm

Depth- 10 cm

c) HIGH JUMP



Specifications

Runway

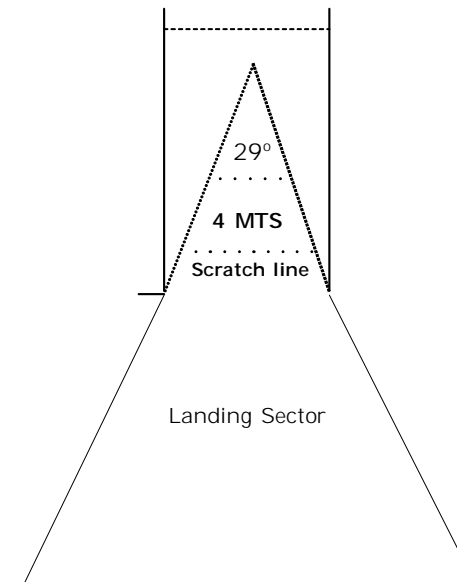
The minimum length of the runway shall be 15 meters. Except in international competitions, where the minimum shall be 20 meters. If conditions permit, the minimum length should be 25 meters.

High Jump Landing Pit

Pit : The pit is made of foam. The length of the pit shall be at least 5m, width 3m and height 60cm.

(86)

Javelin Throw Sector



IMPLEMENTS



Javelin



cord grip

(91)

Specifications

RUNWAY

The minimum length of the runway shall be 15 meters. Except in international competitions where the minimum shall be 20 meters. If conditions permit, the minimum length should be 25 meters.

High Jump Landing Pit

Pit : The pit is made of foam. The length of the pit shall be at least 5m, width 3m and height 60cm.

Uprights

The uprights should be of a rigid or any other suitable material, marked in centimeters. The uprights shall extend at least 10cm above the point up to which the cross bar can be raised. The distance between the uprights shall be between 4.00 - 4.04m.

Cross bar support

The support for the cross bar should be made of rigid or any other suitable material, which can be raised or lowered and can be adjusted up to a height of 2.30m.

Uprights

The uprights should be of a rigid or any other suitable material, marked in centimeters. The uprights shall extend at least 10cm above the point up to which the Cross bar can be raised. The distance between the uprights shall be between 4.00-4.04m.

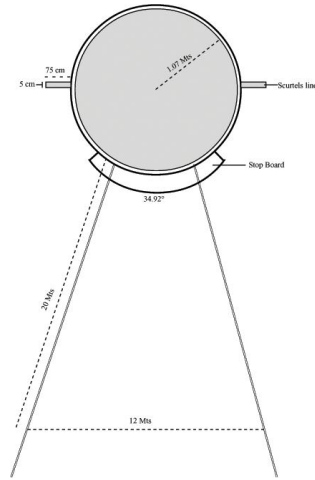
Cross bar support

The support for the cross bar should be made of rigid or any other suitable material, which can be raised or lowered and can be adjusted up to a height of 2.30m.

Cross bar

The cross bar is made of wood, or metal or any other suitable material. The cross bar should be circular with a diameter of 29 mm to 31 mm. The end of the bar shall be of concave or flattened surface of 150-200 mm in length and 29-35 mm in width. The length of the cross bar shall be between 3.98, to 4.02m.

d) SHOT PUT CIRCLE



The Ring

The ring shall be placed to the level of outside ground. It must have a height of 1.4cm to 2.6 cm from the inside floor of the circle and 6mm thickness.

Shot

The shot is made from solid Iron, brass or other hard metal. The men's shot weight is 7.26 kg with a diameter between 110-130mm. The women's shot is of 4kg with a diameter between 95-110mm. The shot should be spherical in shape with smooth surface.

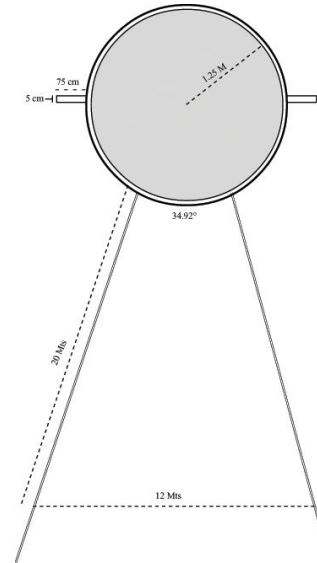
Stop Board

A curved piece of wood 10 cm thick affixed to the front of the shot put circle. When throwing, the shot putter braces his foot against the stop board to avoid falling forwards out of the circle.

(88)

f) DISCUS CIRCLE

Discus



The discus is made of wood, or other suitable material, with a rounded metal rim. The cross section of the edge shall be rounded in a circle of 6mm radius. The thickness of the rim should be at least 12m. The diameter of men's discus shall be between 219-212 mm and its weight should be 2 kg. The diameter of women's discus shall be between 180-182 mm and weight 1kg. The diameter of metal plate or flat centre area should be between 50-57mm.

(89)

a) Track Events

The judges shall decide the order in which the competition finish and if they cannot arrive at a decision shall refer the matter to the Referee, who shall decide.

Dead Heat

If there is a tie for the first place in any track event, the event shall be held after to giving adequate rest. And if it is not possible to conduct event once again due to time factor, the tied competitions shall be awarded first place jointly. This method is known as "dead heat". If tie remains for any other place, the result will stand. Rerace shall not be held to decide the second, third and other place.

Note: If photo finish facilities is available, the positions may be decided, easily.

b) Distance events

When there is a tie for any place, it shall be solved by seeing the second best performance and it necessary third, fourth best, etc. If tie still remains and concerns first place, the tied competitors will complete again in the some order in a new attempt until the tie is result. For remaining places the result will stand. That means same place shall be given to the field competitors.

Height events

When there is a tie for any place in high jump and pole vault it shall be solved by using two rules in order as following

- i) The tie competitor with lowest number of failures at the field height (last cleared height) shall be given higher place.
- ii) If tie shall remain; the competitor with lowest total number of failures throughout the competition shall be given higher place.

If the tie still remains and if it concerns the first place, the field competitors shall be given one more jump at the height where the competition is stopped (height which is immediate next to the field height), and if no decision is reached, the bar shall be raised or lowered 2cm for high jump and 5cm for pole vault. The competitors are allowed only one attempt at each height until the tie is decided. The best performance achieved during jump, if any, shall also be considered.

If the tie concerns any other place, the tied competitors shall be awarded the same place in the competition.

Note: If the same place is given, the immediate next place shall not be awarded to any competitors.

competitors shall be placed in the order in which any part of their bodies (i.e. torso, as distinguished from the heads neck, arms, legs, hands or feet) reaches the vertical plane of the nearer edge of the finish line.

B. MIDDLE DISTANCE RUNNING

Distance running can be split into two groups, Middle distance and Long distance. For middle distance running the athlete needs to both speed and stamina. For long distance running, stamina is the most important thing. Stamina means building up our body so that it can be last the race distance, but at race speed.

Middle Distance Events

1. 800 mts
2. 1500 mts
3. 3000 mts

The middle distance runner must apply his effort correctly throughout the race; this can be achieved only by a knowledge of pace and tactics.

The events which fall into the middle distance category range from 800m to 3000m. With the relentless advance in performance in athletics the 800 meter race now attracts athletes who in the past would have been sprinters. His running style is a model of mechanical efficiency, and even

UNIT - I

INTRODUCTION

A. Meaning of Athletics

Athletics comprise of a wide range of skills and can be divided in two broad categories of track and field events. Track events include sprint races, middle distance races, long distance races, relays and hurdles. The field events are those which are being played either inside or outside the track area or outside the stadium, which include throwing events and jumping events.

The track events include races of 100m, 200m, 400m, 800m, 1500m, 5000, 10000m, and relay races of 4x100m, 4x400m in both men and women categories. In all races shorter than 800m the competitors have to run the length in their respective lanes. The competitors of relay races are required to carry a baton and pass over the same to his/her partner within the take over zone. The starting points are arranged in such false a way that distance from start to finish is same for each competitor. In case of two false starts, the athletes declared disqualified. The competitor who jostles, runs across, or obstructs other competitor(s) can also be disqualified. Timings of competitors are recorded by the official time keeper from stop watches or through electronic time keeping equipment. The hurdle events include 110m and 400m for men and 100m and 400m for women. The competitors are required to jump over specified number of hurdles, which are made of metal with

a wooden top bar. The steeplechase hurdle event comprises of 28 hurdle jumps and 7 water jumps spread over a 3000m run-way.

The throwing events include throw of shot-put, javelin, discus and hammer. Each competitor generally gets six trials and the winner is decided on the best distance covered in any one of his six trials. The Jumping events comprise of High Jump, Pole Vault, Long Jump and Triple Jump. In the first two events, athletes are required to jump over a crossbar. In Triple jump the competitors are required to complete a hop, step and Jump sequence. Winner of jumping event is decided based on the distance measured between the take-off line and the nearest break in the landing area lead by the competitor's body part.

A standard international track is 400 mts in circumference. It has 8 lanes and the width of each lane is 1.22 mts. Track and field events include Sprints, Middle distance running, Long distances race, Hurdles, Steeple Chase, Relay races, throwing events and jumping events. Track and field events are conducted by International Association of Athletic Federation (**IAAF**).

Athletics

The term "Athletics" is derived from the Greek word "Athlon" which means a contest. The word "Athlete" denotes a person who takes part in contests which involve physical activity. "Athletics" is the oldest forms of the organized sport contested between individuals and or teams.

3. Run through

A forward dip during the last stride before the finish line is the most commonly used technique.

Photo Finish Camera

It is impossible for the naked eye to be able to determine accurately the finishing sequence of runners for in a blanket finish. The problem has been solved by photo-finish cameras. A photo-finish camera has very narrow slit lens which photograph an area of the finish line not more than 5-10cm across. It uses a continuous strip of film that moves across the lens at a speed proportionate to the speed of athletes and records the arrival of each competitor at the finish line. The space between each athlete shown in the film exhibits the time elapsed between the arrivals of each of them at the finish line. Photo – finish camera also doubles up as an electronic timing device, recording finishing timings of athletes up to one hundredth of a second. The camera gives a developed photograph that gives positions of athletes and time when their torso reached the finish line.

FINISH POSTS

Except where their use may interfere with the photo finish equipment, two white posts may be placed along the prolongation of the finish line at least 0.30 mts from the edge of the track. They should be of rigid construction and approximately 1.40m high, 8 cm wide and 2 cm thick. The

the foot to push against at the start of the race. The foot plates shall be slopped to suit the starting position of the athlete and can be either flat or slightly concave. To monitor the false starts the blocks can be connected with a devise. The blocks can be used up to and including 400 meters (including the first) leg of the 4x200m and 4x400m).

TYPES OF FINISHING

The finish line should be 5cm in width drawn across the track at right angles to the inner edge. Two white posts of rigid material (80mm in width and 20mm in thickness) shall be placed at a 30cm distance from the edge of the track. Competitors are place in the order in which any part of their torso (as distinguished from the head, neck, arms, legs, hands, or feet) reaches the vertical plane of the edge of the finish line nearest to the star.

Technique

There are three finishing technique used particularly during the sprint events. They are as follows.

1. Lunge finish

The torso reached the finish line first, i.e. leaning torso forward.

2. Diagonal finish (or) Shoulder Shrug

At the finish line crossing it by making the shoulder in diagonal, towards midline of the finish line. It is more difficult type.

B. IAAF

The IAAF (International Association of Athletic Federation) is the supreme governing body controlling international athletics throughout the word. It was founded in Stockholm on July 17th, 1912, to draw up and enforce rules and regulations and a common amateur definition, and to recognize world records, The IAAF now promotes its own World Champions in track and field every four years, with annual World Cross- Country Champions for men and women every march.

IAAF- Structure and Functions

In 1912, two days after the Olympic games a congress was held in Stockholm for the formation of an International Association of Athletic Federation. Seventeen countries were attended the historic meeting. The meeting was urged the Athletics to develop and promote international competitions and the Olympic games. The meeting was also urged the importance of having universal code of rules and regulation and a common definition for Amateur and also an athletic register of world and Olympic records.

One year later in 1963 at Berlin the congress once again met and accepted the first constitution and 34 nations figured on the most membership list. J.Sigfrid Edstrom (Sweden) was elected as first president and Kristvan Hailstorm as honorary secretary. The technical rules for International and domestic competition were framed and presented for approval in 1914 at the third congress in France.

In 1946 the IAAF Head Quarters moved from Stockholm to London. Over the years, the IAAF grew into a huge and dynamic organization as the world governing body of track and field athletics, road running, race walking and cross country. The congress decided to move the head quarters once again from London to Morte Carlo in 1993. The Steady growth of the Federation accelerated in the last decades. By 1997 member countries in addition numbered 209. The IAAF council comprising of 27 members from various countries.

AFI (Athletic Federation of India)

Athletics in its present form was born in our country during past decade of 19th century. Nothing much is known of its early stages till first known participation of Norman G.Pitchard in 2nd Olympic games in 1900 at Paris, where he won a Silver medal in 200mts run. The Indian Olympic Association (IOA) was formed in 1926 and its control athletics. But India unofficially participated in the 1920 and 1924 Olympic games under the leadership of H.C.Buck of Y.M.C.A Madras. The official participation of Indian athletes started in the 1928 Olympic games at Amsterdam till 1936 Berlin Olympics. India participated in the Olympics under the IOA BANNER. Then 1940 and 1944 Olympic Games were not conducted because of second World War.

Structure and Functions

Amateur Athletic Federation of India was formed in 1946 at the initiative of Maharaja Yadindra Singh then

in a natural relaxed position. An angle of about 90° at the front knee and of about 110° to 130° at the rear knee will be appropriate.

(iii) The Long Start (or) Elongated Start

The front starting block is situated 3 foot lengths from the starting line and there is one foot length between the starting blocks. The angle of rear leg about 110°. The long starting position is certainly the most difficult one. It should be applied carefully. Any athletes find this position rather ineffective. The long start, although still known, is hardly used nowadays.

For good starts a sprinter must,

- a) push back against the blocks
- b) moving the hands and arms as quickly as possible in reaction to the gun.
- c) move the hips quickly from the starting position to running position.
- d) run out of the blocks, do not jump.

STARTING BLOCKS

The starting blocks should be made of rigid material. It should be adjustable, but must be without springs. The blocks are fixed to the track, so that it provide firm base for

'On your marks' – position – his body weight resting comfortably on the legs in the crouch position. The hands are shoulder width apart to touch the ground behind the starting line with fingers and thumb pointing away from each other. The eyes are focused downward and forward.

Set position

The block settings should result, the athletes having a 90° angle at the front knee and 110° to 120° angle in the back of the knee. That gives a set position with the hips just slightly higher than shoulders slightly forward. The hands are placed just slightly wider than shoulder width apart, with the fingers and thumbs in a **"high bridge"** position. The shoulders are above and slightly ahead of the hands, the arms are straight, but not locked. He should feel pressure against rear block in the set position since the center of gravity is located high, the first strides are shorter and less powerful.

(ii) The Middle Start (or) Medium Start.

The front starting block is located two foot lengths (21 inches) from the starting line and the rear starting block is one foot length further. Kneel down with the right knee against the instep or toe of the left foot, and keep the trunk erect. The angle for the rear leg is about 130°. The slope of the body from the hips to the shoulders is not very steep. The body weight is on the legs and arms. The head remains

president of IOA with prof.G.D.Sondhi as its first president. The AAFI got affiliated to IAAF in the year 1946. The AAFI for the first time selected 8 athletes who participated in 1948 Olympic games at London. Indian women competed in the Olympic games for the first time in 1948.

Mr.M.C.Dhawn was elected by secretary of AAFI in 1950 and was the technical secretary in the first Asian games held at New Delhi in 1951. Raja Bhalendra Singh become the president of AAFI in 1952 and continued of guide athletic till 1968 along with Mr.M.C.Dhawn. This team acted a yeoman service to athletics in India and strengthened the AAFI to make it the leading federation. The federation produced by group competitors open national championship, Zonal and Inter Zonal Competition.

Many distinguished personalities are acted as president and secretary of AAFI till 1987 from 1988 to till date Mr.Suresh Kalmadi and Mr.Lalit K.Bhanot formed the new team of president and secretary respectively. The main function of AAFI is to prepare a year long sports calendar at the state and national level. They are sending teams to international level competitions based on merit.

D. AGE GROUPS

Under the Jurisdiction of the IAAF is split into five age groups.

1. Men and women there is no age limit
2. Seniors - 19 Years
3. Juniors - 17 and 18 Years
4. Youths - 15 and 16 Years
5. Boys - 13 and 14 Years

UNIT - II

TRACK EVENTS

Athletics is great fun and people of all ages, can enjoy it. Athletic activities can be traced back of the ancient Greeks, who used to take part in games of running, jumping and throwing. Track events include sprint races, middle distance races, long distance races, relays and hurdles.

The track events include races of 100m, 200m, 400m, 800m, 1500m, 5000, 10000m, and relay races of 4x100m, 4x400m in both men and women categories. In the track events all races are run with the competitor's left hand side of the track and finish in the same position. The competitors are required to wear their numbers on their vests.

A. SPRINT EVENTS

Sprints

"To cover the distance in the shortest time with maximum speed"

A. Sprint Events

1. 100 mts
2. 200 mts
3. 400 mts

1. Bunch start (or) Bullet start
2. Medium start
3. Elongated start

Three types of foot spacing bullet, medium and elongated starts. Each sprinter will have his own particular measurements so the following procedure is suggested to enable him to get into a correct starting position.

Block placement

The three block placement positions are determined by the location of the blocks relative to the starting line.

(i) The Bunch or Bullet Start

Stand with the right toe beside the rear of the left heel. Kneel down with trunk erect and rock forward in the same way. In this starting position the starting blocks are close to the starting line. The front block should be placed one foot length (16 inches) from the starting line, with 11 inches between the blocks results in low velocity and fast block clearance Track events, up to and including 400 meters, run at full speed for the entire race distance. Sprinter press their feet against two blocks, which are spaced apart and connected to a shaft, to improve their initial movement. The main features to look for in the sprinter's highly distinctive running action are the high knee-lift, the long strides, the thrusting arm action and the controlled breathing.

should immediately rise to final starting position retaining the contact of the hands with the ground and of the feet with the foot plates of the blocks.

A competitor shall not touch either the starting line or the ground in front of it with his hands or his feet on his marks. The three starting positions are measured from the starting line to the front leg of the starting block. Starting is the first stages in all the running events, should be conducted either track or road. There are only two types of starting should be followed by the athletes.

1. Crouch start
2. Arc start (Standing start)

CROUCH START

Crouch start can be used by the athletes those who are run up to and including 400mts and even the first runner of 4 x 100mts Relay and 4 x 400mts Relay.

In crouch start the following commands to be used,

1. On your mark
2. Set
3. The gun fire or clapping with clap board

It has three (divisions) method should be used according to the height of the individuals.

Sprinter

There is no ideal shape or size for the sprinter. He must, however, be well built and have good all-round muscular development and a quick reaction time. Regular, even and relaxed arm action must be learned first. The legs follow the arms, and the faster the arms are moved the faster the leg action will become. In the arm action emphasis should be on a forward and upward motion.

Most important factors for sprinting

1. Reaction time
2. Starting position
3. Powerful Muscles
4. Acceleration Technique.
5. Effective stride length
6. Curve running technique (200 mts, and 400 mts).
7. Technique at the finish line.
8. The condition of the Track surface
9. Wind and Weather conditions.

Stride Length

“It is the distance between touchdown of the toe of one foot and the touchdown of the toe of the other foot”. Stride length may and usually will be vary from left to right

or right to left on individual at the same velocity. This variance may be influenced by dominance, weakness, injuries and even leg length. Stride length will be vary with the speed of running and during the various phases of a race.

Stride Cadence or Stride frequency

"It is the number of strides per second". The stride cadence for sprinters is 4.5 to 10 strides per second with little difference found between the strides. The method of determining stride rate is to divide the number of strides in a race by the elapsed time for the race.

STARTING

There are varieties of running events for which the track is used . The finishing line for all races must be the same. But the starting line of all the races cannot be the same. It will vary from race to race. While 100mts race, 100mts hurdles and 110mts, hurdles races have to be run in straight courses, appropriate distance shall be measured backward from the beginning of home stretch and starting lines are marked. The extended lines are broken.

The start and finish of a race shall each be denoted by a white line 5 cm wide. The distance of the race shall be measured from the edge of the starting line farther from the finish, to the edge of the finish line nearer to the start.

All races shall be started by the report of the starter's gun or approved starting apparatus fixed upwards after he has ascertained that competitors are steady and in the correct starting position.

At all international sports competitions meetings, the commands of the starter in his own language shall, in races up to and including 400m be "on your marks", "set", and when all competitors are "set" the gun shall be fired, or approved starting apparatus activated.

In races longer than 400m, the commands shall be, "on your marks" and when all competitors are steady, the gun shall be fired, or approved starting apparatus activated. A competitors shall not touch the ground with his hands.

In all races up to and including 400m, and 4 x 100 mts Relay, 4 x 400mts relay first runner a crouch start and the use of starting blocks are compulsory. In competition held under IAAF, competitors must use starting blocks provided by the organizers of the meet. In other meet on all weather tracks, the organizers may insist that only starting blocks provided by them may be used. After the "on your marks" command, the competitor shall approach the starting line, assume a position completely within his allocated lane and behind the starting line. Both hands and one knee shall be in contact with the ground and both feet, in contact with the starting blocks. At the "set" command, the competitor

decreases. A study of the body movements involved in these activities pinpoints the causes. In normal walking and running the knee of the supporting leg is bent as it passes through the vertical position (i.e. when the centre of mass passes vertically over the foot), but in race walking the knee of this leg is straight in the vertical position. The technique is such a way that race walking does not become a modified run. Briefly, contact with the ground must be maintained at all times, a heel-and-toe action must be used, and the supporting leg must be straight at the knee as it passes through the vertical position.

Judging a fast walk is an extremely difficult skill, since it is almost impossible to see whether a walker has a foot on the ground at all times or that the knee is straight through the vertical for it takes only a fraction of a second to pass through the position. Race walking is not a natural skill as normal walking and running are, because the latter are the locomotion skills learnt from very early childhood.

As in most other athlete events, flexibility is an asset and hip mobility especially is an important factor in stride length in normal walking in which the line through the hip of the forward swinging leg is allowed to twist forward with the leg, the stride length is increased considerably. Stride length is also maximized, if the feet move along a straight line.

in the later stages of a race when fatigue is sapping his strength his skill does not break down.

C.LONG DISTANCE EVENTS

1. 5000 mts
2. 10000 mts
3. Marathon

The three main long distance events are 5,000m 10,000m and the marathon. Stamina is the basic quality needed by a long-distance runner, but speed has also become an essential requirement for would-be world beaters.

However, in the long distance the steady pacer must beware of the fast finisher who sits on his shoulder, until the final run-in. the steady runner without an equivalent fast finish must attempt to put himself far enough ahead of the sprint finishers by either a punishing pace throughout the race or by putting in bursts of speed during several laps from the finish. There is nothing more motivating for the training runner than to see his rival a few strides in front of him, but also nothing more demoralizing than for his rival to be 20 meters or more in front.

D.HURDLES – VARIOUS STAGES

MEANING

Running over the barriers (or) obstacles are known as Hurdles. The Hurdle race should be conducted for men and

women, senior boys and senior girls in various height and distance. Every hurdle race is based on certain conditions laid down in the rules of the International Association of Athletic Federation (IAAF).

The hurdles are made of steel with wooden top bar. The height of hurdles can be adjusted as per the length of the race and sex of the athlete. The hurdles are made in such a way that when force of 3.6-4kg. is being applied to the centre of the top, it should overturn automatically. The height required for, men's 110m race is 106.7 cm. The women's 100m sprint hurdles are 84 cm in height. In 400 m race the men's hurdle is 91.4 cm high and women's is 76.2 cm. The length of the wood used for the top bar should be 1.20m and width at least 7cm. The top bar should be striped in black or white or in some other contrasting colors.

The following are the standard distances, it can be classified into two categories,

- Men - 110 & 400 mts
- Women - 100 & 400 mts

Distance of Hurdles	Category	Height of the Hurdles	Distance Start to first Hurdle	Distance Between the Hurdles	Distance Last Hurdle to Finish
100mts	Women	0.840mts	13mts	8.50mts	10.50mts
110mts	Men	1.067mts	13.72mts	9.14mts	14.02mts
400mts	Men	0.914mts	45mts	35mts	40mts
400mts	Women	0.762mts	45mts	35mts	40mts

Substitution

Once a relay team has participated in a competition only two additional athletes may be used as substitutes in the composition of the team for subsequent rounds. Once an athlete, who has participated in a previous round has been replaced by a substitute, he may not return to the team.

RELAY BATON

The relay baton is made of a rigid material. It should be a single piece of smooth, circular and hollow tube of 280-300 mm length. The minimum weight required for baton is 50 grams and its circumference should be between 120-130mm. The batons should be colored so that it can be easily visible during the race.

Specification

- Weight of the baton : not less than 50 gm
- Length of the baton : 28 to 30 cm
- Circumference of the baton : 10 cm
- Color of the baton : Visible color
- Minimum baton required : 6 Nos.
- Maximum baton required : 8 Nos.

D. WALKING

Race walking may appear to be the natural link between ordinary walking and running, and in some respects this is true-with increase in speed, the force-time

runner only. The baton should not be exchanged within the acceleration zone(Advance Zone).

During the exchange the baton must be delivered firmly and safely into the hands of the receiving runner. When the incoming runner has approached his partner within 2 to 3 mts he indicated to him by a signal when to extend his receiving arm backwards. The signal comes too early or too late, or the runner receiving the baton moves his arm up, down or to the side, the results in an unsteady baton pass and consequently in a loss of time. The baton should be put firmly into the grasping hand between the spread thumb and the four locked fingers.

2. 4 x 400 mts Relay

The runners use a visual pass. The incoming runner carries the baton in the right hand and passes to the outgoing runner's left hand. The primary responsibility for the pass rests on the outgoing runner due to fatigue on the part of the passer. Once the baton has been taken, the athlete immediately transfer it to the other hand.

The four athletes shall run 400mts each to cover 1600mts distance by means exchanging a baton. The first leg of the 4x 400 mts relay run in lanes and so is the first curve of the second leg; only after crossing the line making the exit from the first curve, runners free to move to the inside of the track.

110mts Hurdles

There shall be Ten flights of hurdles in each lane, set out in accordance with the below table.

Starting line to First Hurdle	:	=13.72mts
" "	Second Hurdle	: 13.72+9.14 =22.86mts
" "	Third Hurdle	: 22.86+9.14 =32.00mts
" "	Fourth Hurdle	: 32.00+9.14 =41.14mts
" "	Fifth Hurdle	: 41.14+9.14 =50.28mts
" "	Sixth Hurdle	: 50.28+9.14 =59.42mts
" "	Seventh Hurdle	: 59.42+9.14 =68.56mts
" "	Eight Hurdle	: 68.56+9.14 =77.70mts
" "	Ninth Hurdle	: 77.50+9.14 =86.84mts
" "	Tenth Hurdle	: 86.84+9.14 =95.98mts
" "	Finishing line	: 95.98+9.14=110mts

VARIOUS STAGES

110mts Hurdles the Hurdling Technique is classified into the following:

1. Starting
2. Approach to the First Hurdle
3. Hurdle Clearance (Departure)

4. Running between the hurdles
5. The finish

1.Starting

Hurdling is basically a sprinting event, the mechanics of the starting do not vary much from that of the sprint start. In order to get eight (8) strides to the first hurdle to take – off foot should be placed in the first block. If the hurdler wants seven (7) strides to the first hurdle, take – off foot should be placed in the rear block.

2. Approach to the First Hurdle

The distance from the starting line to the first hurdle is 13.72 mts. The first three strides out of the blocks are the same as in a sprinter’s start. On the fourth stride, the hurdler begins to concentrate on the first hurdle. In perfecting the approach to the first hurdle make any adjustments on the 4th, 5th and 6th strides. The first three and last two should be kept constant. The last stride is slightly shorter to permit to get his centre of gravity slightly ahead of the take-off foot. This approach sets the pattern for the entire race.

3. Hurdle clearance

The take – off distance from the hurdle depends on four factors. The height of the athlete, speed of the approach length of the lead leg speed of the lead leg action. Each

The baton must be carried by hand throughout the race, if dropped, it must be recovered by the athlete who dropped it. He may leave his own lane to retrieve the baton provided this procedure is adopted and no other athlete is impeded, dropping the baton shall not result in disqualification.

Stages of Relay Running

The start

The starting of the 4 x 100 mts Relay is basically same as for the 400 mts. The starting blocks are placed close to the outer line of the track. The baton lies between the forefinger and the thumb is enclosed by the other fingers. After a successful start the runner quickly passes to the inside of his lane.

Checkmarks

The second, third and fourth runners place a checkmarks on their lanes just behind their starting positions. This is a check mark for the out going runner. The distance between the checkmark and the starting position depends on the speed of the incoming runner and on the acceleration of the outgoing runner.

The Baton exchange

The relay baton should be exchanged from one to another competitor with in the take over zone. The exchange is completed when the baton is in the hand of the receiving

when hearing the signal from the incoming runner moves the appropriate arm backwards in a positive and slightly angled manner to a level not higher than the shoulder line. The upper arm is straight at the elbow, the back of the hand is facing down wards the thumb and index fingers are widely spaced forming obtuse angle. The baton is received into such a palm from the incoming runner with an outstretched arm. In the final phase of the change over the elbow joint locks quickly and the baton is passed in a down sweep action.

The best result in both techniques the change over should occur when both runners are traveling at maximum speed and the actual change over should be as quick as possible. The majority of experts consider that the speediest change over occurs when the baton is actually changed over a distance of 2 to 4 mts from the end of the exchange zone.

Acceleration Zone

The acceleration zone lets the outgoing runner accelerate properly and allows the athletes more time to reach top speed at the exchange.

Exchange Zone or Take over Zone

The incoming runner can signals the exchange with verbal commands at a specific point when the incoming runner ready to pass the baton. The incoming runners can also use nonverbal signals. The outgoing runner can count the incoming runner's stride from the check mark to the exchange point.

hurdler must be cleared quickly and safely. The first prerequisite of movements much as in the ordinary running stride. For this action the lead leg is slightly flexed at the knee joint, and leading foot to track beyond the hurdle.

The average take-off distance from the hurdle in men's hurdles will be 1.90 mts to 2.20 mts to allow the leading leg to sweep forward and upward in a straight line. Too short a distance for the take-off results in a "jump" over the hurdle. The hurdle clearance are having the following factors.

Action of the Leading leg

The complete action consists of a quick forward and upward thrust of the leading leg in the direction of the leading of introduces the sequences.

Once the take-off foot leaves the track it becomes the trail leg. The heel of the trail leg moves actively toward the buttocks as the knee moves in a exaggerated motion upward and to the side to avoid hitting the hurdle. For the clearance of the hurdle, the trailing leg must be stretched away from the body when clearing the hurdle. This movement requires good mobility of the hip. The sequence of the athlete's movements should be as follows: after a rigorous push from the ground follows a phase of relaxation for the take-off leg. An action forward movement of the high should begin only when the foot of the leading leg has reached the edge of the hurdle.

Action of the Arms

The usual movements during running are also executed during hurdle clearance. With the sole difference that in the hurdle stride the arms perform additional functions. The arms contribute in a greater degree to maintaining body balance. When the trailing leg comes forward, the trailing arm swings backward to counter balance this movement. It is either almost stretched or flexed at the elbow.

4. Running between the hurdles (The three-step Rhythm)

In the 110 mts hurdle run the distance between the hurdles is 9.14 mts. If we reduce from the length of the hurdle stride, there remains for three strides between the hurdles or three-step rhythm a distance of about 5.065 meters. So that is 1.88 mts for each step. But practice shows clearly that the three steps are not of equal length. The first stride after the landing which is of about 1.55 to 1.60 mts follows a wide second stride measuring 2.00 to 2.20 meters and this is the longest between the hurdles. The last stride before the hurdle is always slightly shorter than the previous one.

5. Finish

The athlete has to use any one technique similar to sprint to finish the race.

Baton Exchange

There are two methods of baton (Exchange) passing

1. Up sweep method
2. Down sweep method

1. The up sweep method

In this method the passing of the baton occurs in an upward movement by a straight arm. At the same time the baton is received by an arm which is pointing backward and locked at the elbow. The outgoing runner upon hearing the agreed signal from the incoming runner, quickly extends his arm backwards locking it at the elbow, the thumb and fingers are separated and pointing downwards forming an obtuse angle. The time that he receives the baton the outgoing runner tries to keep his arm as still as possible. This outstretched arm the incoming runner quickly moves his straight arm upwards and in such a way that the outgoing runner can grasp the baton as near to the incoming runner's palm as is possible. In the upsweep method the baton is passed from the right hand to the left hand and then the left hand passing it to the right.

2. Down sweep method

In the down sweep method the baton – exchange takes place over a distance of 2 to 3 mts. The out-going runner

2. The baton must be passed inside a short distance to be covered by some three to four strides and without unnecessary loss of time.
3. The baton must be exchanged by non – visual method.

Visual Method

The visual method of baton exchange is used only in 4x400 mts relay. When the out going runner receive the baton, he must see the incoming runner while receiving the baton. The incoming runner gripping the baton at its base, then passes the baton into the receiver hand with a forward down sweep motion. The outgoing runner reaches arm straight back, palm facing upward and takes the baton, gripping the upper portion.

Non Visual Method

The non-visual method of baton exchange is used only in 4x400 mts relay. When the out going runner receive the baton, he doesn't to see the incoming runner while receiving the baton. The incoming runner gripping the baton at its base, incoming alerts the receiver, then passes the baton into his or her hand with a forward pushing, down sweep motion. The outgoing runner reaches arm back, palm facing upward and takes the baton, gripping the upper portion. then rotates the receiving arm down, under and forward, to ready the baton for the next exchange.

400 mts Hurdles

Hurdling is a sprinting, rhythmic event. In this race a full circuit of the track is run with 10 hurdles, 91.4 cm high, placed 35 mts apart. The distance from the starting to the first hurdle is 45 mts, while the last hurdle to the finish line measures 40 mts. There are ten flights of hurdles in each lane, set out in accordance with the below table.

Placement of Hurdles in 100mts Hurdle race

Starting line to First Hurdle	:	=13.00mts
" "	Second Hurdle	: 13+8.50 =21.50mts
" "	Third Hurdle	: 21.5+8.50=30.00mts
" "	Fourth Hurdle	: 30+8.50 =38.50mts
" "	Fifth Hurdle	: 38.5+8.50=47.00mts
" "	Sixth Hurdle	: 47+8.50 =55.50mts
" "	Seventh Hurdle	: 55.5+8.50 =64.00mts
" "	Eight Hurdle	: 64 +8.50 =72.50mts
" "	Ninth Hurdle	: 72.5+8.50=81.00mts
" "	Tenth Hurdle	: 81+8.50 =89.50mts
" "	Finishing line	: 89.5+10.5=100mts

Placement of 400mts Hurdles in Standard Track

(Men and Women)

Starting line to First Hurdle	:	=45.00mts
" "	Second Hurdle	: 45+35 =80mts
" "	Third Hurdle	: 80+35=115mts

"	"	Fourth Hurdle :115+35=150mts
"	"	Fifth Hurdle : 50+35=185mts
"	"	Sixth Hurdle : 185+35=220mts
"	"	Seventh Hurdle : 220+35=255mts
"	"	Eight Hurdle : 255 +35=290mts
"	"	Ninth Hurdle : 290+35=325mts
"	"	Tenth Hurdle : 325 +35=360mts
"	"	Finishing line: 360+40=400mts

E. RELAY

There are two relay events comprising of 4x100m for men and women, and 4x400m for men and women. All the four members of a team are required to run one stage of the race along with the relay baton in their hands throughout the race. The baton must be picked up by the athlete who dropped it. He/She may leave the lane in order to retrieve the baton, provided no other player is impeded.

4x100m relay races are run entirely in respective lanes with staggered starts. In 4x400m relay races the first lap and the same part, of the track, of the second lap shall be run in lanes. The position of the teams at the start shall be retained at each take-over zone, except in case of races where lanes are not used. The waiting runners can move to inside zone, after handing over the baton, until the course is clear to avoid obstruction to other competitors.

Relay races are a popular and exciting feature of track and field. It is a team event in an individual oriented sport. They give the opportunity for team work and cooperation is not available in the other events. The key to good relay racing is the baton exchange. Commonly the relay events are as mentioned below,

1. 4 x 100 mts
2. 4 x 400 mts

1. 4 x 100 mts Relay

The 4 x 100 relay is undoubtedly the most beautiful and one of the most difficult events of the athletics spectrum. This relay uses four sprinters running a complete lap of the track, passing on a baton which has to arrive at the finish line with the runner of the last leg.

The main objective in the baton pass is to keep the baton moving at top speed throughout the relay. The baton must be passed only within a 20 meters take-over zone (exchange zone). This zone begins 10 mts before the scratch line (100 mts marking) and ends 10 mts after it. A good baton-exchange needs to satisfy the following three conditions.

1. The baton-exchange must take place after some 12 to 16 mts running, measured from the beginning of the take-over zone.

forward and upward. Then he goes upward the body position is in vertical (or) hanging and elbows are flexed.

5. Clearing the bar

When the body is in hanging position lift and swings upward both the legs, at the same time the pole straightened, turn the upside down. Then pushing the pole down by hands the legs are throw over the cross bar. After clearing the cross bar push the pole away from the pit with the wrist action to avoid foul or touching the bar.

6. Landing

Safe landing is required on the landing area.

B.THROWING EVENTS

General conditions

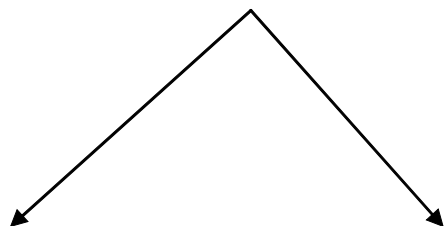
The person who has more body weight and mass of the muscles can choose throwing events. The following qualities are essential for throwers.

1. Body weight
2. Height
3. Leg power
4. Shoulder strength
5. Flexibility
6. Co-ordination
7. Speed

Race walking, of course, involves a rapid leg cadence and if the arms too are no maintain their synchronous swings they have to be bent at the elbows to reduce their moments of inertia, as in running. However, more emphasis is placed on the arm and shoulder action in race walking than in running, because of the need to counterbalancing the exaggerated eccentric thrust of the legs and movements of the hips. But in addition to counterbalancing the leg action, they also aid the forward drive with their swinging the strong upward swing of both arms evokes extra forces from the ground through the driving leg.

UNIT- III

FIELD EVENTS



DISTANCE EVENTS

1. Long Jump
2. Triple Jump
3. Shot Put
4. Discus
5. Javelin
6. Hammer

HEIGHT EVENTS

1. High Jump
2. Pole Vault

A. JUMPING EVENTS

1. LONG JUMP

The following techniques should involve while doing long jump.

1. Approach run
2. Penultimate stride
3. Take – off

1. Grip

Athletes who take off with the left foot, the pole must be carried on the right hand side, the left arm, half bent, supports the pole with the palm of the same hand turned downwards, while the right arm grips about 60-70cm higher with the hand lightly turned out. Keep the pole straight near the cross bar on the uprights. Hold the pole slightly lower than the height of the cross bar. Keep the pole parallel to the ground pointing to the pit or above the right hand palm facing upward and with left hand palm facing down ward.

2. Carry the Pole

The pole should be raised at 50° or 45° to the ground and keep right side. The left hand should be kept flexed at chest level and the right hand at the back. While carrying the pole, the body balance is very important.

3. Approach run

20 to 30 mts away from the vaulting box to start the running with the pole steadily and high knee action. When you reach the check mark, plant the pole in the vaulting box and kick the floor to go up.

4. Planting the pole

When the competitor reaches the check mark he should plant the pole into the box. Join the left hand with the right hand, push the right shoulder and both the hands

(iii) Supports for the cross bar

The cross bar shall rest on pegs pointing in the direction towards the landing area. The supports shall extend not more than 5.5 cm and not more than 1.3 cm in diameter, which should extend 35 – 40 mm above the pegs.

The distance between supports is minimum of 4.30 meters and maximum of 4.37 meters.

(iv) End Pieces of Cross Bar

It shall have 30 mm to 35 mm in diameter, square the length of the end piece is between 15 cm to 20 cm and should be semi circular.

(v) Landing (Pit) Area

The minimum dimensions of the landing area is 5 x 5 meters, for international competitions the length, width and height of the landing area will be 7 x 6 meters. The front pieces must be 2 m long.

VARIOUS STAGES

1. Grip
2. Carry the pole
3. Approach run
4. Planting
5. Crossing the bar
6. Landing

4. Flight in the air
5. Landing

1. Approach run

The length of the un-up is determined by the height of the jumper and his ability to accelerate in the run. According to analyzes carried out at recent Olympic Games, the best athletes use a run-up from 37-50m in length (incase for women 33-40). The athlete should mark the starting check mark 14 to 16 strides from the take – off board. If the athlete who is taking off with left leg, he should start running with right leg. Then he starts the approach run steadily and gradually increase the speed towards the take – off board.

2. Penultimate stride

The last two strides before the take off is called penultimate stride. In this time, the athlete shrugs his body little downward and the length of the stride decreases. That is easy way to fly in the air.

3. Take – off

The length of the jump depends not only on horizontal speed but also on the speed and power of the take-off. After completion of Approach run (penultimate stride), step on the take off board with the stronger foot and jump up in the air by pushing the take off board. After take off (or) jumping in the air the hands should be vertically raised. The Non-

take off leg should be raised high. The last step is executed more quickly and the whole foot is placed on the board, ahead of the projection of the center of gravity.

Plasticine Indicator (No Jump indicator)

Plasticine indicator is called no jump indicator, it is placed at the inner edge of the Take-off board. The judge at the take off board must watch the competitors does not overstep the scratch line. If a no jump indicator is not available the judge should build one moist sand which will clearly show if it is touched by toe or spike. It is a foul only if contact is made with the ground or the no jump indicator.

4. Flight

Jumping styles vary according to the development of the athlete and his muscular characteristics and the bone structure. The most common techniques are,

1. The Sail (common among beginners)
2. The Hitch kick (1-2-3 strides and a half in the air)
3. Hang (extended jump or glide)

(i) Hitch Kick

After jumping in the air from the take off board the athlete swing (or) rotate their legs like pedaling in cycle in the air into 2 or 3 pedaling style, and the legs are closed together before landing. When legs are pedaling the arms alternatively with legs movement.

4. POLE VAULT

Runway

The minimum length of the runway shall be 40 meters, when the conditions permit it is 45 meters.

1. The width of the runway is 1.22 meters.
2. The runway should be marked by white lines with 5cm as width.

Implements

(i) Upright

Any style of uprights or posts may be used provided they are rigid.

(ii) Cross Bar

It is made up of Fiber glass, Metal or other suitable material.

1. The length of the cross bar is 4.48 mts to 4.52 mts.
2. The maximum weight of the cross bar is 2.25 kg.
3. The circular shape of the cross bar is 30 mm diameter.
4. It should have the gap of maximum 3 mm

3.Fosbury Flop

The Fosbury flop was introduced by Dick Fosbury, who won the high jump at the Mexico Olympics in 1968. His technique for clearing the bar, his run up was also very notable because it was in the form of a semi- circle, and he took off with his foot at an angle of about 20 degree relative to the plane of the uprights. At the point of take – off Dick Fosbury with a vigorous bending action and driving up of the free leg, supported by an alternated movement of the upper limbs, rose completing a rotation on the longitudinal axis of the body and then prepared for flight with his back to the cross-bar.

Next he performed his rotation on the transverse axis of the body and at the extreme point of the parabola, he arched himself and continued his trajectory on this position until, so as not to knock down the cross - bar, he straightened his leg and landed on his back bowing his head on to his trunk so that the impact was taken by the top part of the back, avoiding unpleasant injuries to the cervical part of the spinal column.

4. Landing

Safe landing is required on the landing area.

(ii) Hang style

After the take off the athlete do the back arch the arms should be vertically raised above the head, the legs are straighten back, and before landing brings the legs and arms to extend forward, and the legs are closed together before landing.

5. LANDING

After completion of his style in the air, before landing, the athletes should extend both the legs forward / straightened. While landing both the heels should be landed first on the pit. There are three landing techniques should be used to come out of the landing area. They are as follows.

1. Collapsed landing
2. Swing out landing
3. Scoop landing

1. Collapsed landing

While landing both the heels should be touched first on the pit and then toe, the whole body should brought forward and place the knees on the pit, at the same time the buttocks should be kept back on both the heels.

2. Swing out landing

After landing in the pit the athletes should turn his body 45° either right or left in forward and fall down on the ground with shoulder, first then buttocks and so on.

3. Scoop landing

Landing by heels on the pit and push forcefully the sand and makes a dig and place the buttocks on the dig by extending the legs straight.

The competitor commits fouls if he;

1. Take off beyond the take off line.
2. Delaying more than 60 seconds.
3. After landing walking back towards the run way.
4. Performing acrobatics during the jump.
5. Uses illegal style of jump.

Rules

1. The order in which the competitors make their attempts must be decided by drawing lots.
2. Each competitor will be placed according to his best jump.
3. When there are more than eight competitors, each one is given 3 attempts and the 8 competitors with the best jumps are given further three jumps.
4. In case of a tie for the eight position, each competitor involved in the tie has three additional attempts.
5. When there are eight or less competitors, each one is allowed six trials.

3. Clearing the bar

1.The scissors

Towards the end of the 19th century, an American named Mike Sweeny proposed the scissors jump as an alternative to the frontal clearance. The scissors involved passing one leg over after the other at the same time bending the trunk towards the knees when clearing the bar. It consisted of the following movement:

1. While the forward leg was the cross – bar the other one kicked upwards, causing the chest to rotate towards the direction of jumping and a landing on the feet.
2. With the use of this style the world record began to rise this style, the world high-jumpers introduced minor adjustments to the technique according to their physical characteristics and talents.

2.The Straddle

Towards the middle of the 1930s another American Dave Albritton, proposed a radical new technique for clearing the bar, involving the body being parallel to the bar, but with the stomach downwards rather than with the body sideways. Thus the straddle was born, which was clearly demonstrated by the Soviet trainer Vladimir Mihailovic Dyachkov and put to good effect by Valeri Brumel, who took the world record to 2.28m in 1963.

1. Scissors
2. Straddle Roll (or) Belly Roll
3. Fosbury Flop

Various stages

1. Approach run
2. Take – off
3. Crossing the bar/ clearing the bar
4. Landing

1. Approach run

The jumper can approach either from the left side or right side of the cross bar with 25 mts long and medium speed. The angle of approach run and the number of steps vary according to the level of the athlete.

2. Take off

Jumper can stand either right or left one arm away from the cross bar. Then down vertically draw the line that may be considered as take off line. When the jumper start to approach towards crossbar, used his power leg on the take off line for make a jump.

6. Once the competition is under way, competitors are not allowed to use the runway for trail attempts.
7. All jumps must be measured from the nearest mark in the landing area made by any part of the body or limbs of the athlete to the take-off line or its extension and at right angles with the take-off line.
8. If a competitor takes off before the board or the line this does not constitute a foul.

2. TRIPLE JUMP

The triple jump shall consist of a Hop, step and jump in that order. This is the English definition of the jump. The hop must be executed on the same leg which was used for the take off (right-right or left-left). In the step the support is transferred to the other leg. The final jump is a proper long jump.

1. It shall not be considered a failure if the competitor, while jumping, touches the ground, with the “sleeping” leg.
2. There are six stages when taking Triple jump. They are as follows
 - (1) Approach run
 - (2) Take – off
 - (3) Hop

(4) Step

(5) Flight

(6) Landing

1. Approach run

The length of the run-up is determined by the height of the jumper and his ability to accelerate in the run. According to analyzes carried out at recent Olympic Games, the best athletes use a run-up from 37-50m in length (in case for women 33-40). The athlete should mark the starting check mark 14 to 16 strides from the take – off board. If the athlete who are taking off with left leg, he should start running with right leg. Then he start the approach run steadily and gradually increase the speed towards the take – off board.

2. Take – off

The length of the jump depends not only on horizontal speed but also on the speed and power of the take-off. After completion of Approach run (penultimate stride), step on the take off board with the stronger foot and jump up in the air by pushing the take off board. After take off (or) jumping in the air the hands should be vertically raised. The Non-take off leg should raised highly. The last step is executed more quickly and the whole foot is placed on the board, ahead of the projection of the center of gravity.

3. Hopping

The athlete should be used to land on the ground which he was used to take off. For example: The athlete has take off for his left leg means he should land or hop in the same leg. During hopping the non take off leg (or) rear leg has no movement, that's why it is called sleeping leg.

4. Step

After completion of hopping the athlete used to take one more step with his non take – off, foot before landing is called step. Here the athlete does the bounding action to do the step.

5. **Flight** and

6. **Landing** procedures are similar to long jump.

3. HIGH JUMP

The high jump as we know it today first became popular in the 19th century. Subsequent perfecting of the jumping technique took place in the development stages, but it has depended particularly on modification of the rules for the event and on the elimination of some restrictive conditions.

Various techniques should be used by the jumper to cross the bar. Depends upon their ability they used any one of the following techniques.

c) High carry

High carry method is associated with those throwers who tend to use a direct over the shoulder type withdrawal which ends with a turning back of the shoulders at the arm and javelin is reaching near full backward extension (To held on above the head).

A thrower must develop his carry position to suit his technique of withdrawal of the javelin in preparation for the delivery stride.

2. Approach run

During approach run the thrower has to mark the point of starting and the point of check mark with javelin. While running the javelin should move front and back, and slowly increase the running speed still you reach you the check mark.

The Run-up : The run – up has two parts. They are

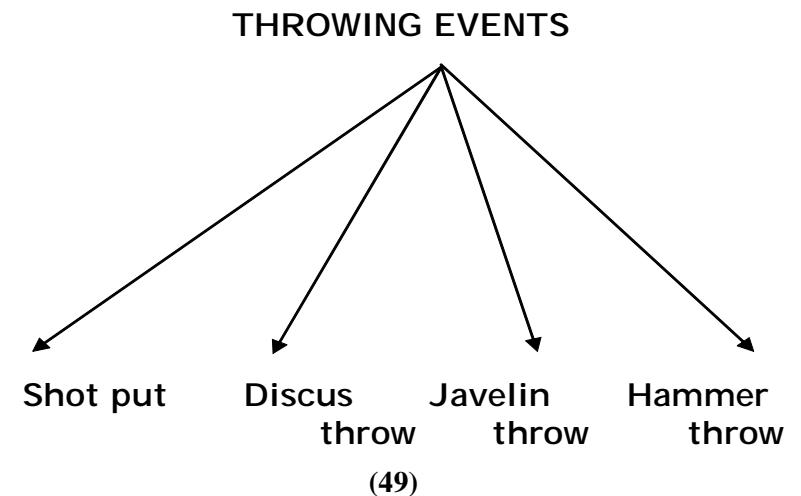
- (i) The cyclic part
- (ii) The acyclic part

The cyclic part speed is built up sufficiently so as to allow for a further increase over the last strides. The run-up should be easy and relaxed, heading the thrower to a powerful explosive all-out release.

- 8. Arm length
- 9. Balance
- 10. Endurance

The competitors are allowed three to six trails and three to eight of the best competitors are allowed three more trails. Incase of a tie for the final place, the competitor shall be allowed three additional trails. The conditions of the competition must be explained to the competitors before its commencement. The best throw of the competition out of all trails taken by the competitors shall be credited in resolving a first place tie. No markers or marks are allowed to be put in the throwing sector.

Competitors may use an adhesive substance on their hands for better grip, and can also wear a belt of leather or some other material to protect the spine from injury. However, taping of the fingers or use of any other devise on their hand which might assist in throwing is not allowed.



1. THROWING THE SHOT PUT

The competitor must begin the throw from a stationary position within the circle. The shot shall be put from the shoulder with one hand only and, shall touch or be in close contact with the chin. The hand shall not be dropped below this position during the act of putting.

Practice trials are not allowed after the commencement of the competition. Competitors are not allowed to put on gloves nor are they allowed to spray or spread any substance either on the surface of the throwing circle or on their shoes.

Basic Principles

1. Forces must be applied along a straight line.
2. Newton's 3rd law – Action and Reaction are equal and opposite.

Specifications

1. Weight of the shot for men - 7.260 Kg
2. Weight of the shot for women - 4.00 Kg
3. Diameter of the shot put circle- 2.135 m
4. Angle of the shot put sector - 34.92
5. Dimension of the sector - 20 x 12 m

a) Normal grip

The above thumb and middle finger is behind the edge of the grip cord and the index finger is partly curled around and behind on the javelin's shaft.

b) Middle and Thumb grip

The index finger and thumb is behind the edge of the cord binder and the rest of the fingers around the cord itself.

c) 'V' grip (or) Glow grip

The Javelin is held between the index and the middle fingers at the edge of the cord binder and rest of the fingers around the cord itself.

Carry

The javelin is carried above the shoulder of the throwing arm. Three commonly used methods of carrying the javelin during the approach run's cyclic phase.

a) Low carry

The low carry is generally associated with a circular type arm action in the 'withdrawal' (To held on waist level).

b) Medium carry

The medium carry is generally favored expansion in the withdrawal. (To held on eye level).

1. A head
2. A shaft and
3. A cord grip

The javelin throw comprises the following technical elements.

1. The grip and carry
2. The Approach run
3. The withdrawal
4. The impulse stride
5. The throwing stride
6. The release
7. The recovery

1. Grip

When executing their throws, javelin throwers may hold the javelin only by the whipcord grip. They may hold the javelin at the end of the cord grip with one or more fingers and the thumb touching the javelin shaft. Javelin throwers have some leeway in how they grip the javelin. It has three types how they can hold the javelin. The javelin is held behind the cord binder the rear edge of which offers a slightly raise border for gripping the javelin.

Stages / Method

1. Holding of the shot
2. Tucking (or) Placement of the shot
3. Stance
4. Glide
5. Release

1. Holding the shot

- a. The shot rest on the root of the fingers, and should not touch the palm.
- b. All the fingers are carry the shot except the little finger which is only support.

2. Placing (Tucking) the shot

1. The shot must be placed between chin and clavicle.
2. The shot does not go beyond the shoulder line.
3. The hand should be parallel to the ground.

3. Stance

The stance varied according to the using the style of Athletes.

Techniques (Style Of Putting)

The thrower can be used 3 style when putting the shot

1. Standing throw
2. 'O' Brien technique (or) Gliding
3. Rotation (or) Disco put

1. The 'O' Brien Technique

The distance a shot travels depends upon its height of release, velocity at the moment of release and the Angle of projection. The optimum angle of projection will vary depending on the height of the release, and the distance of the put, it will be approximately 34.95. The correct technique is the one that will result in the greatest velocity at release. The motion of a projected object is influenced by the exact point of application of the propelling force.

Holding the shot

The procedure for gripping the shot is to hold it in the left hand and lay the right hand loosely on top with the fingers spread slightly. The putter holds the shot in his right hand. Where it rests on the "base" of the fingers. The three middle fingers are only slightly splayed while the thumb and the little finger give the shot lateral support, securing a safe position of the shot.

The Reverse

The reversal is to serve as a follow through after the thrust and to retain balance in order to avoid fouling. After the discus has left the hand the thrower will have to reverse the feet rapidly and lower the body weight to maintain balance. The right leg must be brought forward quickly and planted firmly close to the rim of the circle, mean time the left leg swings back the body is bent at hips and right knee flexes to drop the centre of gravity into a stable position.

3. THROWING THE JAVELIN

The javelin throw distinguishes itself from other throwing events of shot-put, discus throw and hammer throw. These throwing events must be from a circle, the javelin must be thrown from behind the arc of a sector drawn with a radius of 8 mts. Due to the aerodynamic nature of the implement and its relative weight, the event does not require great strength. The event does require few less technique in order to achieve high level results.

Javelin consists of three parts namely the head, shaft and grip. The shaft is made up of either Aluminium or fiber. At the tip of the shaft a sharp head is fixed. At the center a grip made of thread is fixed. The Javelin is round and broad at the center. The circumference is small in the front and rear. It has three main parts

athlete drives off the left foot. The effective throwing position is one of "muscular wind" the hips displaced from the feet, shoulders from the hips and discus from the shoulders.

The run across the circle is initiated by the driving action of the left leg. Synchronized with the swing of the right leg. This drives carries the thrower halfway across the circle. The right foot landing approximately on the centre line with the leg well bent and the shoulder and body weight back. His left leg is pointing toward the direction of the throw, his right shoulder is facing the rear, his throwing arm is well behind the shoulder his left arm is curled and the discus is flat.

The Release

The throw begins with a forward and upward drive from the right foot. The shoulder should now come in slightly after the hip and the arm strikes from the low point, the thrower reaching out as far as possible to give as much distance from axis of rotation as he can. The left leg should now straighten, as the arm strikes. The discus will leave the hand in line with the right shoulder and should be squeezed out of fingers, each digit applying its force in turn and spinning of the first fingers last. The discus is spun clockwise. A good thrower will release the discus at a 35°-40° angle. The release must be smooth and rhythmic using the force generated from the lower body.

The stance

He should stand facing the rear of the ring with his back in the direction that he is going to throw. The shot should be held in right hand, supported by thumb and fingers. The hand holding the shot will be placed into the hollow of the collar bone in such a manner that it does not rest on such a manner that it does not rest on the shoulder but against the right side of the neck and the jaw. The elbow of the right arm is slightly raised and pressed forward. The upper arm points forward and downward. The head remains in its normal position. The eyes should be focused on a point to the rear of the ring and about five to ten yards away. He should stand erect in a telexed attitude, the left arm is held either out in front of the face or relaxed above the head the left front behind the right about one foot with just the toes touching for balance.

The glide or drive

The purpose of the glide is to gain momentum while moving across the ring and to lead into the correct position for the delivery. The initial movement is to lower the trunk and raise the left leg causing the body to form a "T" shape with all weight carried on the right leg. The head, shoulders and hip remain square to the rear of the circle, and the right leg flexes in preparation for the drive across the ring proper balance at this point is extremely important.

2. The Rotation or Disco-put Technique

The Starting Position

The putter stands at the rear of the circle facing 180° away from the throwing direction. The left foot is along the centre line of the circle and the right foot is placed laterally to the right of the centre line about shoulder width apart or just this point in most cases. The grounding of the left foot at the stop board denotes the arrival of the thrower into the delivery stance.

Preliminary Movements

To start the turn, the putter begins by swinging the shoulders, trunk and left arm along with the left and then to the right, as the body weight shifts correspondingly from leg to leg in coordination with the rhythm of the shoulders, trunk and left arm. Both knees are semi – flexed while this side to side swaying movement is taking place to break the inertia and set the pattern of movement to follow.

Turn

The double support phase of the turn begins at the end of the preliminary movements. The thrower is completely over his right leg with the trunk and shoulders well twisted to the right. From this position the thrower begins unwinding his upper body in the direction of turning with a wide

throwing arm bang to the right side along the thrower's thigh with the head and eyes focused to a point about 5 meters behind the circle. There are generally three positions that a thrower may adopt in relation to the line of direction. The experience, technical skill and comfort of the thrower must decide which of the three starting positions suit their ability.

The left foot is generally placed a few centimeters back from the rim of the circle, in order to avoid fouling by bursting the sole of the foot on the top edge of the rim of the circle as the pivot is executed.

The preliminary swings

The thrower should position himself at the rear edge of the circle with his back to the generally facing the direction of throw and his feet slightly wider than hips. The discus should be flat and facing downwards on the arm swung at shoulder height so that the arm and discus go well behind the right shoulder. The free arm rests comfortably across the chest. The thrower's weight should move easily from one foot to the other. On the final preliminary swing, the arm is swung back as far as possible so that the body weight is over a straight right leg.

Coming across the circle

The initial movement is begun the hips are turned and a pivot is made on the ball of the right foot as the

Specification of discus

1. Weight of the discus for men : 2 kg to 2.025 kg
2. Weight of the discus for women : 1 kg to 1.025 kg
3. Diameter of the discus for men : 21.9 cm to 22.1 cm
4. Diameter of the discus for women: 18 cm to 18.2 cm
5. Angle of sector is : 34.92°

Various Stages

Hold

The hand is placed flat against the discus surface, the upper joints of the fingers grasp the rim of the discus. Its center of gravity lies between the index and middle finger. Due to a slight bending at the wrist the upper face of the discus touches the arm, because it prevents the discus from falling out of the hand in the subsequent movements.

Starting position

The starting position at the rear of the circle is with the thrower facing 180 degrees away from the throwing direction. The two feet are usually placed about shoulder width apart or slightly more in the case of very tall throwers. The toes point naturally outwards with the weight of the body evenly distributed over both feet. The discus and

sweeping left arm action parallel to the ground, a slight forward tilt to trunk in a semi sitting position. The single support phase of the initial part of the turn is followed by a brief non support phase when both feet are off the ground and the whole body is turning on its vertical axis, and continues turning after the right foot lands around about the center of the circle.

Follow through (or) Reverse

When the right leg has driven really well and effectively and the action has been timed correctly the athlete will be well over the left foot as the arm strikes. Immediately after the shot has left the hand, he will find himself falling over the stop – board. In order to prevent himself fouling, the left foot is rapidly withdrawn and the right leg brought forward, the toe of the right foot striking the inside edge of the stop – board. At the same time the body weight is lowered in order to be more on balance by lowering the centre of gravity.

Valid Trial

For a valid trial, the shot shall fall completely within the inner edges of the landing sector.

Fouls

1. Throwing the shot from behind the shoulder
2. Touching outside the circle or the top of the stop Board

3. Shot landing on the sector line or outside the sector line
4. Delaying more than 60 seconds to throw.

Rules

1. The use of gloves is not allowed
2. At the competition area, each competitor may have a maximum of two practice trials which should be made in draw order, under the supervision of the judges.
3. Once the competition has begun, competitors are not permitted to use implements for practice purposes or to use the runway or ground within the sector for practice trials, with or without implements.
4. No device of any kind – i.e., taping of two or more fingers together, which in anyway assists a competitor when making a throw, shall be allowed. The use of tape on the hand shall not be allowed except in the case of the need to cover an open cut or wound.
5. A better grip, competitors are permitted to use a suitable substance on their hands only.
6. To protect the spine from injury, a competitor may wear a belt of feather or other suitable material.

7. For a valid trail, the tip of the javelin shall fall completely within the inner edges of the landing sector.
8. If the implements breaks during a throw or while in the air, and if the competitor thereby loses his balance and contravenes, it shall not count as a foul throw, provided one attempt was made in accordance with the Rule.
9. Implements shall be carried back to the starting line and never thrown back.
10. The competitor shall not leave the runway until the implement has touched the ground.

2. THROWING THE DISCUS

The object of the spin in the discus throw is to generate power and speed within the circle to apply to the discus itself, and the more power that is applied to the discus, then further it will go the angle to release of discus, the position of the discus during its flight are important factors. It has three types,

1. Half rotation
2. Full rotation
3. One and half rotation

6. 5000m Run – Arc start **or** Group start
7. 10000m Run – Arc start **or** Group start
8. 400mts Hurdles - Full stagger distance
9. 4 x 100m Relay – Full stagger distance
10. 4 x 400m Relay – One and Half stagger distance with diagonal distance.

2.Non- Standard Track

The track which is not satisfying the conditions of standard track is called as Non-standard track and the 400mts track without curb (raised border) is also treated as Non-standard track. Usually 200mts track is called as Non – standard track.

Some of the disadvantages of Non-standard track:

- a) Sprinters very difficult to show their real capacity.
- b) Very difficult to run more than 6 competitors at a time.
- c) Very difficult to conduct Hurdles and Relay races.
- d) Very difficult to conduct both track and field events simultaneously.

Method of finding Running Distance Radius for 200 mts track if 36 mts as straight.

3. Five – stride – Rhythm

The three known stride Rhythms – the three stride rhythm. The five stride Rhythm and seven stride rhythm. It is five stride – Rhythm which is the most widely accepted, which comprises the following phases:

- (i) The withdrawal of the javelin
- (ii) The impulse stride
- (iii) The throwing position
- (iv) The release
- (v) The recovery

(i) Withdrawal of the javelin

The withdrawal starts at the second stride of the five-stride rhythm and ends at the third stride. The throwing arm is drawn back in alignment with the shoulder axis. The palm of the hand is turned upward and extend the forearm, when the withdrawal is completed, the athlete's body has a marked backward lean.

(II) Impulse stride /Cross step / Three step (or) Five step Rhythm

When an athlete reaches the check mark with the left leg the action of throwing should be starts. The right hand is stretched backward with the javelin and left hand is brought in forward in front of chest. That is otherwise called "with drawl of the javelin".

The toe of the right foot must be deviate more than 30° from the run up direction. The left leg presses the body down low into the fourth stride, preventing the body's centre of gravity from lifting at the landing of the right leg, which must be allowed to bend when it receives the body weight.

(iii) Throwing Position

The throwing position starts at the moment when the athletes right foot makes contact with the ground after the impulse stride. The right leg can start to extend and doing s introduce the release, the full extension of the forearm by the hand is important under no circumstances must the arm be flexed at the wrist.

(iv) The Release

The release is initiated by a forward and upward stretching of the right leg at the knee and ankle joints, driving the right hip forward. The shoulder and the hip axes now run parallel and almost at right angles to the direction of the throw. The throwing arm is not yet stretched while the right leg is extended, the heel is raised, allowing the pressure of the ball of the foot to act longer on the body. The throwing arm now comes into its sphere of action. When the throwing arm begins to strike, the elbows are raised until it is level with the heed and pointing in the throwing direction.

Method of Finding Running Distance Radius for 400 mts if 80 mts as straight.

$$2pr = 240 \text{ (Circumference of two curves)}$$

$$r = 240/2 \pi$$

$$240/2 \times 3.1416 = \frac{240}{2 \times 3.1416} = \frac{240}{6.2832}$$

$$= 38.20 \text{ mts}$$

For Standard Track (With Kerb)

Marking Distance Radius (MDR or CR) = RDR – 0.30 m

MDR = 38.20 – 0.30 = 37.90m

For Non-standard Track (without kerb)

MDR = RDR – 0.20 m = 38.20 – 0.20 m = 38.00m

Starting points in 400 mts Track

1. 100m Run Men & Women
100m Hurdles for Women - Parallel Method
110m Hurdles for Men
2. 200m Run – Half stagger distance
3. 400m Run – Full stagger distance
4. 800m Run – Half stagger with diagonal excess **Or** Arc start / group start
5. 1500m Run – Arc start **or** Group start

Running Distance Radius (RDR)

RDR is the path in which an athlete has to run in the curve to cover the exact distance. The chart below shows that RDR, CDR and area required to lay 400mts raised bordered track when the straights length varies.

Straight length in mts	Rdr in mts	Cdr in mts
79MTS	38.50	38.20
80MTS	38.18	37.88
84.39mts	36.80	36.50

The chart below shows that RDR, CDR and area required to lay 200mts Non raised bordered track when the straights length varies.

Straight length in mts	Rdr in mts	Cdr in mts
37.50MTS	19.89	19.67
40.00MTS	19.09	18.89

During the release the left side of the body must be in a flexed position. This is achieved by a sudden arrest of the backward movement of the left arm just when the right side of the body overtakes the left side the angle of release is between 30 and 36 degrees.

(v) The recovery

A distance of at least two meters from the arc will be required merely checks the forward speed of the body. Thus preventing from fouling. After the release, the right leg is forward in a springing movement. The reverse takes places to avoid stepping over the right foot must be planted transversely to the throwing direction, the upper body must be lean forward, the left leg is raised and brought back into the direction of the run-up. Javelin consists of three parts namely the head, shaft and grip. The shaft is made up of either Aluminium or fiber. At the tip of the shaft a sharp head is fixed. At the center a grip made of thread is fixed. The Javelin is round and broad at the center. The circumference is small in the front and rear.

Follow throw

After releasing the javelin the thrower to avoid his forward momentum (or) foul, then he placed his rear leg to brought forward for his rear leg and placed nearer to the board and to do hopping twice or threes. Then he come back behind the runway should not make foul.

Correct throw

The javelin should be caught in the grip. The javelin must be thrown forward from behind the shoulders. While throwing thrower should not cross the line of runway either in front or side. After releasing, the javelin should fall within the sector lines with the tip first touching the ground. The thrower still remains (leave) the runway only after the javelin lands on the ground.

6. THROWING THE HAMMER

The technique of hammer throwing is determined by the specific nature of the implement and the measurement of the throwing circle, which comply with the international rules. A complete throw consists of two preliminary swings and three turns on the left foot with an active push-off from the right leg at each turn. The following are the parts of hammer throw:

1. The Grip
2. The Initial position
3. The preliminary Arm swings
4. The Transition
5. The turns

Top Layer

Now-a-days all international competitions are being held on synthetic tracks. The thickness and material used for various layers of a synthetic track depend upon the product and preference of the particular firm (construction agency). Although, the material used for top layer by all the firms are synthetic tracks, but of different variations. It is advisable that whenever 8 lane synthetic tracks are being laid, efforts should be made for laying of another 4 lane synthetic track of the same material for training purposes.

Lane

Lane is the space between the two parallel lines.

Kerb

Kerb is the raised border (both inner and outer line) which is fixed permanently through the inner line of the first line and outer line of the last lane. Dimensions of curb is 5 x 5 cm (5 cm height, 5 cm width).

Curb Radius (CR)

Curb radius is the radius which is used to draw the curve. It is otherwise known as Marking Distance Radius (MDR). The curb radius varies according into the nature of the track.

TRACK MARKING

Track must be prepared according to the rules and regulations laid by **International Association Of Athletic Federation** (IAAF). The inner raised border should be 5cm in height and width by using brick, wood or any other suitable material. There shall be a minimum of 8 lanes and width of lane is 1.22mts and width of the line is 5cm. The straight lines are always marked by north to south direction and finishing line must be same for all races.

a) TYPES OF TRACK

The track is classified into two types based on its specifications.

1. Standard Track (with curb)
2. Non- standard Track (without curb)

1. Standard Track

The tracks are made either on plan surface (grass) or with the help of cinder/synthetic material which is skid proof and not too hard. To get maximum benefit from the cinder/right synthetic tracks, it is essential that proper care be taken at the time of the construction so that right materials are mixed in various layers as per required thickness.

6. The Release

7. The Recovery

The Grip

The inside grip of the hammer handle is laid against the pads of the middle phalanges of the left hand fingers. The right hand cuffs the left by putting the four fingers over the back of the middle and basal phalanges of the left hand fingers. The hammer must be held firmly but not tensely.

The initial position

The thrower stands at the rear edge of the circle with his back facing in the direction of the throw his feet are a little more than shoulder width apart and his knees are bent for stability during the arm swings. The thrower now places the hammer head behind his right leg as far to his rear as possible. He then turns to the right until the right shoulder points in the direction of throwing. The hammer wire forms a straight line with the extended left arm.

The preliminary arm swings

The main function of the preliminary swings is to break the inertia of the thrower and hammer and to set a rhythmic pattern of movement by which initial acceleration is transmitted to the hammer. During the preliminary swings, the arms are kept long and relaxed and form and extension

of the hammer wire. They begin with this movement when the hammer is at its lowest point and end it by turning the trunk to the right. The thrower must counteract the increasing centrifugal force.

When the hammer moves backwards, he presses his hips forward. After the first arm swing the thrower keeps the lowest point of his hammer well to the right, at around 290 to 300 degrees, and the highest point somewhere around 120 degrees.

The Release

The delivery phase begins when the right foot touches the ground after the third turn. The landing of the right foot must be fast and firm in order to match the acceleration of the implement, which is racing down to the lowest point with the beginning of the active straightening of the legs. Just before the hammer is released, the left knee straightens. When the implement leaves the hand, the vertical line of projection of the thrower's head should not go beyond the right heel. If the feet are in a stationary position, thus is a clear proof of a correctly executed delivery. The hammer is released at shoulder height. The left shoulder points in throwing direction and back is well arched. The most valuable angle of release in the hammer throw is 42 and 44°.

1st Day Events

1. 100 mts Hurdles
2. High Jump
3. Shot put
4. 200 mts Run

2. Decathlon

Decathlon consist of 10 events which shall be conducted on 2 consecutive days in the following order.

1st Day Events

1. 100 mts Run
2. Discuss throw
3. Pole vault
4. Javelin throw
5. 400 mts Run

2nd Day Events

5. Long Jump
6. Javelin
7. 800 mts Run

2nd Day Events

6. 100 mts Hurdles
7. Long Jump
8. Shot put
9. High Jump
10. 1500 mts Run

Note :

1. Winners will be decided based on the points of all events.
2. There is no heats in the running events and every running events are treated as finals.
3. Three attempts only will be given to field events.
4. Two false start should be permitted.

3. Decathlon

Decathlon consist of 10 events which shall be conducted on two consecutive days in the following order, with minimum 30 minutes interval between two consecutive events and 10 hours interval for last event of first day and first event of second day.

1st Day Events

1. 100 mts Run
2. Long Jump
3. Shot put
4. High Jump
5. 400 mts Run

2nd Day Events

6. 110 mts Hurdles
7. Discus throw
8. Pole vault
9. Javelin throw
10. 1500 mts Run

Combined Events For Women

Combined events for women there are two category mentioned as follows.

1. Heptathlon
2. Decathlon

1. Heptathlon

Heptathlon consist of 7 events which shall be conducted on 2 consecutive days in the following order.

The Recovery or Follow Through

To avoid stepping over to thrower must absorb the impact by reversing the legs and lowering the body's centre of gravity, thus increasing stability.

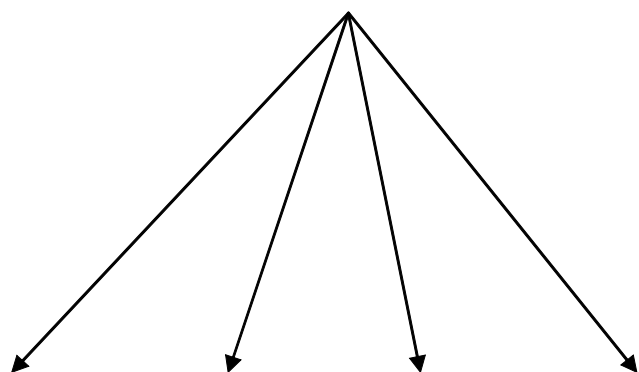
C.COMBINED EVENTS

Multi-discipline events has been included in athletics programmes since eight century B.C. though originally the five events for men included a run, long jump, discus throw, javelin throw and wrestling. The 10 events with we are familiar today were practiced first in Scandinavia, and the event is now developed in importance for the genuine all – rounder, who may not be one event, but who can maintain a high overall standard. Today it is an event for the decathlon or heptathlon specialist who prepares for it and competes in the event as a whole rather than in series of separate competitions. The decathlete or heptathlete needs to be a balanced personality with well –rounded physical development.

The Combined events are an individual events consist of several number of events of different category. For men and women combined events are classified into 4 types according to the level of competitors. The events are held over two days, and they are chose as a true test of skill, stamina and technique. The decathlon combines sprints with middle distance running, throwing, jumping, hurdling and vaulting.

There is a rest period of 30minutes between each event. A competitor is awarded points for his best performance in each event, as calculated by reference to scoring tables produced by the IAAF. The decathlon entered the Olympic programme in 1912.

COMBINED EVENTS



Pentathlon

Heptathlon

Octathlon

Decathlon

They are as follows.

1. Pentathlon - 5 events
2. Heptathlon - 7 events
3. Octathlon - 8 events
4. Decathlon - 10 events

The Combined events such as pentathlon, which shall be conducted on one day, and other combined events such as Heptathlon, Decathlon and Octathlon should be conducted on two consecutive days as in the prescribed order.

Combined Events for Men

1. Pentathlon
2. Octathlon (Youth Boys)
3. Decathlon

1. Pentathlon

The pentathlon is a five-events test of all-round ability. The men's version comprises the long jump, javelin, 200m., discus and 1500 m in that order on one day. Scoring is on the same basis as the decathlon. The pentathlon has long been a most popular women's event, and was introduced into the Olympic schedule in 1964.

2. Octathlon (Youth Boys)

Octathlon consist of 8 events which shall be conducted on consecutive two days in the following order.

1st day Events

1. 100 m Hurdle
2. Long Jump
3. Shot put
4. 400 mts Run

2nd day Events

5. 110mts Hurdles
6. High Jump
7. Javelin
8. 1000 mts Run

i) By seeing their timing in 1/100 of second. If the tie still remains.

ii) Lot shall be used to decide the best loser.

b) Field events

During horizontal or distance events, where there are more than eight competitors, each competitor shall be allocated three trials and the competitors with the best valid performances shall be allowed three additional trials.

In the event of a tie for the last qualifying place it shall be resolved by seeing the second and third best performance among the tied competitors and if tie still remains, the tied competitors shall also be allowed to perform the three additional trials.

In the event of a tie for any position, it shall be decided first by using the available rules. If the tie still remains it concerns for the first place, the competition shall be re-run to decide the winner which is known as concerns any other place, the result will stand. That means the tied competitors shall be awarded the same place.

Note; Its best performance as achieved during field braking, it shall also be considered.

$$2\pi r = 128 \text{ (Circumference of two curves = } 200 - 72 \text{ (} 2 \times 36 \text{))}$$

$$2 \times 3.14 \times r = 128$$

$$\text{RDR or 'r' = } 128 \times \frac{1}{2} \times \frac{1}{3.14} = 20.37 \text{ m}$$

$$\text{MDR = RDR - 0.20 m}$$

$$\text{MDR = } 20.37 - 0.20 = 20.17 \text{ m}$$

b) TYPES OF RUNNING SURFACE

1. Mud
2. Grass
3. Cinder
4. Synthetic Track

c) NEED FOR A STANDARD TRACK

1. Track must be prepared according to the rules and regulations laid by International Association of Athletic Federation (IAAF).
2. The length of the standard track shall be 400 mts.
3. The track should be laid out from North to South direction.
4. Track shall consist of two parallel straights and two curves of same radius. The length of the curve will be more than the straight.

5. The track should have minimum of 6 lanes and maximum of 8 lanes.
6. The inside and outside of the track shall be bordered by a kerb. That is raised border of maximum 5 x 5 cm.
7. The track should have common finishing point.
8. To conduct all the running events up to 10,000 mts within a track and also the jumping and the throwing events simultaneously with the track events.
9. The track should have proper drainage system.
10. The track should be leveled without any ups and downs.
11. The running direction is such that the athlete's left hand side is towards the centre of the track.
12. The synthetic material will be used as the surface of the track.

STAGGER DISTANCE

1. There will be no stagger for the first lane athlete.
2. As and when the width of the lanes changes, the stagger distance also changes.
3. Staggers are needed only when the athletes are required to run in curves also in their lane.
4. Staggers will not change according to the increase in the length of curves.

6. Angle sector is : 34.92°
7. Wire : Single up broken and straight length of string steel wire 3 mm in diameter
8. Handle : Curved or straight grip with maximum width inside of 130 mm and maximum length inside of 110mm.

BREAKING TIES IN ATHLETICS

Tie breaking in can be steadied separately during preliminary rounds and finals to decide the positions.

1) Preliminary rounds;

a) Track events

Preliminary rounds (heats) shall be held in track events when the number of competitors is more in number to reduce the number of competitors to 6 or 8 to conduct the finals. In all preliminary rounds at least first and second in each heat shall qualify for the next round and it possible at least three in each heat shall qualify. The qualification for the next race shall be decided either according to their placings or according to their times (best losers). During this selection if there is a tie among the best loser, the following steps shall be applied to decide the best loser for the next round.

The Ring

The ring shall be placed to the level of outside ground. It must have a height of 1.4cm to 2.6 cm from the inside floor of the circle and 6mm thickness.

Specification of Hammer

The hammer consist of three parts, a metal head, a wire and a grip. The head shall be of solid iron or other metal not softer than brass. The head should be spherical in shape with smooth surface. A steel wire, with a diameter of 3mm, is attached with the head at one end and with a handle on the other end.

Overall weight of the hammer

1. Men : 7.26 kg to 7.285 kg
2. Women : 4 kg to 4.025 kg

Overall length of the hammer

1. Men : 117.5 cm to 121.5 cm
2. Women : 116 cm to 119.5 cm
3. Diameter for men : 11 cm to 13 cm
4. Diameter for women : 95 cm to 110 cm
5. Head : Solid or other suitable material

5. When staggers are marked, the diagonal excess distance also to be taken into consideration.

Formula

$$\text{Half stagger} = [W (N-1) - \alpha 0.10 \text{ m}] \pi$$

$$\text{Full stagger} = [W (N-1) - \alpha 0.10 \text{ m}] 2\pi$$

$$\text{One and Half stagger} = [W(N-1) - 0.10\text{m}] \times 3\pi$$

Where,

W – Width of the lane,

N – Number of the lane

π – 3.1416 (Standard value)

Stagger distances for Non- standard Track

$$\text{Half stagger} = W (N-1) \times \pi$$

$$\text{Full stagger} = W(N-1) \times 2\pi$$

$$\text{One and Half stagger} = W (N-1) \times 3\pi$$

Diagonal (excess) Distance

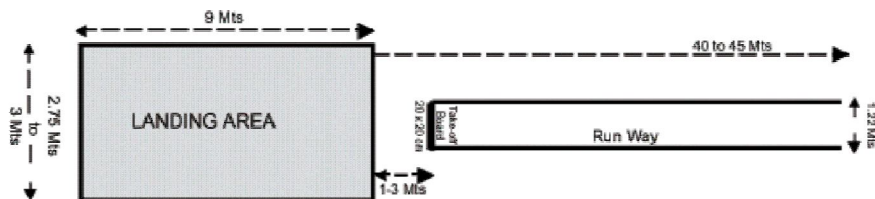
The excessive distance run by the athletes other than the first lane runner for 800mts and 4 x 400mts relay to reach the first lane after the first and three curve respectively is called diagonal excess. This diagonal distance should be calculated for each lane and it should be added with half stagger, and 1½ stagger respectively in the starting point itself.

UNIT - V

FIELD MARKING

Layout of Area for all Field Events with all Specifications

a) LONG JUMP



Specifications

Runway

Approach run - 40-45mts

Width of the lane - 1.22

Width of the line - 5cm

Jumping pit

Length - 9 mts

Width - 2.75 mts to 3 mts

Distance of the take off Board from the nearest edge - 1 – 3 mts of landing area

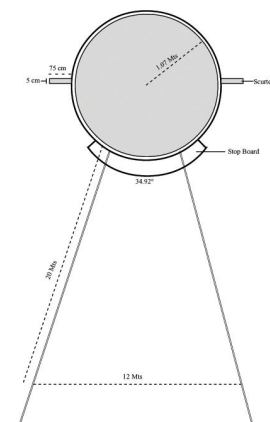
(84)

9. Width of the cord grip : 150 mm to 160 mm for men

10. Width of the cord grip : 140 mm to 150 mm for women

11. Angle of sector is : 29°

h) THROWING THE HAMMER CIRCLE



The hammer is thrown from a circle, shielded on three sides by a netting a cage on a metal frame, and must land within the marked sector. The competitor who achieves the best distance with his throw is declared winner. A total number of five judges watch for infringement within the circle, the other three judges supervise the field. If the hammer breaks while attempting a throw, then the attempt shall not be counted. Under such circumstances, if the competitor loses his balance and commits a foul, it won't go against him.

(93)

The javelin is made of wood or metal shaft with a sharp metal head. There shall be a cord grip around the centre of gravity of javelin. The cord grip should not exceed the diameter of the shaft by more than 8mm. The grip shall be of uniform thickness.

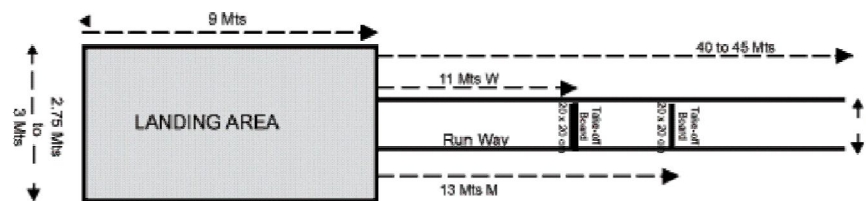
SPECIFICATIONS

1. Length of the runway : 30 to 36.5 mts
2. Width of the runway : Two parallel White lines 5 cm wide and. 4 mts apart
3. Width of the arc : 7 cm extended by 75cm long and 7 cm wide.
4. Weight of the javelin : 800gms to 825 gms for men
5. Weight of the javelin : 600gms to 625gms for women
6. Over all length of the javelin : 2.60 mts to 2.70 mts for men
7. Over all length of the javelin : 2.20 mts to 2.30 mts for women
8. Metal head : 250 mm to 330 mm for men and women

Dimension of the Take- off Board (Wooden Board)

- Length - 1.20 mts to 1.21 mts
 Width - 20 cm
 Depth- 10 cm

b) TRIPLE JUMP



Specifications

Runway

- Approach run - 40-45mts
 Width of the lane - 1.22
 Width of the line - 5cm

Jumping pit

- Length - 9 mts
 Width - 2.75 mts to 3 mts
 Distance of the take off board from the nearest edge of landing area - 11m (w) 13m (m)

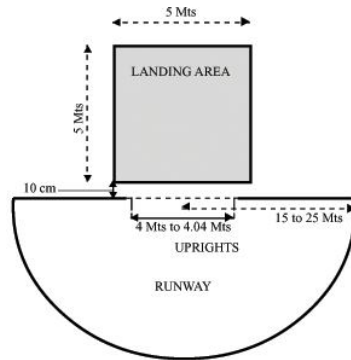
Dimension of the take off board

Length - 1.20 mts to 1.21 mts

Width - 20 cm

Depth- 10 cm

c) HIGH JUMP



Specifications

Runway

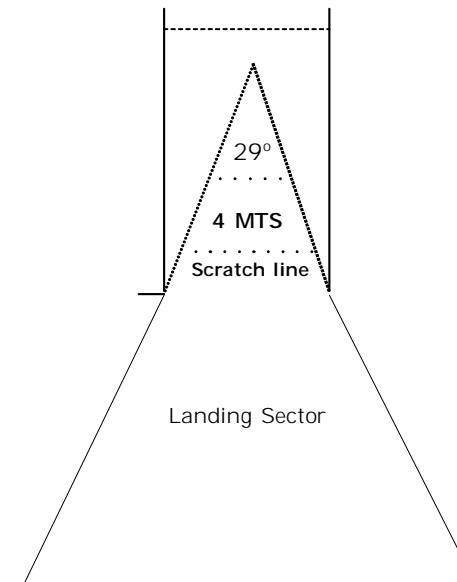
The minimum length of the runway shall be 15 meters. Except in international competitions, where the minimum shall be 20 meters. If conditions permit, the minimum length should be 25 meters.

High Jump Landing Pit

Pit : The pit is made of foam. The length of the pit shall be at least 5m, width 3m and height 60cm.

(86)

Javelin Throw Sector



IMPLEMENTS



Javelin



cord grip

(91)

Specifications

RUNWAY

The minimum length of the runway shall be 15 meters. Except in international competitions where the minimum shall be 20 meters. If conditions permit, the minimum length should be 25 meters.

High Jump Landing Pit

Pit : The pit is made of foam. The length of the pit shall be at least 5m, width 3m and height 60cm.

Uprights

The uprights should be of a rigid or any other suitable material, marked in centimeters. The uprights shall extend at least 10cm above the point up to which the cross bar can be raised. The distance between the uprights shall be between 4.00 - 4.04m.

Cross bar support

The support for the cross bar should be made of rigid or any other suitable material, which can be raised or lowered and can be adjusted up to a height of 2.30m.

Uprights

The uprights should be of a rigid or any other suitable material, marked in centimeters. The uprights shall extend at least 10cm above the point up to which the Cross bar can be raised. The distance between the uprights shall be between 4.00-4.04m.

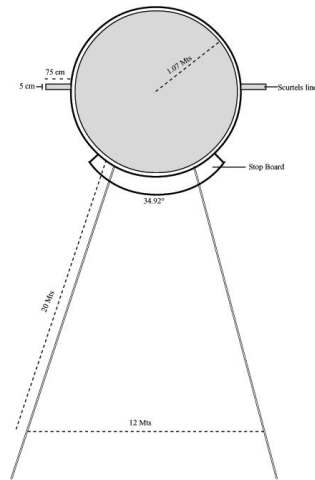
Cross bar support

The support for the cross bar should be made of rigid or any other suitable material, which can be raised or lowered and can be adjusted up to a height of 2.30m.

Cross bar

The cross bar is made of wood, or metal or any other suitable material. The cross bar should be circular with a diameter of 29 mm to 31 mm. The end of the bar shall be of concave or flattened surface of 150-200 mm in length and 29-35 mm in width. The length of the cross bar shall be between 3.98, to 4.02m.

d) SHOT PUT CIRCLE



The Ring

The ring shall be placed to the level of outside ground. It must have a height of 1.4cm to 2.6 cm from the inside floor of the circle and 6mm thickness.

Shot

The shot is made from solid Iron, brass or other hard metal. The men's shot weight is 7.26 kg with a diameter between 110-130mm. The women's shot is of 4kg with a diameter between 95-110mm. The shot should be spherical in shape with smooth surface.

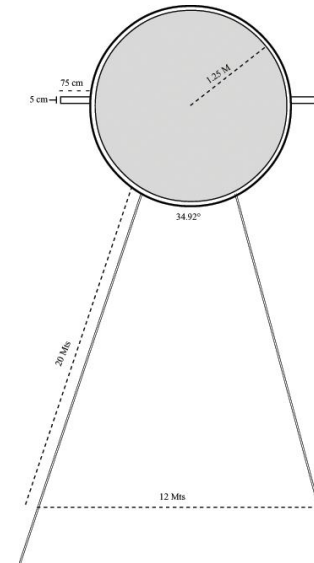
Stop Board

A curved piece of wood 10 cm thick affixed to the front of the shot put circle. When throwing, the shot putter braces his foot against the stop board to avoid falling forwards out of the circle.

(88)

f) DISCUS CIRCLE

Discus



The discus is made of wood, or other suitable material, with a rounded metal rim. The cross section of the edge shall be rounded in a circle of 6mm radius. The thickness of the rim should be at least 12m. The diameter of men's discus shall be between 219-212 mm and its weight should be 2 kg. The diameter of women's discus shall be between 180-182 mm and weight 1kg. The diameter of metal plate or flat centre area should be between 50-57mm.

(89)

a) Track Events

The judges shall decide the order in which the competition finish and if they cannot arrive at a decision shall refer the matter to the Referee, who shall decide.

Dead Heat

If there is a tie for the first place in any track event, the event shall be held after to giving adequate rest. And if it is not possible to conduct event once again due to time factor, the tied competitions shall be awarded first place jointly. This method is known as "dead heat". If tie remains for any other place, the result will stand. Rerace shall not be held to decide the second, third and other place.

Note: If photo finish facilities is available, the positions may be decided, easily.

b) Distance events

When there is a tie for any place, it shall be solved by seeing the second best performance and it necessary third, fourth best, etc. If tie still remains and concerns first place, the tied competitors will complete again in the some order in a new attempt until the tie is result. For remaining places the result will stand. That means same place shall be given to the field competitors.

Height events

When there is a tie for any place in high jump and pole vault it shall be solved by using two rules in order as following

- i) The tie competitor with lowest number of failures at the field height (last cleared height) shall be given higher place.
- ii) If tie shall remain; the competitor with lowest total number of failures throughout the competition shall be given higher place.

If the tie still remains and if it concerns the first place, the field competitors shall be given one more jump at the height where the competition is stopped (height which is immediate next to the field height), and if no decision is reached, the bar shall be raised or lowered 2cm for high jump and 5cm for pole vault. The competitors are allowed only one attempt at each height until the tie is decided. The best performance achieved during jump, if any, shall also be considered.

If the tie concerns any other place, the tied competitors shall be awarded the same place in the competition.

Note: If the same place is given, the immediate next place shall not be awarded to any competitors.

competitors shall be placed in the order in which any part of their bodies (i.e. torso, as distinguished from the heads neck, arms, legs, hands or feet) reaches the vertical plane of the nearer edge of the finish line.

B. MIDDLE DISTANCE RUNNING

Distance running can be split into two groups, Middle distance and Long distance. For middle distance running the athlete needs to both speed and stamina. For long distance running, stamina is the most important thing. Stamina means building up our body so that it can be last the race distance, but at race speed.

Middle Distance Events

1. 800 mts
2. 1500 mts
3. 3000 mts

The middle distance runner must apply his effort correctly throughout the race; this can be achieved only by a knowledge of pace and tactics.

The events which fall into the middle distance category range from 800m to 3000m. With the relentless advance in performance in athletics the 800 meter race now attracts athletes who in the past would have been sprinters. His running style is a model of mechanical efficiency, and even

UNIT - I

INTRODUCTION

A. Meaning of Athletics

Athletics comprise of a wide range of skills and can be divided in two broad categories of track and field events. Track events include sprint races, middle distance races, long distance races, relays and hurdles. The field events are those which are being played either inside or outside the track area or outside the stadium, which include throwing events and jumping events.

The track events include races of 100m, 200m, 400m, 800m, 1500m, 5000, 10000m, and relay races of 4x100m, 4x400m in both men and women categories. In all races shorter than 800m the competitors have to run the length in their respective lanes. The competitors of relay races are required to carry a baton and pass over the same to his/her partner within the take over zone. The starting points are arranged in such false a way that distance from start to finish is same for each competitor. In case of two false starts, the athletes declared disqualified. The competitor who jostles, runs across, or obstructs other competitor(s) can also be disqualified. Timings of competitors are recorded by the official time keeper from stop watches or through electronic time keeping equipment. The hurdle events include 110m and 400m for men and 100m and 400m for women. The competitors are required to jump over specified number of hurdles, which are made of metal with

a wooden top bar. The steeplechase hurdle event comprises of 28 hurdle jumps and 7 water jumps spread over a 3000m run-way.

The throwing events include throw of shot-put, javelin, discus and hammer. Each competitor generally gets six trials and the winner is decided on the best distance covered in any one of his six trials. The Jumping events comprise of High Jump, Pole Vault, Long Jump and Triple Jump. In the first two events, athletes are required to jump over a crossbar. In Triple jump the competitors are required to complete a hop, step and Jump sequence. Winner of jumping event is decided based on the distance measured between the take-off line and the nearest break in the landing area lead by the competitor's body part.

A standard international track is 400 mts in circumference. It has 8 lanes and the width of each lane is 1.22 mts. Track and field events include Sprints, Middle distance running, Long distances race, Hurdles, Steeple Chase, Relay races, throwing events and jumping events. Track and field events are conducted by International Association of Athletic Federation (**IAAF**).

Athletics

The term "Athletics" is derived from the Greek word "Athlon" which means a contest. The word "Athlete" denotes a person who takes part in contests which involve physical activity. "Athletics" is the oldest forms of the organized sport contested between individuals and or teams.

3. Run through

A forward dip during the last stride before the finish line is the most commonly used technique.

Photo Finish Camera

It is impossible for the naked eye to be able to determine accurately the finishing sequence of runners for in a blanket finish. The problem has been solved by photo-finish cameras. A photo-finish camera has very narrow slit lens which photograph an area of the finish line not more than 5-10cm across. It uses a continuous strip of film that moves across the lens at a speed proportionate to the speed of athletes and records the arrival of each competitor at the finish line. The space between each athlete shown in the film exhibits the time elapsed between the arrivals of each of them at the finish line. Photo – finish camera also doubles up as an electronic timing device, recording finishing timings of athletes up to one hundredth of a second. The camera gives a developed photograph that gives positions of athletes and time when their torso reached the finish line.

FINISH POSTS

Except where their use may interfere with the photo finish equipment, two white posts may be placed along the prolongation of the finish line at least 0.30 mts from the edge of the track. They should be of rigid construction and approximately 1.40m high, 8 cm wide and 2 cm thick. The

the foot to push against at the start of the race. The foot plates shall be slopped to suit the starting position of the athlete and can be either flat or slightly concave. To monitor the false starts the blocks can be connected with a devise. The blocks can be used up to and including 400 meters (including the first) leg of the 4x200m and 4x400m).

TYPES OF FINISHING

The finish line should be 5cm in width drawn across the track at right angles to the inner edge. Two white posts of rigid material (80mm in width and 20mm in thickness) shall be placed at a 30cm distance from the edge of the track. Competitors are place in the order in which any part of their torso (as distinguished from the head, neck, arms, legs, hands, or feet) reaches the vertical plane of the edge of the finish line nearest to the star.

Technique

There are three finishing technique used particularly during the sprint events. They are as follows.

1. Lunge finish

The torso reached the finish line first, i.e. leaning torso forward.

2. Diagonal finish (or) Shoulder Shrug

At the finish line crossing it by making the shoulder in diagonal, towards midline of the finish line. It is more difficult type.

B. IAAF

The IAAF (International Association of Athletic Federation) is the supreme governing body controlling international athletics throughout the world. It was founded in Stockholm on July 17th, 1912, to draw up and enforce rules and regulations and a common amateur definition, and to recognize world records, The IAAF now promotes its own World Champions in track and field every four years, with annual World Cross- Country Champions for men and women every march.

IAAF- Structure and Functions

In 1912, two days after the Olympic games a congress was held in Stockholm for the formation of an International Association of Athletic Federation. Seventeen countries were attended the historic meeting. The meeting was urged the Athletics to develop and promote international competitions and the Olympic games. The meeting was also urged the importance of having universal code of rules and regulation and a common definition for Amateur and also an athletic register of world and Olympic records.

One year later in 1913 at Berlin the congress once again met and accepted the first constitution and 34 nations figured on the most membership list. J.Sigfrid Edstrom (Sweden) was elected as first president and Kristvan Hailstorm as honorary secretary. The technical rules for International and domestic competition were framed and presented for approval in 1914 at the third congress in France.

In 1946 the IAAF Head Quarters moved from Stockholm to London. Over the years, the IAAF grew into a huge and dynamic organization as the world governing body of track and field athletics, road running, race walking and cross country. The congress decided to move the head quarters once again from London to Morte Carlo in 1993. The Steady growth of the Federation accelerated in the last decades. By 1997 member countries in addition numbered 209. The IAAF council comprising of 27 members from various countries.

AFI (Athletic Federation of India)

Athletics in its present form was born in our country during past decade of 19th century. Nothing much is known of its early stages till first known participation of Norman G.Pitchard in 2nd Olympic games in 1900 at Paris, where he won a Silver medal in 200mts run. The Indian Olympic Association (IOA) was formed in 1926 and its control athletics. But India unofficially participated in the 1920 and 1924 Olympic games under the leadership of H.C.Buck of Y.M.C.A Madras. The official participation of Indian athletes started in the 1928 Olympic games at Amsterdam till 1936 Berlin Olympics. India participated in the Olympics under the IOA BANNER. Then 1940 and 1944 Olympic Games were not conducted because of second World War.

Structure and Functions

Amateur Athletic Federation of India was formed in 1946 at the initiative of Maharaja Yadvindra Singh then

in a natural relaxed position. An angle of about 90° at the front knee and of about 110° to 130° at the rear knee will be appropriate.

(iii) The Long Start (or) Elongated Start

The front starting block is situated 3 foot lengths from the starting line and there is one foot length between the starting blocks. The angle of rear leg about 110°. The long starting position is certainly the most difficult one. It should be applied carefully. Any athletes find this position rather ineffective. The long start, although still known, is hardly used nowadays.

For good starts a sprinter must,

- a) push back against the blocks
- b) moving the hands and arms as quickly as possible in reaction to the gun.
- c) move the hips quickly from the starting position to running position.
- d) run out of the blocks, do not jump.

STARTING BLOCKS

The starting blocks should be made of rigid material. It should be adjustable, but must be without springs. The blocks are fixed to the track, so that it provide firm base for

'On your marks' – position – his body weight resting comfortably on the legs in the crouch position. The hands are shoulder width apart to touch the ground behind the starting line with fingers and thumb pointing away from each other. The eyes are focused downward and forward.

Set position

The block settings should result, the athletes having a 90° angle at the front knee and 110° to 120° angle in the back of the knee. That gives a set position with the hips just slightly higher than shoulders slightly forward. The hands are placed just slightly wider than shoulder width apart, with the fingers and thumbs in a **"high bridge"** position. The shoulders are above and slightly ahead of the hands, the arms are straight, but not locked. He should feel pressure against rear block in the set position since the center of gravity is located high, the first strides are shorter and less powerful.

(ii) The Middle Start (or) Medium Start.

The front starting block is located two foot lengths (21 inches) from the starting line and the rear starting block is one foot length further. Kneel down with the right knee against the instep or toe of the left foot, and keep the trunk erect. The angle for the rear leg is about 130°. The slope of the body from the hips to the shoulders is not very steep. The body weight is on the legs and arms. The head remains

president of IOA with prof.G.D.Sondhi as its first president. The AAFI got affiliated to IAAF in the year 1946. The AAFI for the first time selected 8 athletes who participated in 1948 Olympic games at London. Indian women competed in the Olympic games for the first time in 1948.

Mr.M.C.Dhawn was elected by secretary of AAFI in 1950 and was the technical secretary in the first Asian games held at New Delhi in 1951. Raja Bhalendra Singh become the president of AAFI in 1952 and continued of guide athletic till 1968 along with Mr.M.C.Dhawn. This team acted a yeoman service to athletics in India and strengthened the AAFI to make it the leading federation. The federation produced by group competitors open national championship, Zonal and Inter Zonal Competition.

Many distinguished personalities are acted as president and secretary of AAFI till 1987 from 1988 to till date Mr.Suresh Kalmadi and Mr.Lalit K.Bhanot formed the new team of president and secretary respectively. The main function of AAFI is to prepare a year long sports calendar at the state and national level. They are sending teams to international level competitions based on merit.

D. AGE GROUPS

Under the Jurisdiction of the IAAF is split into five age groups.

1. Men and women there is no age limit
2. Seniors - 19 Years
3. Juniors - 17 and 18 Years
4. Youths - 15 and 16 Years
5. Boys - 13 and 14 Years

UNIT - II

TRACK EVENTS

Athletics is great fun and people of all ages, can enjoy it. Athletic activities can be traced back of the ancient Greeks, who used to take part in games of running, jumping and throwing. Track events include sprint races, middle distance races, long distance races, relays and hurdles.

The track events include races of 100m, 200m, 400m, 800m, 1500m, 5000, 10000m, and relay races of 4x100m, 4x400m in both men and women categories. In the track events all races are run with the competitor's left hand side of the track and finish in the same position. The competitors are required to wear their numbers on their vests.

A. SPRINT EVENTS

Sprints

"To cover the distance in the shortest time with maximum speed"

A. Sprint Events

1. 100 mts
2. 200 mts
3. 400 mts

1. Bunch start (or) Bullet start
2. Medium start
3. Elongated start

Three types of foot spacing bullet, medium and elongated starts. Each sprinter will have his own particular measurements so the following procedure is suggested to enable him to get into a correct starting position.

Block placement

The three block placement positions are determined by the location of the blocks relative to the starting line.

(i) The Bunch or Bullet Start

Stand with the right toe beside the rear of the left heel. Kneel down with trunk erect and rock forward in the same way. In this starting position the starting blocks are close to the starting line. The front block should be placed one foot length (16 inches) from the starting line, with 11 inches between the blocks results in low velocity and fast block clearance Track events, up to and including 400 meters, run at full speed for the entire race distance. Sprinter press their feet against two blocks, which are spaced apart and connected to a shaft, to improve their initial movement. The main features to look for in the sprinter's highly distinctive running action are the high knee-lift, the long strides, the thrusting arm action and the controlled breathing.

should immediately rise to final starting position retaining the contact of the hands with the ground and of the feet with the foot plates of the blocks.

A competitor shall not touch either the starting line or the ground in front of it with his hands or his feet on his marks. The three starting positions are measured from the starting line to the front leg of the starting block. Starting is the first stages in all the running events, should be conducted either track or road. There are only two types of starting should be followed by the athletes.

1. Crouch start
2. Arc start (Standing start)

CROUCH START

Crouch start can be used by the athletes those who are run up to and including 400mts and even the first runner of 4 x 100mts Relay and 4 x 400mts Relay.

In crouch start the following commands to be used,

1. On your mark
2. Set
3. The gun fire or clapping with clap board

It has three (divisions) method should be used according to the height of the individuals.

Sprinter

There is no ideal shape or size for the sprinter. He must, however, be well built and have good all-round muscular development and a quick reaction time. Regular, even and relaxed arm action must be learned first. The legs follow the arms, and the faster the arms are moved the faster the leg action will become. In the arm action emphasis should be on a forward and upward motion.

Most important factors for sprinting

1. Reaction time
2. Starting position
3. Powerful Muscles
4. Acceleration Technique.
5. Effective stride length
6. Curve running technique (200 mts, and 400 mts).
7. Technique at the finish line.
8. The condition of the Track surface
9. Wind and Weather conditions.

Stride Length

“It is the distance between touchdown of the toe of one foot and the touchdown of the toe of the other foot”. Stride length may and usually will be vary from left to right

or right to left on individual at the same velocity. This variance may be influenced by dominance, weakness, injuries and even leg length. Stride length will be vary with the speed of running and during the various phases of a race.

Stride Cadence or Stride frequency

"It is the number of strides per second". The stride cadence for sprinters is 4.5 to 10 strides per second with little difference found between the strides. The method of determining stride rate is to divide the number of strides in a race by the elapsed time for the race.

STARTING

There are varieties of running events for which the track is used . The finishing line for all races must be the same. But the starting line of all the races cannot be the same. It will vary from race to race. While 100mts race, 100mts hurdles and 110mts, hurdles races have to be run in straight courses, appropriate distance shall be measured backward from the beginning of home stretch and starting lines are marked. The extended lines are broken.

The start and finish of a race shall each be denoted by a white line 5 cm wide. The distance of the race shall be measured from the edge of the starting line farther from the finish, to the edge of the finish line nearer to the start.

All races shall be started by the report of the starter's gun or approved starting apparatus fixed upwards after he has ascertained that competitors are steady and in the correct starting position.

At all international sports competitions meetings, the commands of the starter in his own language shall, in races up to and including 400m be "on your marks", "set", and when all competitors are "set" the gun shall be fired, or approved starting apparatus activated.

In races longer than 400m, the commands shall be, "on your marks" and when all competitors are steady, the gun shall be fired, or approved starting apparatus activated. A competitors shall not touch the ground with his hands.

In all races up to and including 400m, and 4 x 100 mts Relay, 4 x 400mts relay first runner a crouch start and the use of starting blocks are compulsory. In competition held under IAAF, competitors must use starting blocks provided by the organizers of the meet. In other meet on all weather tracks, the organizers may insist that only starting blocks provided by them may be used. After the "on your marks" command, the competitor shall approach the starting line, assume a position completely within his allocated lane and behind the starting line. Both hands and one knee shall be in contact with the ground and both feet, in contact with the starting blocks. At the "set" command, the competitor

decreases. A study of the body movements involved in these activities pinpoints the causes. In normal walking and running the knee of the supporting leg is bent as it passes through the vertical position (i.e. when the centre of mass passes vertically over the foot), but in race walking the knee of this leg is straight in the vertical position. The technique is such a way that race walking does not become a modified run. Briefly, contact with the ground must be maintained at all times, a heel-and-toe action must be used, and the supporting leg must be straight at the knee as it passes through the vertical position.

Judging a fast walk is an extremely difficult skill, since it is almost impossible to see whether a walker has a foot on the ground at all times or that the knee is straight through the vertical for it takes only a fraction of a second to pass through the position. Race walking is not a natural skill as normal walking and running are, because the latter are the locomotion skills learnt from very early childhood.

As in most other athlete events, flexibility is an asset and hip mobility especially is an important factor in stride length in normal walking in which the line through the hip of the forward swinging leg is allowed to twist forward with the leg, the stride length is increased considerably. Stride length is also maximized, if the feet move along a straight line.

in the later stages of a race when fatigue is sapping his strength his skill does not break down.

C.LONG DISTANCE EVENTS

1. 5000 mts
2. 10000 mts
3. Marathon

The three main long distance events are 5,000m 10,000m and the marathon. Stamina is the basic quality needed by a long-distance runner, but speed has also become an essential requirement for would-be world beaters.

However, in the long distance the steady pacer must beware of the fast finisher who sits on his shoulder, until the final run-in. the steady runner without an equivalent fast finish must attempt to put himself far enough ahead of the sprint finishers by either a punishing pace throughout the race or by putting in bursts of speed during several laps from the finish. There is nothing more motivating for the training runner than to see his rival a few strides in front of him, but also nothing more demoralizing than for his rival to be 20 meters or more in front.

D.HURDLES – VARIOUS STAGES

MEANING

Running over the barriers (or) obstacles are known as Hurdles. The Hurdle race should be conducted for men and

women, senior boys and senior girls in various height and distance. Every hurdle race is based on certain conditions laid down in the rules of the International Association of Athletic Federation (IAAF).

The hurdles are made of steel with wooden top bar. The height of hurdles can be adjusted as per the length of the race and sex of the athlete. The hurdles are made in such a way that when force of 3.6-4kg. is being applied to the centre of the top, it should overturn automatically. The height required for, men's 110m race is 106.7 cm. The women's 100m sprint hurdles are 84 cm in height. In 400 m race the men's hurdle is 91.4 cm high and women's is 76.2 cm. The length of the wood used for the top bar should be 1.20m and width at least 7cm. The top bar should be striped in black or white or in some other contrasting colors.

The following are the standard distances, it can be classified into two categories,

- Men - 110 & 400 mts
- Women - 100 & 400 mts

Distance of Hurdles	Category	Height of the Hurdles	Distance Start to first Hurdle	Distance Between the Hurdles	Distance Last Hurdle to Finish
100mts	Women	0.840mts	13mts	8.50mts	10.50mts
110mts	Men	1.067mts	13.72mts	9.14mts	14.02mts
400mts	Men	0.914mts	45mts	35mts	40mts
400mts	Women	0.762mts	45mts	35mts	40mts

Substitution

Once a relay team has participated in a competition only two additional athletes may be used as substitutes in the composition of the team for subsequent rounds. Once an athlete, who has participated in a previous round has been replaced by a substitute, he may not return to the team.

RELAY BATON

The relay baton is made of a rigid material. It should be a single piece of smooth, circular and hollow tube of 280-300 mm length. The minimum weight required for baton is 50 grams and its circumference should be between 120-130mm. The batons should be colored so that it can be easily visible during the race.

Specification

- Weight of the baton : not less than 50 gm
- Length of the baton : 28 to 30 cm
- Circumference of the baton : 10 cm
- Color of the baton : Visible color
- Minimum baton required : 6 Nos.
- Maximum baton required : 8 Nos.

D. WALKING

Race walking may appear to be the natural link between ordinary walking and running, and in some respects this is true-with increase in speed, the force-time

runner only. The baton should not be exchanged within the acceleration zone(Advance Zone).

During the exchange the baton must be delivered firmly and safely into the hands of the receiving runner. When the incoming runner has approached his partner within 2 to 3 mts he indicated to him by a signal when to extend his receiving arm backwards. The signal comes too early or too late, or the runner receiving the baton moves his arm up, down or to the side, the results in an unsteady baton pass and consequently in a loss of time. The baton should be put firmly into the grasping hand between the spread thumb and the four locked fingers.

2. 4 x 400 mts Relay

The runners use a visual pass. The incoming runner carries the baton in the right hand and passes to the outgoing runner's left hand. The primary responsibility for the pass rests on the outgoing runner due to fatigue on the part of the passer. Once the baton has been taken, the athlete immediately transfer it to the other hand.

The four athletes shall run 400mts each to cover 1600mts distance by means exchanging a baton. The first leg of the 4x 400 mts relay run in lanes and so is the first curve of the second leg; only after crossing the line making the exit from the first curve, runners free to move to the inside of the track.

110mts Hurdles

There shall be Ten flights of hurdles in each lane, set out in accordance with the below table.

Starting line to First Hurdle	:	=13.72mts
" "	Second Hurdle	: 13.72+9.14 =22.86mts
" "	Third Hurdle	: 22.86+9.14 =32.00mts
" "	Fourth Hurdle	: 32.00+9.14 =41.14mts
" "	Fifth Hurdle	: 41.14+9.14 =50.28mts
" "	Sixth Hurdle	: 50.28+9.14 =59.42mts
" "	Seventh Hurdle	: 59.42+9.14 =68.56mts
" "	Eight Hurdle	: 68.56+9.14 =77.70mts
" "	Ninth Hurdle	: 77.50+9.14 =86.84mts
" "	Tenth Hurdle	: 86.84+9.14 =95.98mts
" "	Finishing line	: 95.98+9.14=110mts

VARIOUS STAGES

110mts Hurdles the Hurdling Technique is classified into the following:

1. Starting
2. Approach to the First Hurdle
3. Hurdle Clearance (Departure)

4. Running between the hurdles
5. The finish

1.Starting

Hurdling is basically a sprinting event, the mechanics of the starting do not vary much from that of the sprint start. In order to get eight (8) strides to the first hurdle to take – off foot should be placed in the first block. If the hurdler wants seven (7) strides to the first hurdle, take – off foot should be placed in the rear block.

2. Approach to the First Hurdle

The distance from the starting line to the first hurdle is 13.72 mts. The first three strides out of the blocks are the same as in a sprinter’s start. On the fourth stride, the hurdler begins to concentrate on the first hurdle. In perfecting the approach to the first hurdle make any adjustments on the 4th, 5th and 6th strides. The first three and last two should be kept constant. The last stride is slightly shorter to permit to get his centre of gravity slightly ahead of the take-off foot. This approach sets the pattern for the entire race.

3. Hurdle clearance

The take – off distance from the hurdle depends on four factors. The height of the athlete, speed of the approach length of the lead leg speed of the lead leg action. Each

The baton must be carried by hand throughout the race, if dropped, it must be recovered by the athlete who dropped it. He may leave his own lane to retrieve the baton provided this procedure is adopted and no other athlete is impeded, dropping the baton shall not result in disqualification.

Stages of Relay Running

The start

The starting of the 4 x 100 mts Relay is basically same as for the 400 mts. The starting blocks are placed close to the outer line of the track. The baton lies between the forefinger and the thumb is enclosed by the other fingers. After a successful start the runner quickly passes to the inside of his lane.

Checkmarks

The second, third and fourth runners place a checkmarks on their lanes just behind their starting positions. This is a check mark for the out going runner. The distance between the checkmark and the starting position depends on the speed of the incoming runner and on the acceleration of the outgoing runner.

The Baton exchange

The relay baton should be exchanged from one to another competitor with in the take over zone. The exchange is completed when the baton is in the hand of the receiving

when hearing the signal from the incoming runner moves the appropriate arm backwards in a positive and slightly angled manner to a level not higher than the shoulder line. The upper arm is straight at the elbow, the back of the hand is facing down wards the thumb and index fingers are widely spaced forming obtuse angle. The baton is received into such a palm from the incoming runner with an outstretched arm. In the final phase of the change over the elbow joint locks quickly and the baton is passed in a down sweep action.

The best result in both techniques the change over should occur when both runners are traveling at maximum speed and the actual change over should be as quick as possible. The majority of experts consider that the speediest change over occurs when the baton is actually changed over a distance of 2 to 4 mts from the end of the exchange zone.

Acceleration Zone

The acceleration zone lets the outgoing runner accelerate properly and allows the athletes more time to reach top speed at the exchange.

Exchange Zone or Take over Zone

The incoming runner can signals the exchange with verbal commands at a specific point when the incoming runner ready to pass the baton. The incoming runners can also use nonverbal signals. The outgoing runner can count the incoming runner's stride from the check mark to the exchange point.

hurdler must be cleared quickly and safely. The first prerequisite of movements much as in the ordinary running stride. For this action the lead leg is slightly flexed at the knee joint, and leading foot to track beyond the hurdle.

The average take-off distance from the hurdle in men's hurdles will be 1.90 mts to 2.20 mts to allow the leading leg to sweep forward and upward in a straight line. Too short a distance for the take-off results in a "jump" over the hurdle. The hurdle clearance are having the following factors.

Action of the Leading leg

The complete action consists of a quick forward and upward thrust of the leading leg in the direction of the leading of introduces the sequences.

Once the take-off foot leaves the track it becomes the trail leg. The heel of the trail leg moves actively toward the buttocks as the knee moves in a exaggerated motion upward and to the side to avoid hitting the hurdle. For the clearance of the hurdle, the trailing leg must be stretched away from the body when clearing the hurdle. This movement requires good mobility of the hip. The sequence of the athlete's movements should be as follows: after a rigorous push from the ground follows a phase of relaxation for the take-off leg. An action forward movement of the high should begin only when the foot of the leading leg has reached the edge of the hurdle.

Action of the Arms

The usual movements during running are also executed during hurdle clearance. With the sole difference that in the hurdle stride the arms perform additional functions. The arms contribute in a greater degree to maintaining body balance. When the trailing leg comes forward, the trailing arm swings backward to counter balance this movement. It is either almost stretched or flexed at the elbow.

4. Running between the hurdles (The three-step Rhythm)

In the 110 mts hurdle run the distance between the hurdles is 9.14 mts. If we reduce from the length of the hurdle stride, there remains for three strides between the hurdles or three-step rhythm a distance of about 5.065 meters. So that is 1.88 mts for each step. But practice shows clearly that the three steps are not of equal length. The first stride after the landing which is of about 1.55 to 1.60 mts follows a wide second stride measuring 2.00 to 2.20 meters and this is the longest between the hurdles. The last stride before the hurdle is always slightly shorter than the previous one.

5. Finish

The athlete has to use any one technique similar to sprint to finish the race.

Baton Exchange

There are two methods of baton (Exchange) passing

1. Up sweep method
2. Down sweep method

1. The up sweep method

In this method the passing of the baton occurs in an upward movement by a straight arm. At the same time the baton is received by an arm which is pointing backward and locked at the elbow. The outgoing runner upon hearing the agreed signal from the incoming runner, quickly extends his arm backwards locking it at the elbow, the thumb and fingers are separated and pointing downwards forming an obtuse angle. The time that he receives the baton the outgoing runner tries to keep his arm as still as possible. This outstretched arm the incoming runner quickly moves his straight arm upwards and in such a way that the outgoing runner can grasp the baton as near to the incoming runner's palm as is possible. In the upsweep method the baton is passed from the right hand to the left hand and then the left hand passing it to the right.

2. Down sweep method

In the down sweep method the baton – exchange takes place over a distance of 2 to 3 mts. The out-going runner

2. The baton must be passed inside a short distance to be covered by some three to four strides and without unnecessary loss of time.
3. The baton must be exchanged by non – visual method.

Visual Method

The visual method of baton exchange is used only in 4x400 mts relay. When the out going runner receive the baton, he must see the incoming runner while receiving the baton. The incoming runner gripping the baton at its base, then passes the baton into the receiver hand with a forward down sweep motion. The outgoing runner reaches arm straight back, palm facing upward and takes the baton, gripping the upper portion.

Non Visual Method

The non-visual method of baton exchange is used only in 4x400 mts relay. When the out going runner receive the baton, he doesn't to see the incoming runner while receiving the baton. The incoming runner gripping the baton at its base, incoming alerts the receiver, then passes the baton into his or her hand with a forward pushing, down sweep motion. The outgoing runner reaches arm back, palm facing upward and takes the baton, gripping the upper portion. then rotates the receiving arm down, under and forward, to ready the baton for the next exchange.

400 mts Hurdles

Hurdling is a sprinting, rhythmic event. In this race a full circuit of the track is run with 10 hurdles, 91.4 cm high, placed 35 mts apart. The distance from the starting to the first hurdle is 45 mts, while the last hurdle to the finish line measures 40 mts. There are ten flights of hurdles in each lane, set out in accordance with the below table.

Placement of Hurdles in 100mts Hurdle race

Starting line to First Hurdle	:	=13.00mts
" "	Second Hurdle	: 13+8.50 =21.50mts
" "	Third Hurdle	: 21.5+8.50=30.00mts
" "	Fourth Hurdle	: 30+8.50 =38.50mts
" "	Fifth Hurdle	: 38.5+8.50=47.00mts
" "	Sixth Hurdle	: 47+8.50 =55.50mts
" "	Seventh Hurdle	: 55.5+8.50 =64.00mts
" "	Eight Hurdle	: 64 +8.50 =72.50mts
" "	Ninth Hurdle	: 72.5+8.50=81.00mts
" "	Tenth Hurdle	: 81+8.50 =89.50mts
" "	Finishing line	: 89.5+10.5=100mts

Placement of 400mts Hurdles in Standard Track

(Men and Women)

Starting line to First Hurdle	:	=45.00mts
" "	Second Hurdle	: 45+35 =80mts
" "	Third Hurdle	: 80+35=115mts

"	"	Fourth Hurdle :115+35=150mts
"	"	Fifth Hurdle : 50+35=185mts
"	"	Sixth Hurdle : 185+35=220mts
"	"	Seventh Hurdle : 220+35=255mts
"	"	Eight Hurdle : 255 +35=290mts
"	"	Ninth Hurdle : 290+35=325mts
"	"	Tenth Hurdle : 325 +35=360mts
"	"	Finishing line: 360+40=400mts

E. RELAY

There are two relay events comprising of 4x100m for men and women, and 4x400m for men and women. All the four members of a team are required to run one stage of the race along with the relay baton in their hands throughout the race. The baton must be picked up by the athlete who dropped it. He/She may leave the lane in order to retrieve the baton, provided no other player is impeded.

4x100m relay races are run entirely in respective lanes with staggered starts. In 4x400m relay races the first lap and the same part, of the track, of the second lap shall be run in lanes. The position of the teams at the start shall be retained at each take- over zone, except in case of races where lanes are not used. The waiting runners can move to inside zone, after handing over the baton, until the course is clear to avoid obstruction to other competitors.

Relay races are a popular and exciting feature of track and field. It is a team event in an individual oriented sport. They give the opportunity for team work and cooperation is not available in the other events. The key to good relay racing is the baton exchange. Commonly the relay events are as mentioned below,

1. 4 x 100 mts
2. 4 x 400 mts

1. 4 x 100 mts Relay

The 4 x 100 relay is undoubtedly the most beautiful and one of the most difficult events of the athletics spectrum. This relay uses four sprinters running a complete lap of the track, passing on a baton which has to arrive at the finish line with the runner of the last leg.

The main objective in the baton pass is to keep the baton moving at top speed throughout the relay. The baton must be passed only within a 20 meters take – over zone (exchange zone). This zone begins 10 mts before the scratch line (100 mts marking) and ends 10 mts after it. A good baton – exchange needs to satisfy the following three conditions.

1. The baton – exchange must take place after some 12 to 16 mts running, measured from the beginning of the take – over zone.

forward and upward. Then he goes upward the body position is in vertical (or) hanging and elbows are flexed.

5. Clearing the bar

When the body is in hanging position lift and swings upward both the legs, at the same time the pole straightened, turn the upside down. Then pushing the pole down by hands the legs are throw over the cross bar. After clearing the cross bar push the pole away from the pit with the wrist action to avoid foul or touching the bar.

6. Landing

Safe landing is required on the landing area.

B.THROWING EVENTS

General conditions

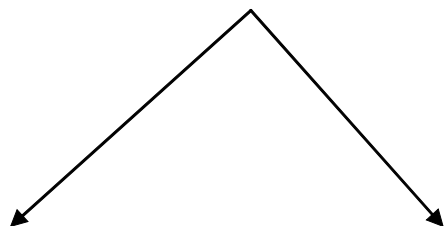
The person who has more body weight and mass of the muscles can choose throwing events. The following qualities are essential for throwers.

1. Body weight
2. Height
3. Leg power
4. Shoulder strength
5. Flexibility
6. Co-ordination
7. Speed

Race walking, of course, involves a rapid leg cadence and if the arms too are no maintain their synchronous swings they have to be bent at the elbows to reduce their moments of inertia, as in running. However, more emphasis is placed on the arm and shoulder action in race walking than in running, because of the need to counterbalancing the exaggerated eccentric thrust of the legs and movements of the hips. But in addition to counterbalancing the leg action, they also aid the forward drive with their swinging the strong upward swing of both arms evokes extra forces from the ground through the driving leg.

UNIT- III

FIELD EVENTS



DISTANCE EVENTS

1. Long Jump
2. Triple Jump
3. Shot Put
4. Discus
5. Javelin
6. Hammer

HEIGHT EVENTS

1. High Jump
2. Pole Vault

A. JUMPING EVENTS

1. LONG JUMP

The following techniques should involve while doing long jump.

1. Approach run
2. Penultimate stride
3. Take – off

(34)

1. Grip

Athletes who take off with the left foot, the pole must be carried on the right hand side, the left arm, half bent, supports the pole with the palm of the same hand turned downwards, while the right arm grips about 60-70cm higher with the hand lightly turned out. Keep the pole straight near the cross bar on the uprights. Hold the pole slightly lower than the height of the cross bar. Keep the pole parallel to the ground pointing to the pit or above the right hand palm facing upward and with left hand palm facing down ward.

2. Carry the Pole

The pole should be raised at 50° or 45° to the ground and keep right side. The left hand should be kept flexed at chest level and the right hand at the back. While carrying the pole, the body balance is very important.

3. Approach run

20 to 30 mts away from the vaulting box to start the running with the pole steadily and high knee action. When you reach the check mark, plant the pole in the vaulting box and kick the floor to go up.

4. Planting the pole

When the competitor reaches the check mark he should plant the pole into the box. Join the left hand with the right hand, push the right shoulder and both the hands

(47)

(iii) Supports for the cross bar

The cross bar shall rest on pegs pointing in the direction towards the landing area. The supports shall extend not more than 5.5 cm and not more than 1.3 cm in diameter, which should extend 35 – 40 mm above the pegs.

The distance between supports is minimum of 4.30 meters and maximum of 4.37 meters.

(iv) End Pieces of Cross Bar

It shall have 30 mm to 35 mm in diameter, square the length of the end piece is between 15 cm to 20 cm and should be semi circular.

(v) Landing (Pit) Area

The minimum dimensions of the landing area is 5 x 5 meters, for international competitions the length, width and height of the landing area will be 7 x 6 meters. The front pieces must be 2 m long.

VARIOUS STAGES

1. Grip
2. Carry the pole
3. Approach run
4. Planting
5. Crossing the bar
6. Landing

4. Flight in the air
5. Landing

1. Approach run

The length of the un-up is determined by the height of the jumper and his ability to accelerate in the run. According to analyzes carried out at recent Olympic Games, the best athletes use a run-up from 37-50m in length (incase for women 33-40). The athlete should mark the starting check mark 14 to 16 strides from the take – off board. If the athlete who is taking off with left leg, he should start running with right leg. Then he starts the approach run steadily and gradually increase the speed towards the take – off board.

2. Penultimate stride

The last two strides before the take off is called penultimate stride. In this time, the athlete shrugs his body little downward and the length of the stride decreases. That is easy way to fly in the air.

3. Take – off

The length of the jump depends not only on horizontal speed but also on the speed and power of the take-off. After completion of Approach run (penultimate stride), step on the take off board with the stronger foot and jump up in the air by pushing the take off board. After take off (or) jumping in the air the hands should be vertically raised. The Non-

take off leg should be raised high. The last step is executed more quickly and the whole foot is placed on the board, ahead of the projection of the center of gravity.

Plasticine Indicator (No Jump indicator)

Plasticine indicator is called no jump indicator, it is placed at the inner edge of the Take-off board. The judge at the take off board must watch the competitors does not overstep the scratch line. If a no jump indicator is not available the judge should build one moist sand which will clearly show if it is touched by toe or spike. It is a foul only if contact is made with the ground or the no jump indicator.

4. Flight

Jumping styles vary according to the development of the athlete and his muscular characteristics and the bone structure. The most common techniques are,

1. The Sail (common among beginners)
2. The Hitch kick (1-2-3 strides and a half in the air)
3. Hang (extended jump or glide)

(i) Hitch Kick

After jumping in the air from the take off board the athlete swing (or) rotate their legs like pedaling in cycle in the air into 2 or 3 pedaling style, and the legs are closed together before landing. When legs are pedaling the arms alternatively with legs movement.

4. POLE VAULT

Runway

The minimum length of the runway shall be 40 meters, when the conditions permit it is 45 meters.

1. The width of the runway is 1.22 meters.
2. The runway should be marked by white lines with 5cm as width.

Implements

(i) Upright

Any style of uprights or posts may be used provided they are rigid.

(ii) Cross Bar

It is made up of Fiber glass, Metal or other suitable material.

1. The length of the cross bar is 4.48 mts to 4.52 mts.
2. The maximum weight of the cross bar is 2.25 kg.
3. The circular shape of the cross bar is 30 mm diameter.
4. It should have the gap of maximum 3 mm

3.Fosbury Flop

The Fosbury flop was introduced by Dick Fosbury, who won the high jump at the Mexico Olympics in 1968. His technique for clearing the bar, his run up was also very notable because it was in the form of a semi- circle, and he took off with his foot at an angle of about 20 degree relative to the plane of the uprights. At the point of take – off Dick Fosbury with a vigorous bending action and driving up of the free leg, supported by an alternated movement of the upper limbs, rose completing a rotation on the longitudinal axis of the body and then prepared for flight with his back to the cross-bar.

Next he performed his rotation on the transverse axis of the body and at the extreme point of the parabola, he arched himself and continued his trajectory on this position until, so as not to knock down the cross - bar, he straightened his leg and landed on his back bowing his head on to his trunk so that the impact was taken by the top part of the back, avoiding unpleasant injuries to the cervical part of the spinal column.

4. Landing

Safe landing is required on the landing area.

(ii) Hang style

After the take off the athlete do the back arch the arms should be vertically raised above the head, the legs are straighten back, and before landing brings the legs and arms to extend forward, and the legs are closed together before landing.

5. LANDING

After completion of his style in the air, before landing, the athletes should extend both the legs forward / straightened. While landing both the heels should be landed first on the pit. There are three landing techniques should be used to come out of the landing area. They are as follows.

1. Collapsed landing
2. Swing out landing
3. Scoop landing

1. Collapsed landing

While landing both the heels should be touched first on the pit and then toe, the whole body should brought forward and place the knees on the pit, at the same time the buttocks should be kept back on both the heels.

2. Swing out landing

After landing in the pit the athletes should turn his body 45° either right or left in forward and fall down on the ground with shoulder, first then buttocks and so on.

3. Scoop landing

Landing by heels on the pit and push forcefully the sand and makes a dig and place the buttocks on the dig by extending the legs straight.

The competitor commits fouls if he;

1. Take off beyond the take off line.
2. Delaying more than 60 seconds.
3. After landing walking back towards the run way.
4. Performing acrobatics during the jump.
5. Uses illegal style of jump.

Rules

1. The order in which the competitors make their attempts must be decided by drawing lots.
2. Each competitor will be placed according to his best jump.
3. When there are more than eight competitors, each one is given 3 attempts and the 8 competitors with the best jumps are given further three jumps.
4. In case of a tie for the eight position, each competitor involved in the tie has three additional attempts.
5. When there are eight or less competitors, each one is allowed six trials.

3. Clearing the bar

1.The scissors

Towards the end of the 19th century, an American named Mike Sweeny proposed the scissors jump as an alternative to the frontal clearance. The scissors involved passing one leg over after the other at the same time bending the trunk towards the knees when clearing the bar. It consisted of the following movement:

1. While the forward leg was the cross – bar the other one kicked upwards, causing the chest to rotate towards the direction of jumping and a landing on the feet.
2. With the use of this style the world record began to rise this style, the world high-jumpers introduced minor adjustments to the technique according to their physical characteristics and talents.

2.The Straddle

Towards the middle of the 1930s another American Dave Albritton, proposed a radical new technique for clearing the bar, involving the body being parallel to the bar, but with the stomach downwards rather than with the body sideways. Thus the straddle was born, which was clearly demonstrated by the Soviet trainer Vladimir Mihailovic Dyachkov and put to good effect by Valeri Brumel, who took the world record to 2.28m in 1963.

1. Scissors
2. Straddle Roll (or) Belly Roll
3. Fosbury Flop

Various stages

1. Approach run
2. Take – off
3. Crossing the bar/ clearing the bar
4. Landing

1. Approach run

The jumper can approach either from the left side or right side of the cross bar with 25 mts long and medium speed. The angle of approach run and the number of steps vary according to the level of the athlete.

2. Take off

Jumper can stand either right or left one arm away from the cross bar. Then down vertically draw the line that may be considered as take off line. When the jumper start to approach towards crossbar, used his power leg on the take off line for make a jump.

6. Once the competition is under way, competitors are not allowed to use the runway for trail attempts.
7. All jumps must be measured from the nearest mark in the landing area made by any part of the body or limbs of the athlete to the take-off line or its extension and at right angles with the take-off line.
8. If a competitor takes off before the board or the line this does not constitute a foul.

2. TRIPLE JUMP

The triple jump shall consist of a Hop, step and jump in that order. This is the English definition of the jump. The hop must be executed on the same leg which was used for the take off (right-right or left-left). In the step the support is transferred to the other leg. The final jump is a proper long jump.

1. It shall not be considered a failure if the competitor, while jumping, touches the ground, with the “sleeping” leg.
2. There are six stages when taking Triple jump. They are as follows
 - (1) Approach run
 - (2) Take – off
 - (3) Hop

(4) Step

(5) Flight

(6) Landing

1. Approach run

The length of the run-up is determined by the height of the jumper and his ability to accelerate in the run. According to analyzes carried out at recent Olympic Games, the best athletes use a run-up from 37-50m in length (incase for women 33-40). The athlete should mark the starting check mark 14 to 16 strides from the take – off board. If the athlete who are taking off with left leg, he should start running with right leg. Then he start the approach run steadily and gradually increase the speed towards the take – off board.

2. Take – off

The length of the jump depends not only on horizontal speed but also on the speed and power of the take-off. After completion of Approach run (penultimate stride), step on the take off board with the stronger foot and jump up in the air by pushing the take off board. After take off (or) jumping in the air the hands should be vertically raised. The Non-take off leg should raised highly. The last step is executed more quickly and the whole foot is placed on the board, ahead of the projection of the center of gravity.

3. Hopping

The athlete should be used to land on the ground which he was used to take off. For example: The athlete has take off for his left leg means he should land or hop in the same leg. During hopping the non take off leg (or) rear leg has no movement, that's why it is called sleeping leg.

4. Step

After completion of hopping the athlete used to take one more step with his non take – off, foot before landing is called step. Here the athlete does the bounding action to do the step.

5. **Flight** and

6. **Landing** procedures are similar to long jump.

3. HIGH JUMP

The high jump as we know it today first became popular in the 19th century. Subsequent perfecting of the jumping technique took place in the development stages, but it has depended particularly on modification of the rules for the event and on the elimination of some restrictive conditions.

Various techniques should be used by the jumper to cross the bar. Depends upon their ability they used any one of the following techniques.

c) High carry

High carry method is associated with those throwers who tend to use a direct over the shoulder type withdrawal which ends with a turning back of the shoulders at the arm and javelin is reaching near full backward extension (To held on above the head).

A thrower must develop his carry position to suit his technique of withdrawal of the javelin in preparation for the delivery stride.

2. Approach run

During approach run the thrower has to mark the point of starting and the point of check mark with javelin. While running the javelin should move front and back, and slowly increase the running speed still you reach you the check mark.

The Run-up : The run – up has two parts. They are

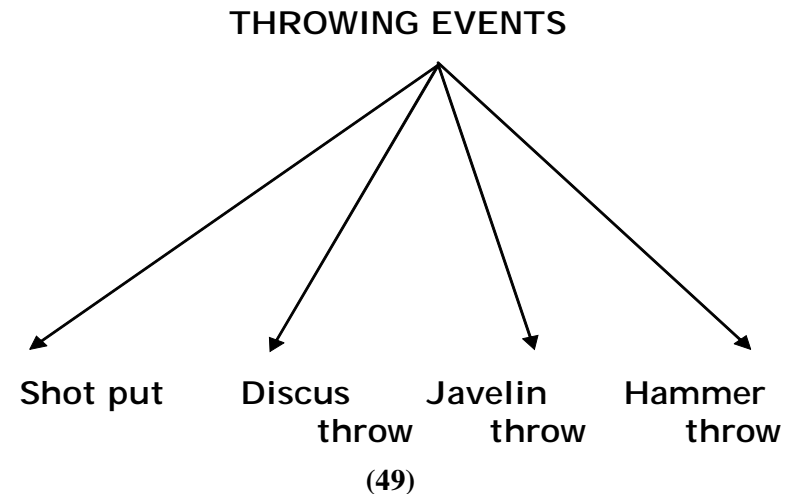
- (i) The cyclic part
- (ii) The acyclic part

The cyclic part speed is built up sufficiently so as to allow for a further increase over the last strides. The run-up should be easy and relaxed, heading the thrower to a powerful explosive all-out release.

- 8. Arm length
- 9. Balance
- 10. Endurance

The competitors are allowed three to six trails and three to eight of the best competitors are allowed three more trails. Incase of a tie for the final place, the competitor shall be allowed three additional trails. The conditions of the competition must be explained to the competitors before its commencement. The best throw of the competition out of all trails taken by the competitors shall be credited in resolving a first place tie. No markers or marks are allowed to be put in the throwing sector.

Competitors may use an adhesive substance on their hands for better grip, and can also wear a belt of leather or some other material to protect the spine from injury. However, taping of the fingers or use of any other devise on their hand which might assist in throwing is not allowed.



1. THROWING THE SHOT PUT

The competitor must begin the throw from a stationary position within the circle. The shot shall be put from the shoulder with one hand only and, shall touch or be in close contact with the chin. The hand shall not be dropped below this position during the act of putting.

Practice trials are not allowed after the commencement of the competition. Competitors are not allowed to put on gloves nor are they allowed to spray or spread any substance either on the surface of the throwing circle or on their shoes.

Basic Principles

1. Forces must be applied along a straight line.
2. Newton's 3rd law – Action and Reaction are equal and opposite.

Specifications

1. Weight of the shot for men - 7.260 Kg
2. Weight of the shot for women - 4.00 Kg
3. Diameter of the shot put circle- 2.135 m
4. Angle of the shot put sector - 34.92
5. Dimension of the sector - 20 x 12 m

a) Normal grip

The above thumb and middle finger is behind the edge of the grip cord and the index finger is partly curled around and behind on the javelin's shaft.

b) Middle and Thumb grip

The index finger and thumb is behind the edge of the cord binder and the rest of the fingers around the cord itself.

c) 'V' grip (or) Glow grip

The Javelin is held between the index and the middle fingers at the edge of the cord binder and rest of the fingers around the cord itself.

Carry

The javelin is carried above the shoulder of the throwing arm. Three commonly used methods of carrying the javelin during the approach run's cyclic phase.

a) Low carry

The low carry is generally associated with a circular type arm action in the 'withdrawal' (To held on waist level).

b) Medium carry

The medium carry is generally favored expansion in the withdrawal. (To held on eye level).

1. A head
2. A shaft and
3. A cord grip

The javelin throw comprises the following technical elements.

1. The grip and carry
2. The Approach run
3. The withdrawal
4. The impulse stride
5. The throwing stride
6. The release
7. The recovery

1. Grip

When executing their throws, javelin throwers may hold the javelin only by the whipcord grip. They may hold the javelin at the end of the cord grip with one or more fingers and the thumb touching the javelin shaft. Javelin throwers have some leeway in how they grip the javelin. It has three types how they can hold the javelin. The javelin is held behind the cord binder the rear edge of which offers a slightly raise border for gripping the javelin.

Stages / Method

1. Holding of the shot
2. Tucking (or) Placement of the shot
3. Stance
4. Glide
5. Release

1. Holding the shot

- a. The shot rest on the root of the fingers, and should not touch the palm.
- b. All the fingers are carry the shot except the little finger which is only support.

2. Placing (Tucking) the shot

1. The shot must be placed between chin and clavicle.
2. The shot does not go beyond the shoulder line.
3. The hand should be parallel to the ground.

3. Stance

The stance varied according to the using the style of Athletes.

Techniques (Style Of Putting)

The thrower can be used 3 style when putting the shot

1. Standing throw
2. 'O' Brien technique (or) Gliding
3. Rotation (or) Disco put

1. The 'O' Brien Technique

The distance a shot travels depends upon its height of release, velocity at the moment of release and the Angle of projection. The optimum angle of projection will vary depending on the height of the release, and the distance of the put, it will be approximately 34.95. The correct technique is the one that will result in the greatest velocity at release. The motion of a projected object is influenced by the exact point of application of the propelling force.

Holding the shot

The procedure for gripping the shot is to hold it in the left hand and lay the right hand loosely on top with the fingers spread slightly. The putter holds the shot in his right hand. Where it rests on the "base" of the fingers. The three middle fingers are only slightly splayed while the thumb and the little finger give the shot lateral support, securing a safe position of the shot.

The Reverse

The reversal is to serve as a follow through after the thrust and to retain balance in order to avoid fouling. After the discus has left the hand the thrower will have to reverse the feet rapidly and lower the body weight to maintain balance. The right leg must be brought forward quickly and planted firmly close to the rim of the circle, mean time the left leg swings back the body is bent at hips and right knee flexes to drop the centre of gravity into a stable position.

3. THROWING THE JAVELIN

The javelin throw distinguishes itself from other throwing events of shot-put, discus throw and hammer throw. These throwing events must be from a circle, the javelin must be thrown from behind the arc of a sector drawn with a radius of 8 mts. Due to the aerodynamic nature of the implement and its relative weight, the event does not require great strength. The event does require few less technique in order to achieve high level results.

Javelin consists of three parts namely the head, shaft and grip. The shaft is made up of either Aluminium or fiber. At the tip of the shaft a sharp head is fixed. At the center a grip made of thread is fixed. The Javelin is round and broad at the center. The circumference is small in the front and rear. It has three main parts

athlete drives off the left foot. The effective throwing position is one of "muscular wind" the hips displaced from the feet, shoulders from the hips and discus from the shoulders.

The run across the circle is initiated by the driving action of the left leg. Synchronized with the swing of the right leg. This drive carries the thrower halfway across the circle. The right foot landing approximately on the centre line with the leg well bent and the shoulder and body weight back. His left leg is pointing toward the direction of the throw, his right shoulder is facing the rear, his throwing arm is well behind the shoulder his left arm is curled and the discus is flat.

The Release

The throw begins with a forward and upward drive from the right foot. The shoulder should now come in slightly after the hip and the arm strikes from the low point, the thrower reaching out as far as possible to give as much distance from axis of rotation as he can. The left leg should now straighten, as the arm strikes. The discus will leave the hand in line with the right shoulder and should be squeezed out of fingers, each digit applying its force in turn and spinning of the first fingers last. The discus is spun clockwise. A good thrower will release the discus at a 35°-40° angle. The release must be smooth and rhythmic using the force generated from the lower body.

The stance

He should stand facing the rear of the ring with his back in the direction that he is going to throw. The shot should be held in right hand, supported by thumb and fingers. The hand holding the shot will be placed into the hollow of the collar bone in such a manner that it does not rest on such a manner that it does not rest on the shoulder but against the right side of the neck and the jaw. The elbow of the right arm is slightly raised and pressed forward. The upper arm points forward and downward. The head remains in its normal position. The eyes should be focused on a point to the rear of the ring and about five to ten yards away. He should stand erect in a telexed attitude, the left arm is held either out in front of the face or relaxed above the head the left front behind the right about one foot with just the toes touching for balance.

The glide or drive

The purpose of the glide is to gain momentum while moving across the ring and to lead into the correct position for the delivery. The initial movement is to lower the trunk and raise the left leg causing the body to form a "T" shape with all weight carried on the right leg. The head, shoulders and hip remain square to the rear of the circle, and the right leg flexes in preparation for the drive across the ring proper balance at this point is extremely important.

2. The Rotation or Disco-put Technique

The Starting Position

The putter stands at the rear of the circle facing 180° away from the throwing direction. The left foot is along the centre line of the circle and the right foot is placed laterally to the right of the centre line about shoulder width apart or just this point in most cases. The grounding of the left foot at the stop board denotes the arrival of the thrower into the delivery stance.

Preliminary Movements

To start the turn, the putter begins by swinging the shoulders, trunk and left arm along with the left and then to the right, as the body weight shifts correspondingly from leg to leg in coordination with the rhythm of the shoulders, trunk and left arm. Both knees are semi – flexed while this side to side swaying movement is taking place to break the inertia and set the pattern of movement to follow.

Turn

The double support phase of the turn begins at the end of the preliminary movements. The thrower is completely over his right leg with the trunk and shoulders well twisted to the right. From this position the thrower begins unwinding his upper body in the direction of turning with a wide

throwing arm bang to the right side along the thrower's thigh with the head and eyes focused to a point about 5 meters behind the circle. There are generally three positions that a thrower may adopt in relation to the line of direction. The experience, technical skill and comfort of the thrower must decide which of the three starting positions suit their ability.

The left foot is generally placed a few centimeters back from the rim of the circle, in order to avoid fouling by bursting the sole of the foot on the top edge of the rim of the circle as the pivot is executed.

The preliminary swings

The thrower should position himself at the rear edge of the circle with his back to the generally facing the direction of throw and his feet slightly wider than hips. The discus should be flat and facing downwards on the arm swung at shoulder height so that the arm and discus go well behind the right shoulder. The free arm rests comfortably across the chest. The thrower's weight should move easily from one foot to the other. On the final preliminary swing, the arm is swung back as far as possible so that the body weight is over a straight right leg.

Coming across the circle

The initial movement is begun the hips are turned and a pivot is made on the ball of the right foot as the

Specification of discus

1. Weight of the discus for men : 2 kg to 2.025 kg
2. Weight of the discus for women : 1 kg to 1.025 kg
3. Diameter of the discus for men : 21.9 cm to 22.1 cm
4. Diameter of the discus for women: 18 cm to 18.2 cm
5. Angle of sector is : 34.92°

Various Stages

Hold

The hand is placed flat against the discus surface, the upper joints of the fingers grasp the rim of the discus. Its center of gravity lies between the index and middle finger. Due to a slight bending at the wrist the upper face of the discus touches the arm, because it prevents the discus from falling out of the hand in the subsequent movements.

Starting position

The starting position at the rear of the circle is with the thrower facing 180 degrees away from the throwing direction. The two feet are usually placed about shoulder width apart or slightly more in the case of very tall throwers. The toes point naturally outwards with the weight of the body evenly distributed over both feet. The discus and

sweeping left arm action parallel to the ground, a slight forward tilt to trunk in a semi sitting position. The single support phase of the initial part of the turn is followed by a brief non support phase when both feet are off the ground and the whole body is turning on its vertical axis, and continues turning after the right foot lands around about the center of the circle.

Follow through (or) Reverse

When the right leg has driven really well and effectively and the action has been timed correctly the athlete will be well over the left foot as the arm strikes. Immediately after the shot has left the hand, he will find himself falling over the stop – board. In order to prevent himself fouling, the left foot is rapidly withdrawn and the right leg brought forward, the toe of the right foot striking the inside edge of the stop – board. At the same time the body weight is lowered in order to be more on balance by lowering the centre of gravity.

Valid Trial

For a valid trial, the shot shall fall completely within the inner edges of the landing sector.

Fouls

1. Throwing the shot from behind the shoulder
2. Touching outside the circle or the top of the stop Board

3. Shot landing on the sector line or outside the sector line
4. Delaying more than 60 seconds to throw.

Rules

1. The use of gloves is not allowed
2. At the competition area, each competitor may have a maximum of two practice trials which should be made in draw order, under the supervision of the judges.
3. Once the competition has begun, competitors are not permitted to use implements for practice purposes or to use the runway or ground within the sector for practice trials, with or without implements.
4. No device of any kind – i.e., taping of two or more fingers together, which in anyway assists a competitor when making a throw, shall be allowed. The use of tape on the hand shall not be allowed except in the case of the need to cover an open cut or wound.
5. A better grip, competitors are permitted to use a suitable substance on their hands only.
6. To protect the spine from injury, a competitor may wear a belt of feather or other suitable material.

7. For a valid trail, the tip of the javelin shall fall completely within the inner edges of the landing sector.
8. If the implements breaks during a throw or while in the air, and if the competitor thereby loses his balance and contravenes, it shall not count as a foul throw, provided one attempt was made in accordance with the Rule.
9. Implements shall be carried back to the starting line and never thrown back.
10. The competitor shall not leave the runway until the implement has touched the ground.

2. THROWING THE DISCUS

The object of the spin in the discus throw is to generate power and speed within the circle to apply to the discus itself, and the more power that is applied to the discus, then further it will go the angle to release of discus, the position of the discus during its flight are important factors. It has three types,

1. Half rotation
2. Full rotation
3. One and half rotation

6. 5000m Run – Arc start **or** Group start
7. 10000m Run – Arc start **or** Group start
8. 400mts Hurdles - Full stagger distance
9. 4 x 100m Relay – Full stagger distance
10. 4 x 400m Relay – One and Half stagger distance with diagonal distance.

2.Non- Standard Track

The track which is not satisfying the conditions of standard track is called as Non-standard track and the 400mts track without curb (raised border) is also treated as Non-standard track. Usually 200mts track is called as Non – standard track.

Some of the disadvantages of Non-standard track:

- a) Sprinters very difficult to show their real capacity.
- b) Very difficult to run more than 6 competitors at a time.
- c) Very difficult to conduct Hurdles and Relay races.
- d) Very difficult to conduct both track and field events simultaneously.

Method of finding Running Distance Radius for 200 mts track if 36 mts as straight.

3. Five – stride – Rhythm

The three known stride Rhythms – the three stride rhythm. The five stride Rhythm and seven stride rhythm. It is five stride – Rhythm which is the most widely accepted, which comprises the following phases:

- (i) The withdrawal of the javelin
- (ii) The impulse stride
- (iii) The throwing position
- (iv) The release
- (v) The recovery

(i) Withdrawal of the javelin

The withdrawal starts at the second stride of the five-stride rhythm and ends at the third stride. The throwing arm is drawn back in alignment with the shoulder axis. The palm of the hand is turned upward and extend the forearm, when the withdrawal is completed, the athlete's body has a marked backward lean.

(II) Impulse stride /Cross step / Three step (or) Five step Rhythm

When an athlete reaches the check mark with the left leg the action of throwing should be starts. The right hand is stretched backward with the javelin and left hand is brought in forward in front of chest. That is otherwise called "with drawl of the javelin".

The toe of the right foot must be deviate more than 30° from the run up direction. The left leg presses the body down low into the fourth stride, preventing the body's centre of gravity from lifting at the landing of the right leg, which must be allowed to bend when it receives the body weight.

(iii) Throwing Position

The throwing position starts at the moment when the athletes right foot makes contact with the ground after the impulse stride. The right leg can start to extend and doing s introduce the release, the full extension of the forearm by the hand is important under no circumstances must the arm be flexed at the wrist.

(iv) The Release

The release is initiated by a forward and upward stretching of the right leg at the knee and ankle joints, driving the right hip forward. The shoulder and the hip axes now run parallel and almost at right angles to the direction of the throw. The throwing arm is not yet stretched while the right leg is extended, the heel is raised, allowing the pressure of the ball of the foot to act longer on the body. The throwing arm now comes into its sphere of action. When the throwing arm begins to strike, the elbows are raised until it is level with the heed and pointing in the throwing direction.

Method of Finding Running Distance Radius for 400 mts if 80 mts as straight.

$$2pr = 240 \text{ (Circumference of two curves)}$$

$$r = 240/2 \pi$$

$$240/2 \times 3.1416 = \frac{240}{2 \times 3.1416} = \frac{240}{6.2832}$$

$$= 38.20 \text{ mts}$$

For Standard Track (With Kerb)

Marking Distance Radius (MDR or CR) = RDR – 0.30 m

MDR = 38.20 – 0.30 = 37.90m

For Non-standard Track (without kerb)

MDR = RDR – 0.20 m = 38.20 – 0.20 m = 38.00m

Starting points in 400 mts Track

1. 100m Run Men & Women
100m Hurdles for Women - Parallel Method
110m Hurdles for Men
2. 200m Run – Half stagger distance
3. 400m Run – Full stagger distance
4. 800m Run – Half stagger with diagonal excess **Or** Arc start / group start
5. 1500m Run – Arc start **or** Group start

Running Distance Radius (RDR)

RDR is the path in which an athlete has to run in the curve to cover the exact distance. The chart below shows that RDR,CDR and area required to lay 400mts raised bordered track when the straights length varies.

Straight length in mts	Rdr in mts	Cdr in mts
79MTS	38.50	38.20
80MTS	38.18	37.88
84.39mts	36.80	36.50

The chart below shows that RDR,CDR and area required to lay 200mts Non raised bordered track when the straights length varies.

Straight length in mts	Rdr in mts	Cdr in mts
37.50MTS	19.89	19.67
40.00MTS	19.09	18.89

During the release the left side of the body must be in a flexed position. This is achieved by a sudden arrest of the backward movement of the left arm just when the right side of the body overtakes the left side the angle of release is between 30 and 36 degrees.

(v) The recovery

A distance of at least two meters from the arc will be required merely checks the forward speed of the body. Thus preventing from fouling. After the release, the right leg is forward in a springing movement. The reverse takes places to avoid stepping over the right foot must be planted transversely to the throwing direction, the upper body must be lean forward, the left leg is raised and brought back into the direction of the run-up. Javelin consists of three parts namely the head, shaft and grip. The shaft is made up of either Aluminium or fiber. At the tip of the shaft a sharp head is fixed. At the center a grip made of thread is fixed. The Javelin is round and broad at the center. The circumference is small in the front and rear.

Follow throw

After releasing the javelin the thrower to avoid his forward momentum (or) foul, then he placed his rear leg to brought forward for his rear leg and placed nearer to the board and to do hopping twice or threes. Then he come back behind the runway should not make foul.

Correct throw

The javelin should be caught in the grip. The javelin must be thrown forward from behind the shoulders. While throwing thrower should not cross the line of runway either in front or side. After releasing, the javelin should fall within the sector lines with the tip first touching the ground. The thrower still remains (leave) the runway only after the javelin lands on the ground.

6. THROWING THE HAMMER

The technique of hammer throwing is determined by the specific nature of the implement and the measurement of the throwing circle, which comply with the international rules. A complete throw consists of two preliminary swings and three turns on the left foot with an active push-off from the right leg at each turn. The following are the parts of hammer throw:

1. The Grip
2. The Initial position
3. The preliminary Arm swings
4. The Transition
5. The turns

Top Layer

Now-a-days all international competitions are being held on synthetic tracks. The thickness and material used for various layers of a synthetic track depend upon the product and preference of the particular firm (construction agency). Although, the material used for top layer by all the firms are synthetic tracks, but of different variations. It is advisable that whenever 8 lane synthetic tracks are being laid, efforts should be made for laying of another 4 lane synthetic track of the same material for training purposes.

Lane

Lane is the space between the two parallel lines.

Kerb

Kerb is the raised border (both inner and outer line) which is fixed permanently through the inner line of the first line and outer line of the last lane. Dimensions of curb is 5 x 5 cm (5 cm height, 5 cm width).

Curb Radius (CR)

Curb radius is the radius which is used to draw the curve. It is otherwise known as Marking Distance Radius (MDR). The curb radius varies according into the nature of the track.

TRACK MARKING

Track must be prepared according to the rules and regulations laid by **International Association Of Athletic Federation** (IAAF). The inner raised border should be 5cm in height and width by using brick, wood or any other suitable material. There shall be a minimum of 8 lanes and width of lane is 1.22mts and width of the line is 5cm. The straight lines are always marked by north to south direction and finishing line must be same for all races.

a) TYPES OF TRACK

The track is classified into two types based on its specifications.

1. Standard Track (with curb)
2. Non- standard Track (without curb)

1. Standard Track

The tracks are made either on plan surface (grass) or with the help of cinder/synthetic material which is skid proof and not too hard. To get maximum benefit from the cinder/right synthetic tracks, it is essential that proper care be taken at the time of the construction so that right materials are mixed in various layers as per required thickness.

6. The Release

7. The Recovery

The Grip

The inside grip of the hammer handle is laid against the pads of the middle phalanges of the left hand fingers. The right hand cuffs the left by putting the four fingers over the back of the middle and basal phalanges of the left hand fingers. The hammer must be held firmly but not tensely.

The initial position

The thrower stands at the rear edge of the circle with his back facing in the direction of the throw his feet are a little more than shoulder width apart and his knees are bent for stability during the arm swings. The thrower now places the hammer head behind his right leg as far to his rear as possible. He then turns to the right until the right shoulder points in the direction of throwing. The hammer wire forms a straight line with the extended left arm.

The preliminary arm swings

The main function of the preliminary swings is to break the inertia of the thrower and hammer and to set a rhythmic pattern of movement by which initial acceleration is transmitted to the hammer. During the preliminary swings, the arms are kept long and relaxed and form and extension

of the hammer wire. They begin with this movement when the hammer is at its lowest point and end it by turning the trunk to the right. The thrower must counteract the increasing centrifugal force.

When the hammer moves backwards, he presses his hips forward. After the first arm swing the thrower keeps the lowest point of his hammer well to the right, at around 290 to 300 degrees, and the highest point somewhere around 120 degrees.

The Release

The delivery phase begins when the right foot touches the ground after the third turn. The landing of the right foot must be fast and firm in order to match the acceleration of the implement, which is racing down to the lowest point with the beginning of the active straightening of the legs. Just before the hammer is released, the left knee straightens. When the implement leaves the hand, the vertical line of projection of the thrower's head should not go beyond the right heel. If the feet are in a stationary position, thus is a clear proof of a correctly executed delivery. The hammer is released at shoulder height. The left shoulder points in throwing direction and back is well arched. The most valuable angle of release in the hammer throw is 42 and 44°.

1st Day Events

1. 100 mts Hurdles
2. High Jump
3. Shot put
4. 200 mts Run

2. Decathlon

Decathlon consist of 10 events which shall be conducted on 2 consecutive days in the following order.

1st Day Events

1. 100 mts Run
2. Discuss throw
3. Pole vault
4. Javelin throw
5. 400 mts Run

2nd Day Events

5. Long Jump
6. Javelin
7. 800 mts Run

2nd Day Events

6. 100 mts Hurdles
7. Long Jump
8. Shot put
9. High Jump
10. 1500 mts Run

Note :

1. Winners will be decided based on the points of all events.
2. There is no heats in the running events and every running events are treated as finals.
3. Three attempts only will be given to field events.
4. Two false start should be permitted.

3. Decathlon

Decathlon consist of 10 events which shall be conducted on two consecutive days in the following order, with minimum 30 minutes interval between two consecutive events and 10 hours interval for last event of first day and first event of second day.

1st Day Events

1. 100 mts Run
2. Long Jump
3. Shot put
4. High Jump
5. 400 mts Run

2nd Day Events

6. 110 mts Hurdles
7. Discus throw
8. Pole vault
9. Javelin throw
10. 1500 mts Run

Combined Events For Women

Combined events for women there are two category mentioned as follows.

1. Heptathlon

2. Decathlon

1. Heptathlon

Heptathlon consist of 7 events which shall be conducted on 2 consecutive days in the following order.

The Recovery or Follow Through

To avoid stepping over to thrower must absorb the impact by reversing the legs and lowering the body's centre of gravity, thus increasing stability.

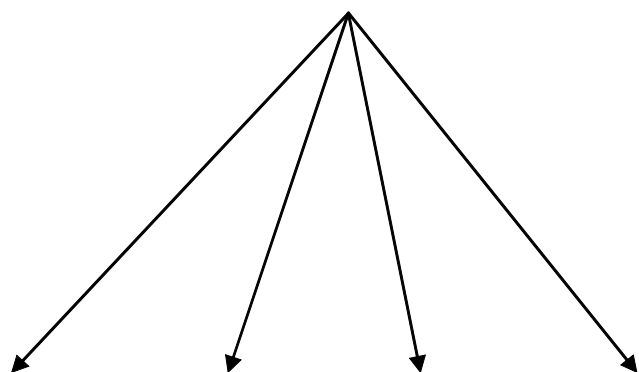
C.COMBINED EVENTS

Multi-discipline events has been included in athletics programmes since eight century B.C. though originally the five events for men included a run, long jump, discus throw, javelin throw and wrestling. The 10 events with we are familiar today were practiced first in Scandinavia, and the event is now developed in importance for the genuine all – rounder, who may not be one event, but who can maintain a high overall standard. Today it is an event for the decathlon or heptathlon specialist who prepares for it and competes in the event as a whole rather than in series of separate competitions. The decathlete or heptathlete needs to be a balanced personality with well –rounded physical development.

The Combined events are an individual events consist of several number of events of different category. For men and women combined events are classified into 4 types according to the level of competitors. The events are held over two days, and they are chose as a true test of skill, stamina and technique. The decathlon combines sprints with middle distance running, throwing, jumping, hurdling and vaulting.

There is a rest period of 30minutes between each event. A competitor is awarded points for his best performance in each event, as calculated by reference to scoring tables produced by the IAAF. The decathlon entered the Olympic programme in 1912.

COMBINED EVENTS



Pentathlon

Heptathlon

Octathlon

Decathlon

They are as follows.

1. Pentathlon - 5 events
2. Heptathlon - 7 events
3. Octathlon - 8 events
4. Decathlon - 10 events

The Combined events such as pentathlon, which shall be conducted on one day, and other combined events such as Heptathlon, Decathlon and Octathlon should be conducted on two consecutive days as in the prescribed order.

Combined Events for Men

1. Pentathlon
2. Octathlon (Youth Boys)
3. Decathlon

1. Pentathlon

The pentathlon is a five-events test of all-round ability. The men's version comprises the long jump, javelin, 200m., discus and 1500 m in that order on one day. Scoring is on the same basis as the decathlon. The pentathlon has long been a most popular women's event, and was introduced into the Olympic schedule in 1964.

2. Octathlon (Youth Boys)

Octathlon consist of 8 events which shall be conducted on consecutive two days in the following order.

1st day Events

1. 100 m Hurdle
2. Long Jump
3. Shot put
4. 400 mts Run

2nd day Events

5. 110mts Hurdles
6. High Jump
7. Javelin
8. 1000 mts Run

i) By seeing their timing in 1/100 of second. If the tie still remains.

ii) Lot shall be used to decide the best loser.

b) Field events

During horizontal or distance events, where there are more than eight competitors, each competitor shall be allocated three trials and the competitors with the best valid performances shall be allowed three additional trials.

In the event of a tie for the last qualifying place it shall be resolved by seeing the second and third best performance among the tied competitors and if tie still remains, the tied competitors shall also be allowed to perform three additional trials.

In the event of a tie for any position, it shall be decided first by using the available rules. If the tie still remains it concerns for the first place, the competition shall be re-run to decide the winner which is known as concerns any other place, the result will stand. That means the tied competitors shall be awarded the same place.

Note; Its best performance as achieved during field braking, it shall also be considered.

$$2\pi r = 128 \text{ (Circumference of two curves = } 200 - 72 \text{ (} 2 \times 36 \text{))}$$

$$2 \times 3.14 \times r = 128$$

$$\text{RDR or 'r' = } 128 \times \frac{1}{2} \times \frac{1}{3.14} = 20.37 \text{ m}$$

$$\text{MDR = RDR - 0.20 m}$$

$$\text{MDR = } 20.37 - 0.20 = 20.17 \text{ m}$$

b) TYPES OF RUNNING SURFACE

1. Mud
2. Grass
3. Cinder
4. Synthetic Track

c) NEED FOR A STANDARD TRACK

1. Track must be prepared according to the rules and regulations laid by International Association of Athletic Federation (IAAF).
2. The length of the standard track shall be 400 mts.
3. The track should be laid out from North to South direction.
4. Track shall consist of two parallel straights and two curves of same radius. The length of the curve will be more than the straight.

5. The track should have minimum of 6 lanes and maximum of 8 lanes.
6. The inside and outside of the track shall be bordered by a kerb. That is raised border of maximum 5 x 5 cm.
7. The track should have common finishing point.
8. To conduct all the running events up to 10,000 mts within a track and also the jumping and the throwing events simultaneously with the track events.
9. The track should have proper drainage system.
10. The track should be leveled without any ups and downs.
11. The running direction is such that the athlete's left hand side is towards the centre of the track.
12. The synthetic material will be used as the surface of the track.

STAGGER DISTANCE

1. There will be no stagger for the first lane athlete.
2. As and when the width of the lanes changes, the stagger distance also changes.
3. Staggers are needed only when the athletes are required to run in curves also in their lane.
4. Staggers will not change according to the increase in the length of curves.

6. Angle sector is : 34.92°
7. Wire : Single up broken and straight length of string steel wire 3 mm in diameter
8. Handle : Curved or straight grip with maximum width inside of 130 mm and maximum length inside of 110mm.

BREAKING TIES IN ATHLETICS

Tie breaking in can be steadied separately during preliminary rounds and finals to decide the positions.

1) Preliminary rounds;

a) Track events

Preliminary rounds (heats) shall be held in track events when the number of competitors is more in number to reduce the number of competitors to 6 or 8 to conduct the finals. In all preliminary rounds at least first and second in each heat shall qualify for the next round and it possible at least three in each heat shall qualify. The qualification for the next race shall be decided either according to their placings or according to their times (best losers). During this selection if there is a tie among the best loser, the following steps shall be applied to decide the best loser for the next round.

The Ring

The ring shall be placed to the level of outside ground. It must have a height of 1.4cm to 2.6 cm from the inside floor of the circle and 6mm thickness.

Specification of Hammer

The hammer consist of three parts, a metal head, a wire and a grip. The head shall be of solid iron or other metal not softer than brass. The head should be spherical in shape with smooth surface. A steel wire, with a diameter of 3mm, is attached with the head at one end and with a handle on the other end.

Overall weight of the hammer

1. Men : 7.26 kg to 7.285 kg
2. Women : 4 kg to 4.025 kg

Overall length of the hammer

1. Men : 117.5 cm to 121.5 cm
2. Women : 116 cm to 119.5 cm
3. Diameter for men : 11 cm to 13 cm
4. Diameter for women : 95 cm to 110 cm
5. Head : Solid or other suitable material

5. When staggers are marked, the diagonal excess distance also to be taken into consideration.

Formula

$$\text{Half stagger} = [W (N-1) - \alpha 0.10 \text{ m}] \pi$$

$$\text{Full stagger} = [W (N-1) - \alpha 0.10 \text{ m}] 2\pi$$

$$\text{One and Half stagger} = [W(N-1) - 0.10\text{m}] \times 3\pi$$

Where,

W – Width of the lane,

N – Number of the lane

π – 3.1416 (Standard value)

Stagger distances for Non- standard Track

$$\text{Half stagger} = W (N-1) \times \pi$$

$$\text{Full stagger} = W(N-1) \times 2\pi$$

$$\text{One and Half stagger} = W (N-1) \times 3\pi$$

Diagonal (excess) Distance

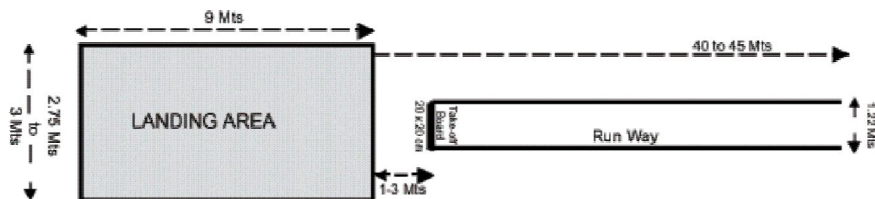
The excessive distance run by the athletes other than the first lane runner for 800mts and 4 x 400mts relay to reach the first lane after the first and three curve respectively is called diagonal excess. This diagonal distance should be calculated for each lane and it should be added with half stagger, and 1½ stagger respectively in the starting point itself.

UNIT - V

FIELD MARKING

Layout of Area for all Field Events with all Specifications

a) LONG JUMP



Specifications

Runway

Approach run - 40-45mts

Width of the lane - 1.22

Width of the line - 5cm

Jumping pit

Length - 9 mts

Width - 2.75 mts to 3 mts

Distance of the take off Board from the nearest edge - 1 – 3 mts of landing area

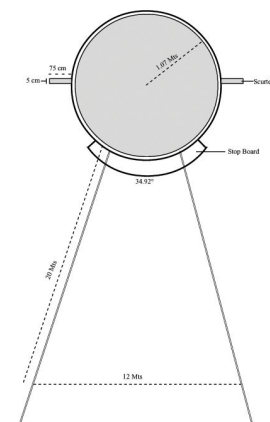
(84)

9. Width of the cord grip : 150 mm to 160 mm for men

10. Width of the cord grip : 140 mm to 150 mm for women

11. Angle of sector is : 29°

h) THROWING THE HAMMER CIRCLE



The hammer is thrown from a circle, shielded on three sides by a netting a cage on a metal frame, and must land within the marked sector. The competitor who achieves the best distance with his throw is declared winner. A total number of five judges watch for infringement within the circle, the other three judges supervise the field. If the hammer breaks while attempting a throw, then the attempt shall not be counted. Under such circumstances, if the competitor loses his balance and commits a foul, it won't go against him.

(93)

The javelin is made of wood or metal shaft with a sharp metal head. There shall be a cord grip around the centre of gravity of javelin. The cord grip should not exceed the diameter of the shaft by more than 8mm. The grip shall be of uniform thickness.

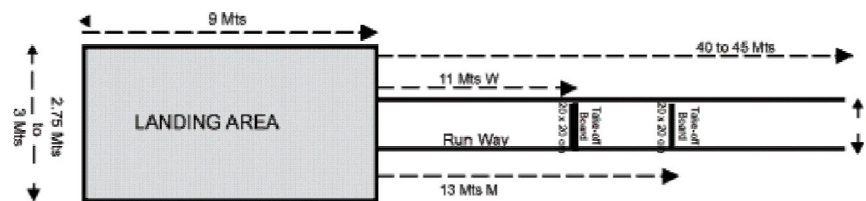
SPECIFICATIONS

1. Length of the runway : 30 to 36.5 mts
2. Width of the runway : Two parallel White lines 5 cm wide and. 4 mts apart
3. Width of the arc : 7 cm extended by 75cm long and 7 cm wide.
4. Weight of the javelin : 800gms to 825 gms for men
5. Weight of the javelin : 600gms to 625gms for women
6. Over all length of the javelin : 2.60 mts to 2.70 mts for men
7. Over all length of the javelin : 2.20 mts to 2.30 mts for women
8. Metal head : 250 mm to 330 mm for men and women

Dimension of the Take- off Board (Wooden Board)

- Length - 1.20 mts to 1.21 mts
 Width - 20 cm
 Depth- 10 cm

b) TRIPLE JUMP



Specifications

Runway

- Approach run - 40-45mts
 Width of the lane - 1.22
 Width of the line - 5cm

Jumping pit

- Length - 9 mts
 Width - 2.75 mts to 3 mts
 Distance of the take off board from the nearest edge of landing area - 11m (w) 13m (m)

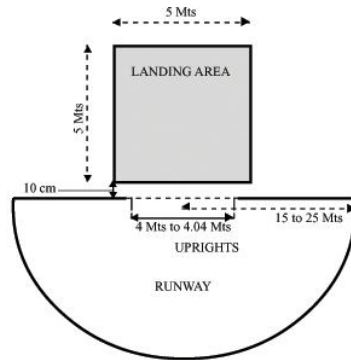
Dimension of the take off board

Length - 1.20 mts to 1.21 mts

Width - 20 cm

Depth- 10 cm

c) HIGH JUMP



Specifications

Runway

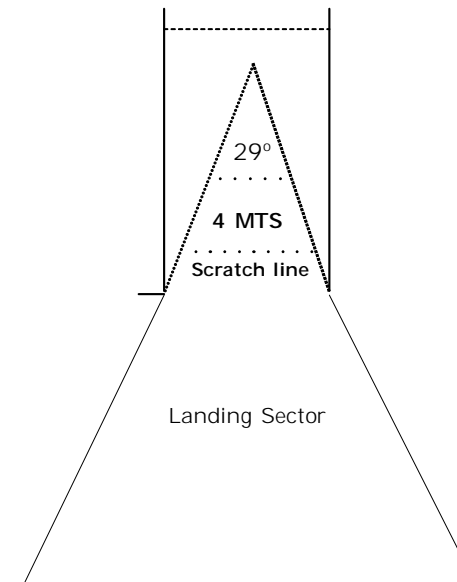
The minimum length of the runway shall be 15 meters. Except in international competitions, where the minimum shall be 20 meters. If conditions permit, the minimum length should be 25 meters.

High Jump Landing Pit

Pit : The pit is made of foam. The length of the pit shall be at least 5m, width 3m and height 60cm.

(86)

Javelin Throw Sector



IMPLEMENTS



Javelin



cord grip

(91)

Specifications

RUNWAY

The minimum length of the runway shall be 15 meters. Except in international competitions where the minimum shall be 20 meters. If conditions permit, the minimum length should be 25 meters.

High Jump Landing Pit

Pit : The pit is made of foam. The length of the pit shall be at least 5m, width 3m and height 60cm.

Uprights

The uprights should be of a rigid or any other suitable material, marked in centimeters. The uprights shall extend at least 10cm above the point up to which the cross bar can be raised. The distance between the uprights shall be between 4.00 - 4.04m.

Cross bar support

The support for the cross bar should be made of rigid or any other suitable material, which can be raised or lowered and can be adjusted up to a height of 2.30m.

Uprights

The uprights should be of a rigid or any other suitable material, marked in centimeters. The uprights shall extend at least 10cm above the point up to which the Cross bar can be raised. The distance between the uprights shall be between 4.00-4.04m.

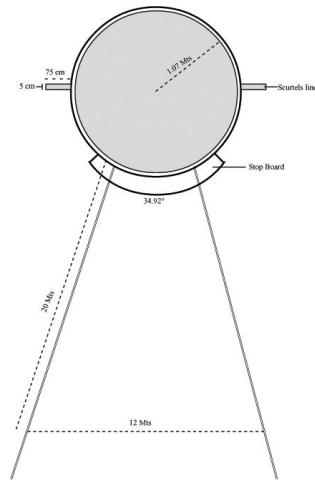
Cross bar support

The support for the cross bar should be made of rigid or any other suitable material, which can be raised or lowered and can be adjusted up to a height of 2.30m.

Cross bar

The cross bar is made of wood, or metal or any other suitable material. The cross bar should be circular with a diameter of 29 mm to 31 mm. The end of the bar shall be of concave or flattened surface of 150-200 mm in length and 29-35 mm in width. The length of the cross bar shall be between 3.98, to 4.02m.

d) SHOT PUT CIRCLE



The Ring

The ring shall be placed to the level of outside ground. It must have a height of 1.4cm to 2.6 cm from the inside floor of the circle and 6mm thickness.

Shot

The shot is made from solid Iron, brass or other hard metal. The men's shot weight is 7.26 kg with a diameter between 110-130mm. The women's shot is of 4kg with a diameter between 95-110mm. The shot should be spherical in shape with smooth surface.

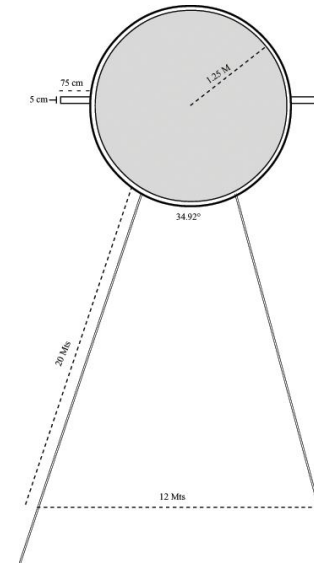
Stop Board

A curved piece of wood 10 cm thick affixed to the front of the shot put circle. When throwing, the shot putter braces his foot against the stop board to avoid falling forwards out of the circle.

(88)

f) DISCUS CIRCLE

Discus



The discus is made of wood, or other suitable material, with a rounded metal rim. The cross section of the edge shall be rounded in a circle of 6mm radius. The thickness of the rim should be at least 12m. The diameter of men's discus shall be between 219-212 mm and its weight should be 2 kg. The diameter of women's discus shall be between 180-182 mm and weight 1kg. The diameter of metal plate or flat centre area should be between 50-57mm.

(89)

a) Track Events

The judges shall decide the order in which the competition finish and if they cannot arrive at a decision shall refer the matter to the Referee, who shall decide.

Dead Heat

If there is a tie for the first place in any track event, the event shall be held after to giving adequate rest. And if it is not possible to conduct event once again due to time factor, the tied competitions shall be awarded first place jointly. This method is known as "dead heat". If tie remains for any other place, the result will stand. Rerace shall not be held to decide the second, third and other place.

Note: If photo finish facilities is available, the positions may be decided, easily.

b) Distance events

When there is a tie for any place, it shall be solved by seeing the second best performance and it necessary third, fourth best, etc. If tie still remains and concerns first place, the tied competitors will complete again in the some order in a new attempt until the tie is result. For remaining places the result will stand. That means same place shall be given to the field competitors.

Height events

When there is a tie for any place in high jump and pole vault it shall be solved by using two rules in order as following

- i) The tie competitor with lowest number of failures at the field height (last cleared height) shall be given higher place.
- ii) If tie shall remain; the competitor with lowest total number of failures throughout the competition shall be given higher place.

If the tie still remains and if it concerns the first place, the field competitors shall be given one more jump at the height where the competition is stopped (height which is immediate next to the field height), and if no decision is reached, the bar shall be raised or lowered 2cm for high jump and 5cm for pole vault. The competitors are allowed only one attempt at each height until the tie is decided. The best performance achieved during jump, if any, shall also be considered.

If the tie concerns any other place, the tied competitors shall be awarded the same place in the competition.

Note: If the same place is given, the immediate next place shall not be awarded to any competitors.

competitors shall be placed in the order in which any part of their bodies (i.e. torso, as distinguished from the heads neck, arms, legs, hands or feet) reaches the vertical plane of the nearer edge of the finish line.

B. MIDDLE DISTANCE RUNNING

Distance running can be split into two groups, Middle distance and Long distance. For middle distance running the athlete needs to both speed and stamina. For long distance running, stamina is the most important thing. Stamina means building up our body so that it can be last the race distance, but at race speed.

Middle Distance Events

1. 800 mts
2. 1500 mts
3. 3000 mts

The middle distance runner must apply his effort correctly throughout the race; this can be achieved only by a knowledge of pace and tactics.

The events which fall into the middle distance category range from 800m to 3000m. With the relentless advance in performance in athletics the 800 meter race now attracts athletes who in the past would have been sprinters. His running style is a model of mechanical efficiency, and even

UNIT - I

INTRODUCTION

A. Meaning of Athletics

Athletics comprise of a wide range of skills and can be divided in two broad categories of track and field events. Track events include sprint races, middle distance races, long distance races, relays and hurdles. The field events are those which are being played either inside or outside the track area or outside the stadium, which include throwing events and jumping events.

The track events include races of 100m, 200m, 400m, 800m, 1500m, 5000, 10000m, and relay races of 4x100m, 4x400m in both men and women categories. In all races shorter than 800m the competitors have to run the length in their respective lanes. The competitors of relay races are required to carry a baton and pass over the same to his/her partner within the take over zone. The starting points are arranged in such false a way that distance from start to finish is same for each competitor. In case of two false starts, the athletes declared disqualified. The competitor who jostles, runs across, or obstructs other competitor(s) can also be disqualified. Timings of competitors are recorded by the official time keeper from stop watches or through electronic time keeping equipment. The hurdle events include 110m and 400m for men and 100m and 400m for women. The competitors are required to jump over specified number of hurdles, which are made of metal with

a wooden top bar. The steeplechase hurdle event comprises of 28 hurdle jumps and 7 water jumps spread over a 3000m run-way.

The throwing events include throw of shot-put, javelin, discus and hammer. Each competitor generally gets six trials and the winner is decided on the best distance covered in any one of his six trials. The Jumping events comprise of High Jump, Pole Vault, Long Jump and Triple Jump. In the first two events, athletes are required to jump over a crossbar. In Triple jump the competitors are required to complete a hop, step and Jump sequence. Winner of jumping event is decided based on the distance measured between the take-off line and the nearest break in the landing area lead by the competitor's body part.

A standard international track is 400 mts in circumference. It has 8 lanes and the width of each lane is 1.22 mts. Track and field events include Sprints, Middle distance running, Long distances race, Hurdles, Steeple Chase, Relay races, throwing events and jumping events. Track and field events are conducted by International Association of Athletic Federation (**IAAF**).

Athletics

The term "Athletics" is derived from the Greek word "Athlon" which means a contest. The word "Athlete" denotes a person who takes part in contests which involve physical activity. "Athletics" is the oldest forms of the organized sport contested between individuals and or teams.

3. Run through

A forward dip during the last stride before the finish line is the most commonly used technique.

Photo Finish Camera

It is impossible for the naked eye to be able to determine accurately the finishing sequence of runners for in a blanket finish. The problem has been solved by photo-finish cameras. A photo-finish camera has very narrow slit lens which photograph an area of the finish line not more than 5-10cm across. It uses a continuous strip of film that moves across the lens at a speed proportionate to the speed of athletes and records the arrival of each competitor at the finish line. The space between each athlete shown in the film exhibits the time elapsed between the arrivals of each of them at the finish line. Photo – finish camera also doubles up as an electronic timing device, recording finishing timings of athletes up to one hundredth of a second. The camera gives a developed photograph that gives positions of athletes and time when their torso reached the finish line.

FINISH POSTS

Except where their use may interfere with the photo finish equipment, two white posts may be placed along the prolongation of the finish line at least 0.30 mts from the edge of the track. They should be of rigid construction and approximately 1.40m high, 8 cm wide and 2 cm thick. The

the foot to push against at the start of the race. The foot plates shall be slopped to suit the starting position of the athlete and can be either flat or slightly concave. To monitor the false starts the blocks can be connected with a devise. The blocks can be used up to and including 400 meters (including the first) leg of the 4x200m and 4x400m).

TYPES OF FINISHING

The finish line should be 5cm in width drawn across the track at right angles to the inner edge. Two white posts of rigid material (80mm in width and 20mm in thickness) shall be placed at a 30cm distance from the edge of the track. Competitors are place in the order in which any part of their torso (as distinguished from the head, neck, arms, legs, hands, or feet) reaches the vertical plane of the edge of the finish line nearest to the star.

Technique

There are three finishing technique used particularly during the sprint events. They are as follows.

1. Lunge finish

The torso reached the finish line first, i.e. leaning torso forward.

2. Diagonal finish (or) Shoulder Shrug

At the finish line crossing it by making the shoulder in diagonal, towards midline of the finish line. It is more difficult type.

B. IAAF

The IAAF (International Association of Athletic Federation) is the supreme governing body controlling international athletics throughout the word. It was founded in Stockholm on July 17th, 1912, to draw up and enforce rules and regulations and a common amateur definition, and to recognize world records, The IAAF now promotes its own World Champions in track and field every four years, with annual World Cross- Country Champions for men and women every march.

IAAF- Structure and Functions

In 1912, two days after the Olympic games a congress was held in Stockholm for the formation of an International Association of Athletic Federation. Seventeen countries were attended the historic meeting. The meeting was urged the Athletics to develop and promote international competitions and the Olympic games. The meeting was also urged the importance of having universal code of rules and regulation and a common definition for Amateur and also an athletic register of world and Olympic records.

One year later in 1963 at Berlin the congress once again met and accepted the first constitution and 34 nations figured on the most membership list. J.Sigfrid Edstrom (Sweden) was elected as first president and Kristvan Hailstorm as honorary secretary. The technical rules for International and domestic competition were framed and presented for approval in 1914 at the third congress in France.

In 1946 the IAAF Head Quarters moved from Stockholm to London. Over the years, the IAAF grew into a huge and dynamic organization as the world governing body of track and field athletics, road running, race walking and cross country. The congress decided to move the head quarters once again from London to Morte Carlo in 1993. The Steady growth of the Federation accelerated in the last decades. By 1997 member countries in addition numbered 209. The IAAF council comprising of 27 members from various countries.

AFI (Athletic Federation of India)

Athletics in its present form was born in our country during past decade of 19th century. Nothing much is known of its early stages till first known participation of Norman G.Pitchard in 2nd Olympic games in 1900 at Paris, where he won a Silver medal in 200mts run. The Indian Olympic Association (IOA) was formed in 1926 and its control athletics. But India unofficially participated in the 1920 and 1924 Olympic games under the leadership of H.C.Buck of Y.M.C.A Madras. The official participation of Indian athletes started in the 1928 Olympic games at Amsterdam till 1936 Berlin Olympics. India participated in the Olympics under the IOA BANNER. Then 1940 and 1944 Olympic Games were not conducted because of second World War.

Structure and Functions

Amateur Athletic Federation of India was formed in 1946 at the initiative of Maharaja Yadindra Singh then

in a natural relaxed position. An angle of about 90° at the front knee and of about 110° to 130° at the rear knee will be appropriate.

(iii) The Long Start (or) Elongated Start

The front starting block is situated 3 foot lengths from the starting line and there is one foot length between the starting blocks. The angle of rear leg about 110°. The long starting position is certainly the most difficult one. It should be applied carefully. Any athletes find this position rather ineffective. The long start, although still known, is hardly used nowadays.

For good starts a sprinter must,

- a) push back against the blocks
- b) moving the hands and arms as quickly as possible in reaction to the gun.
- c) move the hips quickly from the starting position to running position.
- d) run out of the blocks, do not jump.

STARTING BLOCKS

The starting blocks should be made of rigid material. It should be adjustable, but must be without springs. The blocks are fixed to the track, so that it provide firm base for

'On your marks' – position – his body weight resting comfortably on the legs in the crouch position. The hands are shoulder width apart to touch the ground behind the starting line with fingers and thumb pointing away from each other. The eyes are focused downward and forward.

Set position

The block settings should result, the athletes having a 90° angle at the front knee and 110° to 120° angle in the back of the knee. That gives a set position with the hips just slightly higher than shoulders slightly forward. The hands are placed just slightly wider than shoulder width apart, with the fingers and thumbs in a **"high bridge"** position. The shoulders are above and slightly ahead of the hands, the arms are straight, but not locked. He should feel pressure against rear block in the set position since the center of gravity is located high, the first strides are shorter and less powerful.

(ii) The Middle Start (or) Medium Start.

The front starting block is located two foot lengths (21 inches) from the starting line and the rear starting block is one foot length further. Kneel down with the right knee against the instep or toe of the left foot, and keep the trunk erect. The angle for the rear leg is about 130°. The slope of the body from the hips to the shoulders is not very steep. The body weight is on the legs and arms. The head remains

president of IOA with prof.G.D.Sondhi as its first president. The AAFI got affiliated to IAAF in the year 1946. The AAFI for the first time selected 8 athletes who participated in 1948 Olympic games at London. Indian women competed in the Olympic games for the first time in 1948.

Mr.M.C.Dhawn was elected by secretary of AAFI in 1950 and was the technical secretary in the first Asian games held at New Delhi in 1951. Raja Bhalendra Singh become the president of AAFI in 1952 and continued of guide athletic till 1968 along with Mr.M.C.Dhawn. This team acted a yeoman service to athletics in India and strengthened the AAFI to make it the leading federation. The federation produced by group competitors open national championship, Zonal and Inter Zonal Competition.

Many distinguished personalities are acted as president and secretary of AAFI till 1987 from 1988 to till date Mr.Suresh Kalmadi and Mr.Lalit K.Bhanot formed the new team of president and secretary respectively. The main function of AAFI is to prepare a year long sports calendar at the state and national level. They are sending teams to international level competitions based on merit.

D. AGE GROUPS

Under the Jurisdiction of the IAAF is split into five age groups.

1. Men and women there is no age limit
2. Seniors - 19 Years
3. Juniors - 17 and 18 Years
4. Youths - 15 and 16 Years
5. Boys - 13 and 14 Years

UNIT - II

TRACK EVENTS

Athletics is great fun and people of all ages, can enjoy it. Athletic activities can be traced back of the ancient Greeks, who used to take part in games of running, jumping and throwing. Track events include sprint races, middle distance races, long distance races, relays and hurdles.

The track events include races of 100m, 200m, 400m, 800m, 1500m, 5000, 10000m, and relay races of 4x100m, 4x400m in both men and women categories. In the track events all races are run with the competitor's left hand side of the track and finish in the same position. The competitors are required to wear their numbers on their vests.

A. SPRINT EVENTS

Sprints

"To cover the distance in the shortest time with maximum speed"

A. Sprint Events

1. 100 mts
2. 200 mts
3. 400 mts

1. Bunch start (or) Bullet start
2. Medium start
3. Elongated start

Three types of foot spacing bullet, medium and elongated starts. Each sprinter will have his own particular measurements so the following procedure is suggested to enable him to get into a correct starting position.

Block placement

The three block placement positions are determined by the location of the blocks relative to the starting line.

(i) The Bunch or Bullet Start

Stand with the right toe beside the rear of the left heel. Kneel down with trunk erect and rock forward in the same way. In this starting position the starting blocks are close to the starting line. The front block should be placed one foot length (16 inches) from the starting line, with 11 inches between the blocks results in low velocity and fast block clearance Track events, up to and including 400 meters, run at full speed for the entire race distance. Sprinter press their feet against two blocks, which are spaced apart and connected to a shaft, to improve their initial movement. The main features to look for in the sprinter's highly distinctive running action are the high knee-lift, the long strides, the thrusting arm action and the controlled breathing.

should immediately rise to final starting position retaining the contact of the hands with the ground and of the feet with the foot plates of the blocks.

A competitor shall not touch either the starting line or the ground in front of it with his hands or his feet on his marks. The three starting positions are measured from the starting line to the front leg of the starting block. Starting is the first stages in all the running events, should be conducted either track or road. There are only two types of starting should be followed by the athletes.

1. Crouch start
2. Arc start (Standing start)

CROUCH START

Crouch start can be used by the athletes those who are run up to and including 400mts and even the first runner of 4 x 100mts Relay and 4 x 400mts Relay.

In crouch start the following commands to be used,

1. On your mark
2. Set
3. The gun fire or clapping with clap board

It has three (divisions) method should be used according to the height of the individuals.

Sprinter

There is no ideal shape or size for the sprinter. He must, however, be well built and have good all-round muscular development and a quick reaction time. Regular, even and relaxed arm action must be learned first. The legs follow the arms, and the faster the arms are moved the faster the leg action will become. In the arm action emphasis should be on a forward and upward motion.

Most important factors for sprinting

1. Reaction time
2. Starting position
3. Powerful Muscles
4. Acceleration Technique.
5. Effective stride length
6. Curve running technique (200 mts, and 400 mts).
7. Technique at the finish line.
8. The condition of the Track surface
9. Wind and Weather conditions.

Stride Length

“It is the distance between touchdown of the toe of one foot and the touchdown of the toe of the other foot”. Stride length may and usually will be vary from left to right

or right to left on individual at the same velocity. This variance may be influenced by dominance, weakness, injuries and even leg length. Stride length will be vary with the speed of running and during the various phases of a race.

Stride Cadence or Stride frequency

"It is the number of strides per second". The stride cadence for sprinters is 4.5 to 10 strides per second with little difference found between the strides. The method of determining stride rate is to divide the number of strides in a race by the elapsed time for the race.

STARTING

There are varieties of running events for which the track is used . The finishing line for all races must be the same. But the starting line of all the races cannot be the same. It will vary from race to race. While 100mts race, 100mts hurdles and 110mts, hurdles races have to be run in straight courses, appropriate distance shall be measured backward from the beginning of home stretch and starting lines are marked. The extended lines are broken.

The start and finish of a race shall each be denoted by a white line 5 cm wide. The distance of the race shall be measured from the edge of the starting line farther from the finish, to the edge of the finish line nearer to the start.

All races shall be started by the report of the starter's gun or approved starting apparatus fixed upwards after he has ascertained that competitors are steady and in the correct starting position.

At all international sports competitions meetings, the commands of the starter in his own language shall, in races up to and including 400m be "on your marks", "set", and when all competitors are "set" the gun shall be fired, or approved starting apparatus activated.

In races longer than 400m, the commands shall be, "on your marks" and when all competitors are steady, the gun shall be fired, or approved starting apparatus activated. A competitors shall not touch the ground with his hands.

In all races up to and including 400m, and 4 x 100 mts Relay, 4 x 400mts relay first runner a crouch start and the use of starting blocks are compulsory. In competition held under IAAF, competitors must use starting blocks provided by the organizers of the meet. In other meet on all weather tracks, the organizers may insist that only starting blocks provided by them may be used. After the "on your marks" command, the competitor shall approach the starting line, assume a position completely within his allocated lane and behind the starting line. Both hands and one knee shall be in contact with the ground and both feet, in contact with the starting blocks. At the "set" command, the competitor

decreases. A study of the body movements involved in these activities pinpoints the causes. In normal walking and running the knee of the supporting leg is bent as it passes through the vertical position (i.e. when the centre of mass passes vertically over the foot), but in race walking the knee of this leg is straight in the vertical position. The technique is such a way that race walking does not become a modified run. Briefly, contact with the ground must be maintained at all times, a heel-and-toe action must be used, and the supporting leg must be straight at the knee as it passes through the vertical position.

Judging a fast walk is an extremely difficult skill, since it is almost impossible to see whether a walker has a foot on the ground at all times or that the knee is straight through the vertical for it takes only a fraction of a second to pass through the position. Race walking is not a natural skill as normal walking and running are, because the latter are the locomotion skills learnt from very early childhood.

As in most other athlete events, flexibility is an asset and hip mobility especially is an important factor in stride length in normal walking in which the line through the hip of the forward swinging leg is allowed to twist forward with the leg, the stride length is increased considerably. Stride length is also maximized, if the feet move along a straight line.

in the later stages of a race when fatigue is sapping his strength his skill does not break down.

C.LONG DISTANCE EVENTS

1. 5000 mts
2. 10000 mts
3. Marathon

The three main long distance events are 5,000m 10,000m and the marathon. Stamina is the basic quality needed by a long-distance runner, but speed has also become an essential requirement for would-be world beaters.

However, in the long distance the steady pacer must beware of the fast finisher who sits on his shoulder, until the final run-in. the steady runner without an equivalent fast finish must attempt to put himself far enough ahead of the sprint finishers by either a punishing pace throughout the race or by putting in bursts of speed during several laps from the finish. There is nothing more motivating for the training runner than to see his rival a few strides in front of him, but also nothing more demoralizing than for his rival to be 20 meters or more in front.

D.HURDLES – VARIOUS STAGES

MEANING

Running over the barriers (or) obstacles are known as Hurdles. The Hurdle race should be conducted for men and

women, senior boys and senior girls in various height and distance. Every hurdle race is based on certain conditions laid down in the rules of the International Association of Athletic Federation (IAAF).

The hurdles are made of steel with wooden top bar. The height of hurdles can be adjusted as per the length of the race and sex of the athlete. The hurdles are made in such a way that when force of 3.6-4kg. is being applied to the centre of the top, it should overturn automatically. The height required for, men's 110m race is 106.7 cm. The women's 100m sprint hurdles are 84 cm in height. In 400 m race the men's hurdle is 91.4 cm high and women's is 76.2 cm. The length of the wood used for the top bar should be 1.20m and width at least 7cm. The top bar should be striped in black or white or in some other contrasting colors.

The following are the standard distances, it can be classified into two categories,

- Men - 110 & 400 mts
- Women - 100 & 400 mts

Distance of Hurdles	Category	Height of the Hurdles	Distance Start to first Hurdle	Distance Between the Hurdles	Distance Last Hurdle to Finish
100mts	Women	0.840mts	13mts	8.50mts	10.50mts
110mts	Men	1.067mts	13.72mts	9.14mts	14.02mts
400mts	Men	0.914mts	45mts	35mts	40mts
400mts	Women	0.762mts	45mts	35mts	40mts

Substitution

Once a relay team has participated in a competition only two additional athletes may be used as substitutes in the composition of the team for subsequent rounds. Once an athlete, who has participated in a previous round has been replaced by a substitute, he may not return to the team.

RELAY BATON

The relay baton is made of a rigid material. It should be a single piece of smooth, circular and hollow tube of 280-300 mm length. The minimum weight required for baton is 50 grams and its circumference should be between 120-130mm. The batons should be colored so that it can be easily visible during the race.

Specification

- Weight of the baton : not less than 50 gm
- Length of the baton : 28 to 30 cm
- Circumference of the baton : 10 cm
- Color of the baton : Visible color
- Minimum baton required : 6 Nos.
- Maximum baton required : 8 Nos.

D. WALKING

Race walking may appear to be the natural link between ordinary walking and running, and in some respects this is true-with increase in speed, the force-time

runner only. The baton should not be exchanged within the acceleration zone(Advance Zone).

During the exchange the baton must be delivered firmly and safely into the hands of the receiving runner. When the incoming runner has approached his partner within 2 to 3 mts he indicated to him by a signal when to extend his receiving arm backwards. The signal comes too early or too late, or the runner receiving the baton moves his arm up, down or to the side, the results in an unsteady baton pass and consequently in a loss of time. The baton should be put firmly into the grasping hand between the spread thumb and the four locked fingers.

2. 4 x 400 mts Relay

The runners use a visual pass. The incoming runner carries the baton in the right hand and passes to the outgoing runner's left hand. The primary responsibility for the pass rests on the outgoing runner due to fatigue on the part of the passer. Once the baton has been taken, the athlete immediately transfer it to the other hand.

The four athletes shall run 400mts each to cover 1600mts distance by means exchanging a baton. The first leg of the 4x 400 mts relay run in lanes and so is the first curve of the second leg; only after crossing the line making the exit from the first curve, runners free to move to the inside of the track.

110mts Hurdles

There shall be Ten flights of hurdles in each lane, set out in accordance with the below table.

Starting line to First Hurdle	:	=13.72mts
" "	Second Hurdle	: 13.72+9.14 =22.86mts
" "	Third Hurdle	: 22.86+9.14 =32.00mts
" "	Fourth Hurdle	: 32.00+9.14 =41.14mts
" "	Fifth Hurdle	: 41.14+9.14 =50.28mts
" "	Sixth Hurdle	: 50.28+9.14 =59.42mts
" "	Seventh Hurdle	: 59.42+9.14 =68.56mts
" "	Eight Hurdle	: 68.56+9.14 =77.70mts
" "	Ninth Hurdle	: 77.50+9.14 =86.84mts
" "	Tenth Hurdle	: 86.84+9.14 =95.98mts
" "	Finishing line	: 95.98+9.14=110mts

VARIOUS STAGES

110mts Hurdles the Hurdling Technique is classified into the following:

1. Starting
2. Approach to the First Hurdle
3. Hurdle Clearance (Departure)

4. Running between the hurdles
5. The finish

1.Starting

Hurdling is basically a sprinting event, the mechanics of the starting do not vary much from that of the sprint start. In order to get eight (8) strides to the first hurdle to take – off foot should be placed in the first block. If the hurdler wants seven (7) strides to the first hurdle, take – off foot should be placed in the rear block.

2. Approach to the First Hurdle

The distance from the starting line to the first hurdle is 13.72 mts. The first three strides out of the blocks are the same as in a sprinter’s start. On the fourth stride, the hurdler begins to concentrate on the first hurdle. In perfecting the approach to the first hurdle make any adjustments on the 4th, 5th and 6th strides. The first three and last two should be kept constant. The last stride is slightly shorter to permit to get his centre of gravity slightly ahead of the take-off foot. This approach sets the pattern for the entire race.

3. Hurdle clearance

The take – off distance from the hurdle depends on four factors. The height of the athlete, speed of the approach length of the lead leg speed of the lead leg action. Each

The baton must be carried by hand throughout the race, if dropped, it must be recovered by the athlete who dropped it. He may leave his own lane to retrieve the baton provided this procedure is adopted and no other athlete is impeded, dropping the baton shall not result in disqualification.

Stages of Relay Running

The start

The starting of the 4 x 100 mts Relay is basically same as for the 400 mts. The starting blocks are placed close to the outer line of the track. The baton lies between the forefinger and the thumb is enclosed by the other fingers. After a successful start the runner quickly passes to the inside of his lane.

Checkmarks

The second, third and fourth runners place a checkmarks on their lanes just behind their starting positions. This is a check mark for the out going runner. The distance between the checkmark and the starting position depends on the speed of the incoming runner and on the acceleration of the outgoing runner.

The Baton exchange

The relay baton should be exchanged from one to another competitor with in the take over zone. The exchange is completed when the baton is in the hand of the receiving

when hearing the signal from the incoming runner moves the appropriate arm backwards in a positive and slightly angled manner to a level not higher than the shoulder line. The upper arm is straight at the elbow, the back of the hand is facing down wards the thumb and index fingers are widely spaced forming obtuse angle. The baton is received into such a palm from the incoming runner with an outstretched arm. In the final phase of the change over the elbow joint locks quickly and the baton is passed in a down sweep action.

The best result in both techniques the change over should occur when both runners are traveling at maximum speed and the actual change over should be as quick as possible. The majority of experts consider that the speediest change over occurs when the baton is actually changed over a distance of 2 to 4 mts from the end of the exchange zone.

Acceleration Zone

The acceleration zone lets the outgoing runner accelerate properly and allows the athletes more time to reach top speed at the exchange.

Exchange Zone or Take over Zone

The incoming runner can signals the exchange with verbal commands at a specific point when the incoming runner ready to pass the baton. The incoming runners can also use nonverbal signals. The outgoing runner can count the incoming runner's stride from the check mark to the exchange point.

hurdler must be cleared quickly and safely. The first prerequisite of movements much as in the ordinary running stride. For this action the lead leg is slightly flexed at the knee joint, and leading foot to track beyond the hurdle.

The average take-off distance from the hurdle in men's hurdles will be 1.90 mts to 2.20 mts to allow the leading leg to sweep forward and upward in a straight line. Too short a distance for the take-off results in a "jump" over the hurdle. The hurdle clearance are having the following factors.

Action of the Leading leg

The complete action consists of a quick forward and upward thrust of the leading leg in the direction of the leading of introduces the sequences.

Once the take-off foot leaves the track it becomes the trail leg. The heel of the trail leg moves actively toward the buttocks as the knee moves in a exaggerated motion upward and to the side to avoid hitting the hurdle. For the clearance of the hurdle, the trailing leg must be stretched away from the body when clearing the hurdle. This movement requires good mobility of the hip. The sequence of the athlete's movements should be as follows: after a rigorous push from the ground follows a phase of relaxation for the take-off leg. An action forward movement of the high should begin only when the foot of the leading leg has reached the edge of the hurdle.

Action of the Arms

The usual movements during running are also executed during hurdle clearance. With the sole difference that in the hurdle stride the arms perform additional functions. The arms contribute in a greater degree to maintaining body balance. When the trailing leg comes forward, the trailing arm swings backward to counter balance this movement. It is either almost stretched or flexed at the elbow.

4. Running between the hurdles (The three-step Rhythm)

In the 110 mts hurdle run the distance between the hurdles is 9.14 mts. If we reduce from the length of the hurdle stride, there remains for three strides between the hurdles or three-step rhythm a distance of about 5.065 meters. So that is 1.88 mts for each step. But practice shows clearly that the three steps are not of equal length. The first stride after the landing which is of about 1.55 to 1.60 mts follows a wide second stride measuring 2.00 to 2.20 meters and this is the longest between the hurdles. The last stride before the hurdle is always slightly shorter than the previous one.

5. Finish

The athlete has to use any one technique similar to sprint to finish the race.

Baton Exchange

There are two methods of baton (Exchange) passing

1. Up sweep method
2. Down sweep method

1. The up sweep method

In this method the passing of the baton occurs in an upward movement by a straight arm. At the same time the baton is received by an arm which is pointing backward and locked at the elbow. The outgoing runner upon hearing the agreed signal from the incoming runner, quickly extends his arm backwards locking it at the elbow, the thumb and fingers are separated and pointing downwards forming an obtuse angle. The time that he receives the baton the outgoing runner tries to keep his arm as still as possible. This outstretched arm the incoming runner quickly moves his straight arm upwards and in such a way that the outgoing runner can grasp the baton as near to the incoming runner's palm as is possible. In the upsweep method the baton is passed from the right hand to the left hand and then the left hand passing it to the right.

2. Down sweep method

In the down sweep method the baton – exchange takes place over a distance of 2 to 3 mts. The out-going runner

2. The baton must be passed inside a short distance to be covered by some three to four strides and without unnecessary loss of time.
3. The baton must be exchanged by non – visual method.

Visual Method

The visual method of baton exchange is used only in 4x400 mts relay. When the out going runner receive the baton, he must see the incoming runner while receiving the baton. The incoming runner gripping the baton at its base, then passes the baton into the receiver hand with a forward down sweep motion. The outgoing runner reaches arm straight back, palm facing upward and takes the baton, gripping the upper portion.

Non Visual Method

The non-visual method of baton exchange is used only in 4x400 mts relay. When the out going runner receive the baton, he doesn't to see the incoming runner while receiving the baton. The incoming runner gripping the baton at its base, incoming alerts the receiver, then passes the baton into his or her hand with a forward pushing, down sweep motion. The outgoing runner reaches arm back, palm facing upward and takes the baton, gripping the upper portion. then rotates the receiving arm down, under and forward, to ready the baton for the next exchange.

400 mts Hurdles

Hurdling is a sprinting, rhythmic event. In this race a full circuit of the track is run with 10 hurdles, 91.4 cm high, placed 35 mts apart. The distance from the starting to the first hurdle is 45 mts, while the last hurdle to the finish line measures 40 mts. There are ten flights of hurdles in each lane, set out in accordance with the below table.

Placement of Hurdles in 100mts Hurdle race

Starting line to First Hurdle	:	=13.00mts
" "	Second Hurdle	: 13+8.50 =21.50mts
" "	Third Hurdle	: 21.5+8.50=30.00mts
" "	Fourth Hurdle	: 30+8.50 =38.50mts
" "	Fifth Hurdle	: 38.5+8.50=47.00mts
" "	Sixth Hurdle	: 47+8.50 =55.50mts
" "	Seventh Hurdle	: 55.5+8.50 =64.00mts
" "	Eight Hurdle	: 64 +8.50 =72.50mts
" "	Ninth Hurdle	: 72.5+8.50=81.00mts
" "	Tenth Hurdle	: 81+8.50 =89.50mts
" "	Finishing line	: 89.5+10.5=100mts

Placement of 400mts Hurdles in Standard Track

(Men and Women)

Starting line to First Hurdle	:	=45.00mts
" "	Second Hurdle	: 45+35 =80mts
" "	Third Hurdle	: 80+35=115mts

"	"	Fourth Hurdle :115+35=150mts
"	"	Fifth Hurdle : 50+35=185mts
"	"	Sixth Hurdle : 185+35=220mts
"	"	Seventh Hurdle : 220+35=255mts
"	"	Eight Hurdle : 255 +35=290mts
"	"	Ninth Hurdle : 290+35=325mts
"	"	Tenth Hurdle : 325 +35=360mts
"	"	Finishing line: 360+40=400mts

E. RELAY

There are two relay events comprising of 4x100m for men and women, and 4x400m for men and women. All the four members of a team are required to run one stage of the race along with the relay baton in their hands throughout the race. The baton must be picked up by the athlete who dropped it. He/She may leave the lane in order to retrieve the baton, provided no other player is impeded.

4x100m relay races are run entirely in respective lanes with staggered starts. In 4x400m relay races the first lap and the same part, of the track, of the second lap shall be run in lanes. The position of the teams at the start shall be retained at each take- over zone, except in case of races where lanes are not used. The waiting runners can move to inside zone, after handing over the baton, until the course is clear to avoid obstruction to other competitors.

Relay races are a popular and exciting feature of track and field. It is a team event in an individual oriented sport. They give the opportunity for team work and cooperation is not available in the other events. The key to good relay racing is the baton exchange. Commonly the relay events are as mentioned below,

1. 4 x 100 mts
2. 4 x 400 mts

1. 4 x 100 mts Relay

The 4 x 100 relay is undoubtedly the most beautiful and one of the most difficult events of the athletics spectrum. This relay uses four sprinters running a complete lap of the track, passing on a baton which has to arrive at the finish line with the runner of the last leg.

The main objective in the baton pass is to keep the baton moving at top speed throughout the relay. The baton must be passed only within a 20 meters take – over zone (exchange zone). This zone begins 10 mts before the scratch line (100 mts marking) and ends 10 mts after it. A good baton – exchange needs to satisfy the following three conditions.

1. The baton – exchange must take place after some 12 to 16 mts running, measured from the beginning of the take – over zone.

forward and upward. Then he goes upward the body position is in vertical (or) hanging and elbows are flexed.

5. Clearing the bar

When the body is in hanging position lift and swings upward both the legs, at the same time the pole straightened, turn the upside down. Then pushing the pole down by hands the legs are throw over the cross bar. After clearing the cross bar push the pole away from the pit with the wrist action to avoid foul or touching the bar.

6. Landing

Safe landing is required on the landing area.

B.THROWING EVENTS

General conditions

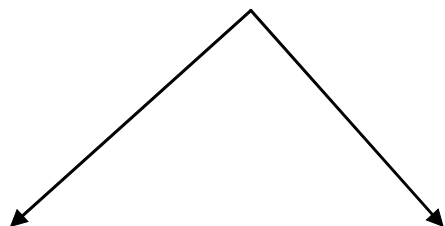
The person who has more body weight and mass of the muscles can choose throwing events. The following qualities are essential for throwers.

1. Body weight
2. Height
3. Leg power
4. Shoulder strength
5. Flexibility
6. Co-ordination
7. Speed

Race walking, of course, involves a rapid leg cadence and if the arms too are no maintain their synchronous swings they have to be bent at the elbows to reduce their moments of inertia, as in running. However, more emphasis is placed on the arm and shoulder action in race walking than in running, because of the need to counterbalancing the exaggerated eccentric thrust of the legs and movements of the hips. But in addition to counterbalancing the leg action, they also aid the forward drive with their swinging the strong upward swing of both arms evokes extra forces from the ground through the driving leg.

UNIT- III

FIELD EVENTS



DISTANCE EVENTS

1. Long Jump
2. Triple Jump
3. Shot Put
4. Discus
5. Javelin
6. Hammer

HEIGHT EVENTS

1. High Jump
2. Pole Vault

A. JUMPING EVENTS

1. LONG JUMP

The following techniques should involve while doing long jump.

1. Approach run
2. Penultimate stride
3. Take – off

1. Grip

Athletes who take off with the left foot, the pole must be carried on the right hand side, the left arm, half bent, supports the pole with the palm of the same hand turned downwards, while the right arm grips about 60-70cm higher with the hand lightly turned out. Keep the pole straight near the cross bar on the uprights. Hold the pole slightly lower than the height of the cross bar. Keep the pole parallel to the ground pointing to the pit or above the right hand palm facing upward and with left hand palm facing down ward.

2. Carry the Pole

The pole should be raised at 50° or 45° to the ground and keep right side. The left hand should be kept flexed at chest level and the right hand at the back. While carrying the pole, the body balance is very important.

3. Approach run

20 to 30 mts away from the vaulting box to start the running with the pole steadily and high knee action. When you reach the check mark, plant the pole in the vaulting box and kick the floor to go up.

4. Planting the pole

When the competitor reaches the check mark he should plant the pole into the box. Join the left hand with the right hand, push the right shoulder and both the hands

(iii) Supports for the cross bar

The cross bar shall rest on pegs pointing in the direction towards the landing area. The supports shall extend not more than 5.5 cm and not more than 1.3 cm in diameter, which should extend 35 – 40 mm above the pegs.

The distance between supports is minimum of 4.30 meters and maximum of 4.37 meters.

(iv) End Pieces of Cross Bar

It shall have 30 mm to 35 mm in diameter, square the length of the end piece is between 15 cm to 20 cm and should be semi circular.

(v) Landing (Pit) Area

The minimum dimensions of the landing area is 5 x 5 meters, for international competitions the length, width and height of the landing area will be 7 x 6 meters. The front pieces must be 2 m long.

VARIOUS STAGES

1. Grip
2. Carry the pole
3. Approach run
4. Planting
5. Crossing the bar
6. Landing

4. Flight in the air
5. Landing

1. Approach run

The length of the un-up is determined by the height of the jumper and his ability to accelerate in the run. According to analyzes carried out at recent Olympic Games, the best athletes use a run-up from 37-50m in length (incase for women 33-40). The athlete should mark the starting check mark 14 to 16 strides from the take – off board. If the athlete who is taking off with left leg, he should start running with right leg. Then he starts the approach run steadily and gradually increase the speed towards the take – off board.

2. Penultimate stride

The last two strides before the take off is called penultimate stride. In this time, the athlete shrugs his body little downward and the length of the stride decreases. That is easy way to fly in the air.

3. Take – off

The length of the jump depends not only on horizontal speed but also on the speed and power of the take-off. After completion of Approach run (penultimate stride), step on the take off board with the stronger foot and jump up in the air by pushing the take off board. After take off (or) jumping in the air the hands should be vertically raised. The Non-

take off leg should be raised high. The last step is executed more quickly and the whole foot is placed on the board, ahead of the projection of the center of gravity.

Plasticine Indicator (No Jump indicator)

Plasticine indicator is called no jump indicator, it is placed at the inner edge of the Take-off board. The judge at the take off board must watch the competitors does not overstep the scratch line. If a no jump indicator is not available the judge should build one moist sand which will clearly show if it is touched by toe or spike. It is a foul only if contact is made with the ground or the no jump indicator.

4. Flight

Jumping styles vary according to the development of the athlete and his muscular characteristics and the bone structure. The most common techniques are,

1. The Sail (common among beginners)
2. The Hitch kick (1-2-3 strides and a half in the air)
3. Hang (extended jump or glide)

(i) Hitch Kick

After jumping in the air from the take off board the athlete swing (or) rotate their legs like pedaling in cycle in the air into 2 or 3 pedaling style, and the legs are closed together before landing. When legs are pedaling the arms alternatively with legs movement.

4. POLE VAULT

Runway

The minimum length of the runway shall be 40 meters, when the conditions permit it is 45 meters.

1. The width of the runway is 1.22 meters.
2. The runway should be marked by white lines with 5cm as width.

Implements

(i) Upright

Any style of uprights or posts may be used provided they are rigid.

(ii) Cross Bar

It is made up of Fiber glass, Metal or other suitable material.

1. The length of the cross bar is 4.48 mts to 4.52 mts.
2. The maximum weight of the cross bar is 2.25 kg.
3. The circular shape of the cross bar is 30 mm diameter.
4. It should have the gap of maximum 3 mm

3.Fosbury Flop

The Fosbury flop was introduced by Dick Fosbury, who won the high jump at the Mexico Olympics in 1968. His technique for clearing the bar, his run up was also very notable because it was in the form of a semi- circle, and he took off with his foot at an angle of about 20 degree relative to the plane of the uprights. At the point of take – off Dick Fosbury with a vigorous bending action and driving up of the free leg, supported by an alternated movement of the upper limbs, rose completing a rotation on the longitudinal axis of the body and then prepared for flight with his back to the cross-bar.

Next he performed his rotation on the transverse axis of the body and at the extreme point of the parabola, he arched himself and continued his trajectory on this position until, so as not to knock down the cross - bar, he straightened his leg and landed on his back bowing his head on to his trunk so that the impact was taken by the top part of the back, avoiding unpleasant injuries to the cervical part of the spinal column.

4. Landing

Safe landing is required on the landing area.

(ii) Hang style

After the take off the athlete do the back arch the arms should be vertically raised above the head, the legs are straighten back, and before landing brings the legs and arms to extend forward, and the legs are closed together before landing.

5. LANDING

After completion of his style in the air, before landing, the athletes should extend both the legs forward / straightened. While landing both the heels should be landed first on the pit. There are three landing techniques should be used to come out of the landing area. They are as follows.

1. Collapsed landing
2. Swing out landing
3. Scoop landing

1. Collapsed landing

While landing both the heels should be touched first on the pit and then toe, the whole body should brought forward and place the knees on the pit, at the same time the buttocks should be kept back on both the heels.

2. Swing out landing

After landing in the pit the athletes should turn his body 45° either right or left in forward and fall down on the ground with shoulder, first then buttocks and so on.

3. Scoop landing

Landing by heels on the pit and push forcefully the sand and makes a dig and place the buttocks on the dig by extending the legs straight.

The competitor commits fouls if he;

1. Take off beyond the take off line.
2. Delaying more than 60 seconds.
3. After landing walking back towards the run way.
4. Performing acrobatics during the jump.
5. Uses illegal style of jump.

Rules

1. The order in which the competitors make their attempts must be decided by drawing lots.
2. Each competitor will be placed according to his best jump.
3. When there are more than eight competitors, each one is given 3 attempts and the 8 competitors with the best jumps are given further three jumps.
4. In case of a tie for the eight position, each competitor involved in the tie has three additional attempts.
5. When there are eight or less competitors, each one is allowed six trials.

3. Clearing the bar

1.The scissors

Towards the end of the 19th century, an American named Mike Sweeny proposed the scissors jump as an alternative to the frontal clearance. The scissors involved passing one leg over after the other at the same time bending the trunk towards the knees when clearing the bar. It consisted of the following movement:

1. While the forward leg was the cross – bar the other one kicked upwards, causing the chest to rotate towards the direction of jumping and a landing on the feet.
2. With the use of this style the world record began to rise this style, the world high-jumpers introduced minor adjustments to the technique according to their physical characteristics and talents.

2.The Straddle

Towards the middle of the 1930s another American Dave Albritton, proposed a radical new technique for clearing the bar, involving the body being parallel to the bar, but with the stomach downwards rather than with the body sideways. Thus the straddle was born, which was clearly demonstrated by the Soviet trainer Vladimir Mihailovic Dyachkov and put to good effect by Valeri Brumel, who took the world record to 2.28m in 1963.

1. Scissors
2. Straddle Roll (or) Belly Roll
3. Fosbury Flop

Various stages

1. Approach run
2. Take – off
3. Crossing the bar/ clearing the bar
4. Landing

1. Approach run

The jumper can approach either from the left side or right side of the cross bar with 25 mts long and medium speed. The angle of approach run and the number of steps vary according to the level of the athlete.

2. Take off

Jumper can stand either right or left one arm away from the cross bar. Then down vertically draw the line that may be considered as take off line. When the jumper start to approach towards crossbar, used his power leg on the take off line for make a jump.

6. Once the competition is under way, competitors are not allowed to use the runway for trail attempts.
7. All jumps must be measured from the nearest mark in the landing area made by any part of the body or limbs of the athlete to the take-off line or its extension and at right angles with the take-off line.
8. If a competitor takes off before the board or the line this does not constitute a foul.

2. TRIPLE JUMP

The triple jump shall consist of a Hop, step and jump in that order. This is the English definition of the jump. The hop must be executed on the same leg which was used for the take off (right-right or left-left). In the step the support is transferred to the other leg. The final jump is a proper long jump.

1. It shall not be considered a failure if the competitor, while jumping, touches the ground, with the “sleeping” leg.
2. There are six stages when taking Triple jump. They are as follows
 - (1) Approach run
 - (2) Take – off
 - (3) Hop

(4) Step

(5) Flight

(6) Landing

1. Approach run

The length of the run-up is determined by the height of the jumper and his ability to accelerate in the run. According to analyzes carried out at recent Olympic Games, the best athletes use a run-up from 37-50m in length (incase for women 33-40). The athlete should mark the starting check mark 14 to 16 strides from the take – off board. If the athlete who are taking off with left leg, he should start running with right leg. Then he start the approach run steadily and gradually increase the speed towards the take – off board.

2. Take – off

The length of the jump depends not only on horizontal speed but also on the speed and power of the take-off. After completion of Approach run (penultimate stride), step on the take off board with the stronger foot and jump up in the air by pushing the take off board. After take off (or) jumping in the air the hands should be vertically raised. The Non-take off leg should raised highly. The last step is executed more quickly and the whole foot is placed on the board, ahead of the projection of the center of gravity.

3. Hopping

The athlete should be used to land on the ground which he was used to take off. For example: The athlete has take off for his left leg means he should land or hop in the same leg. During hopping the non take off leg (or) rear leg has no movement, that's why it is called sleeping leg.

4. Step

After completion of hopping the athlete used to take one more step with his non take – off, foot before landing is called step. Here the athlete does the bounding action to do the step.

5. **Flight** and

6. **Landing** procedures are similar to long jump.

3. HIGH JUMP

The high jump as we know it today first became popular in the 19th century. Subsequent perfecting of the jumping technique took place in the development stages, but it has depended particularly on modification of the rules for the event and on the elimination of some restrictive conditions.

Various techniques should be used by the jumper to cross the bar. Depends upon their ability they used any one of the following techniques.

c) High carry

High carry method is associated with those throwers who tend to use a direct over the shoulder type withdrawal which ends with a turning back of the shoulders at the arm and javelin is reaching near full backward extension (To held on above the head).

A thrower must develop his carry position to suit his technique of withdrawal of the javelin in preparation for the delivery stride.

2. Approach run

During approach run the thrower has to mark the point of starting and the point of check mark with javelin. While running the javelin should move front and back, and slowly increase the running speed still you reach you the check mark.

The Run-up : The run – up has two parts. They are

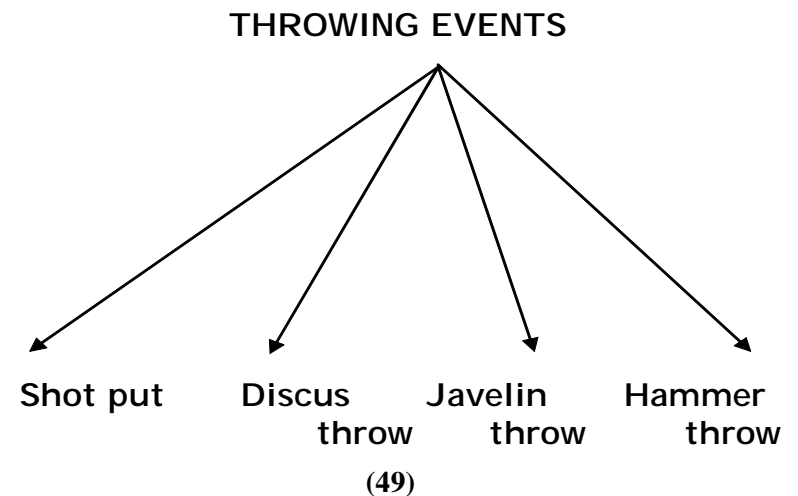
- (i) The cyclic part
- (ii) The acyclic part

The cyclic part speed is built up sufficiently so as to allow for a further increase over the last strides. The run-up should be easy and relaxed, heading the thrower to a powerful explosive all-out release.

- 8. Arm length
- 9. Balance
- 10. Endurance

The competitors are allowed three to six trails and three to eight of the best competitors are allowed three more trails. Incase of a tie for the final place, the competitor shall be allowed three additional trails. The conditions of the competition must be explained to the competitors before its commencement. The best throw of the competition out of all trails taken by the competitors shall be credited in resolving a first place tie. No markers or marks are allowed to be put in the throwing sector.

Competitors may use an adhesive substance on their hands for better grip, and can also wear a belt of leather or some other material to protect the spine from injury. However, taping of the fingers or use of any other devise on their hand which might assist in throwing is not allowed.



1. THROWING THE SHOT PUT

The competitor must begin the throw from a stationary position within the circle. The shot shall be put from the shoulder with one hand only and, shall touch or be in close contact with the chin. The hand shall not be dropped below this position during the act of putting.

Practice trials are not allowed after the commencement of the competition. Competitors are not allowed to put on gloves nor are they allowed to spray or spread any substance either on the surface of the throwing circle or on their shoes.

Basic Principles

1. Forces must be applied along a straight line.
2. Newton's 3rd law – Action and Reaction are equal and opposite.

Specifications

1. Weight of the shot for men - 7.260 Kg
2. Weight of the shot for women - 4.00 Kg
3. Diameter of the shot put circle- 2.135 m
4. Angle of the shot put sector - 34.92
5. Dimension of the sector - 20 x 12 m

a) Normal grip

The above thumb and middle finger is behind the edge of the grip cord and the index finger is partly curled around and behind on the javelin's shaft.

b) Middle and Thumb grip

The index finger and thumb is behind the edge of the cord binder and the rest of the fingers around the cord itself.

c) 'V' grip (or) Glow grip

The Javelin is held between the index and the middle fingers at the edge of the cord binder and rest of the fingers around the cord itself.

Carry

The javelin is carried above the shoulder of the throwing arm. Three commonly used methods of carrying the javelin during the approach run's cyclic phase.

a) Low carry

The low carry is generally associated with a circular type arm action in the 'withdrawal' (To held on waist level).

b) Medium carry

The medium carry is generally favored expansion in the withdrawal. (To held on eye level).

1. A head
2. A shaft and
3. A cord grip

The javelin throw comprises the following technical elements.

1. The grip and carry
2. The Approach run
3. The withdrawal
4. The impulse stride
5. The throwing stride
6. The release
7. The recovery

1. Grip

When executing their throws, javelin throwers may hold the javelin only by the whipcord grip. They may hold the javelin at the end of the cord grip with one or more fingers and the thumb touching the javelin shaft. Javelin throwers have some leeway in how they grip the javelin. It has three types how they can hold the javelin. The javelin is held behind the cord binder the rear edge of which offers a slightly raise border for gripping the javelin.

Stages / Method

1. Holding of the shot
2. Tucking (or) Placement of the shot
3. Stance
4. Glide
5. Release

1. Holding the shot

- a. The shot rest on the root of the fingers, and should not touch the palm.
- b. All the fingers are carry the shot except the little finger which is only support.

2. Placing (Tucking) the shot

1. The shot must be placed between chin and clavicle.
2. The shot does not go beyond the shoulder line.
3. The hand should be parallel to the ground.

3. Stance

The stance varied according to the using the style of Athletes.

Techniques (Style Of Putting)

The thrower can be used 3 style when putting the shot

1. Standing throw
2. 'O' Brien technique (or) Gliding
3. Rotation (or) Disco put

1. The 'O' Brien Technique

The distance a shot travels depends upon its height of release, velocity at the moment of release and the Angle of projection. The optimum angle of projection will vary depending on the height of the release, and the distance of the put, it will be approximately 34.95. The correct technique is the one that will result in the greatest velocity at release. The motion of a projected object is influenced by the exact point of application of the propelling force.

Holding the shot

The procedure for gripping the shot is to hold it in the left hand and lay the right hand loosely on top with the fingers spread slightly. The putter holds the shot in his right hand. Where it rests on the "base" of the fingers. The three middle fingers are only slightly splayed while the thumb and the little finger give the shot lateral support, securing a safe position of the shot.

The Reverse

The reversal is to serve as a follow through after the thrust and to retain balance in order to avoid fouling. After the discus has left the hand the thrower will have to reverse the feet rapidly and lower the body weight to maintain balance. The right leg must be brought forward quickly and planted firmly close to the rim of the circle, mean time the left leg swings back the body is bent at hips and right knee flexes to drop the centre of gravity into a stable position.

3. THROWING THE JAVELIN

The javelin throw distinguishes itself from other throwing events of shot-put, discus throw and hammer throw. These throwing events must be from a circle, the javelin must be thrown from behind the arc of a sector drawn with a radius of 8 mts. Due to the aerodynamic nature of the implement and its relative weight, the event does not require great strength. The event does require few less technique in order to achieve high level results.

Javelin consists of three parts namely the head, shaft and grip. The shaft is made up of either Aluminium or fiber. At the tip of the shaft a sharp head is fixed. At the center a grip made of thread is fixed. The Javelin is round and broad at the center. The circumference is small in the front and rear. It has three main parts

athlete drives off the left foot. The effective throwing position is one of "muscular wind" the hips displaced from the feet, shoulders from the hips and discus from the shoulders.

The run across the circle is initiated by the driving action of the left leg. Synchronized with the swing of the right leg. This drive carries the thrower halfway across the circle. The right foot landing approximately on the centre line with the leg well bent and the shoulder and body weight back. His left leg is pointing toward the direction of the throw, his right shoulder is facing the rear, his throwing arm is well behind the shoulder his left arm is curled and the discus is flat.

The Release

The throw begins with a forward and upward drive from the right foot. The shoulder should now come in slightly after the hip and the arm strikes from the low point, the thrower reaching out as far as possible to give as much distance from axis of rotation as he can. The left leg should now straighten, as the arm strikes. The discus will leave the hand in line with the right shoulder and should be squeezed out of fingers, each digit applying its force in turn and spinning of the first fingers last. The discus is spun clockwise. A good thrower will release the discus at a 35°-40° angle. The release must be smooth and rhythmic using the force generated from the lower body.

The stance

He should stand facing the rear of the ring with his back in the direction that he is going to throw. The shot should be held in right hand, supported by thumb and fingers. The hand holding the shot will be placed into the hollow of the collar bone in such a manner that it does not rest on such a manner that it does not rest on the shoulder but against the right side of the neck and the jaw. The elbow of the right arm is slightly raised and pressed forward. The upper arm points forward and downward. The head remains in its normal position. The eyes should be focused on a point to the rear of the ring and about five to ten yards away. He should stand erect in a telexed attitude, the left arm is held either out in front of the face or relaxed above the head the left front behind the right about one foot with just the toes touching for balance.

The glide or drive

The purpose of the glide is to gain momentum while moving across the ring and to lead into the correct position for the delivery. The initial movement is to lower the trunk and raise the left leg causing the body to form a "T" shape with all weight carried on the right leg. The head, shoulders and hip remain square to the rear of the circle, and the right leg flexes in preparation for the drive across the ring proper balance at this point is extremely important.

2. The Rotation or Disco-put Technique

The Starting Position

The putter stands at the rear of the circle facing 180° away from the throwing direction. The left foot is along the centre line of the circle and the right foot is placed laterally to the right of the centre line about shoulder width apart or just this point in most cases. The grounding of the left foot at the stop board denotes the arrival of the thrower into the delivery stance.

Preliminary Movements

To start the turn, the putter begins by swinging the shoulders, trunk and left arm along with the left and then to the right, as the body weight shifts correspondingly from leg to leg in coordination with the rhythm of the shoulders, trunk and left arm. Both knees are semi – flexed while this side to side swaying movement is taking place to break the inertia and set the pattern of movement to follow.

Turn

The double support phase of the turn begins at the end of the preliminary movements. The thrower is completely over his right leg with the trunk and shoulders well twisted to the right. From this position the thrower begins unwinding his upper body in the direction of turning with a wide

throwing arm bang to the right side along the thrower's thigh with the head and eyes focused to a point about 5 meters behind the circle. There are generally three positions that a thrower may adopt in relation to the line of direction. The experience, technical skill and comfort of the thrower must decide which of the three starting positions suit their ability.

The left foot is generally placed a few centimeters back from the rim of the circle, in order to avoid fouling by bursting the sole of the foot on the top edge of the rim of the circle as the pivot is executed.

The preliminary swings

The thrower should position himself at the rear edge of the circle with his back to the generally facing the direction of throw and his feet slightly wider than hips. The discus should be flat and facing downwards on the arm swung at shoulder height so that the arm and discus go well behind the right shoulder. The free arm rests comfortably across the chest. The thrower's weight should move easily from one foot to the other. On the final preliminary swing, the arm is swung back as far as possible so that the body weight is over a straight right leg.

Coming across the circle

The initial movement is begun the hips are turned and a pivot is made on the ball of the right foot as the

Specification of discus

1. Weight of the discus for men : 2 kg to 2.025 kg
2. Weight of the discus for women : 1 kg to 1.025 kg
3. Diameter of the discus for men : 21.9 cm to 22.1 cm
4. Diameter of the discus for women: 18 cm to 18.2 cm
5. Angle of sector is : 34.92°

Various Stages

Hold

The hand is placed flat against the discus surface, the upper joints of the fingers grasp the rim of the discus. Its center of gravity lies between the index and middle finger. Due to a slight bending at the wrist the upper face of the discus touches the arm, because it prevents the discus from falling out of the hand in the subsequent movements.

Starting position

The starting position at the rear of the circle is with the thrower facing 180 degrees away from the throwing direction. The two feet are usually placed about shoulder width apart or slightly more in the case of very tall throwers. The toes point naturally outwards with the weight of the body evenly distributed over both feet. The discus and

sweeping left arm action parallel to the ground, a slight forward tilt to trunk in a semi sitting position. The single support phase of the initial part of the turn is followed by a brief non support phase when both feet are off the ground and the whole body is turning on its vertical axis, and continues turning after the right foot lands around about the center of the circle.

Follow through (or) Reverse

When the right leg has driven really well and effectively and the action has been timed correctly the athlete will be well over the left foot as the arm strikes. Immediately after the shot has left the hand, he will find himself falling over the stop – board. In order to prevent himself fouling, the left foot is rapidly withdrawn and the right leg brought forward, the toe of the right foot striking the inside edge of the stop – board. At the same time the body weight is lowered in order to be more on balance by lowering the centre of gravity.

Valid Trial

For a valid trial, the shot shall fall completely within the inner edges of the landing sector.

Fouls

1. Throwing the shot from behind the shoulder
2. Touching outside the circle or the top of the stop Board

3. Shot landing on the sector line or outside the sector line
4. Delaying more than 60 seconds to throw.

Rules

1. The use of gloves is not allowed
2. At the competition area, each competitor may have a maximum of two practice trials which should be made in draw order, under the supervision of the judges.
3. Once the competition has begun, competitors are not permitted to use implements for practice purposes or to use the runway or ground within the sector for practice trials, with or without implements.
4. No device of any kind – i.e., taping of two or more fingers together, which in anyway assists a competitor when making a throw, shall be allowed. The use of tape on the hand shall not be allowed except in the case of the need to cover an open cut or wound.
5. A better grip, competitors are permitted to use a suitable substance on their hands only.
6. To protect the spine from injury, a competitor may wear a belt of feather or other suitable material.

7. For a valid trail, the tip of the javelin shall fall completely within the inner edges of the landing sector.
8. If the implements breaks during a throw or while in the air, and if the competitor thereby loses his balance and contravenes, it shall not count as a foul throw, provided one attempt was made in accordance with the Rule.
9. Implements shall be carried back to the starting line and never thrown back.
10. The competitor shall not leave the runway until the implement has touched the ground.

2. THROWING THE DISCUS

The object of the spin in the discus throw is to generate power and speed within the circle to apply to the discus itself, and the more power that is applied to the discus, then further it will go the angle to release of discus, the position of the discus during its flight are important factors. It has three types,

1. Half rotation
2. Full rotation
3. One and half rotation

6. 5000m Run – Arc start **or** Group start
7. 10000m Run – Arc start **or** Group start
8. 400mts Hurdles - Full stagger distance
9. 4 x 100m Relay – Full stagger distance
10. 4 x 400m Relay – One and Half stagger distance with diagonal distance.

2.Non- Standard Track

The track which is not satisfying the conditions of standard track is called as Non-standard track and the 400mts track without curb (raised border) is also treated as Non-standard track. Usually 200mts track is called as Non – standard track.

Some of the disadvantages of Non-standard track:

- a) Sprinters very difficult to show their real capacity.
- b) Very difficult to run more than 6 competitors at a time.
- c) Very difficult to conduct Hurdles and Relay races.
- d) Very difficult to conduct both track and field events simultaneously.

Method of finding Running Distance Radius for 200 mts track if 36 mts as straight.

3. Five – stride – Rhythm

The three known stride Rhythms – the three stride rhythm. The five stride Rhythm and seven stride rhythm. It is five stride – Rhythm which is the most widely accepted, which comprises the following phases:

- (i) The withdrawal of the javelin
- (ii) The impulse stride
- (iii) The throwing position
- (iv) The release
- (v) The recovery

(i) Withdrawal of the javelin

The withdrawal starts at the second stride of the five-stride rhythm and ends at the third stride. The throwing arm is drawn back in alignment with the shoulder axis. The palm of the hand is turned upward and extend the forearm, when the withdrawal is completed, the athlete's body has a marked backward lean.

(II) Impulse stride /Cross step / Three step (or) Five step Rhythm

When an athlete reaches the check mark with the left leg the action of throwing should be starts. The right hand is stretched backward with the javelin and left hand is brought in forward in front of chest. That is otherwise called "with drawl of the javelin".

The toe of the right foot must be deviate more than 30° from the run up direction. The left leg presses the body down low into the fourth stride, preventing the body's centre of gravity from lifting at the landing of the right leg, which must be allowed to bend when it receives the body weight.

(iii) Throwing Position

The throwing position starts at the moment when the athletes right foot makes contact with the ground after the impulse stride. The right leg can start to extend and doing s introduce the release, the full extension of the forearm by the hand is important under no circumstances must the arm be flexed at the wrist.

(iv) The Release

The release is initiated by a forward and upward stretching of the right leg at the knee and ankle joints, driving the right hip forward. The shoulder and the hip axes now run parallel and almost at right angles to the direction of the throw. The throwing arm is not yet stretched while the right leg is extended, the heel is raised, allowing the pressure of the ball of the foot to act longer on the body. The throwing arm now comes into its sphere of action. When the throwing arm begins to strike, the elbows are raised until it is level with the heed and pointing in the throwing direction.

Method of Finding Running Distance Radius for 400 mts if 80 mts as straight.

$$2pr = 240 \text{ (Circumference of two curves)}$$

$$r = 240/2 \pi$$

$$240/2 \times 3.1416 = \frac{240}{2 \times 3.1416} = \frac{240}{6.2832}$$

$$= 38.20 \text{ mts}$$

For Standard Track (With Kerb)

Marking Distance Radius (MDR or CR) = RDR – 0.30 m

MDR = 38.20 – 0.30 = 37.90m

For Non-standard Track (without kerb)

MDR = RDR – 0.20 m = 38.20 – 0.20 m = 38.00m

Starting points in 400 mts Track

1. 100m Run Men & Women
100m Hurdles for Women - Parallel Method
110m Hurdles for Men
2. 200m Run – Half stagger distance
3. 400m Run – Full stagger distance
4. 800m Run – Half stagger with diagonal excess **Or** Arc start / group start
5. 1500m Run – Arc start **or** Group start

Running Distance Radius (RDR)

RDR is the path in which an athlete has to run in the curve to cover the exact distance. The chart below shows that RDR, CDR and area required to lay 400mts raised bordered track when the straights length varies.

Straight length in mts	Rdr in mts	Cdr in mts
79MTS	38.50	38.20
80MTS	38.18	37.88
84.39mts	36.80	36.50

The chart below shows that RDR, CDR and area required to lay 200mts Non raised bordered track when the straights length varies.

Straight length in mts	Rdr in mts	Cdr in mts
37.50MTS	19.89	19.67
40.00MTS	19.09	18.89

During the release the left side of the body must be in a flexed position. This is achieved by a sudden arrest of the backward movement of the left arm just when the right side of the body overtakes the left side the angle of release is between 30 and 36 degrees.

(v) The recovery

A distance of at least two meters from the arc will be required merely checks the forward speed of the body. Thus preventing from fouling. After the release, the right leg is forward in a springing movement. The reverse takes places to avoid stepping over the right foot must be planted transversely to the throwing direction, the upper body must be lean forward, the left leg is raised and brought back into the direction of the run-up. Javelin consists of three parts namely the head, shaft and grip. The shaft is made up of either Aluminium or fiber. At the tip of the shaft a sharp head is fixed. At the center a grip made of thread is fixed. The Javelin is round and broad at the center. The circumference is small in the front and rear.

Follow throw

After releasing the javelin the thrower to avoid his forward momentum (or) foul, then he placed his rear leg to brought forward for his rear leg and placed nearer to the board and to do hopping twice or threes. Then he come back behind the runway should not make foul.

Correct throw

The javelin should be caught in the grip. The javelin must be thrown forward from behind the shoulders. While throwing thrower should not cross the line of runway either in front or side. After releasing, the javelin should fall within the sector lines with the tip first touching the ground. The thrower still remains (leave) the runway only after the javelin lands on the ground.

6. THROWING THE HAMMER

The technique of hammer throwing is determined by the specific nature of the implement and the measurement of the throwing circle, which comply with the international rules. A complete throw consists of two preliminary swings and three turns on the left foot with an active push-off from the right leg at each turn. The following are the parts of hammer throw:

1. The Grip
2. The Initial position
3. The preliminary Arm swings
4. The Transition
5. The turns

Top Layer

Now-a-days all international competitions are being held on synthetic tracks. The thickness and material used for various layers of a synthetic track depend upon the product and preference of the particular firm (construction agency). Although, the material used for top layer by all the firms are synthetic tracks, but of different variations. It is advisable that whenever 8 lane synthetic tracks are being laid, efforts should be made for laying of another 4 lane synthetic track of the same material for training purposes.

Lane

Lane is the space between the two parallel lines.

Kerb

Kerb is the raised border (both inner and outer line) which is fixed permanently through the inner line of the first line and outer line of the last lane. Dimensions of curb is 5 x 5 cm (5 cm height, 5 cm width).

Curb Radius (CR)

Curb radius is the radius which is used to draw the curve. It is otherwise known as Marking Distance Radius (MDR). The curb radius varies according into the nature of the track.

TRACK MARKING

Track must be prepared according to the rules and regulations laid by **International Association Of Athletic Federation** (IAAF). The inner raised border should be 5cm in height and width by using brick, wood or any other suitable material. There shall be a minimum of 8 lanes and width of lane is 1.22mts and width of the line is 5cm. The straight lines are always marked by north to south direction and finishing line must be same for all races.

a) TYPES OF TRACK

The track is classified into two types based on its specifications.

1. Standard Track (with curb)
2. Non- standard Track (without curb)

1. Standard Track

The tracks are made either on plan surface (grass) or with the help of cinder/synthetic material which is skid proof and not too hard. To get maximum benefit from the cinder/right synthetic tracks, it is essential that proper care be taken at the time of the construction so that right materials are mixed in various layers as per required thickness.

6. The Release

7. The Recovery

The Grip

The inside grip of the hammer handle is laid against the pads of the middle phalanges of the left hand fingers. The right hand cuffs the left by putting the four fingers over the back of the middle and basal phalanges of the left hand fingers. The hammer must be held firmly but not tensely.

The initial position

The thrower stands at the rear edge of the circle with his back facing in the direction of the throw his feet are a little more than shoulder width apart and his knees are bent for stability during the arm swings. The thrower now places the hammer head behind his right leg as far to his rear as possible. He then turns to the right until the right shoulder points in the direction of throwing. The hammer wire forms a straight line with the extended left arm.

The preliminary arm swings

The main function of the preliminary swings is to break the inertia of the thrower and hammer and to set a rhythmic pattern of movement by which initial acceleration is transmitted to the hammer. During the preliminary swings, the arms are kept long and relaxed and form and extension

of the hammer wire. They begin with this movement when the hammer is at its lowest point and end it by turning the trunk to the right. The thrower must counteract the increasing centrifugal force.

When the hammer moves backwards, he presses his hips forward. After the first arm swing the thrower keeps the lowest point of his hammer well to the right, at around 290 to 300 degrees, and the highest point somewhere around 120 degrees.

The Release

The delivery phase begins when the right foot touches the ground after the third turn. The landing of the right foot must be fast and firm in order to match the acceleration of the implement, which is racing down to the lowest point with the beginning of the active straightening of the legs. Just before the hammer is released, the left knee straightens. When the implement leaves the hand, the vertical line of projection of the thrower's head should not go beyond the right heel. If the feet are in a stationary position, thus is a clear proof of a correctly executed delivery. The hammer is released at shoulder height. The left shoulder points in throwing direction and back is well arched. The most valuable angle of release in the hammer throw is 42 and 44°.

1st Day Events

1. 100 mts Hurdles
2. High Jump
3. Shot put
4. 200 mts Run

2. Decathlon

Decathlon consist of 10 events which shall be conducted on 2 consecutive days in the following order.

1st Day Events

1. 100 mts Run
2. Discuss throw
3. Pole vault
4. Javelin throw
5. 400 mts Run

2nd Day Events

5. Long Jump
6. Javelin
7. 800 mts Run

2nd Day Events

6. 100 mts Hurdles
7. Long Jump
8. Shot put
9. High Jump
10. 1500 mts Run

Note :

1. Winners will be decided based on the points of all events.
2. There is no heats in the running events and every running events are treated as finals.
3. Three attempts only will be given to field events.
4. Two false start should be permitted.

3. Decathlon

Decathlon consist of 10 events which shall be conducted on two consecutive days in the following order, with minimum 30 minutes interval between two consecutive events and 10 hours interval for last event of first day and first event of second day.

1st Day Events

1. 100 mts Run
2. Long Jump
3. Shot put
4. High Jump
5. 400 mts Run

2nd Day Events

6. 110 mts Hurdles
7. Discus throw
8. Pole vault
9. Javelin throw
10. 1500 mts Run

Combined Events For Women

Combined events for women there are two category mentioned as follows.

1. Heptathlon
2. Decathlon

1. Heptathlon

Heptathlon consist of 7 events which shall be conducted on 2 consecutive days in the following order.

The Recovery or Follow Through

To avoid stepping over to thrower must absorb the impact by reversing the legs and lowering the body's centre of gravity, thus increasing stability.

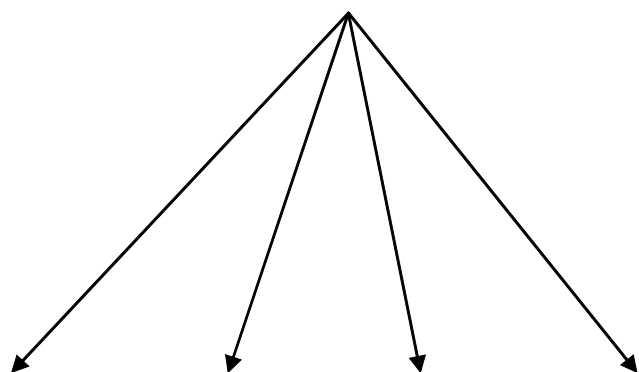
C.COMBINED EVENTS

Multi-discipline events has been included in athletics programmes since eight century B.C. though originally the five events for men included a run, long jump, discus throw, javelin throw and wrestling. The 10 events with we are familiar today were practiced first in Scandinavia, and the event is now developed in importance for the genuine all – rounder, who may not be one event, but who can maintain a high overall standard. Today it is an event for the decathlon or heptathlon specialist who prepares for it and competes in the event as a whole rather than in series of separate competitions. The decathlete or heptathlete needs to be a balanced personality with well –rounded physical development.

The Combined events are an individual events consist of several number of events of different category. For men and women combined events are classified into 4 types according to the level of competitors. The events are held over two days, and they are chose as a true test of skill, stamina and technique. The decathlon combines sprints with middle distance running, throwing, jumping, hurdling and vaulting.

There is a rest period of 30minutes between each event. A competitor is awarded points for his best performance in each event, as calculated by reference to scoring tables produced by the IAAF. The decathlon entered the Olympic programme in 1912.

COMBINED EVENTS



Pentathlon

Heptathlon

Octathlon

Decathlon

They are as follows.

1. Pentathlon - 5 events
2. Heptathlon - 7 events
3. Octathlon - 8 events
4. Decathlon - 10 events

The Combined events such as pentathlon, which shall be conducted on one day, and other combined events such as Heptathlon, Decathlon and Octathlon should be conducted on two consecutive days as in the prescribed order.

Combined Events for Men

1. Pentathlon
2. Octathlon (Youth Boys)
3. Decathlon

1. Pentathlon

The pentathlon is a five-events test of all-round ability. The men's version comprises the long jump, javelin, 200m., discus and 1500 m in that order on one day. Scoring is on the same basis as the decathlon. The pentathlon has long been a most popular women's event, and was introduced into the Olympic schedule in 1964.

2. Octathlon (Youth Boys)

Octathlon consist of 8 events which shall be conducted on consecutive two days in the following order.

1st day Events

1. 100 m Hurdle
2. Long Jump
3. Shot put
4. 400 mts Run

2nd day Events

5. 110mts Hurdles
6. High Jump
7. Javelin
8. 1000 mts Run

i) By seeing their timing in 1/100 of second. If the tie still remains.

ii) Lot shall be used to decide the best loser.

b) Field events

During horizontal or distance events, where there are more than eight competitors, each competitor shall be allocated three trials and the competitors with the best valid performances shall be allowed three additional trials.

In the event of a tie for the last qualifying place it shall be resolved by seeing the second and third best performance among the tied competitors and if tie still remains, the tied competitors shall also be allowed to for the three additional trials.

In the event of a tie for any position, it shall be decided first by using the available rules. If the tie still remains it concerns for the first place, the competition shall be re-run to decide the winner which is known as concerns any other place, the result will stand. That means the tied competitors shall be awarded the same place.

Note; Its best performance as achieved during field braking, it shall also be considered.

$$2\pi r = 128 \text{ (Circumference of two curves = } 200 - 72 \text{ (} 2 \times 36 \text{))}$$

$$2 \times 3.14 \times r = 128$$

$$\text{RDR or 'r' = } 128 \times \frac{1}{2} \times \frac{1}{3.14} = 20.37 \text{ m}$$

$$\text{MDR = RDR - 0.20 m}$$

$$\text{MDR = } 20.37 - 0.20 = 20.17 \text{ m}$$

b) TYPES OF RUNNING SURFACE

1. Mud
2. Grass
3. Cinder
4. Synthetic Track

c) NEED FOR A STANDARD TRACK

1. Track must be prepared according to the rules and regulations laid by International Association of Athletic Federation (IAAF).
2. The length of the standard track shall be 400 mts.
3. The track should be laid out from North to South direction.
4. Track shall consist of two parallel straights and two curves of same radius. The length of the curve will be more than the straight.

5. The track should have minimum of 6 lanes and maximum of 8 lanes.
6. The inside and outside of the track shall be bordered by a kerb. That is raised border of maximum 5 x 5 cm.
7. The track should have common finishing point.
8. To conduct all the running events up to 10,000 mts within a track and also the jumping and the throwing events simultaneously with the track events.
9. The track should have proper drainage system.
10. The track should be leveled without any ups and downs.
11. The running direction is such that the athlete's left hand side is towards the centre of the track.
12. The synthetic material will be used as the surface of the track.

STAGGER DISTANCE

1. There will be no stagger for the first lane athlete.
2. As and when the width of the lanes changes, the stagger distance also changes.
3. Staggers are needed only when the athletes are required to run in curves also in their lane.
4. Staggers will not change according to the increase in the length of curves.

6. Angle sector is : 34.92°
7. Wire : Single up broken and straight length of string steel wire 3 mm in diameter
8. Handle : Curved or straight grip with maximum width inside of 130 mm and maximum length inside of 110mm.

BREAKING TIES IN ATHLETICS

Tie breaking in can be steadied separately during preliminary rounds and finals to decide the positions.

1) Preliminary rounds;

a) Track events

Preliminary rounds (heats) shall be held in track events when the number of competitors is more in number to reduce the number of competitors to 6 or 8 to conduct the finals. In all preliminary rounds at least first and second in each heat shall qualify for the next round and it possible at least three in each heat shall qualify. The qualification for the next race shall be decided either according to their placings or according to their times (best losers). During this selection if there is a tie among the best loser, the following steps shall be applied to docile the best loser for the next round.

The Ring

The ring shall be placed to the level of outside ground. It must have a height of 1.4cm to 2.6 cm from the inside floor of the circle and 6mm thickness.

Specification of Hammer

The hammer consist of three parts, a metal head, a wire and a grip. The head shall be of solid iron or other metal not softer than brass. The head should be spherical in shape with smooth surface. A steel wire, with a diameter of 3mm, is attached with the head at one end and with a handle on the other end.

Overall weight of the hammer

1. Men : 7.26 kg to 7.285 kg
2. Women : 4 kg to 4.025 kg

Overall length of the hammer

1. Men : 117.5 cm to 121.5 cm
2. Women : 116 cm to 119.5 cm
3. Diameter for men : 11 cm to 13 cm
4. Diameter for women : 95 cm to 110 cm
5. Head : Solid or other suitable material

5. When staggers are marked, the diagonal excess distance also to be taken into consideration.

Formula

$$\text{Half stagger} = [W (N-1) - \alpha 0.10 \text{ m}] \pi$$

$$\text{Full stagger} = [W (N-1) - \alpha 0.10 \text{ m}] 2\pi$$

$$\text{One and Half stagger} = [W(N-1) - 0.10\text{m}] \times 3\pi$$

Where,

W – Width of the lane,

N – Number of the lane

π – 3.1416 (Standard value)

Stagger distances for Non- standard Track

$$\text{Half stagger} = W (N-1) \times \pi$$

$$\text{Full stagger} = W(N-1) \times 2\pi$$

$$\text{One and Half stagger} = W (N-1) \times 3\pi$$

Diagonal (excess) Distance

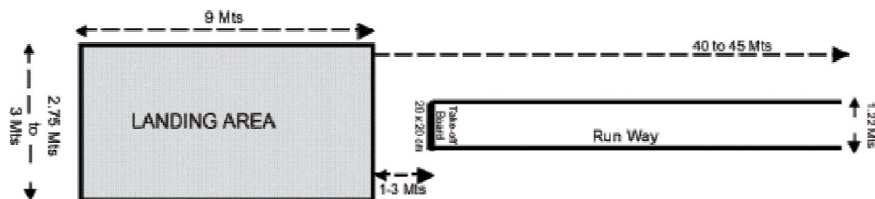
The excessive distance run by the athletes other than the first lane runner for 800mts and 4 x 400mts relay to reach the first lane after the first and three curve respectively is called diagonal excess. This diagonal distance should be calculated for each lane and it should be added with half stagger, and 1½ stagger respectively in the starting point itself.

UNIT - V

FIELD MARKING

Layout of Area for all Field Events with all Specifications

a) LONG JUMP



Specifications

Runway

Approach run - 40-45mts

Width of the lane - 1.22

Width of the line - 5cm

Jumping pit

Length - 9 mts

Width - 2.75 mts to 3 mts

Distance of the take off Board from the nearest edge - 1 – 3 mts of landing area

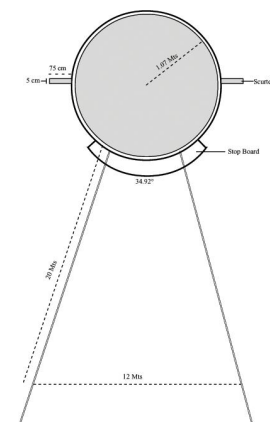
(84)

9. Width of the cord grip : 150 mm to 160 mm for men

10. Width of the cord grip : 140 mm to 150 mm for women

11. Angle of sector is : 29°

h) THROWING THE HAMMER CIRCLE



The hammer is thrown from a circle, shielded on three sides by a netting a cage on a metal frame, and must land within the marked sector. The competitor who achieves the best distance with his throw is declared winner. A total number of five judges watch for infringement within the circle, the other three judges supervise the field. If the hammer breaks while attempting a throw, then the attempt shall not be counted. Under such circumstances, if the competitor loses his balance and commits a foul, it won't go against him.

(93)

The javelin is made of wood or metal shaft with a sharp metal head. There shall be a cord grip around the centre of gravity of javelin. The cord grip should not exceed the diameter of the shaft by more than 8mm. The grip shall be of uniform thickness.

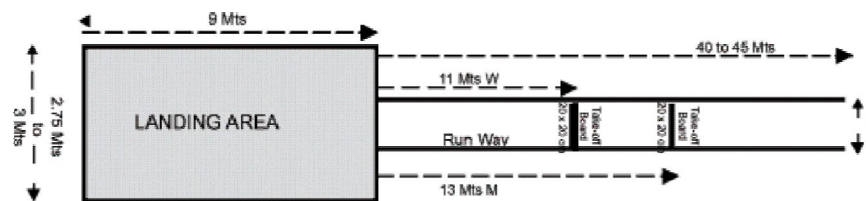
SPECIFICATIONS

1. Length of the runway : 30 to 36.5 mts
2. Width of the runway : Two parallel White lines 5 cm wide and. 4 mts apart
3. Width of the arc : 7 cm extended by 75cm long and 7 cm wide.
4. Weight of the javelin : 800gms to 825 gms for men
5. Weight of the javelin : 600gms to 625gms for women
6. Over all length of the javelin : 2.60 mts to 2.70 mts for men
7. Over all length of the javelin : 2.20 mts to 2.30 mts for women
8. Metal head : 250 mm to 330 mm for men and women

Dimension of the Take- off Board (Wooden Board)

- Length - 1.20 mts to 1.21 mts
 Width - 20 cm
 Depth- 10 cm

b) TRIPLE JUMP



Specifications

Runway

- Approach run - 40-45mts
 Width of the lane - 1.22
 Width of the line - 5cm

Jumping pit

- Length - 9 mts
 Width - 2.75 mts to 3 mts
 Distance of the take off board from the nearest edge of landing area - 11m (w) 13m (m)

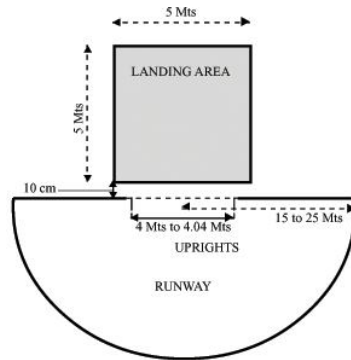
Dimension of the take off board

Length - 1.20 mts to 1.21 mts

Width - 20 cm

Depth- 10 cm

c) HIGH JUMP



Specifications

Runway

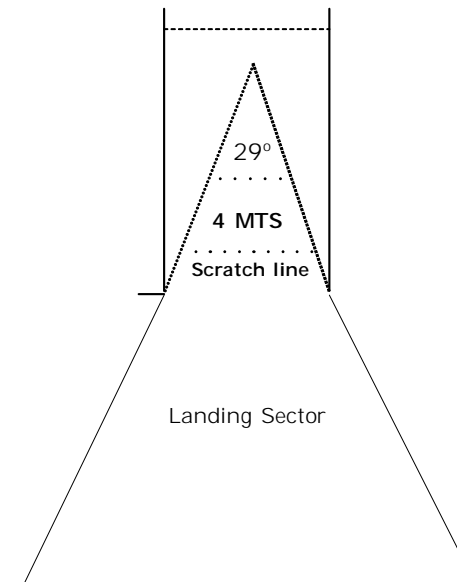
The minimum length of the runway shall be 15 meters. Except in international competitions, where the minimum shall be 20 meters. If conditions permit, the minimum length should be 25 meters.

High Jump Landing Pit

Pit : The pit is made of foam. The length of the pit shall be at least 5m, width 3m and height 60cm.

(86)

Javelin Throw Sector



IMPLEMENTS



Javelin



cord grip

(91)

Specifications

RUNWAY

The minimum length of the runway shall be 15 meters. Except in international competitions where the minimum shall be 20 meters. If conditions permit, the minimum length should be 25 meters.

High Jump Landing Pit

Pit : The pit is made of foam. The length of the pit shall be at least 5m, width 3m and height 60cm.

Uprights

The uprights should be of a rigid or any other suitable material, marked in centimeters. The uprights shall extend at least 10cm above the point up to which the cross bar can be raised. The distance between the uprights shall be between 4.00 - 4.04m.

Cross bar support

The support for the cross bar should be made of rigid or any other suitable material, which can be raised or lowered and can be adjusted up to a height of 2.30m.

Uprights

The uprights should be of a rigid or any other suitable material, marked in centimeters. The uprights shall extend at least 10cm above the point up to which the Cross bar can be raised. The distance between the uprights shall be between 4.00-4.04m.

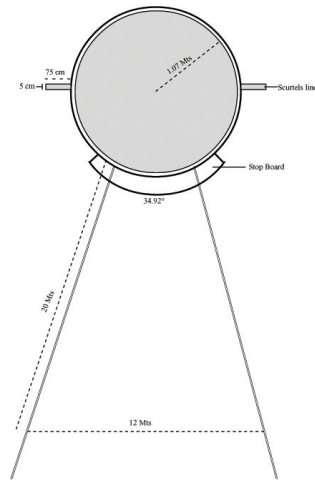
Cross bar support

The support for the cross bar should be made of rigid or any other suitable material, which can be raised or lowered and can be adjusted up to a height of 2.30m.

Cross bar

The cross bar is made of wood, or metal or any other suitable material. The cross bar should be circular with a diameter of 29 mm to 31 mm. The end of the bar shall be of concave or flattened surface of 150-200 mm in length and 29-35 mm in width. The length of the cross bar shall be between 3.98, to 4.02m.

d) SHOT PUT CIRCLE



The Ring

The ring shall be placed to the level of outside ground. It must have a height of 1.4cm to 2.6 cm from the inside floor of the circle and 6mm thickness.

Shot

The shot is made from solid Iron, brass or other hard metal. The men's shot weight is 7.26 kg with a diameter between 110-130mm. The women's shot is of 4kg with a diameter between 95-110mm. The shot should be spherical in shape with smooth surface.

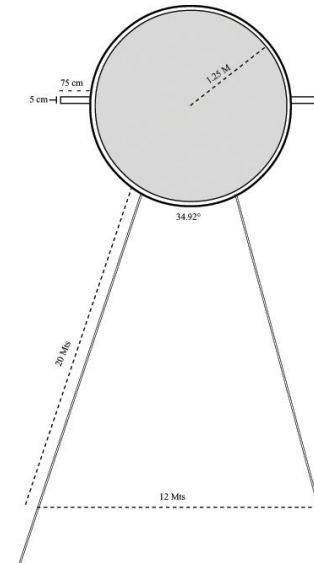
Stop Board

A curved piece of wood 10 cm thick affixed to the front of the shot put circle. When throwing, the shot putter braces his foot against the stop board to avoid falling forwards out of the circle.

(88)

f) DISCUS CIRCLE

Discus



The discus is made of wood, or other suitable material, with a rounded metal rim. The cross section of the edge shall be rounded in a circle of 6mm radius. The thickness of the rim should be at least 12m. The diameter of men's discus shall be between 219-212 mm and its weight should be 2 kg. The diameter of women's discus shall be between 180-182 mm and weight 1kg. The diameter of metal plate or flat centre area should be between 50-57mm.

(89)

a) Track Events

The judges shall decide the order in which the competition finish and if they cannot arrive at a decision shall refer the matter to the Referee, who shall decide.

Dead Heat

If there is a tie for the first place in any track event, the event shall be held after to giving adequate rest. And if it is not possible to conduct event once again due to time factor, the tied competitions shall be awarded first place jointly. This method is known as "dead heat". If tie remains for any other place, the result will stand. Rerace shall not be held to decide the second, third and other place.

Note: If photo finish facilities is available, the positions may be decided, easily.

b) Distance events

When there is a tie for any place, it shall be solved by seeing the second best performance and it necessary third, fourth best, etc. If tie still remains and concerns first place, the tied competitors will complete again in the some order in a new attempt until the tie is result. For remaining places the result will stand. That means same place shall be given to the field competitors.

Height events

When there is a tie for any place in high jump and pole vault it shall be solved by using two rules in order as following

- i) The tie competitor with lowest number of failures at the field height (last cleared height) shall be given higher place.
- ii) If tie shall remain; the competitor with lowest total number of failures throughout the competition shall be given higher place.

If the tie still remains and if it concerns the first place, the field competitors shall be given one more jump at the height where the competition is stopped (height which is immediate next to the field height), and if no decision is reached, the bar shall be raised or lowered 2cm for high jump and 5cm for pole vault. The competitors are allowed only one attempt at each height until the tie is decided. The best performance achieved during jump, if any, shall also be considered.

If the tie concerns any other place, the tied competitors shall be awarded the same place in the competition.

Note: If the same place is given, the immediate next place shall not be awarded to any competitors.

competitors shall be placed in the order in which any part of their bodies (i.e. torso, as distinguished from the heads neck, arms, legs, hands or feet) reaches the vertical plane of the nearer edge of the finish line.

B. MIDDLE DISTANCE RUNNING

Distance running can be split into two groups, Middle distance and Long distance. For middle distance running the athlete needs to both speed and stamina. For long distance running, stamina is the most important thing. Stamina means building up our body so that it can be last the race distance, but at race speed.

Middle Distance Events

1. 800 mts
2. 1500 mts
3. 3000 mts

The middle distance runner must apply his effort correctly throughout the race; this can be achieved only by a knowledge of pace and tactics.

The events which fall into the middle distance category range from 800m to 3000m. With the relentless advance in performance in athletics the 800 meter race now attracts athletes who in the past would have been sprinters. His running style is a model of mechanical efficiency, and even

UNIT - I

INTRODUCTION

A. Meaning of Athletics

Athletics comprise of a wide range of skills and can be divided in two broad categories of track and field events. Track events include sprint races, middle distance races, long distance races, relays and hurdles. The field events are those which are being played either inside or outside the track area or outside the stadium, which include throwing events and jumping events.

The track events include races of 100m, 200m, 400m, 800m, 1500m, 5000, 10000m, and relay races of 4x100m, 4x400m in both men and women categories. In all races shorter than 800m the competitors have to run the length in their respective lanes. The competitors of relay races are required to carry a baton and pass over the same to his/her partner within the take over zone. The starting points are arranged in such false a way that distance from start to finish is same for each competitor. In case of two false starts, the athletes declared disqualified. The competitor who jostles, runs across, or obstructs other competitor(s) can also be disqualified. Timings of competitors are recorded by the official time keeper from stop watches or through electronic time keeping equipment. The hurdle events include 110m and 400m for men and 100m and 400m for women. The competitors are required to jump over specified number of hurdles, which are made of metal with

a wooden top bar. The steeplechase hurdle event comprises of 28 hurdle jumps and 7 water jumps spread over a 3000m run-way.

The throwing events include throw of shot-put, javelin, discus and hammer. Each competitor generally gets six trials and the winner is decided on the best distance covered in any one of his six trials. The Jumping events comprise of High Jump, Pole Vault, Long Jump and Triple Jump. In the first two events, athletes are required to jump over a crossbar. In Triple jump the competitors are required to complete a hop, step and Jump sequence. Winner of jumping event is decided based on the distance measured between the take-off line and the nearest break in the landing area lead by the competitor's body part.

A standard international track is 400 mts in circumference. It has 8 lanes and the width of each lane is 1.22 mts. Track and field events include Sprints, Middle distance running, Long distances race, Hurdles, Steeple Chase, Relay races, throwing events and jumping events. Track and field events are conducted by International Association of Athletic Federation (**IAAF**).

Athletics

The term "Athletics" is derived from the Greek word "Athlon" which means a contest. The word "Athlete" denotes a person who takes part in contests which involve physical activity. "Athletics" is the oldest forms of the organized sport contested between individuals and or teams.

3. Run through

A forward dip during the last stride before the finish line is the most commonly used technique.

Photo Finish Camera

It is impossible for the naked eye to be able to determine accurately the finishing sequence of runners for in a blanket finish. The problem has been solved by photo-finish cameras. A photo-finish camera has very narrow slit lens which photograph an area of the finish line not more than 5-10cm across. It uses a continuous strip of film that moves across the lens at a speed proportionate to the speed of athletes and records the arrival of each competitor at the finish line. The space between each athlete shown in the film exhibits the time elapsed between the arrivals of each of them at the finish line. Photo – finish camera also doubles up as an electronic timing device, recording finishing timings of athletes up to one hundredth of a second. The camera gives a developed photograph that gives positions of athletes and time when their torso reached the finish line.

FINISH POSTS

Except where their use may interfere with the photo finish equipment, two white posts may be placed along the prolongation of the finish line at least 0.30 mts from the edge of the track. They should be of rigid construction and approximately 1.40m high, 8 cm wide and 2 cm thick. The

the foot to push against at the start of the race. The foot plates shall be slopped to suit the starting position of the athlete and can be either flat or slightly concave. To monitor the false starts the blocks can be connected with a devise. The blocks can be used up to and including 400 meters (including the first) leg of the 4x200m and 4x400m).

TYPES OF FINISHING

The finish line should be 5cm in width drawn across the track at right angles to the inner edge. Two white posts of rigid material (80mm in width and 20mm in thickness) shall be placed at a 30cm distance from the edge of the track. Competitors are place in the order in which any part of their torso (as distinguished from the head, neck, arms, legs, hands, or feet) reaches the vertical plane of the edge of the finish line nearest to the star.

Technique

There are three finishing technique used particularly during the sprint events. They are as follows.

1. Lunge finish

The torso reached the finish line first, i.e. leaning torso forward.

2. Diagonal finish (or) Shoulder Shrug

At the finish line crossing it by making the shoulder in diagonal, towards midline of the finish line. It is more difficult type.

B. IAAF

The IAAF (International Association of Athletic Federation) is the supreme governing body controlling international athletics throughout the word. It was founded in Stockholm on July 17th, 1912, to draw up and enforce rules and regulations and a common amateur definition, and to recognize world records, The IAAF now promotes its own World Champions in track and field every four years, with annual World Cross- Country Champions for men and women every march.

IAAF- Structure and Functions

In 1912, two days after the Olympic games a congress was held in Stockholm for the formation of an International Association of Athletic Federation. Seventeen countries were attended the historic meeting. The meeting was urged the Athletics to develop and promote international competitions and the Olympic games. The meeting was also urged the importance of having universal code of rules and regulation and a common definition for Amateur and also an athletic register of world and Olympic records.

One year later in 1963 at Berlin the congress once again met and accepted the first constitution and 34 nations figured on the most membership list. J.Sigfrid Edstrom (Sweden) was elected as first president and Kristvan Hailstorm as honorary secretary. The technical rules for International and domestic competition were framed and presented for approval in 1914 at the third congress in France.

In 1946 the IAAF Head Quarters moved from Stockholm to London. Over the years, the IAAF grew into a huge and dynamic organization as the world governing body of track and field athletics, road running, race walking and cross country. The congress decided to move the head quarters once again from London to Morte Carlo in 1993. The Steady growth of the Federation accelerated in the last decades. By 1997 member countries in addition numbered 209. The IAAF council comprising of 27 members from various countries.

AFI (Athletic Federation of India)

Athletics in its present form was born in our country during past decade of 19th century. Nothing much is known of its early stages till first known participation of Norman G.Pitchard in 2nd Olympic games in 1900 at Paris, where he won a Silver medal in 200mts run. The Indian Olympic Association (IOA) was formed in 1926 and its control athletics. But India unofficially participated in the 1920 and 1924 Olympic games under the leadership of H.C.Buck of Y.M.C.A Madras. The official participation of Indian athletes started in the 1928 Olympic games at Amsterdam till 1936 Berlin Olympics. India participated in the Olympics under the IOA BANNER. Then 1940 and 1944 Olympic Games were not conducted because of second World War.

Structure and Functions

Amateur Athletic Federation of India was formed in 1946 at the initiative of Maharaja Yadindra Singh then

in a natural relaxed position. An angle of about 90° at the front knee and of about 110° to 130° at the rear knee will be appropriate.

(iii) The Long Start (or) Elongated Start

The front starting block is situated 3 foot lengths from the starting line and there is one foot length between the starting blocks. The angle of rear leg about 110°. The long starting position is certainly the most difficult one. It should be applied carefully. Any athletes find this position rather ineffective. The long start, although still known, is hardly used nowadays.

For good starts a sprinter must,

- a) push back against the blocks
- b) moving the hands and arms as quickly as possible in reaction to the gun.
- c) move the hips quickly from the starting position to running position.
- d) run out of the blocks, do not jump.

STARTING BLOCKS

The starting blocks should be made of rigid material. It should be adjustable, but must be without springs. The blocks are fixed to the track, so that it provide firm base for

'On your marks' – position – his body weight resting comfortably on the legs in the crouch position. The hands are shoulder width apart to touch the ground behind the starting line with fingers and thumb pointing away from each other. The eyes are focused downward and forward.

Set position

The block settings should result, the athletes having a 90° angle at the front knee and 110° to 120° angle in the back of the knee. That gives a set position with the hips just slightly higher than shoulders slightly forward. The hands are placed just slightly wider than shoulder width apart, with the fingers and thumbs in a **"high bridge"** position. The shoulders are above and slightly ahead of the hands, the arms are straight, but not locked. He should feel pressure against rear block in the set position since the center of gravity is located high, the first strides are shorter and less powerful.

(ii) The Middle Start (or) Medium Start.

The front starting block is located two foot lengths (21 inches) from the starting line and the rear starting block is one foot length further. Kneel down with the right knee against the instep or toe of the left foot, and keep the trunk erect. The angle for the rear leg is about 130°. The slope of the body from the hips to the shoulders is not very steep. The body weight is on the legs and arms. The head remains

president of IOA with prof.G.D.Sondhi as its first president. The AAFI got affiliated to IAAF in the year 1946. The AAFI for the first time selected 8 athletes who participated in 1948 Olympic games at London. Indian women competed in the Olympic games for the first time in 1948.

Mr.M.C.Dhawn was elected by secretary of AAFI in 1950 and was the technical secretary in the first Asian games held at New Delhi in 1951. Raja Bhalendra Singh become the president of AAFI in 1952 and continued of guide athletic till 1968 along with Mr.M.C.Dhawn. This team acted a yeoman service to athletics in India and strengthened the AAFI to make it the leading federation. The federation produced by group competitors open national championship, Zonal and Inter Zonal Competition.

Many distinguished personalities are acted as president and secretary of AAFI till 1987 from 1988 to till date Mr.Suresh Kalmadi and Mr.Lalit K.Bhanot formed the new team of president and secretary respectively. The main function of AAFI is to prepare a year long sports calendar at the state and national level. They are sending teams to international level competitions based on merit.

D. AGE GROUPS

Under the Jurisdiction of the IAAF is split into five age groups.

1. Men and women there is no age limit
2. Seniors - 19 Years
3. Juniors - 17 and 18 Years
4. Youths - 15 and 16 Years
5. Boys - 13 and 14 Years

UNIT - II

TRACK EVENTS

Athletics is great fun and people of all ages, can enjoy it. Athletic activities can be traced back of the ancient Greeks, who used to take part in games of running, jumping and throwing. Track events include sprint races, middle distance races, long distance races, relays and hurdles.

The track events include races of 100m, 200m, 400m, 800m, 1500m, 5000, 10000m, and relay races of 4x100m, 4x400m in both men and women categories. In the track events all races are run with the competitor's left hand side of the track and finish in the same position. The competitors are required to wear their numbers on their vests.

A. SPRINT EVENTS

Sprints

"To cover the distance in the shortest time with maximum speed"

A. Sprint Events

1. 100 mts
2. 200 mts
3. 400 mts

1. Bunch start (or) Bullet start
2. Medium start
3. Elongated start

Three types of foot spacing bullet, medium and elongated starts. Each sprinter will have his own particular measurements so the following procedure is suggested to enable him to get into a correct starting position.

Block placement

The three block placement positions are determined by the location of the blocks relative to the starting line.

(i) The Bunch or Bullet Start

Stand with the right toe beside the rear of the left heel. Kneel down with trunk erect and rock forward in the same way. In this starting position the starting blocks are close to the starting line. The front block should be placed one foot length (16 inches) from the starting line, with 11 inches between the blocks results in low velocity and fast block clearance Track events, up to and including 400 meters, run at full speed for the entire race distance. Sprinter press their feet against two blocks, which are spaced apart and connected to a shaft, to improve their initial movement. The main features to look for in the sprinter's highly distinctive running action are the high knee-lift, the long strides, the thrusting arm action and the controlled breathing.

should immediately rise to final starting position retaining the contact of the hands with the ground and of the feet with the foot plates of the blocks.

A competitor shall not touch either the starting line or the ground in front of it with his hands or his feet on his marks. The three starting positions are measured from the starting line to the front leg of the starting block. Starting is the first stages in all the running events, should be conducted either track or road. There are only two types of starting should be followed by the athletes.

1. Crouch start
2. Arc start (Standing start)

CROUCH START

Crouch start can be used by the athletes those who are run up to and including 400mts and even the first runner of 4 x 100mts Relay and 4 x 400mts Relay.

In crouch start the following commands to be used,

1. On your mark
2. Set
3. The gun fire or clapping with clap board

It has three (divisions) method should be used according to the height of the individuals.

Sprinter

There is no ideal shape or size for the sprinter. He must, however, be well built and have good all-round muscular development and a quick reaction time. Regular, even and relaxed arm action must be learned first. The legs follow the arms, and the faster the arms are moved the faster the leg action will become. In the arm action emphasis should be on a forward and upward motion.

Most important factors for sprinting

1. Reaction time
2. Starting position
3. Powerful Muscles
4. Acceleration Technique.
5. Effective stride length
6. Curve running technique (200 mts, and 400 mts).
7. Technique at the finish line.
8. The condition of the Track surface
9. Wind and Weather conditions.

Stride Length

“It is the distance between touchdown of the toe of one foot and the touchdown of the toe of the other foot”. Stride length may and usually will be vary from left to right

or right to left on individual at the same velocity. This variance may be influenced by dominance, weakness, injuries and even leg length. Stride length will be vary with the speed of running and during the various phases of a race.

Stride Cadence or Stride frequency

"It is the number of strides per second". The stride cadence for sprinters is 4.5 to 10 strides per second with little difference found between the strides. The method of determining stride rate is to divide the number of strides in a race by the elapsed time for the race.

STARTING

There are varieties of running events for which the track is used . The finishing line for all races must be the same. But the starting line of all the races cannot be the same. It will vary from race to race. While 100mts race, 100mts hurdles and 110mts, hurdles races have to be run in straight courses, appropriate distance shall be measured backward from the beginning of home stretch and starting lines are marked. The extended lines are broken.

The start and finish of a race shall each be denoted by a white line 5 cm wide. The distance of the race shall be measured from the edge of the starting line farther from the finish, to the edge of the finish line nearer to the start.

All races shall be started by the report of the starter's gun or approved starting apparatus fixed upwards after he has ascertained that competitors are steady and in the correct starting position.

At all international sports competitions meetings, the commands of the starter in his own language shall, in races up to and including 400m be "on your marks", "set", and when all competitors are "set" the gun shall be fired, or approved starting apparatus activated.

In races longer than 400m, the commands shall be, "on your marks" and when all competitors are steady, the gun shall be fired, or approved starting apparatus activated. A competitors shall not touch the ground with his hands.

In all races up to and including 400m, and 4 x 100 mts Relay, 4 x 400mts relay first runner a crouch start and the use of starting blocks are compulsory. In competition held under IAAF, competitors must use starting blocks provided by the organizers of the meet. In other meet on all weather tracks, the organizers may insist that only starting blocks provided by them may be used. After the "on your marks" command, the competitor shall approach the starting line, assume a position completely within his allocated lane and behind the starting line. Both hands and one knee shall be in contact with the ground and both feet, in contact with the starting blocks. At the "set" command, the competitor

decreases. A study of the body movements involved in these activities pinpoints the causes. In normal walking and running the knee of the supporting leg is bent as it passes through the vertical position (i.e. when the centre of mass passes vertically over the foot), but in race walking the knee of this leg is straight in the vertical position. The technique is such a way that race walking does not become a modified run. Briefly, contact with the ground must be maintained at all times, a heel-and-toe action must be used, and the supporting leg must be straight at the knee as it passes through the vertical position.

Judging a fast walk is an extremely difficult skill, since it is almost impossible to see whether a walker has a foot on the ground at all times or that the knee is straight through the vertical for it takes only a fraction of a second to pass through the position. Race walking is not a natural skill as normal walking and running are, because the latter are the locomotion skills learnt from very early childhood.

As in most other athlete events, flexibility is an asset and hip mobility especially is an important factor in stride length in normal walking in which the line through the hip of the forward swinging leg is allowed to twist forward with the leg, the stride length is increased considerably. Stride length is also maximized, if the feet move along a straight line.

in the later stages of a race when fatigue is sapping his strength his skill does not break down.

C.LONG DISTANCE EVENTS

1. 5000 mts
2. 10000 mts
3. Marathon

The three main long distance events are 5,000m 10,000m and the marathon. Stamina is the basic quality needed by a long-distance runner, but speed has also become an essential requirement for would-be world beaters.

However, in the long distance the steady pacer must beware of the fast finisher who sits on his shoulder, until the final run-in. the steady runner without an equivalent fast finish must attempt to put himself far enough ahead of the sprint finishers by either a punishing pace throughout the race or by putting in bursts of speed during several laps from the finish. There is nothing more motivating for the training runner than to see his rival a few strides in front of him, but also nothing more demoralizing than for his rival to be 20 meters or more in front.

D.HURDLES – VARIOUS STAGES

MEANING

Running over the barriers (or) obstacles are known as Hurdles. The Hurdle race should be conducted for men and

women, senior boys and senior girls in various height and distance. Every hurdle race is based on certain conditions laid down in the rules of the International Association of Athletic Federation (IAAF).

The hurdles are made of steel with wooden top bar. The height of hurdles can be adjusted as per the length of the race and sex of the athlete. The hurdles are made in such a way that when force of 3.6-4kg. is being applied to the centre of the top, it should overturn automatically. The height required for, men's 110m race is 106.7 cm. The women's 100m sprint hurdles are 84 cm in height. In 400 m race the men's hurdle is 91.4 cm high and women's is 76.2 cm. The length of the wood used for the top bar should be 1.20m and width at least 7cm. The top bar should be striped in black or white or in some other contrasting colors.

The following are the standard distances, it can be classified into two categories,

- Men - 110 & 400 mts
- Women - 100 & 400 mts

Distance of Hurdles	Category	Height of the Hurdles	Distance Start to first Hurdle	Distance Between the Hurdles	Distance Last Hurdle to Finish
100mts	Women	0.840mts	13mts	8.50mts	10.50mts
110mts	Men	1.067mts	13.72mts	9.14mts	14.02mts
400mts	Men	0.914mts	45mts	35mts	40mts
400mts	Women	0.762mts	45mts	35mts	40mts

Substitution

Once a relay team has participated in a competition only two additional athletes may be used as substitutes in the composition of the team for subsequent rounds. Once an athlete, who has participated in a previous round has been replaced by a substitute, he may not return to the team.

RELAY BATON

The relay baton is made of a rigid material. It should be a single piece of smooth, circular and hollow tube of 280-300 mm length. The minimum weight required for baton is 50 grams and its circumference should be between 120-130mm. The batons should be colored so that it can be easily visible during the race.

Specification

- Weight of the baton : not less than 50 gm
- Length of the baton : 28 to 30 cm
- Circumference of the baton : 10 cm
- Color of the baton : Visible color
- Minimum baton required : 6 Nos.
- Maximum baton required : 8 Nos.

D. WALKING

Race walking may appear to be the natural link between ordinary walking and running, and in some respects this is true-with increase in speed, the force-time

runner only. The baton should not be exchanged within the acceleration zone(Advance Zone).

During the exchange the baton must be delivered firmly and safely into the hands of the receiving runner. When the incoming runner has approached his partner within 2 to 3 mts he indicated to him by a signal when to extend his receiving arm backwards. The signal comes too early or too late, or the runner receiving the baton moves his arm up, down or to the side, the results in an unsteady baton pass and consequently in a loss of time. The baton should be put firmly into the grasping hand between the spread thumb and the four locked fingers.

2. 4 x 400 mts Relay

The runners use a visual pass. The incoming runner carries the baton in the right hand and passes to the outgoing runner's left hand. The primary responsibility for the pass rests on the outgoing runner due to fatigue on the part of the passer. Once the baton has been taken, the athlete immediately transfer it to the other hand.

The four athletes shall run 400mts each to cover 1600mts distance by means exchanging a baton. The first leg of the 4x 400 mts relay run in lanes and so is the first curve of the second leg; only after crossing the line making the exit from the first curve, runners free to move to the inside of the track.

110mts Hurdles

There shall be Ten flights of hurdles in each lane, set out in accordance with the below table.

Starting line to First Hurdle	:	=13.72mts
" "	Second Hurdle	: 13.72+9.14 =22.86mts
" "	Third Hurdle	: 22.86+9.14 =32.00mts
" "	Fourth Hurdle	: 32.00+9.14 =41.14mts
" "	Fifth Hurdle	: 41.14+9.14 =50.28mts
" "	Sixth Hurdle	: 50.28+9.14 =59.42mts
" "	Seventh Hurdle	: 59.42+9.14 =68.56mts
" "	Eight Hurdle	: 68.56+9.14 =77.70mts
" "	Ninth Hurdle	: 77.50+9.14 =86.84mts
" "	Tenth Hurdle	: 86.84+9.14 =95.98mts
" "	Finishing line	: 95.98+9.14=110mts

VARIOUS STAGES

110mts Hurdles the Hurdling Technique is classified into the following:

1. Starting
2. Approach to the First Hurdle
3. Hurdle Clearance (Departure)

4. Running between the hurdles
5. The finish

1.Starting

Hurdling is basically a sprinting event, the mechanics of the starting do not vary much from that of the sprint start. In order to get eight (8) strides to the first hurdle to take – off foot should be placed in the first block. If the hurdler wants seven (7) strides to the first hurdle, take – off foot should be placed in the rear block.

2. Approach to the First Hurdle

The distance from the starting line to the first hurdle is 13.72 mts. The first three strides out of the blocks are the same as in a sprinter’s start. On the fourth stride, the hurdler begins to concentrate on the first hurdle. In perfecting the approach to the first hurdle make any adjustments on the 4th, 5th and 6th strides. The first three and last two should be kept constant. The last stride is slightly shorter to permit to get his centre of gravity slightly ahead of the take-off foot. This approach sets the pattern for the entire race.

3. Hurdle clearance

The take – off distance from the hurdle depends on four factors. The height of the athlete, speed of the approach length of the lead leg speed of the lead leg action. Each

The baton must be carried by hand throughout the race, if dropped, it must be recovered by the athlete who dropped it. He may leave his own lane to retrieve the baton provided this procedure is adopted and no other athlete is impeded, dropping the baton shall not result in disqualification.

Stages of Relay Running

The start

The starting of the 4 x 100 mts Relay is basically same as for the 400 mts. The starting blocks are placed close to the outer line of the track. The baton lies between the forefinger and the thumb is enclosed by the other fingers. After a successful start the runner quickly passes to the inside of his lane.

Checkmarks

The second, third and fourth runners place a checkmarks on their lanes just behind their starting positions. This is a check mark for the out going runner. The distance between the checkmark and the starting position depends on the speed of the incoming runner and on the acceleration of the outgoing runner.

The Baton exchange

The relay baton should be exchanged from one to another competitor with in the take over zone. The exchange is completed when the baton is in the hand of the receiving

when hearing the signal from the incoming runner moves the appropriate arm backwards in a positive and slightly angled manner to a level not higher than the shoulder line. The upper arm is straight at the elbow, the back of the hand is facing down wards the thumb and index fingers are widely spaced forming obtuse angle. The baton is received into such a palm from the incoming runner with an outstretched arm. In the final phase of the change over the elbow joint locks quickly and the baton is passed in a down sweep action.

The best result in both techniques the change over should occur when both runners are traveling at maximum speed and the actual change over should be as quick as possible. The majority of experts consider that the speediest change over occurs when the baton is actually changed over a distance of 2 to 4 mts from the end of the exchange zone.

Acceleration Zone

The acceleration zone lets the outgoing runner accelerate properly and allows the athletes more time to reach top speed at the exchange.

Exchange Zone or Take over Zone

The incoming runner can signals the exchange with verbal commands at a specific point when the incoming runner ready to pass the baton. The incoming runners can also use nonverbal signals. The outgoing runner can count the incoming runner's stride from the check mark to the exchange point.

hurdler must be cleared quickly and safely. The first prerequisite of movements much as in the ordinary running stride. For this action the lead leg is slightly flexed at the knee joint, and leading foot to track beyond the hurdle.

The average take-off distance from the hurdle in men's hurdles will be 1.90 mts to 2.20 mts to allow the leading leg to sweep forward and upward in a straight line. Too short a distance for the take-off results in a "jump" over the hurdle. The hurdle clearance are having the following factors.

Action of the Leading leg

The complete action consists of a quick forward and upward thrust of the leading leg in the direction of the leading of introduces the sequences.

Once the take-off foot leaves the track it becomes the trail leg. The heel of the trail leg moves actively toward the buttocks as the knee moves in a exaggerated motion upward and to the side to avoid hitting the hurdle. For the clearance of the hurdle, the trailing leg must be stretched away from the body when clearing the hurdle. This movement requires good mobility of the hip. The sequence of the athlete's movements should be as follows: after a rigorous push from the ground follows a phase of relaxation for the take-off leg. An action forward movement of the high should begin only when the foot of the leading leg has reached the edge of the hurdle.

Action of the Arms

The usual movements during running are also executed during hurdle clearance. With the sole difference that in the hurdle stride the arms perform additional functions. The arms contribute in a greater degree to maintaining body balance. When the trailing leg comes forward, the trailing arm swings backward to counter balance this movement. It is either almost stretched or flexed at the elbow.

4. Running between the hurdles (The three-step Rhythm)

In the 110 mts hurdle run the distance between the hurdles is 9.14 mts. If we reduce from the length of the hurdle stride, there remains for three strides between the hurdles or three-step rhythm a distance of about 5.065 meters. So that is 1.88 mts for each step. But practice shows clearly that the three steps are not of equal length. The first stride after the landing which is of about 1.55 to 1.60 mts follows a wide second stride measuring 2.00 to 2.20 meters and this is the longest between the hurdles. The last stride before the hurdle is always slightly shorter than the previous one.

5. Finish

The athlete has to use any one technique similar to sprint to finish the race.

Baton Exchange

There are two methods of baton (Exchange) passing

1. Up sweep method
2. Down sweep method

1. The up sweep method

In this method the passing of the baton occurs in an upward movement by a straight arm. At the same time the baton is received by an arm which is pointing backward and locked at the elbow. The outgoing runner upon hearing the agreed signal from the incoming runner, quickly extends his arm backwards locking it at the elbow, the thumb and fingers are separated and pointing downwards forming an obtuse angle. The time that he receives the baton the outgoing runner tries to keep his arm as still as possible. This outstretched arm the incoming runner quickly moves his straight arm upwards and in such a way that the outgoing runner can grasp the baton as near to the incoming runner's palm as is possible. In the upsweep method the baton is passed from the right hand to the left hand and then the left hand passing it to the right.

2. Down sweep method

In the down sweep method the baton – exchange takes place over a distance of 2 to 3 mts. The out-going runner

2. The baton must be passed inside a short distance to be covered by some three to four strides and without unnecessary loss of time.
3. The baton must be exchanged by non – visual method.

Visual Method

The visual method of baton exchange is used only in 4x400 mts relay. When the out going runner receive the baton, he must see the incoming runner while receiving the baton. The incoming runner gripping the baton at its base, then passes the baton into the receiver hand with a forward down sweep motion. The outgoing runner reaches arm straight back, palm facing upward and takes the baton, gripping the upper portion.

Non Visual Method

The non-visual method of baton exchange is used only in 4x400 mts relay. When the out going runner receive the baton, he doesn't to see the incoming runner while receiving the baton. The incoming runner gripping the baton at its base, incoming alerts the receiver, then passes the baton into his or her hand with a forward pushing, down sweep motion. The outgoing runner reaches arm back, palm facing upward and takes the baton, gripping the upper portion. then rotates the receiving arm down, under and forward, to ready the baton for the next exchange.

400 mts Hurdles

Hurdling is a sprinting, rhythmic event. In this race a full circuit of the track is run with 10 hurdles, 91.4 cm high, placed 35 mts apart. The distance from the starting to the first hurdle is 45 mts, while the last hurdle to the finish line measures 40 mts. There are ten flights of hurdles in each lane, set out in accordance with the below table.

Placement of Hurdles in 100mts Hurdle race

Starting line to First Hurdle	:	=13.00mts
" "	Second Hurdle	: 13+8.50 =21.50mts
" "	Third Hurdle	: 21.5+8.50=30.00mts
" "	Fourth Hurdle	: 30+8.50 =38.50mts
" "	Fifth Hurdle	: 38.5+8.50=47.00mts
" "	Sixth Hurdle	: 47+8.50 =55.50mts
" "	Seventh Hurdle	: 55.5+8.50 =64.00mts
" "	Eight Hurdle	: 64 +8.50 =72.50mts
" "	Ninth Hurdle	: 72.5+8.50=81.00mts
" "	Tenth Hurdle	: 81+8.50 =89.50mts
" "	Finishing line	: 89.5+10.5=100mts

Placement of 400mts Hurdles in Standard Track

(Men and Women)

Starting line to First Hurdle	:	=45.00mts
" "	Second Hurdle	: 45+35 =80mts
" "	Third Hurdle	: 80+35=115mts

"	"	Fourth Hurdle :115+35=150mts
"	"	Fifth Hurdle : 50+35=185mts
"	"	Sixth Hurdle : 185+35=220mts
"	"	Seventh Hurdle : 220+35=255mts
"	"	Eight Hurdle : 255 +35=290mts
"	"	Ninth Hurdle : 290+35=325mts
"	"	Tenth Hurdle : 325 +35=360mts
"	"	Finishing line: 360+40=400mts

E. RELAY

There are two relay events comprising of 4x100m for men and women, and 4x400m for men and women. All the four members of a team are required to run one stage of the race along with the relay baton in their hands throughout the race. The baton must be picked up by the athlete who dropped it. He/She may leave the lane in order to retrieve the baton, provided no other player is impeded.

4x100m relay races are run entirely in respective lanes with staggered starts. In 4x400m relay races the first lap and the same part, of the track, of the second lap shall be run in lanes. The position of the teams at the start shall be retained at each take- over zone, except in case of races where lanes are not used. The waiting runners can move to inside zone, after handing over the baton, until the course is clear to avoid obstruction to other competitors.

Relay races are a popular and exciting feature of track and field. It is a team event in an individual oriented sport. They give the opportunity for team work and cooperation is not available in the other events. The key to good relay racing is the baton exchange. Commonly the relay events are as mentioned below,

1. 4 x 100 mts
2. 4 x 400 mts

1. 4 x 100 mts Relay

The 4 x 100 relay is undoubtedly the most beautiful and one of the most difficult events of the athletics spectrum. This relay uses four sprinters running a complete lap of the track, passing on a baton which has to arrive at the finish line with the runner of the last leg.

The main objective in the baton pass is to keep the baton moving at top speed throughout the relay. The baton must be passed only within a 20 meters take – over zone (exchange zone). This zone begins 10 mts before the scratch line (100 mts marking) and ends 10 mts after it. A good baton – exchange needs to satisfy the following three conditions.

1. The baton – exchange must take place after some 12 to 16 mts running, measured from the beginning of the take – over zone.

forward and upward. Then he goes upward the body position is in vertical (or) hanging and elbows are flexed.

5. Clearing the bar

When the body is in hanging position lift and swings upward both the legs, at the same time the pole straightened, turn the upside down. Then pushing the pole down by hands the legs are throw over the cross bar. After clearing the cross bar push the pole away from the pit with the wrist action to avoid foul or touching the bar.

6. Landing

Safe landing is required on the landing area.

B.THROWING EVENTS

General conditions

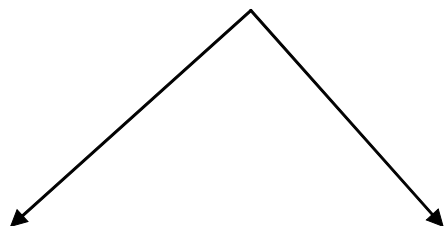
The person who has more body weight and mass of the muscles can choose throwing events. The following qualities are essential for throwers.

1. Body weight
2. Height
3. Leg power
4. Shoulder strength
5. Flexibility
6. Co-ordination
7. Speed

Race walking, of course, involves a rapid leg cadence and if the arms too are no maintain their synchronous swings they have to be bent at the elbows to reduce their moments of inertia, as in running. However, more emphasis is placed on the arm and shoulder action in race walking than in running, because of the need to counterbalancing the exaggerated eccentric thrust of the legs and movements of the hips. But in addition to counterbalancing the leg action, they also aid the forward drive with their swinging the strong upward swing of both arms evokes extra forces from the ground through the driving leg.

UNIT- III

FIELD EVENTS



DISTANCE EVENTS

1. Long Jump
2. Triple Jump
3. Shot Put
4. Discus
5. Javelin
6. Hammer

HEIGHT EVENTS

1. High Jump
2. Pole Vault

A. JUMPING EVENTS

1. LONG JUMP

The following techniques should involve while doing long jump.

1. Approach run
2. Penultimate stride
3. Take – off

(34)

1. Grip

Athletes who take off with the left foot, the pole must be carried on the right hand side, the left arm, half bent, supports the pole with the palm of the same hand turned downwards, while the right arm grips about 60-70cm higher with the hand lightly turned out. Keep the pole straight near the cross bar on the uprights. Hold the pole slightly lower than the height of the cross bar. Keep the pole parallel to the ground pointing to the pit or above the right hand palm facing upward and with left hand palm facing down ward.

2. Carry the Pole

The pole should be raised at 50° or 45° to the ground and keep right side. The left hand should be kept flexed at chest level and the right hand at the back. While carrying the pole, the body balance is very important.

3. Approach run

20 to 30 mts away from the vaulting box to start the running with the pole steadily and high knee action. When you reach the check mark, plant the pole in the vaulting box and kick the floor to go up.

4. Planting the pole

When the competitor reaches the check mark he should plant the pole into the box. Join the left hand with the right hand, push the right shoulder and both the hands

(47)

(iii) Supports for the cross bar

The cross bar shall rest on pegs pointing in the direction towards the landing area. The supports shall extend not more than 5.5 cm and not more than 1.3 cm in diameter, which should extend 35 – 40 mm above the pegs.

The distance between supports is minimum of 4.30 meters and maximum of 4.37 meters.

(iv) End Pieces of Cross Bar

It shall have 30 mm to 35 mm in diameter, square the length of the end piece is between 15 cm to 20 cm and should be semi circular.

(v) Landing (Pit) Area

The minimum dimensions of the landing area is 5 x 5 meters, for international competitions the length, width and height of the landing area will be 7 x 6 meters. The front pieces must be 2 m long.

VARIOUS STAGES

1. Grip
2. Carry the pole
3. Approach run
4. Planting
5. Crossing the bar
6. Landing

4. Flight in the air
5. Landing

1. Approach run

The length of the un-up is determined by the height of the jumper and his ability to accelerate in the run. According to analyzes carried out at recent Olympic Games, the best athletes use a run-up from 37-50m in length (incase for women 33-40). The athlete should mark the starting check mark 14 to 16 strides from the take – off board. If the athlete who is taking off with left leg, he should start running with right leg. Then he starts the approach run steadily and gradually increase the speed towards the take – off board.

2. Penultimate stride

The last two strides before the take off is called penultimate stride. In this time, the athlete shrugs his body little downward and the length of the stride decreases. That is easy way to fly in the air.

3. Take – off

The length of the jump depends not only on horizontal speed but also on the speed and power of the take-off. After completion of Approach run (penultimate stride), step on the take off board with the stronger foot and jump up in the air by pushing the take off board. After take off (or) jumping in the air the hands should be vertically raised. The Non-

take off leg should be raised high. The last step is executed more quickly and the whole foot is placed on the board, ahead of the projection of the center of gravity.

Plasticine Indicator (No Jump indicator)

Plasticine indicator is called no jump indicator, it is placed at the inner edge of the Take-off board. The judge at the take off board must watch the competitors does not overstep the scratch line. If a no jump indicator is not available the judge should build one moist sand which will clearly show if it is touched by toe or spike. It is a foul only if contact is made with the ground or the no jump indicator.

4. Flight

Jumping styles vary according to the development of the athlete and his muscular characteristics and the bone structure. The most common techniques are,

1. The Sail (common among beginners)
2. The Hitch kick (1-2-3 strides and a half in the air)
3. Hang (extended jump or glide)

(i) Hitch Kick

After jumping in the air from the take off board the athlete swing (or) rotate their legs like pedaling in cycle in the air into 2 or 3 pedaling style, and the legs are closed together before landing. When legs are pedaling the arms alternatively with legs movement.

4. POLE VAULT

Runway

The minimum length of the runway shall be 40 meters, when the conditions permit it is 45 meters.

1. The width of the runway is 1.22 meters.
2. The runway should be marked by white lines with 5cm as width.

Implements

(i) Upright

Any style of uprights or posts may be used provided they are rigid.

(ii) Cross Bar

It is made up of Fiber glass, Metal or other suitable material.

1. The length of the cross bar is 4.48 mts to 4.52 mts.
2. The maximum weight of the cross bar is 2.25 kg.
3. The circular shape of the cross bar is 30 mm diameter.
4. It should have the gap of maximum 3 mm

3.Fosbury Flop

The Fosbury flop was introduced by Dick Fosbury, who won the high jump at the Mexico Olympics in 1968. His technique for clearing the bar, his run up was also very notable because it was in the form of a semi- circle, and he took off with his foot at an angle of about 20 degree relative to the plane of the uprights. At the point of take – off Dick Fosbury with a vigorous bending action and driving up of the free leg, supported by an alternated movement of the upper limbs, rose completing a rotation on the longitudinal axis of the body and then prepared for flight with his back to the cross-bar.

Next he performed his rotation on the transverse axis of the body and at the extreme point of the parabola, he arched himself and continued his trajectory on this position until, so as not to knock down the cross - bar, he straightened his leg and landed on his back bowing his head on to his trunk so that the impact was taken by the top part of the back, avoiding unpleasant injuries to the cervical part of the spinal column.

4. Landing

Safe landing is required on the landing area.

(ii) Hang style

After the take off the athlete do the back arch the arms should be vertically raised above the head, the legs are straighten back, and before landing brings the legs and arms to extend forward, and the legs are closed together before landing.

5. LANDING

After completion of his style in the air, before landing, the athletes should extend both the legs forward / straightened. While landing both the heels should be landed first on the pit. There are three landing techniques should be used to come out of the landing area. They are as follows.

1. Collapsed landing
2. Swing out landing
3. Scoop landing

1. Collapsed landing

While landing both the heels should be touched first on the pit and then toe, the whole body should brought forward and place the knees on the pit, at the same time the buttocks should be kept back on both the heels.

2. Swing out landing

After landing in the pit the athletes should turn his body 45° either right or left in forward and fall down on the ground with shoulder, first then buttocks and so on.

3. Scoop landing

Landing by heels on the pit and push forcefully the sand and makes a dig and place the buttocks on the dig by extending the legs straight.

The competitor commits fouls if he;

1. Take off beyond the take off line.
2. Delaying more than 60 seconds.
3. After landing walking back towards the run way.
4. Performing acrobatics during the jump.
5. Uses illegal style of jump.

Rules

1. The order in which the competitors make their attempts must be decided by drawing lots.
2. Each competitor will be placed according to his best jump.
3. When there are more than eight competitors, each one is given 3 attempts and the 8 competitors with the best jumps are given further three jumps.
4. In case of a tie for the eight position, each competitor involved in the tie has three additional attempts.
5. When there are eight or less competitors, each one is allowed six trials.

3. Clearing the bar

1.The scissors

Towards the end of the 19th century, an American named Mike Sweeny proposed the scissors jump as an alternative to the frontal clearance. The scissors involved passing one leg over after the other at the same time bending the trunk towards the knees when clearing the bar. It consisted of the following movement:

1. While the forward leg was the cross – bar the other one kicked upwards, causing the chest to rotate towards the direction of jumping and a landing on the feet.
2. With the use of this style the world record began to rise this style, the world high-jumpers introduced minor adjustments to the technique according to their physical characteristics and talents.

2.The Straddle

Towards the middle of the 1930s another American Dave Albritton, proposed a radical new technique for clearing the bar, involving the body being parallel to the bar, but with the stomach downwards rather than with the body sideways. Thus the straddle was born, which was clearly demonstrated by the Soviet trainer Vladimir Mihailovic Dyachkov and put to good effect by Valeri Brumel, who took the world record to 2.28m in 1963.

1. Scissors
2. Straddle Roll (or) Belly Roll
3. Fosbury Flop

Various stages

1. Approach run
2. Take – off
3. Crossing the bar/ clearing the bar
4. Landing

1. Approach run

The jumper can approach either from the left side or right side of the cross bar with 25 mts long and medium speed. The angle of approach run and the number of steps vary according to the level of the athlete.

2. Take off

Jumper can stand either right or left one arm away from the cross bar. Then down vertically draw the line that may be considered as take off line. When the jumper start to approach towards crossbar, used his power leg on the take off line for make a jump.

6. Once the competition is under way, competitors are not allowed to use the runway for trail attempts.
7. All jumps must be measured from the nearest mark in the landing area made by any part of the body or limbs of the athlete to the take-off line or its extension and at right angles with the take-off line.
8. If a competitor takes off before the board or the line this does not constitute a foul.

2. TRIPLE JUMP

The triple jump shall consist of a Hop, step and jump in that order. This is the English definition of the jump. The hop must be executed on the same leg which was used for the take off (right-right or left-left). In the step the support is transferred to the other leg. The final jump is a proper long jump.

1. It shall not be considered a failure if the competitor, while jumping, touches the ground, with the “sleeping” leg.
2. There are six stages when taking Triple jump. They are as follows
 - (1) Approach run
 - (2) Take – off
 - (3) Hop

(4) Step

(5) Flight

(6) Landing

1. Approach run

The length of the run-up is determined by the height of the jumper and his ability to accelerate in the run. According to analyzes carried out at recent Olympic Games, the best athletes use a run-up from 37-50m in length (incase for women 33-40). The athlete should mark the starting check mark 14 to 16 strides from the take – off board. If the athlete who are taking off with left leg, he should start running with right leg. Then he start the approach run steadily and gradually increase the speed towards the take – off board.

2. Take – off

The length of the jump depends not only on horizontal speed but also on the speed and power of the take-off. After completion of Approach run (penultimate stride), step on the take off board with the stronger foot and jump up in the air by pushing the take off board. After take off (or) jumping in the air the hands should be vertically raised. The Non-take off leg should raised highly. The last step is executed more quickly and the whole foot is placed on the board, ahead of the projection of the center of gravity.

3. Hopping

The athlete should be used to land on the ground which he was used to take off. For example: The athlete has take off for his left leg means he should land or hop in the same leg. During hopping the non take off leg (or) rear leg has no movement, that's why it is called sleeping leg.

4. Step

After completion of hopping the athlete used to take one more step with his non take – off, foot before landing is called step. Here the athlete does the bounding action to do the step.

5. **Flight** and

6. **Landing** procedures are similar to long jump.

3. HIGH JUMP

The high jump as we know it today first became popular in the 19th century. Subsequent perfecting of the jumping technique took place in the development stages, but it has depended particularly on modification of the rules for the event and on the elimination of some restrictive conditions.

Various techniques should be used by the jumper to cross the bar. Depends upon their ability they used any one of the following techniques.

c) High carry

High carry method is associated with those throwers who tend to use a direct over the shoulder type withdrawal which ends with a turning back of the shoulders at the arm and javelin is reaching near full backward extension (To held on above the head).

A thrower must develop his carry position to suit his technique of withdrawal of the javelin in preparation for the delivery stride.

2. Approach run

During approach run the thrower has to mark the point of starting and the point of check mark with javelin. While running the javelin should move front and back, and slowly increase the running speed still you reach you the check mark.

The Run-up : The run – up has two parts. They are

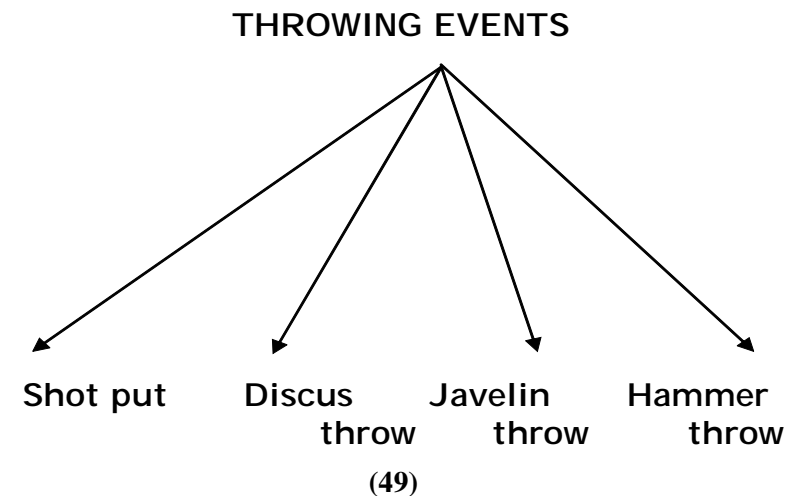
- (i) The cyclic part
- (ii) The acyclic part

The cyclic part speed is built up sufficiently so as to allow for a further increase over the last strides. The run-up should be easy and relaxed, heading the thrower to a powerful explosive all-out release.

- 8. Arm length
- 9. Balance
- 10. Endurance

The competitors are allowed three to six trails and three to eight of the best competitors are allowed three more trails. Incase of a tie for the final place, the competitor shall be allowed three additional trails. The conditions of the competition must be explained to the competitors before its commencement. The best throw of the competition out of all trails taken by the competitors shall be credited in resolving a first place tie. No markers or marks are allowed to be put in the throwing sector.

Competitors may use an adhesive substance on their hands for better grip, and can also wear a belt of leather or some other material to protect the spine from injury. However, taping of the fingers or use of any other devise on their hand which might assist in throwing is not allowed.



1. THROWING THE SHOT PUT

The competitor must begin the throw from a stationary position within the circle. The shot shall be put from the shoulder with one hand only and, shall touch or be in close contact with the chin. The hand shall not be dropped below this position during the act of putting.

Practice trials are not allowed after the commencement of the competition. Competitors are not allowed to put on gloves nor are they allowed to spray or spread any substance either on the surface of the throwing circle or on their shoes.

Basic Principles

1. Forces must be applied along a straight line.
2. Newton's 3rd law – Action and Reaction are equal and opposite.

Specifications

1. Weight of the shot for men - 7.260 Kg
2. Weight of the shot for women - 4.00 Kg
3. Diameter of the shot put circle- 2.135 m
4. Angle of the shot put sector - 34.92
5. Dimension of the sector - 20 x 12 m

a) Normal grip

The above thumb and middle finger is behind the edge of the grip cord and the index finger is partly curled around and behind on the javelin's shaft.

b) Middle and Thumb grip

The index finger and thumb is behind the edge of the cord binder and the rest of the fingers around the cord itself.

c) 'V' grip (or) Glow grip

The Javelin is held between the index and the middle fingers at the edge of the cord binder and rest of the fingers around the cord itself.

Carry

The javelin is carried above the shoulder of the throwing arm. Three commonly used methods of carrying the javelin during the approach run's cyclic phase.

a) Low carry

The low carry is generally associated with a circular type arm action in the 'withdrawal' (To held on waist level).

b) Medium carry

The medium carry is generally favored expansion in the withdrawal. (To held on eye level).

1. A head
2. A shaft and
3. A cord grip

The javelin throw comprises the following technical elements.

1. The grip and carry
2. The Approach run
3. The withdrawal
4. The impulse stride
5. The throwing stride
6. The release
7. The recovery

1. Grip

When executing their throws, javelin throwers may hold the javelin only by the whipcord grip. They may hold the javelin at the end of the cord grip with one or more fingers and the thumb touching the javelin shaft. Javelin throwers have some leeway in how they grip the javelin. It has three types how they can hold the javelin. The javelin is held behind the cord binder the rear edge of which offers a slightly raise border for gripping the javelin.

Stages / Method

1. Holding of the shot
2. Tucking (or) Placement of the shot
3. Stance
4. Glide
5. Release

1. Holding the shot

- a. The shot rest on the root of the fingers, and should not touch the palm.
- b. All the fingers are carry the shot except the little finger which is only support.

2. Placing (Tucking) the shot

1. The shot must be placed between chin and clavicle.
2. The shot does not go beyond the shoulder line.
3. The hand should be parallel to the ground.

3. Stance

The stance varied according to the using the style of Athletes.

Techniques (Style Of Putting)

The thrower can be used 3 style when putting the shot

1. Standing throw
2. 'O' Brien technique (or) Gliding
3. Rotation (or) Disco put

1. The 'O' Brien Technique

The distance a shot travels depends upon its height of release, velocity at the moment of release and the Angle of projection. The optimum angle of projection will vary depending on the height of the release, and the distance of the put, it will be approximately 34.95. The correct technique is the one that will result in the greatest velocity at release. The motion of a projected object is influenced by the exact point of application of the propelling force.

Holding the shot

The procedure for gripping the shot is to hold it in the left hand and lay the right hand loosely on top with the fingers spread slightly. The putter holds the shot in his right hand. Where it rests on the "base" of the fingers. The three middle fingers are only slightly splayed while the thumb and the little finger give the shot lateral support, securing a safe position of the shot.

The Reverse

The reversal is to serve as a follow through after the thrust and to retain balance in order to avoid fouling. After the discus has left the hand the thrower will have to reverse the feet rapidly and lower the body weight to maintain balance. The right leg must be brought forward quickly and planted firmly close to the rim of the circle, mean time the left leg swings back the body is bent at hips and right knee flexes to drop the centre of gravity into a stable position.

3. THROWING THE JAVELIN

The javelin throw distinguishes itself from other throwing events of shot-put, discus throw and hammer throw. These throwing events must be from a circle, the javelin must be thrown from behind the arc of a sector drawn with a radius of 8 mts. Due to the aerodynamic nature of the implement and its relative weight, the event does not require great strength. The event does require few less technique in order to achieve high level results.

Javelin consists of three parts namely the head, shaft and grip. The shaft is made up of either Aluminium or fiber. At the tip of the shaft a sharp head is fixed. At the center a grip made of thread is fixed. The Javelin is round and broad at the center. The circumference is small in the front and rear. It has three main parts

athlete drives off the left foot. The effective throwing position is one of "muscular wind" the hips displaced from the feet, shoulders from the hips and discus from the shoulders.

The run across the circle is initiated by the driving action of the left leg. Synchronized with the swing of the right leg. This drives carries the thrower halfway across the circle. The right foot landing approximately on the centre line with the leg well bent and the shoulder and body weight back. His left leg is pointing toward the direction of the throw, his right shoulder is facing the rear, his throwing arm is well behind the shoulder his left arm is curled and the discus is flat.

The Release

The throw begins with a forward and upward drive from the right foot. The shoulder should now come in slightly after the hip and the arm strikes from the low point, the thrower reaching out as far as possible to give as much distance from axis of rotation as he can. The left leg should now straighten, as the arm strikes. The discus will leave the hand in line with the right shoulder and should be squeezed out of fingers, each digit applying its force in turn and spinning of the first fingers last. The discus is spun clockwise. A good thrower will release the discus at a 35°-40° angle. The release must be smooth and rhythmic using the force generated from the lower body.

The stance

He should stand facing the rear of the ring with his back in the direction that he is going to throw. The shot should be held in right hand, supported by thumb and fingers. The hand holding the shot will be placed into the hollow of the collar bone in such a manner that it does not rest on such a manner that it does not rest on the shoulder but against the right side of the neck and the jaw. The elbow of the right arm is slightly raised and pressed forward. The upper arm points forward and downward. The head remains in its normal position. The eyes should be focused on a point to the rear of the ring and about five to ten yards away. He should stand erect in a telexed attitude, the left arm is held either out in front of the face or relaxed above the head the left front behind the right about one foot with just the toes touching for balance.

The glide or drive

The purpose of the glide is to gain momentum while moving across the ring and to lead into the correct position for the delivery. The initial movement is to lower the trunk and raise the left leg causing the body to form a "T" shape with all weight carried on the right leg. The head, shoulders and hip remain square to the rear of the circle, and the right leg flexes in preparation for the drive across the ring proper balance at this point is extremely important.

2. The Rotation or Disco-put Technique

The Starting Position

The putter stands at the rear of the circle facing 180° away from the throwing direction. The left foot is along the centre line of the circle and the right foot is placed laterally to the right of the centre line about shoulder width apart or just this point in most cases. The grounding of the left foot at the stop board denotes the arrival of the thrower into the delivery stance.

Preliminary Movements

To start the turn, the putter begins by swinging the shoulders, trunk and left arm along with the left and then to the right, as the body weight shifts correspondingly from leg to leg in coordination with the rhythm of the shoulders, trunk and left arm. Both knees are semi – flexed while this side to side swaying movement is taking place to break the inertia and set the pattern of movement to follow.

Turn

The double support phase of the turn begins at the end of the preliminary movements. The thrower is completely over his right leg with the trunk and shoulders well twisted to the right. From this position the thrower begins unwinding his upper body in the direction of turning with a wide

throwing arm bang to the right side along the thrower's thigh with the head and eyes focused to a point about 5 meters behind the circle. There are generally three positions that a thrower may adopt in relation to the line of direction. The experience, technical skill and comfort of the thrower must decide which of the three starting positions suit their ability.

The left foot is generally placed a few centimeters back from the rim of the circle, in order to avoid fouling by bursting the sole of the foot on the top edge of the rim of the circle as the pivot is executed.

The preliminary swings

The thrower should position himself at the rear edge of the circle with his back to the generally facing the direction of throw and his feet slightly wider than hips. The discus should be flat and facing downwards on the arm swung at shoulder height so that the arm and discus go well behind the right shoulder. The free arm rests comfortably across the chest. The thrower's weight should move easily from one foot to the other. On the final preliminary swing, the arm is swung back as far as possible so that the body weight is over a straight right leg.

Coming across the circle

The initial movement is begun the hips are turned and a pivot is made on the ball of the right foot as the

Specification of discus

1. Weight of the discus for men : 2 kg to 2.025 kg
2. Weight of the discus for women : 1 kg to 1.025 kg
3. Diameter of the discus for men : 21.9 cm to 22.1 cm
4. Diameter of the discus for women: 18 cm to 18.2 cm
5. Angle of sector is : 34.92°

Various Stages

Hold

The hand is placed flat against the discus surface, the upper joints of the fingers grasp the rim of the discus. Its center of gravity lies between the index and middle finger. Due to a slight bending at the wrist the upper face of the discus touches the arm, because it prevents the discus from falling out of the hand in the subsequent movements.

Starting position

The starting position at the rear of the circle is with the thrower facing 180 degrees away from the throwing direction. The two feet are usually placed about shoulder width apart or slightly more in the case of very tall throwers. The toes point naturally outwards with the weight of the body evenly distributed over both feet. The discus and

sweeping left arm action parallel to the ground, a slight forward tilt to trunk in a semi sitting position. The single support phase of the initial part of the turn is followed by a brief non support phase when both feet are off the ground and the whole body is turning on its vertical axis, and continues turning after the right foot lands around about the center of the circle.

Follow through (or) Reverse

When the right leg has driven really well and effectively and the action has been timed correctly the athlete will be well over the left foot as the arm strikes. Immediately after the shot has left the hand, he will find himself falling over the stop – board. In order to prevent himself fouling, the left foot is rapidly withdrawn and the right leg brought forward, the toe of the right foot striking the inside edge of the stop – board. At the same time the body weight is lowered in order to be more on balance by lowering the centre of gravity.

Valid Trial

For a valid trial, the shot shall fall completely within the inner edges of the landing sector.

Fouls

1. Throwing the shot from behind the shoulder
2. Touching outside the circle or the top of the stop Board

3. Shot landing on the sector line or outside the sector line
4. Delaying more than 60 seconds to throw.

Rules

1. The use of gloves is not allowed
2. At the competition area, each competitor may have a maximum of two practice trials which should be made in draw order, under the supervision of the judges.
3. Once the competition has begun, competitors are not permitted to use implements for practice purposes or to use the runway or ground within the sector for practice trials, with or without implements.
4. No device of any kind – i.e., taping of two or more fingers together, which in anyway assists a competitor when making a throw, shall be allowed. The use of tape on the hand shall not be allowed except in the case of the need to cover an open cut or wound.
5. A better grip, competitors are permitted to use a suitable substance on their hands only.
6. To protect the spine from injury, a competitor may wear a belt of feather or other suitable material.

7. For a valid trail, the tip of the javelin shall fall completely within the inner edges of the landing sector.
8. If the implements breaks during a throw or while in the air, and if the competitor thereby loses his balance and contravenes, it shall not count as a foul throw, provided one attempt was made in accordance with the Rule.
9. Implements shall be carried back to the starting line and never thrown back.
10. The competitor shall not leave the runway until the implement has touched the ground.

2. THROWING THE DISCUS

The object of the spin in the discus throw is to generate power and speed within the circle to apply to the discus itself, and the more power that is applied to the discus, then further it will go the angle to release of discus, the position of the discus during its flight are important factors. It has three types,

1. Half rotation
2. Full rotation
3. One and half rotation

6. 5000m Run – Arc start **or** Group start
7. 10000m Run – Arc start **or** Group start
8. 400mts Hurdles - Full stagger distance
9. 4 x 100m Relay – Full stagger distance
10. 4 x 400m Relay – One and Half stagger distance with diagonal distance.

2.Non- Standard Track

The track which is not satisfying the conditions of standard track is called as Non-standard track and the 400mts track without curb (raised border) is also treated as Non-standard track. Usually 200mts track is called as Non – standard track.

Some of the disadvantages of Non-standard track:

- a) Sprinters very difficult to show their real capacity.
- b) Very difficult to run more than 6 competitors at a time.
- c) Very difficult to conduct Hurdles and Relay races.
- d) Very difficult to conduct both track and field events simultaneously.

Method of finding Running Distance Radius for 200 mts track if 36 mts as straight.

3. Five – stride – Rhythm

The three known stride Rhythms – the three stride rhythm. The five stride Rhythm and seven stride rhythm. It is five stride – Rhythm which is the most widely accepted, which comprises the following phases:

- (i) The withdrawal of the javelin
- (ii) The impulse stride
- (iii) The throwing position
- (iv) The release
- (v) The recovery

(i) Withdrawal of the javelin

The withdrawal starts at the second stride of the five-stride rhythm and ends at the third stride. The throwing arm is drawn back in alignment with the shoulder axis. The palm of the hand is turned upward and extend the forearm, when the withdrawal is completed, the athlete's body has a marked backward lean.

(II) Impulse stride /Cross step / Three step (or) Five step Rhythm

When an athlete reaches the check mark with the left leg the action of throwing should be starts. The right hand is stretched backward with the javelin and left hand is brought in forward in front of chest. That is otherwise called "with drawl of the javelin".

The toe of the right foot must be deviate more than 30° from the run up direction. The left leg presses the body down low into the fourth stride, preventing the body's centre of gravity from lifting at the landing of the right leg, which must be allowed to bend when it receives the body weight.

(iii) Throwing Position

The throwing position starts at the moment when the athletes right foot makes contact with the ground after the impulse stride. The right leg can start to extend and doing s introduce the release, the full extension of the forearm by the hand is important under no circumstances must the arm be flexed at the wrist.

(iv) The Release

The release is initiated by a forward and upward stretching of the right leg at the knee and ankle joints, driving the right hip forward. The shoulder and the hip axes now run parallel and almost at right angles to the direction of the throw. The throwing arm is not yet stretched while the right leg is extended, the heel is raised, allowing the pressure of the ball of the foot to act longer on the body. The throwing arm now comes into its sphere of action. When the throwing arm begins to strike, the elbows are raised until it is level with the heed and pointing in the throwing direction.

Method of Finding Running Distance Radius for 400 mts if 80 mts as straight.

$$\begin{aligned}
 2pr &= 240 \text{ (Circumference of two curves)} \\
 r &= 240/2 \pi \\
 240/2 \times 3.1416 &= \frac{240}{2 \times 3.1416} = \frac{240}{6.2832} \\
 &= 38.20 \text{ mts}
 \end{aligned}$$

For Standard Track (With Kerb)

Marking Distance Radius (MDR or CR) = RDR – 0.30 m

MDR = 38.20 – 0.30 = 37.90m

For Non-standard Track (without kerb)

MDR = RDR – 0.20 m = 38.20 – 0.20 m = 38.00m

Starting points in 400 mts Track

1. 100m Run Men & Women
100m Hurdles for Women - Parallel Method
110m Hurdles for Men
2. 200m Run – Half stagger distance
3. 400m Run – Full stagger distance
4. 800m Run – Half stagger with diagonal excess **Or** Arc start / group start
5. 1500m Run – Arc start **or** Group start

Running Distance Radius (RDR)

RDR is the path in which an athlete has to run in the curve to cover the exact distance. The chart below shows that RDR,CDR and area required to lay 400mts raised bordered track when the straights length varies.

Straight length in mts	Rdr in mts	Cdr in mts
79MTS	38.50	38.20
80MTS	38.18	37.88
84.39mts	36.80	36.50

The chart below shows that RDR,CDR and area required to lay 200mts Non raised bordered track when the straights length varies.

Straight length in mts	Rdr in mts	Cdr in mts
37.50MTS	19.89	19.67
40.00MTS	19.09	18.89

During the release the left side of the body must be in a flexed position. This is achieved by a sudden arrest of the backward movement of the left arm just when the right side of the body overtakes the left side the angle of release is between 30 and 36 degrees.

(v) The recovery

A distance of at least two meters from the arc will be required merely checks the forward speed of the body. Thus preventing from fouling. After the release, the right leg is forward in a springing movement. The reverse takes places to avoid stepping over the right foot must be planted transversely to the throwing direction, the upper body must be lean forward, the left leg is raised and brought back into the direction of the run-up. Javelin consists of three parts namely the head, shaft and grip. The shaft is made up of either Aluminium or fiber. At the tip of the shaft a sharp head is fixed. At the center a grip made of thread is fixed. The Javelin is round and broad at the center. The circumference is small in the front and rear.

Follow throw

After releasing the javelin the thrower to avoid his forward momentum (or) foul, then he placed his rear leg to brought forward for his rear leg and placed nearer to the board and to do hopping twice or threes. Then he come back behind the runway should not make foul.

Correct throw

The javelin should be caught in the grip. The javelin must be thrown forward from behind the shoulders. While throwing thrower should not cross the line of runway either in front or side. After releasing, the javelin should fall within the sector lines with the tip first touching the ground. The thrower still remains (leave) the runway only after the javelin lands on the ground.

6. THROWING THE HAMMER

The technique of hammer throwing is determined by the specific nature of the implement and the measurement of the throwing circle, which comply with the international rules. A complete throw consists of two preliminary swings and three turns on the left foot with an active push-off from the right leg at each turn. The following are the parts of hammer throw:

1. The Grip
2. The Initial position
3. The preliminary Arm swings
4. The Transition
5. The turns

Top Layer

Now-a-days all international competitions are being held on synthetic tracks. The thickness and material used for various layers of a synthetic track depend upon the product and preference of the particular firm (construction agency). Although, the material used for top layer by all the firms are synthetic tracks, but of different variations. It is advisable that whenever 8 lane synthetic tracks are being laid, efforts should be made for laying of another 4 lane synthetic track of the same material for training purposes.

Lane

Lane is the space between the two parallel lines.

Kerb

Kerb is the raised border (both inner and outer line) which is fixed permanently through the inner line of the first line and outer line of the last lane. Dimensions of curb is 5 x 5 cm (5 cm height, 5 cm width).

Curb Radius (CR)

Curb radius is the radius which is used to draw the curve. It is otherwise known as Marking Distance Radius (MDR). The curb radius varies according into the nature of the track.

TRACK MARKING

Track must be prepared according to the rules and regulations laid by **International Association Of Athletic Federation** (IAAF). The inner raised border should be 5cm in height and width by using brick, wood or any other suitable material. There shall be a minimum of 8 lanes and width of lane is 1.22mts and width of the line is 5cm. The straight lines are always marked by north to south direction and finishing line must be same for all races.

a) TYPES OF TRACK

The track is classified into two types based on its specifications.

1. Standard Track (with curb)
2. Non- standard Track (without curb)

1. Standard Track

The tracks are made either on plan surface (grass) or with the help of cinder/synthetic material which is skid proof and not too hard. To get maximum benefit from the cinder/right synthetic tracks, it is essential that proper care be taken at the time of the construction so that right materials are mixed in various layers as per required thickness.

6. The Release

7. The Recovery

The Grip

The inside grip of the hammer handle is laid against the pads of the middle phalanges of the left hand fingers. The right hand cuffs the left by putting the four fingers over the back of the middle and basal phalanges of the left hand fingers. The hammer must be held firmly but not tensely.

The initial position

The thrower stands at the rear edge of the circle with his back facing in the direction of the throw his feet are a little more than shoulder width apart and his knees are bent for stability during the arm swings. The thrower now places the hammer head behind his right leg as far to his rear as possible. He then turns to the right until the right shoulder points in the direction of throwing. The hammer wire forms a straight line with the extended left arm.

The preliminary arm swings

The main function of the preliminary swings is to break the inertia of the thrower and hammer and to set a rhythmic pattern of movement by which initial acceleration is transmitted to the hammer. During the preliminary swings, the arms are kept long and relaxed and form and extension

of the hammer wire. They begin with this movement when the hammer is at its lowest point and end it by turning the trunk to the right. The thrower must counteract the increasing centrifugal force.

When the hammer moves backwards, he presses his hips forward. After the first arm swing the thrower keeps the lowest point of his hammer well to the right, at around 290 to 300 degrees, and the highest point somewhere around 120 degrees.

The Release

The delivery phase begins when the right foot touches the ground after the third turn. The landing of the right foot must be fast and firm in order to match the acceleration of the implement, which is racing down to the lowest point with the beginning of the active straightening of the legs. Just before the hammer is released, the left knee straightens. When the implement leaves the hand, the vertical line of projection of the thrower's head should not go beyond the right heel. If the feet are in a stationary position, thus is a clear proof of a correctly executed delivery. The hammer is released at shoulder height. The left shoulder points in throwing direction and back is well arched. The most valuable angle of release in the hammer throw is 42 and 44°.

1st Day Events

1. 100 mts Hurdles
2. High Jump
3. Shot put
4. 200 mts Run

2. Decathlon

Decathlon consist of 10 events which shall be conducted on 2 consecutive days in the following order.

1st Day Events

1. 100 mts Run
2. Discuss throw
3. Pole vault
4. Javelin throw
5. 400 mts Run

2nd Day Events

6. 100 mts Hurdles
7. Long Jump
8. Shot put
9. High Jump
10. 1500 mts Run

Note :

1. Winners will be decided based on the points of all events.
2. There is no heats in the running events and every running events are treated as finals.
3. Three attempts only will be given to field events.
4. Two false start should be permitted.

3. Decathlon

Decathlon consist of 10 events which shall be conducted on two consecutive days in the following order, with minimum 30 minutes interval between two consecutive events and 10 hours interval for last event of first day and first event of second day.

1st Day Events

1. 100 mts Run
2. Long Jump
3. Shot put
4. High Jump
5. 400 mts Run

2nd Day Events

6. 110 mts Hurdles
7. Discus throw
8. Pole vault
9. Javelin throw
10. 1500 mts Run

Combined Events For Women

Combined events for women there are two category mentioned as follows.

1. Heptathlon
2. Decathlon

1. Heptathlon

Heptathlon consist of 7 events which shall be conducted on 2 consecutive days in the following order.

The Recovery or Follow Through

To avoid stepping over to thrower must absorb the impact by reversing the legs and lowering the body's centre of gravity, thus increasing stability.

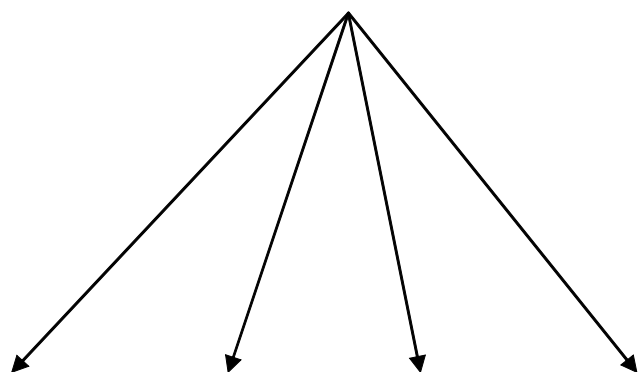
C.COMBINED EVENTS

Multi-discipline events has been included in athletics programmes since eight century B.C. though originally the five events for men included a run, long jump, discus throw, javelin throw and wrestling. The 10 events with we are familiar today were practiced first in Scandinavia, and the event is now developed in importance for the genuine all – rounder, who may not be one event, but who can maintain a high overall standard. Today it is an event for the decathlon or heptathlon specialist who prepares for it and competes in the event as a whole rather than in series of separate competitions. The decathlete or heptathlete needs to be a balanced personality with well –rounded physical development.

The Combined events are an individual events consist of several number of events of different category. For men and women combined events are classified into 4 types according to the level of competitors. The events are held over two days, and they are chose as a true test of skill, stamina and technique. The decathlon combines sprints with middle distance running, throwing, jumping, hurdling and vaulting.

There is a rest period of 30minutes between each event. A competitor is awarded points for his best performance in each event, as calculated by reference to scoring tables produced by the IAAF. The decathlon entered the Olympic programme in 1912.

COMBINED EVENTS



Pentathlon

Heptathlon

Octathlon

Decathlon

They are as follows.

1. Pentathlon - 5 events
2. Heptathlon - 7 events
3. Octathlon - 8 events
4. Decathlon - 10 events

The Combined events such as pentathlon, which shall be conducted on one day, and other combined events such as Heptathlon, Decathlon and Octathlon should be conducted on two consecutive days as in the prescribed order.

Combined Events for Men

1. Pentathlon
2. Octathlon (Youth Boys)
3. Decathlon

1. Pentathlon

The pentathlon is a five-events test of all-round ability. The men's version comprises the long jump, javelin, 200m., discus and 1500 m in that order on one day. Scoring is on the same basis as the decathlon. The pentathlon has long been a most popular women's event, and was introduced into the Olympic schedule in 1964.

2. Octathlon (Youth Boys)

Octathlon consist of 8 events which shall be conducted on consecutive two days in the following order.

1st day Events

1. 100 m Hurdle
2. Long Jump
3. Shot put
4. 400 mts Run

2nd day Events

5. 110mts Hurdles
6. High Jump
7. Javelin
8. 1000 mts Run

i) By seeing their timing in 1/100 of second. If the tie still remains.

ii) Lot shall be used to decide the best loser.

b) Field events

During horizontal or distance events, where there are more than eight competitors, each competitor shall be allocated three trials and the competitors with the best valid performances shall be allowed three additional trials.

In the event of a tie for the last qualifying place it shall be resolved by seeing the second and third best performance among the tied competitors and if tie still remains, the tied competitors shall also be allowed to for the three additional trials.

In the event of a tie for any position, it shall be decided first by using the available rules. If the tie still remains it concerns for the first place, the competition shall be re-run to decide the swimmer which is known as concerns any other place, the result will stand. That means the tied competitors shall be awarded the same place.

Note; Its best performance as achieved during field braking, it shall also be considered.

$$2\pi r = 128 \text{ (Circumference of two curves = } 200 - 72 \text{ (} 2 \times 36 \text{))}$$

$$2 \times 3.14 \times r = 128$$

$$\text{RDR or 'r' = } 128 \times \frac{1}{2} \times \frac{1}{3.14} = 20.37 \text{ m}$$

$$\text{MDR = RDR - 0.20 m}$$

$$\text{MDR = } 20.37 - 0.20 = 20.17 \text{ m}$$

b) TYPES OF RUNNING SURFACE

1. Mud
2. Grass
3. Cinder
4. Synthetic Track

c) NEED FOR A STANDARD TRACK

1. Track must be prepared according to the rules and regulations laid by International Association of Athletic Federation (IAAF).
2. The length of the standard track shall be 400 mts.
3. The track should be laid out from North to South direction.
4. Track shall consist of two parallel straights and two curves of same radius. The length of the curve will be more than the straight.

5. The track should have minimum of 6 lanes and maximum of 8 lanes.
6. The inside and outside of the track shall be bordered by a kerb. That is raised border of maximum 5 x 5 cm.
7. The track should have common finishing point.
8. To conduct all the running events up to 10,000 mts within a track and also the jumping and the throwing events simultaneously with the track events.
9. The track should have proper drainage system.
10. The track should be leveled without any ups and downs.
11. The running direction is such that the athlete's left hand side is towards the centre of the track.
12. The synthetic material will be used as the surface of the track.

STAGGER DISTANCE

1. There will be no stagger for the first lane athlete.
2. As and when the width of the lanes changes, the stagger distance also changes.
3. Staggers are needed only when the athletes are required to run in curves also in their lane.
4. Staggers will not change according to the increase in the length of curves.

6. Angle sector is : 34.92°
7. Wire : Single up broken and straight length of string steel wire 3 mm in diameter
8. Handle : Curved or straight grip with maximum width inside of 130 mm and maximum length inside of 110mm.

BREAKING TIES IN ATHLETICS

Tie breaking in can be steadied separately during preliminary rounds and finals to decide the positions.

1) Preliminary rounds;

a) Track events

Preliminary rounds (heats) shall be held in track events when the number of competitors is more in number to reduce the number of competitors to 6 or 8 to conduct the finals. In all preliminary rounds at least first and second in each heat shall qualify for the next round and it possible at least three in each heat shall qualify. The qualification for the next race shall be decided either according to their placings or according to their times (best losers). During this selection if there is a tie among the best loser, the following steps shall be applied to decide the best loser for the next round.

The Ring

The ring shall be placed to the level of outside ground. It must have a height of 1.4cm to 2.6 cm from the inside floor of the circle and 6mm thickness.

Specification of Hammer

The hammer consist of three parts, a metal head, a wire and a grip. The head shall be of solid iron or other metal not softer than brass. The head should be spherical in shape with smooth surface. A steel wire, with a diameter of 3mm, is attached with the head at one end and with a handle on the other end.

Overall weight of the hammer

1. Men : 7.26 kg to 7.285 kg
2. Women : 4 kg to 4.025 kg

Overall length of the hammer

1. Men : 117.5 cm to 121.5 cm
2. Women : 116 cm to 119.5 cm
3. Diameter for men : 11 cm to 13 cm
4. Diameter for women : 95 cm to 110 cm
5. Head : Solid or other suitable material

5. When staggers are marked, the diagonal excess distance also to be taken into consideration.

Formula

$$\text{Half stagger} = [W (N-1) - \alpha 0.10 \text{ m}] \pi$$

$$\text{Full stagger} = [W (N-1) - \alpha 0.10 \text{ m}] 2\pi$$

$$\text{One and Half stagger} = [W(N-1) - 0.10\text{m}] \times 3\pi$$

Where,

W – Width of the lane,

N – Number of the lane

π – 3.1416 (Standard value)

Stagger distances for Non- standard Track

$$\text{Half stagger} = W (N-1) \times \pi$$

$$\text{Full stagger} = W(N-1) \times 2\pi$$

$$\text{One and Half stagger} = W (N-1) \times 3\pi$$

Diagonal (excess) Distance

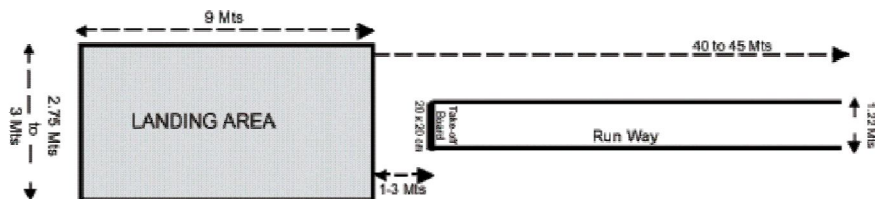
The excessive distance run by the athletes other than the first lane runner for 800mts and 4 x 400mts relay to reach the first lane after the first and three curve respectively is called diagonal excess. This diagonal distance should be calculated for each lane and it should be added with half stagger, and 1½ stagger respectively in the starting point itself.

UNIT - V

FIELD MARKING

Layout of Area for all Field Events with all Specifications

a) LONG JUMP



Specifications

Runway

Approach run - 40-45mts

Width of the lane - 1.22

Width of the line - 5cm

Jumping pit

Length - 9 mts

Width - 2.75 mts to 3 mts

Distance of the take off Board from the nearest edge - 1 – 3 mts of landing area

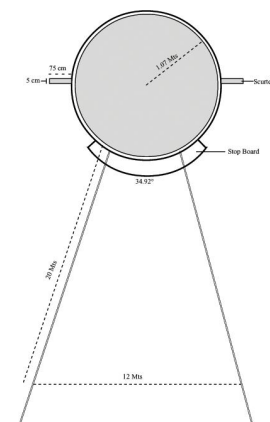
(84)

9. Width of the cord grip : 150 mm to 160 mm for men

10. Width of the cord grip : 140 mm to 150 mm for women

11. Angle of sector is : 29°

h) THROWING THE HAMMER CIRCLE



The hammer is thrown from a circle, shielded on three sides by a netting a cage on a metal frame, and must land within the marked sector. The competitor who achieves the best distance with his throw is declared winner. A total number of five judges watch for infringement within the circle, the other three judges supervise the field. If the hammer breaks while attempting a throw, then the attempt shall not be counted. Under such circumstances, if the competitor loses his balance and commits a foul, it won't go against him.

(93)

The javelin is made of wood or metal shaft with a sharp metal head. There shall be a cord grip around the centre of gravity of javelin. The cord grip should not exceed the diameter of the shaft by more than 8mm. The grip shall be of uniform thickness.

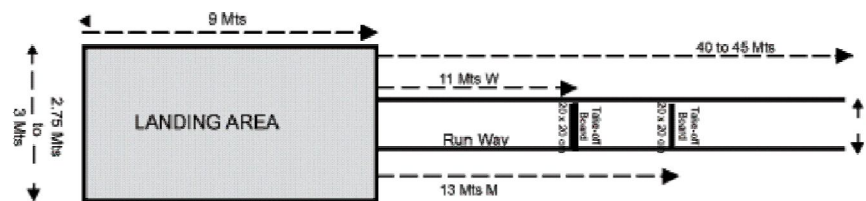
SPECIFICATIONS

1. Length of the runway : 30 to 36.5 mts
2. Width of the runway : Two parallel White lines 5 cm wide and. 4 mts apart
3. Width of the arc : 7 cm extended by 75cm long and 7 cm wide.
4. Weight of the javelin : 800gms to 825 gms for men
5. Weight of the javelin : 600gms to 625gms for women
6. Over all length of the javelin : 2.60 mts to 2.70 mts for men
7. Over all length of the javelin : 2.20 mts to 2.30 mts for women
8. Metal head : 250 mm to 330 mm for men and women

Dimension of the Take- off Board (Wooden Board)

- Length - 1.20 mts to 1.21 mts
 Width - 20 cm
 Depth- 10 cm

b) TRIPLE JUMP



Specifications

Runway

- Approach run - 40-45mts
 Width of the lane - 1.22
 Width of the line - 5cm

Jumping pit

- Length - 9 mts
 Width - 2.75 mts to 3 mts
 Distance of the take off board from the nearest edge of landing area - 11m (w) 13m (m)

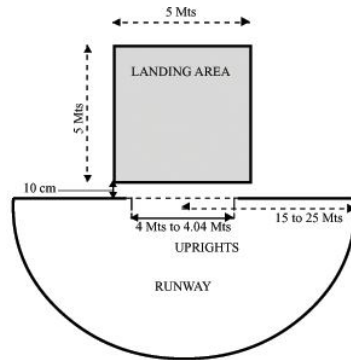
Dimension of the take off board

Length - 1.20 mts to 1.21 mts

Width - 20 cm

Depth- 10 cm

c) HIGH JUMP



Specifications

Runway

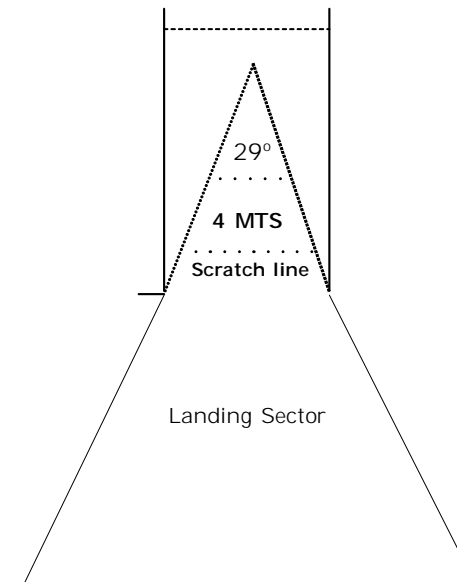
The minimum length of the runway shall be 15 meters. Except in international competitions, where the minimum shall be 20 meters. If conditions permit, the minimum length should be 25 meters.

High Jump Landing Pit

Pit : The pit is made of foam. The length of the pit shall be at least 5m, width 3m and height 60cm.

(86)

Javelin Throw Sector



IMPLEMENTS



Javelin



cord grip

(91)

Specifications

RUNWAY

The minimum length of the runway shall be 15 meters. Except in international competitions where the minimum shall be 20 meters. If conditions permit, the minimum length should be 25 meters.

High Jump Landing Pit

Pit : The pit is made of foam. The length of the pit shall be at least 5m, width 3m and height 60cm.

Uprights

The uprights should be of a rigid or any other suitable material, marked in centimeters. The uprights shall extend at least 10cm above the point up to which the cross bar can be raised. The distance between the uprights shall be between 4.00 - 4.04m.

Cross bar support

The support for the cross bar should be made of rigid or any other suitable material, which can be raised or lowered and can be adjusted up to a height of 2.30m.

Uprights

The uprights should be of a rigid or any other suitable material, marked in centimeters. The uprights shall extend at least 10cm above the point up to which the Cross bar can be raised. The distance between the uprights shall be between 4.00-4.04m.

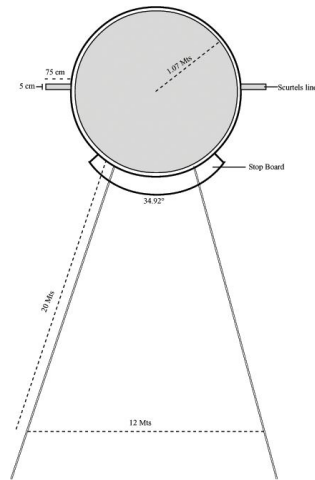
Cross bar support

The support for the cross bar should be made of rigid or any other suitable material, which can be raised or lowered and can be adjusted up to a height of 2.30m.

Cross bar

The cross bar is made of wood, or metal or any other suitable material. The cross bar should be circular with a diameter of 29 mm to 31 mm. The end of the bar shall be of concave or flattened surface of 150-200 mm in length and 29-35 mm in width. The length of the cross bar shall be between 3.98, to 4.02m.

d) SHOT PUT CIRCLE



The Ring

The ring shall be placed to the level of outside ground. It must have a height of 1.4cm to 2.6 cm from the inside floor of the circle and 6mm thickness.

Shot

The shot is made from solid Iron, brass or other hard metal. The men's shot weight is 7.26 kg with a diameter between 110-130mm. The women's shot is of 4kg with a diameter between 95-110mm. The shot should be spherical in shape with smooth surface.

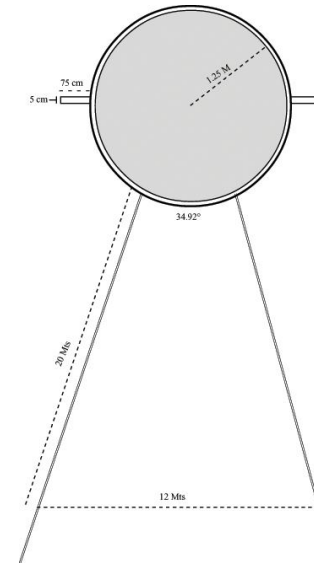
Stop Board

A curved piece of wood 10 cm thick affixed to the front of the shot put circle. When throwing, the shot putter braces his foot against the stop board to avoid falling forwards out of the circle.

(88)

f) DISCUS CIRCLE

Discus



The discus is made of wood, or other suitable material, with a rounded metal rim. The cross section of the edge shall be rounded in a circle of 6mm radius. The thickness of the rim should be at least 12m. The diameter of men's discus shall be between 219-212 mm and its weight should be 2 kg. The diameter of women's discus shall be between 180-182 mm and weight 1kg. The diameter of metal plate or flat centre area should be between 50-57mm.

(89)

a) Track Events

The judges shall decide the order in which the competition finish and if they cannot arrive at a decision shall refer the matter to the Referee, who shall decide.

Dead Heat

If there is a tie for the first place in any track event, the event shall be held after to giving adequate rest. And if it is not possible to conduct event once again due to time factor, the tied competitions shall be awarded first place jointly. This method is known as "dead heat". If tie remains for any other place, the result will stand. Rerace shall not be held to decide the second, third and other place.

Note: If photo finish facilities is available, the positions may be decided, easily.

b) Distance events

When there is a tie for any place, it shall be solved by seeing the second best performance and it necessary third, fourth best, etc. If tie still remains and concerns first place, the tied competitors will complete again in the some order in a new attempt until the tie is result. For remaining places the result will stand. That means same place shall be given to the field competitors.

Height events

When there is a tie for any place in high jump and pole vault it shall be solved by using two rules in order as following

- i) The tie competitor with lowest number of failures at the field height (last cleared height) shall be given higher place.
- ii) If tie shall remain; the competitor with lowest total number of failures throughout the competition shall be given higher place.

If the tie still remains and if it concerns the first place, the field competitors shall be given one more jump at the height where the competition is stopped (height which is immediate next to the field height), and if no decision is reached, the bar shall be raised or lowered 2cm for high jump and 5cm for pole vault. The competitors are allowed only one attempt at each height until the tie is decided. The best performance achieved during jump, if any, shall also be considered.

If the tie concerns any other place, the tied competitors shall be awarded the same place in the competition.

Note: If the same place is given, the immediate next place shall not be awarded to any competitors.

competitors shall be placed in the order in which any part of their bodies (i.e. torso, as distinguished from the heads neck, arms, legs, hands or feet) reaches the vertical plane of the nearer edge of the finish line.

B. MIDDLE DISTANCE RUNNING

Distance running can be split into two groups, Middle distance and Long distance. For middle distance running the athlete needs to both speed and stamina. For long distance running, stamina is the most important thing. Stamina means building up our body so that it can be last the race distance, but at race speed.

Middle Distance Events

1. 800 mts
2. 1500 mts
3. 3000 mts

The middle distance runner must apply his effort correctly throughout the race; this can be achieved only by a knowledge of pace and tactics.

The events which fall into the middle distance category range from 800m to 3000m. With the relentless advance in performance in athletics the 800 meter race now attracts athletes who in the past would have been sprinters. His running style is a model of mechanical efficiency, and even

UNIT - I

INTRODUCTION

A. Meaning of Athletics

Athletics comprise of a wide range of skills and can be divided in two broad categories of track and field events. Track events include sprint races, middle distance races, long distance races, relays and hurdles. The field events are those which are being played either inside or outside the track area or outside the stadium, which include throwing events and jumping events.

The track events include races of 100m, 200m, 400m, 800m, 1500m, 5000, 10000m, and relay races of 4x100m, 4x400m in both men and women categories. In all races shorter than 800m the competitors have to run the length in their respective lanes. The competitors of relay races are required to carry a baton and pass over the same to his/her partner within the take over zone. The starting points are arranged in such false a way that distance from start to finish is same for each competitor. In case of two false starts, the athletes declared disqualified. The competitor who jostles, runs across, or obstructs other competitor(s) can also be disqualified. Timings of competitors are recorded by the official time keeper from stop watches or through electronic time keeping equipment. The hurdle events include 110m and 400m for men and 100m and 400m for women. The competitors are required to jump over specified number of hurdles, which are made of metal with

a wooden top bar. The steeplechase hurdle event comprises of 28 hurdle jumps and 7 water jumps spread over a 3000m run-way.

The throwing events include throw of shot-put, javelin, discus and hammer. Each competitor generally gets six trials and the winner is decided on the best distance covered in any one of his six trials. The Jumping events comprise of High Jump, Pole Vault, Long Jump and Triple Jump. In the first two events, athletes are required to jump over a crossbar. In Triple jump the competitors are required to complete a hop, step and Jump sequence. Winner of jumping event is decided based on the distance measured between the take-off line and the nearest break in the landing area lead by the competitor's body part.

A standard international track is 400 mts in circumference. It has 8 lanes and the width of each lane is 1.22 mts. Track and field events include Sprints, Middle distance running, Long distances race, Hurdles, Steeple Chase, Relay races, throwing events and jumping events. Track and field events are conducted by International Association of Athletic Federation (**IAAF**).

Athletics

The term "Athletics" is derived from the Greek word "Athlon" which means a contest. The word "Athlete" denotes a person who takes part in contests which involve physical activity. "Athletics" is the oldest forms of the organized sport contested between individuals and or teams.

3. Run through

A forward dip during the last stride before the finish line is the most commonly used technique.

Photo Finish Camera

It is impossible for the naked eye to be able to determine accurately the finishing sequence of runners for in a blanket finish. The problem has been solved by photo-finish cameras. A photo-finish camera has very narrow slit lens which photograph an area of the finish line not more than 5-10cm across. It uses a continuous strip of film that moves across the lens at a speed proportionate to the speed of athletes and records the arrival of each competitor at the finish line. The space between each athlete shown in the film exhibits the time elapsed between the arrivals of each of them at the finish line. Photo – finish camera also doubles up as an electronic timing device, recording finishing timings of athletes up to one hundredth of a second. The camera gives a developed photograph that gives positions of athletes and time when their torso reached the finish line.

FINISH POSTS

Except where their use may interfere with the photo finish equipment, two white posts may be placed along the prolongation of the finish line at least 0.30 mts from the edge of the track. They should be of rigid construction and approximately 1.40m high, 8 cm wide and 2 cm thick. The

the foot to push against at the start of the race. The foot plates shall be slopped to suit the starting position of the athlete and can be either flat or slightly concave. To monitor the false starts the blocks can be connected with a devise. The blocks can be used up to and including 400 meters (including the first) leg of the 4x200m and 4x400m).

TYPES OF FINISHING

The finish line should be 5cm in width drawn across the track at right angles to the inner edge. Two white posts of rigid material (80mm in width and 20mm in thickness) shall be placed at a 30cm distance from the edge of the track. Competitors are place in the order in which any part of their torso (as distinguished from the head, neck, arms, legs, hands, or feet) reaches the vertical plane of the edge of the finish line nearest to the star.

Technique

There are three finishing technique used particularly during the sprint events. They are as follows.

1. Lunge finish

The torso reached the finish line first, i.e. leaning torso forward.

2. Diagonal finish (or) Shoulder Shrug

At the finish line crossing it by making the shoulder in diagonal, towards midline of the finish line. It is more difficult type.

B. IAAF

The IAAF (International Association of Athletic Federation) is the supreme governing body controlling international athletics throughout the word. It was founded in Stockholm on July 17th, 1912, to draw up and enforce rules and regulations and a common amateur definition, and to recognize world records, The IAAF now promotes its own World Champions in track and field every four years, with annual World Cross- Country Champions for men and women every march.

IAAF- Structure and Functions

In 1912, two days after the Olympic games a congress was held in Stockholm for the formation of an International Association of Athletic Federation. Seventeen countries were attended the historic meeting. The meeting was urged the Athletics to develop and promote international competitions and the Olympic games. The meeting was also urged the importance of having universal code of rules and regulation and a common definition for Amateur and also an athletic register of world and Olympic records.

One year later in 1963 at Berlin the congress once again met and accepted the first constitution and 34 nations figured on the most membership list. J.Sigfrid Edstrom (Sweden) was elected as first president and Kristvan Hailstorm as honorary secretary. The technical rules for International and domestic competition were framed and presented for approval in 1914 at the third congress in France.

In 1946 the IAAF Head Quarters moved from Stockholm to London. Over the years, the IAAF grew into a huge and dynamic organization as the world governing body of track and field athletics, road running, race walking and cross country. The congress decided to move the head quarters once again from London to Morte Carlo in 1993. The Steady growth of the Federation accelerated in the last decades. By 1997 member countries in addition numbered 209. The IAAF council comprising of 27 members from various countries.

AFI (Athletic Federation of India)

Athletics in its present form was born in our country during past decade of 19th century. Nothing much is known of its early stages till first known participation of Norman G.Pitchard in 2nd Olympic games in 1900 at Paris, where he won a Silver medal in 200mts run. The Indian Olympic Association (IOA) was formed in 1926 and its control athletics. But India unofficially participated in the 1920 and 1924 Olympic games under the leadership of H.C.Buck of Y.M.C.A Madras. The official participation of Indian athletes started in the 1928 Olympic games at Amsterdam till 1936 Berlin Olympics. India participated in the Olympics under the IOA BANNER. Then 1940 and 1944 Olympic Games were not conducted because of second World War.

Structure and Functions

Amateur Athletic Federation of India was formed in 1946 at the initiative of Maharaja Yadindra Singh then

in a natural relaxed position. An angle of about 90° at the front knee and of about 110° to 130° at the rear knee will be appropriate.

(iii) The Long Start (or) Elongated Start

The front starting block is situated 3 foot lengths from the starting line and there is one foot length between the starting blocks. The angle of rear leg about 110°. The long starting position is certainly the most difficult one. It should be applied carefully. Any athletes find this position rather ineffective. The long start, although still known, is hardly used nowadays.

For good starts a sprinter must,

- a) push back against the blocks
- b) moving the hands and arms as quickly as possible in reaction to the gun.
- c) move the hips quickly from the starting position to running position.
- d) run out of the blocks, do not jump.

STARTING BLOCKS

The starting blocks should be made of rigid material. It should be adjustable, but must be without springs. The blocks are fixed to the track, so that it provide firm base for

'On your marks' – position – his body weight resting comfortably on the legs in the crouch position. The hands are shoulder width apart to touch the ground behind the starting line with fingers and thumb pointing away from each other. The eyes are focused downward and forward.

Set position

The block settings should result, the athletes having a 90° angle at the front knee and 110° to 120° angle in the back of the knee. That gives a set position with the hips just slightly higher than shoulders slightly forward. The hands are placed just slightly wider than shoulder width apart, with the fingers and thumbs in a **"high bridge"** position. The shoulders are above and slightly ahead of the hands, the arms are straight, but not locked. He should feel pressure against rear block in the set position since the center of gravity is located high, the first strides are shorter and less powerful.

(ii) The Middle Start (or) Medium Start.

The front starting block is located two foot lengths (21 inches) from the starting line and the rear starting block is one foot length further. Kneel down with the right knee against the instep or toe of the left foot, and keep the trunk erect. The angle for the rear leg is about 130°. The slope of the body from the hips to the shoulders is not very steep. The body weight is on the legs and arms. The head remains

president of IOA with prof.G.D.Sondhi as its first president. The AAFI got affiliated to IAAF in the year 1946. The AAFI for the first time selected 8 athletes who participated in 1948 Olympic games at London. Indian women competed in the Olympic games for the first time in 1948.

Mr.M.C.Dhawn was elected by secretary of AAFI in 1950 and was the technical secretary in the first Asian games held at New Delhi in 1951. Raja Bhalendra Singh become the president of AAFI in 1952 and continued of guide athletic till 1968 along with Mr.M.C.Dhawn. This team acted a yeoman service to athletics in India and strengthened the AAFI to make it the leading federation. The federation produced by group competitors open national championship, Zonal and Inter Zonal Competition.

Many distinguished personalities are acted as president and secretary of AAFI till 1987 from 1988 to till date Mr.Suresh Kalmadi and Mr.Lalit K.Bhanot formed the new team of president and secretary respectively. The main function of AAFI is to prepare a year long sports calendar at the state and national level. They are sending teams to international level competitions based on merit.

D. AGE GROUPS

Under the Jurisdiction of the IAAF is split into five age groups.

1. Men and women there is no age limit
2. Seniors - 19 Years
3. Juniors - 17 and 18 Years
4. Youths - 15 and 16 Years
5. Boys - 13 and 14 Years

UNIT - II

TRACK EVENTS

Athletics is great fun and people of all ages, can enjoy it. Athletic activities can be traced back of the ancient Greeks, who used to take part in games of running, jumping and throwing. Track events include sprint races, middle distance races, long distance races, relays and hurdles.

The track events include races of 100m, 200m, 400m, 800m, 1500m, 5000, 10000m, and relay races of 4x100m, 4x400m in both men and women categories. In the track events all races are run with the competitor's left hand side of the track and finish in the same position. The competitors are required to wear their numbers on their vests.

A. SPRINT EVENTS

Sprints

"To cover the distance in the shortest time with maximum speed"

A. Sprint Events

1. 100 mts
2. 200 mts
3. 400 mts

1. Bunch start (or) Bullet start
2. Medium start
3. Elongated start

Three types of foot spacing bullet, medium and elongated starts. Each sprinter will have his own particular measurements so the following procedure is suggested to enable him to get into a correct starting position.

Block placement

The three block placement positions are determined by the location of the blocks relative to the starting line.

(i) The Bunch or Bullet Start

Stand with the right toe beside the rear of the left heel. Kneel down with trunk erect and rock forward in the same way. In this starting position the starting blocks are close to the starting line. The front block should be placed one foot length (16 inches) from the starting line, with 11 inches between the blocks results in low velocity and fast block clearance Track events, up to and including 400 meters, run at full speed for the entire race distance. Sprinter press their feet against two blocks, which are spaced apart and connected to a shaft, to improve their initial movement. The main features to look for in the sprinter's highly distinctive running action are the high knee-lift, the long strides, the thrusting arm action and the controlled breathing.

should immediately rise to final starting position retaining the contact of the hands with the ground and of the feet with the foot plates of the blocks.

A competitor shall not touch either the starting line or the ground in front of it with his hands or his feet on his marks. The three starting positions are measured from the starting line to the front leg of the starting block. Starting is the first stages in all the running events, should be conducted either track or road. There are only two types of starting should be followed by the athletes.

1. Crouch start
2. Arc start (Standing start)

CROUCH START

Crouch start can be used by the athletes those who are run up to and including 400mts and even the first runner of 4 x 100mts Relay and 4 x 400mts Relay.

In crouch start the following commands to be used,

1. On your mark
2. Set
3. The gun fire or clapping with clap board

It has three (divisions) method should be used according to the height of the individuals.

Sprinter

There is no ideal shape or size for the sprinter. He must, however, be well built and have good all-round muscular development and a quick reaction time. Regular, even and relaxed arm action must be learned first. The legs follow the arms, and the faster the arms are moved the faster the leg action will become. In the arm action emphasis should be on a forward and upward motion.

Most important factors for sprinting

1. Reaction time
2. Starting position
3. Powerful Muscles
4. Acceleration Technique.
5. Effective stride length
6. Curve running technique (200 mts, and 400 mts).
7. Technique at the finish line.
8. The condition of the Track surface
9. Wind and Weather conditions.

Stride Length

“It is the distance between touchdown of the toe of one foot and the touchdown of the toe of the other foot”. Stride length may and usually will be vary from left to right

or right to left on individual at the same velocity. This variance may be influenced by dominance, weakness, injuries and even leg length. Stride length will be vary with the speed of running and during the various phases of a race.

Stride Cadence or Stride frequency

"It is the number of strides per second". The stride cadence for sprinters is 4.5 to 10 strides per second with little difference found between the strides. The method of determining stride rate is to divide the number of strides in a race by the elapsed time for the race.

STARTING

There are varieties of running events for which the track is used . The finishing line for all races must be the same. But the starting line of all the races cannot be the same. It will vary from race to race. While 100mts race, 100mts hurdles and 110mts, hurdles races have to be run in straight courses, appropriate distance shall be measured backward from the beginning of home stretch and starting lines are marked. The extended lines are broken.

The start and finish of a race shall each be denoted by a white line 5 cm wide. The distance of the race shall be measured from the edge of the starting line farther from the finish, to the edge of the finish line nearer to the start.

All races shall be started by the report of the starter's gun or approved starting apparatus fixed upwards after he has ascertained that competitors are steady and in the correct starting position.

At all international sports competitions meetings, the commands of the starter in his own language shall, in races up to and including 400m be "on your marks", "set", and when all competitors are "set" the gun shall be fired, or approved starting apparatus activated.

In races longer than 400m, the commands shall be, "on your marks" and when all competitors are steady, the gun shall be fired, or approved starting apparatus activated. A competitors shall not touch the ground with his hands.

In all races up to and including 400m, and 4 x 100 mts Relay, 4 x 400mts relay first runner a crouch start and the use of starting blocks are compulsory. In competition held under IAAF, competitors must use starting blocks provided by the organizers of the meet. In other meet on all weather tracks, the organizers may insist that only starting blocks provided by them may be used. After the "on your marks" command, the competitor shall approach the starting line, assume a position completely within his allocated lane and behind the starting line. Both hands and one knee shall be in contact with the ground and both feet, in contact with the starting blocks. At the "set" command, the competitor

decreases. A study of the body movements involved in these activities pinpoints the causes. In normal walking and running the knee of the supporting leg is bent as it passes through the vertical position (i.e. when the centre of mass passes vertically over the foot), but in race walking the knee of this leg is straight in the vertical position. The technique is such a way that race walking does not become a modified run. Briefly, contact with the ground must be maintained at all times, a heel-and-toe action must be used, and the supporting leg must be straight at the knee as it passes through the vertical position.

Judging a fast walk is an extremely difficult skill, since it is almost impossible to see whether a walker has a foot on the ground at all times or that the knee is straight through the vertical for it takes only a fraction of a second to pass through the position. Race walking is not a natural skill as normal walking and running are, because the latter are the locomotion skills learnt from very early childhood.

As in most other athlete events, flexibility is an asset and hip mobility especially is an important factor in stride length in normal walking in which the line through the hip of the forward swinging leg is allowed to twist forward with the leg, the stride length is increased considerably. Stride length is also maximized, if the feet move along a straight line.

in the later stages of a race when fatigue is sapping his strength his skill does not break down.

C.LONG DISTANCE EVENTS

1. 5000 mts
2. 10000 mts
3. Marathon

The three main long distance events are 5,000m 10,000m and the marathon. Stamina is the basic quality needed by a long-distance runner, but speed has also become an essential requirement for would-be world beaters.

However, in the long distance the steady pacer must beware of the fast finisher who sits on his shoulder, until the final run-in. the steady runner without an equivalent fast finish must attempt to put himself far enough ahead of the sprint finishers by either a punishing pace throughout the race or by putting in bursts of speed during several laps from the finish. There is nothing more motivating for the training runner than to see his rival a few strides in front of him, but also nothing more demoralizing than for his rival to be 20 meters or more in front.

D.HURDLES – VARIOUS STAGES

MEANING

Running over the barriers (or) obstacles are known as Hurdles. The Hurdle race should be conducted for men and

women, senior boys and senior girls in various height and distance. Every hurdle race is based on certain conditions laid down in the rules of the International Association of Athletic Federation (IAAF).

The hurdles are made of steel with wooden top bar. The height of hurdles can be adjusted as per the length of the race and sex of the athlete. The hurdles are made in such a way that when force of 3.6-4kg. is being applied to the centre of the top, it should overturn automatically. The height required for, men's 110m race is 106.7 cm. The women's 100m sprint hurdles are 84 cm in height. In 400 m race the men's hurdle is 91.4 cm high and women's is 76.2 cm. The length of the wood used for the top bar should be 1.20m and width at least 7cm. The top bar should be striped in black or white or in some other contrasting colors.

The following are the standard distances, it can be classified into two categories,

- Men - 110 & 400 mts
- Women - 100 & 400 mts

Distance of Hurdles	Category	Height of the Hurdles	Distance Start to first Hurdle	Distance Between the Hurdles	Distance Last Hurdle to Finish
100mts	Women	0.840mts	13mts	8.50mts	10.50mts
110mts	Men	1.067mts	13.72mts	9.14mts	14.02mts
400mts	Men	0.914mts	45mts	35mts	40mts
400mts	Women	0.762mts	45mts	35mts	40mts

Substitution

Once a relay team has participated in a competition only two additional athletes may be used as substitutes in the composition of the team for subsequent rounds. Once an athlete, who has participated in a previous round has been replaced by a substitute, he may not return to the team.

RELAY BATON

The relay baton is made of a rigid material. It should be a single piece of smooth, circular and hollow tube of 280-300 mm length. The minimum weight required for baton is 50 grams and its circumference should be between 120-130mm. The batons should be colored so that it can be easily visible during the race.

Specification

- Weight of the baton : not less than 50 gm
- Length of the baton : 28 to 30 cm
- Circumference of the baton : 10 cm
- Color of the baton : Visible color
- Minimum baton required : 6 Nos.
- Maximum baton required : 8 Nos.

D. WALKING

Race walking may appear to be the natural link between ordinary walking and running, and in some respects this is true-with increase in speed, the force-time

runner only. The baton should not be exchanged within the acceleration zone(Advance Zone).

During the exchange the baton must be delivered firmly and safely into the hands of the receiving runner. When the incoming runner has approached his partner within 2 to 3 mts he indicated to him by a signal when to extend his receiving arm backwards. The signal comes too early or too late, or the runner receiving the baton moves his arm up, down or to the side, the results in an unsteady baton pass and consequently in a loss of time. The baton should be put firmly into the grasping hand between the spread thumb and the four locked fingers.

2. 4 x 400 mts Relay

The runners use a visual pass. The incoming runner carries the baton in the right hand and passes to the outgoing runner's left hand. The primary responsibility for the pass rests on the outgoing runner due to fatigue on the part of the passer. Once the baton has been taken, the athlete immediately transfer it to the other hand.

The four athletes shall run 400mts each to cover 1600mts distance by means exchanging a baton. The first leg of the 4x 400 mts relay run in lanes and so is the first curve of the second leg; only after crossing the line making the exit from the first curve, runners free to move to the inside of the track.

110mts Hurdles

There shall be Ten flights of hurdles in each lane, set out in accordance with the below table.

Starting line to First Hurdle	:	=13.72mts
" "	Second Hurdle	: 13.72+9.14 =22.86mts
" "	Third Hurdle	: 22.86+9.14 =32.00mts
" "	Fourth Hurdle	: 32.00+9.14 =41.14mts
" "	Fifth Hurdle	: 41.14+9.14 =50.28mts
" "	Sixth Hurdle	: 50.28+9.14 =59.42mts
" "	Seventh Hurdle	: 59.42+9.14 =68.56mts
" "	Eight Hurdle	: 68.56+9.14 =77.70mts
" "	Ninth Hurdle	: 77.50+9.14 =86.84mts
" "	Tenth Hurdle	: 86.84+9.14 =95.98mts
" "	Finishing line	: 95.98+9.14=110mts

VARIOUS STAGES

110mts Hurdles the Hurdling Technique is classified into the following:

1. Starting
2. Approach to the First Hurdle
3. Hurdle Clearance (Departure)

4. Running between the hurdles
5. The finish

1.Starting

Hurdling is basically a sprinting event, the mechanics of the starting do not vary much from that of the sprint start. In order to get eight (8) strides to the first hurdle to take – off foot should be placed in the first block. If the hurdler wants seven (7) strides to the first hurdle, take – off foot should be placed in the rear block.

2. Approach to the First Hurdle

The distance from the starting line to the first hurdle is 13.72 mts. The first three strides out of the blocks are the same as in a sprinter’s start. On the fourth stride, the hurdler begins to concentrate on the first hurdle. In perfecting the approach to the first hurdle make any adjustments on the 4th, 5th and 6th strides. The first three and last two should be kept constant. The last stride is slightly shorter to permit to get his centre of gravity slightly ahead of the take-off foot. This approach sets the pattern for the entire race.

3. Hurdle clearance

The take – off distance from the hurdle depends on four factors. The height of the athlete, speed of the approach length of the lead leg speed of the lead leg action. Each

The baton must be carried by hand throughout the race, if dropped, it must be recovered by the athlete who dropped it. He may leave his own lane to retrieve the baton provided this procedure is adopted and no other athlete is impeded, dropping the baton shall not result in disqualification.

Stages of Relay Running

The start

The starting of the 4 x 100 mts Relay is basically same as for the 400 mts. The starting blocks are placed close to the outer line of the track. The baton lies between the forefinger and the thumb is enclosed by the other fingers. After a successful start the runner quickly passes to the inside of his lane.

Checkmarks

The second, third and fourth runners place a checkmarks on their lanes just behind their starting positions. This is a check mark for the out going runner. The distance between the checkmark and the starting position depends on the speed of the incoming runner and on the acceleration of the outgoing runner.

The Baton exchange

The relay baton should be exchanged from one to another competitor with in the take over zone. The exchange is completed when the baton is in the hand of the receiving

when hearing the signal from the incoming runner moves the appropriate arm backwards in a positive and slightly angled manner to a level not higher than the shoulder line. The upper arm is straight at the elbow, the back of the hand is facing down wards the thumb and index fingers are widely spaced forming obtuse angle. The baton is received into such a palm from the incoming runner with an outstretched arm. In the final phase of the change over the elbow joint locks quickly and the baton is passed in a down sweep action.

The best result in both techniques the change over should occur when both runners are traveling at maximum speed and the actual change over should be as quick as possible. The majority of experts consider that the speediest change over occurs when the baton is actually changed over a distance of 2 to 4 mts from the end of the exchange zone.

Acceleration Zone

The acceleration zone lets the outgoing runner accelerate properly and allows the athletes more time to reach top speed at the exchange.

Exchange Zone or Take over Zone

The incoming runner can signals the exchange with verbal commands at a specific point when the incoming runner ready to pass the baton. The incoming runners can also use nonverbal signals. The outgoing runner can count the incoming runner's stride from the check mark to the exchange point.

hurdler must be cleared quickly and safely. The first prerequisite of movements much as in the ordinary running stride. For this action the lead leg is slightly flexed at the knee joint, and leading foot to track beyond the hurdle.

The average take-off distance from the hurdle in men's hurdles will be 1.90 mts to 2.20 mts to allow the leading leg to sweep forward and upward in a straight line. Too short a distance for the take-off results in a "jump" over the hurdle. The hurdle clearance are having the following factors.

Action of the Leading leg

The complete action consists of a quick forward and upward thrust of the leading leg in the direction of the leading of introduces the sequences.

Once the take-off foot leaves the track it becomes the trail leg. The heel of the trail leg moves actively toward the buttocks as the knee moves in a exaggerated motion upward and to the side to avoid hitting the hurdle. For the clearance of the hurdle, the trailing leg must be stretched away from the body when clearing the hurdle. This movement requires good mobility of the hip. The sequence of the athlete's movements should be as follows: after a rigorous push from the ground follows a phase of relaxation for the take-off leg. An action forward movement of the high should begin only when the foot of the leading leg has reached the edge of the hurdle.

Action of the Arms

The usual movements during running are also executed during hurdle clearance. With the sole difference that in the hurdle stride the arms perform additional functions. The arms contribute in a greater degree to maintaining body balance. When the trailing leg comes forward, the trailing arm swings backward to counter balance this movement. It is either almost stretched or flexed at the elbow.

4. Running between the hurdles (The three-step Rhythm)

In the 110 mts hurdle run the distance between the hurdles is 9.14 mts. If we reduce from the length of the hurdle stride, there remains for three strides between the hurdles or three-step rhythm a distance of about 5.065 meters. So that is 1.88 mts for each step. But practice shows clearly that the three steps are not of equal length. The first stride after the landing which is of about 1.55 to 1.60 mts follows a wide second stride measuring 2.00 to 2.20 meters and this is the longest between the hurdles. The last stride before the hurdle is always slightly shorter than the previous one.

5. Finish

The athlete has to use any one technique similar to sprint to finish the race.

Baton Exchange

There are two methods of baton (Exchange) passing

1. Up sweep method
2. Down sweep method

1. The up sweep method

In this method the passing of the baton occurs in an upward movement by a straight arm. At the same time the baton is received by an arm which is pointing backward and locked at the elbow. The outgoing runner upon hearing the agreed signal from the incoming runner, quickly extends his arm backwards locking it at the elbow, the thumb and fingers are separated and pointing downwards forming an obtuse angle. The time that he receives the baton the outgoing runner tries to keep his arm as still as possible. This outstretched arm the incoming runner quickly moves his straight arm upwards and in such a way that the outgoing runner can grasp the baton as near to the incoming runner's palm as is possible. In the upsweep method the baton is passed from the right hand to the left hand and then the left hand passing it to the right.

2. Down sweep method

In the down sweep method the baton – exchange takes place over a distance of 2 to 3 mts. The out-going runner

2. The baton must be passed inside a short distance to be covered by some three to four strides and without unnecessary loss of time.
3. The baton must be exchanged by non – visual method.

Visual Method

The visual method of baton exchange is used only in 4x400 mts relay. When the out going runner receive the baton, he must see the incoming runner while receiving the baton. The incoming runner gripping the baton at its base, then passes the baton into the receiver hand with a forward down sweep motion. The outgoing runner reaches arm straight back, palm facing upward and takes the baton, gripping the upper portion.

Non Visual Method

The non-visual method of baton exchange is used only in 4x400 mts relay. When the out going runner receive the baton, he doesn't to see the incoming runner while receiving the baton. The incoming runner gripping the baton at its base, incoming alerts the receiver, then passes the baton into his or her hand with a forward pushing, down sweep motion. The outgoing runner reaches arm back, palm facing upward and takes the baton, gripping the upper portion. then rotates the receiving arm down, under and forward, to ready the baton for the next exchange.

400 mts Hurdles

Hurdling is a sprinting, rhythmic event. In this race a full circuit of the track is run with 10 hurdles, 91.4 cm high, placed 35 mts apart. The distance from the starting to the first hurdle is 45 mts, while the last hurdle to the finish line measures 40 mts. There are ten flights of hurdles in each lane, set out in accordance with the below table.

Placement of Hurdles in 100mts Hurdle race

Starting line to First Hurdle	:	=13.00mts
" "	Second Hurdle	: 13+8.50 =21.50mts
" "	Third Hurdle	: 21.5+8.50=30.00mts
" "	Fourth Hurdle	: 30+8.50 =38.50mts
" "	Fifth Hurdle	: 38.5+8.50=47.00mts
" "	Sixth Hurdle	: 47+8.50 =55.50mts
" "	Seventh Hurdle	: 55.5+8.50 =64.00mts
" "	Eight Hurdle	: 64 +8.50 =72.50mts
" "	Ninth Hurdle	: 72.5+8.50=81.00mts
" "	Tenth Hurdle	: 81+8.50 =89.50mts
" "	Finishing line	: 89.5+10.5=100mts

Placement of 400mts Hurdles in Standard Track

(Men and Women)

Starting line to First Hurdle	:	=45.00mts
" "	Second Hurdle	: 45+35 =80mts
" "	Third Hurdle	: 80+35=115mts

"	"	Fourth Hurdle :115+35=150mts
"	"	Fifth Hurdle : 50+35=185mts
"	"	Sixth Hurdle : 185+35=220mts
"	"	Seventh Hurdle : 220+35=255mts
"	"	Eight Hurdle : 255 +35=290mts
"	"	Ninth Hurdle : 290+35=325mts
"	"	Tenth Hurdle : 325 +35=360mts
"	"	Finishing line: 360+40=400mts

E. RELAY

There are two relay events comprising of 4x100m for men and women, and 4x400m for men and women. All the four members of a team are required to run one stage of the race along with the relay baton in their hands throughout the race. The baton must be picked up by the athlete who dropped it. He/She may leave the lane in order to retrieve the baton, provided no other player is impeded.

4x100m relay races are run entirely in respective lanes with staggered starts. In 4x400m relay races the first lap and the same part, of the track, of the second lap shall be run in lanes. The position of the teams at the start shall be retained at each take- over zone, except in case of races where lanes are not used. The waiting runners can move to inside zone, after handing over the baton, until the course is clear to avoid obstruction to other competitors.

Relay races are a popular and exciting feature of track and field. It is a team event in an individual oriented sport. They give the opportunity for team work and cooperation is not available in the other events. The key to good relay racing is the baton exchange. Commonly the relay events are as mentioned below,

1. 4 x 100 mts
2. 4 x 400 mts

1. 4 x 100 mts Relay

The 4 x 100 relay is undoubtedly the most beautiful and one of the most difficult events of the athletics spectrum. This relay uses four sprinters running a complete lap of the track, passing on a baton which has to arrive at the finish line with the runner of the last leg.

The main objective in the baton pass is to keep the baton moving at top speed throughout the relay. The baton must be passed only within a 20 meters take – over zone (exchange zone). This zone begins 10 mts before the scratch line (100 mts marking) and ends 10 mts after it. A good baton – exchange needs to satisfy the following three conditions.

1. The baton – exchange must take place after some 12 to 16 mts running, measured from the beginning of the take – over zone.

forward and upward. Then he goes upward the body position is in vertical (or) hanging and elbows are flexed.

5. Clearing the bar

When the body is in hanging position lift and swings upward both the legs, at the same time the pole straightened, turn the upside down. Then pushing the pole down by hands the legs are throw over the cross bar. After clearing the cross bar push the pole away from the pit with the wrist action to avoid foul or touching the bar.

6. Landing

Safe landing is required on the landing area.

B.THROWING EVENTS

General conditions

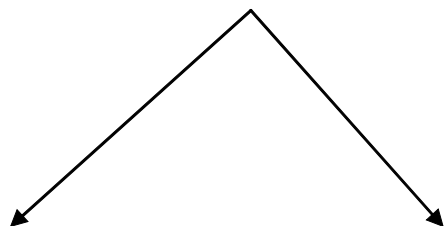
The person who has more body weight and mass of the muscles can choose throwing events. The following qualities are essential for throwers.

1. Body weight
2. Height
3. Leg power
4. Shoulder strength
5. Flexibility
6. Co-ordination
7. Speed

Race walking, of course, involves a rapid leg cadence and if the arms too are no maintain their synchronous swings they have to be bent at the elbows to reduce their moments of inertia, as in running. However, more emphasis is placed on the arm and shoulder action in race walking than in running, because of the need to counterbalancing the exaggerated eccentric thrust of the legs and movements of the hips. But in addition to counterbalancing the leg action, they also aid the forward drive with their swinging the strong upward swing of both arms evokes extra forces from the ground through the driving leg.

UNIT- III

FIELD EVENTS



DISTANCE EVENTS

1. Long Jump
2. Triple Jump
3. Shot Put
4. Discus
5. Javelin
6. Hammer

HEIGHT EVENTS

1. High Jump
2. Pole Vault

A. JUMPING EVENTS

1. LONG JUMP

The following techniques should involve while doing long jump.

1. Approach run
2. Penultimate stride
3. Take – off

1. Grip

Athletes who take off with the left foot, the pole must be carried on the right hand side, the left arm, half bent, supports the pole with the palm of the same hand turned downwards, while the right arm grips about 60-70cm higher with the hand lightly turned out. Keep the pole straight near the cross bar on the uprights. Hold the pole slightly lower than the height of the cross bar. Keep the pole parallel to the ground pointing to the pit or above the right hand palm facing upward and with left hand palm facing down ward.

2. Carry the Pole

The pole should be raised at 50° or 45° to the ground and keep right side. The left hand should be kept flexed at chest level and the right hand at the back. While carrying the pole, the body balance is very important.

3. Approach run

20 to 30 mts away from the vaulting box to start the running with the pole steadily and high knee action. When you reach the check mark, plant the pole in the vaulting box and kick the floor to go up.

4. Planting the pole

When the competitor reaches the check mark he should plant the pole into the box. Join the left hand with the right hand, push the right shoulder and both the hands

(iii) Supports for the cross bar

The cross bar shall rest on pegs pointing in the direction towards the landing area. The supports shall extend not more than 5.5 cm and not more than 1.3 cm in diameter, which should extend 35 – 40 mm above the pegs.

The distance between supports is minimum of 4.30 meters and maximum of 4.37 meters.

(iv) End Pieces of Cross Bar

It shall have 30 mm to 35 mm in diameter, square the length of the end piece is between 15 cm to 20 cm and should be semi circular.

(v) Landing (Pit) Area

The minimum dimensions of the landing area is 5 x 5 meters, for international competitions the length, width and height of the landing area will be 7 x 6 meters. The front pieces must be 2 m long.

VARIOUS STAGES

1. Grip
2. Carry the pole
3. Approach run
4. Planting
5. Crossing the bar
6. Landing

4. Flight in the air
5. Landing

1. Approach run

The length of the un-up is determined by the height of the jumper and his ability to accelerate in the run. According to analyzes carried out at recent Olympic Games, the best athletes use a run-up from 37-50m in length (incase for women 33-40). The athlete should mark the starting check mark 14 to 16 strides from the take – off board. If the athlete who is taking off with left leg, he should start running with right leg. Then he starts the approach run steadily and gradually increase the speed towards the take – off board.

2. Penultimate stride

The last two strides before the take off is called penultimate stride. In this time, the athlete shrugs his body little downward and the length of the stride decreases. That is easy way to fly in the air.

3. Take – off

The length of the jump depends not only on horizontal speed but also on the speed and power of the take-off. After completion of Approach run (penultimate stride), step on the take off board with the stronger foot and jump up in the air by pushing the take off board. After take off (or) jumping in the air the hands should be vertically raised. The Non-

take off leg should be raised high. The last step is executed more quickly and the whole foot is placed on the board, ahead of the projection of the center of gravity.

Plasticine Indicator (No Jump indicator)

Plasticine indicator is called no jump indicator, it is placed at the inner edge of the Take-off board. The judge at the take off board must watch the competitors does not overstep the scratch line. If a no jump indicator is not available the judge should build one moist sand which will clearly show if it is touched by toe or spike. It is a foul only if contact is made with the ground or the no jump indicator.

4. Flight

Jumping styles vary according to the development of the athlete and his muscular characteristics and the bone structure. The most common techniques are,

1. The Sail (common among beginners)
2. The Hitch kick (1-2-3 strides and a half in the air)
3. Hang (extended jump or glide)

(i) Hitch Kick

After jumping in the air from the take off board the athlete swing (or) rotate their legs like pedaling in cycle in the air into 2 or 3 pedaling style, and the legs are closed together before landing. When legs are pedaling the arms alternatively with legs movement.

4. POLE VAULT

Runway

The minimum length of the runway shall be 40 meters, when the conditions permit it is 45 meters.

1. The width of the runway is 1.22 meters.
2. The runway should be marked by white lines with 5cm as width.

Implements

(i) Upright

Any style of uprights or posts may be used provided they are rigid.

(ii) Cross Bar

It is made up of Fiber glass, Metal or other suitable material.

1. The length of the cross bar is 4.48 mts to 4.52 mts.
2. The maximum weight of the cross bar is 2.25 kg.
3. The circular shape of the cross bar is 30 mm diameter.
4. It should have the gap of maximum 3 mm

3.Fosbury Flop

The Fosbury flop was introduced by Dick Fosbury, who won the high jump at the Mexico Olympics in 1968. His technique for clearing the bar, his run up was also very notable because it was in the form of a semi- circle, and he took off with his foot at an angle of about 20 degree relative to the plane of the uprights. At the point of take – off Dick Fosbury with a vigorous bending action and driving up of the free leg, supported by an alternated movement of the upper limbs, rose completing a rotation on the longitudinal axis of the body and then prepared for flight with his back to the cross-bar.

Next he performed his rotation on the transverse axis of the body and at the extreme point of the parabola, he arched himself and continued his trajectory on this position until, so as not to knock down the cross - bar, he straightened his leg and landed on his back bowing his head on to his trunk so that the impact was taken by the top part of the back, avoiding unpleasant injuries to the cervical part of the spinal column.

4. Landing

Safe landing is required on the landing area.

(ii) Hang style

After the take off the athlete do the back arch the arms should be vertically raised above the head, the legs are straighten back, and before landing brings the legs and arms to extend forward, and the legs are closed together before landing.

5. LANDING

After completion of his style in the air, before landing, the athletes should extend both the legs forward / straightened. While landing both the heels should be landed first on the pit. There are three landing techniques should be used to come out of the landing area. They are as follows.

1. Collapsed landing
2. Swing out landing
3. Scoop landing

1. Collapsed landing

While landing both the heels should be touched first on the pit and then toe, the whole body should brought forward and place the knees on the pit, at the same time the buttocks should be kept back on both the heels.

2. Swing out landing

After landing in the pit the athletes should turn his body 45° either right or left in forward and fall down on the ground with shoulder, first then buttocks and so on.

3. Scoop landing

Landing by heels on the pit and push forcefully the sand and makes a dig and place the buttocks on the dig by extending the legs straight.

The competitor commits fouls if he;

1. Take off beyond the take off line.
2. Delaying more than 60 seconds.
3. After landing walking back towards the run way.
4. Performing acrobatics during the jump.
5. Uses illegal style of jump.

Rules

1. The order in which the competitors make their attempts must be decided by drawing lots.
2. Each competitor will be placed according to his best jump.
3. When there are more than eight competitors, each one is given 3 attempts and the 8 competitors with the best jumps are given further three jumps.
4. In case of a tie for the eight position, each competitor involved in the tie has three additional attempts.
5. When there are eight or less competitors, each one is allowed six trials.

3. Clearing the bar

1.The scissors

Towards the end of the 19th century, an American named Mike Sweeny proposed the scissors jump as an alternative to the frontal clearance. The scissors involved passing one leg over after the other at the same time bending the trunk towards the knees when clearing the bar. It consisted of the following movement:

1. While the forward leg was the cross – bar the other one kicked upwards, causing the chest to rotate towards the direction of jumping and a landing on the feet.
2. With the use of this style the world record began to rise this style, the world high-jumpers introduced minor adjustments to the technique according to their physical characteristics and talents.

2.The Straddle

Towards the middle of the 1930s another American Dave Albritton, proposed a radical new technique for clearing the bar, involving the body being parallel to the bar, but with the stomach downwards rather than with the body sideways. Thus the straddle was born, which was clearly demonstrated by the Soviet trainer Vladimir Mihailovic Dyachkov and put to good effect by Valeri Brumel, who took the world record to 2.28m in 1963.

1. Scissors
2. Straddle Roll (or) Belly Roll
3. Fosbury Flop

Various stages

1. Approach run
2. Take – off
3. Crossing the bar/ clearing the bar
4. Landing

1. Approach run

The jumper can approach either from the left side or right side of the cross bar with 25 mts long and medium speed. The angle of approach run and the number of steps vary according to the level of the athlete.

2. Take off

Jumper can stand either right or left one arm away from the cross bar. Then down vertically draw the line that may be considered as take off line. When the jumper start to approach towards crossbar, used his power leg on the take off line for make a jump.

6. Once the competition is under way, competitors are not allowed to use the runway for trail attempts.
7. All jumps must be measured from the nearest mark in the landing area made by any part of the body or limbs of the athlete to the take-off line or its extension and at right angles with the take-off line.
8. If a competitor takes off before the board or the line this does not constitute a foul.

2. TRIPLE JUMP

The triple jump shall consist of a Hop, step and jump in that order. This is the English definition of the jump. The hop must be executed on the same leg which was used for the take off (right-right or left-left). In the step the support is transferred to the other leg. The final jump is a proper long jump.

1. It shall not be considered a failure if the competitor, while jumping, touches the ground, with the “sleeping” leg.
2. There are six stages when taking Triple jump. They are as follows
 - (1) Approach run
 - (2) Take – off
 - (3) Hop

(4) Step

(5) Flight

(6) Landing

1. Approach run

The length of the run-up is determined by the height of the jumper and his ability to accelerate in the run. According to analyzes carried out at recent Olympic Games, the best athletes use a run-up from 37-50m in length (incase for women 33-40). The athlete should mark the starting check mark 14 to 16 strides from the take – off board. If the athlete who are taking off with left leg, he should start running with right leg. Then he start the approach run steadily and gradually increase the speed towards the take – off board.

2. Take – off

The length of the jump depends not only on horizontal speed but also on the speed and power of the take-off. After completion of Approach run (penultimate stride), step on the take off board with the stronger foot and jump up in the air by pushing the take off board. After take off (or) jumping in the air the hands should be vertically raised. The Non-take off leg should raised highly. The last step is executed more quickly and the whole foot is placed on the board, ahead of the projection of the center of gravity.

3. Hopping

The athlete should be used to land on the ground which he was used to take off. For example: The athlete has take off for his left leg means he should land or hop in the same leg. During hopping the non take off leg (or) rear leg has no movement, that's why it is called sleeping leg.

4. Step

After completion of hopping the athlete used to take one more step with his non take – off, foot before landing is called step. Here the athlete does the bounding action to do the step.

5. Flight and

6.Landing procedures are similar to long jump.

3. HIGH JUMP

The high jump as we know it today first became popular in the 19th century. Subsequent perfecting of the jumping technique took place in the development stages, but it has depended particularly on modification of the rules for the event and on the elimination of some restrictive conditions.

Various techniques should be used by the jumper to cross the bar. Depends upon their ability they used any one of the following techniques.

c) High carry

High carry method is associated with those throwers who tend to use a direct over the shoulder type withdrawal which ends with a turning back of the shoulders at the arm and javelin is reaching near full backward extension (To held on above the head).

A thrower must develop his carry position to suit his technique of withdrawal of the javelin in preparation for the delivery stride.

2. Approach run

During approach run the thrower has to mark the point of starting and the point of check mark with javelin. While running the javelin should move front and back, and slowly increase the running speed still you reach you the check mark.

The Run-up : The run – up has two parts. They are

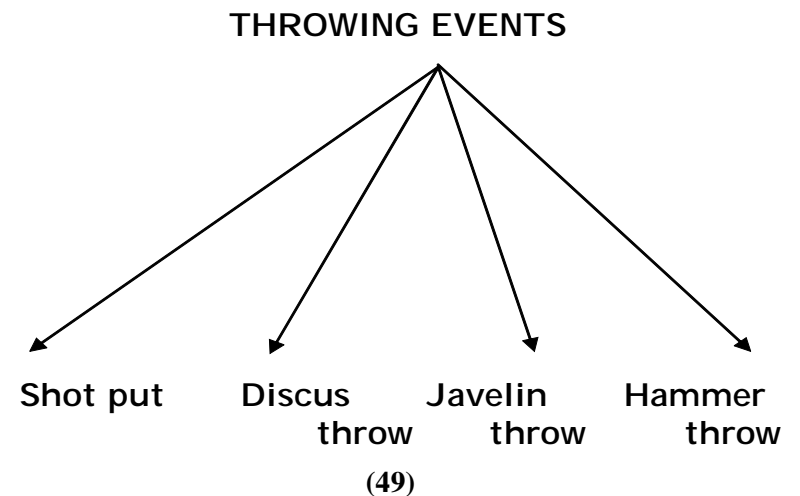
- (i) The cyclic part
- (ii) The acyclic part

The cyclic part speed is built up sufficiently so as to allow for a further increase over the last strides. The run-up should be easy and relaxed, heading the thrower to a powerful explosive all-out release.

- 8. Arm length
- 9. Balance
- 10. Endurance

The competitors are allowed three to six trails and three to eight of the best competitors are allowed three more trails. Incase of a tie for the final place, the competitor shall be allowed three additional trails. The conditions of the competition must be explained to the competitors before its commencement. The best throw of the competition out of all trails taken by the competitors shall be credited in resolving a first place tie. No markers or marks are allowed to be put in the throwing sector.

Competitors may use an adhesive substance on their hands for better grip, and can also wear a belt of leather or some other material to protect the spine from injury. However, taping of the fingers or use of any other devise on their hand which might assist in throwing is not allowed.



1. THROWING THE SHOT PUT

The competitor must begin the throw from a stationary position within the circle. The shot shall be put from the shoulder with one hand only and, shall touch or be in close contact with the chin. The hand shall not be dropped below this position during the act of putting.

Practice trials are not allowed after the commencement of the competition. Competitors are not allowed to put on gloves nor are they allowed to spray or spread any substance either on the surface of the throwing circle or on their shoes.

Basic Principles

1. Forces must be applied along a straight line.
2. Newton's 3rd law – Action and Reaction are equal and opposite.

Specifications

1. Weight of the shot for men - 7.260 Kg
2. Weight of the shot for women - 4.00 Kg
3. Diameter of the shot put circle- 2.135 m
4. Angle of the shot put sector - 34.92
5. Dimension of the sector - 20 x 12 m

a) Normal grip

The above thumb and middle finger is behind the edge of the grip cord and the index finger is partly curled around and behind on the javelin's shaft.

b) Middle and Thumb grip

The index finger and thumb is behind the edge of the cord binder and the rest of the fingers around the cord itself.

c) 'V' grip (or) Glow grip

The Javelin is held between the index and the middle fingers at the edge of the cord binder and rest of the fingers around the cord itself.

Carry

The javelin is carried above the shoulder of the throwing arm. Three commonly used methods of carrying the javelin during the approach run's cyclic phase.

a) Low carry

The low carry is generally associated with a circular type arm action in the 'withdrawal' (To held on waist level).

b) Medium carry

The medium carry is generally favored expansion in the withdrawal. (To held on eye level).

1. A head
2. A shaft and
3. A cord grip

The javelin throw comprises the following technical elements.

1. The grip and carry
2. The Approach run
3. The withdrawal
4. The impulse stride
5. The throwing stride
6. The release
7. The recovery

1. Grip

When executing their throws, javelin throwers may hold the javelin only by the whipcord grip. They may hold the javelin at the end of the cord grip with one or more fingers and the thumb touching the javelin shaft. Javelin throwers have some leeway in how they grip the javelin. It has three types how they can hold the javelin. The javelin is held behind the cord binder the rear edge of which offers a slightly raise border for gripping the javelin.

Stages / Method

1. Holding of the shot
2. Tucking (or) Placement of the shot
3. Stance
4. Glide
5. Release

1. Holding the shot

- a. The shot rest on the root of the fingers, and should not touch the palm.
- b. All the fingers are carry the shot except the little finger which is only support.

2. Placing (Tucking) the shot

1. The shot must be placed between chin and clavicle.
2. The shot does not go beyond the shoulder line.
3. The hand should be parallel to the ground.

3. Stance

The stance varied according to the using the style of Athletes.

Techniques (Style Of Putting)

The thrower can be used 3 style when putting the shot

1. Standing throw
2. 'O' Brien technique (or) Gliding
3. Rotation (or) Disco put

1. The 'O' Brien Technique

The distance a shot travels depends upon its height of release, velocity at the moment of release and the Angle of projection. The optimum angle of projection will vary depending on the height of the release, and the distance of the put, it will be approximately 34.95. The correct technique is the one that will result in the greatest velocity at release. The motion of a projected object is influenced by the exact point of application of the propelling force.

Holding the shot

The procedure for gripping the shot is to hold it in the left hand and lay the right hand loosely on top with the fingers spread slightly. The putter holds the shot in his right hand. Where it rests on the "base" of the fingers. The three middle fingers are only slightly splayed while the thumb and the little finger give the shot lateral support, securing a safe position of the shot.

The Reverse

The reversal is to serve as a follow through after the thrust and to retain balance in order to avoid fouling. After the discus has left the hand the thrower will have to reverse the feet rapidly and lower the body weight to maintain balance. The right leg must be brought forward quickly and planted firmly close to the rim of the circle, mean time the left leg swings back the body is bent at hips and right knee flexes to drop the centre of gravity into a stable position.

3. THROWING THE JAVELIN

The javelin throw distinguishes itself from other throwing events of shot-put, discus throw and hammer throw. These throwing events must be from a circle, the javelin must be thrown from behind the arc of a sector drawn with a radius of 8 mts. Due to the aerodynamic nature of the implement and its relative weight, the event does not require great strength. The event does require few less technique in order to achieve high level results.

Javelin consists of three parts namely the head, shaft and grip. The shaft is made up of either Aluminium or fiber. At the tip of the shaft a sharp head is fixed. At the center a grip made of thread is fixed. The Javelin is round and broad at the center. The circumference is small in the front and rear. It has three main parts

athlete drives off the left foot. The effective throwing position is one of "muscular wind" the hips displaced from the feet, shoulders from the hips and discus from the shoulders.

The run across the circle is initiated by the driving action of the left leg. Synchronized with the swing of the right leg. This drive carries the thrower halfway across the circle. The right foot landing approximately on the centre line with the leg well bent and the shoulder and body weight back. His left leg is pointing toward the direction of the throw, his right shoulder is facing the rear, his throwing arm is well behind the shoulder his left arm is curled and the discus is flat.

The Release

The throw begins with a forward and upward drive from the right foot. The shoulder should now come in slightly after the hip and the arm strikes from the low point, the thrower reaching out as far as possible to give as much distance from axis of rotation as he can. The left leg should now straighten, as the arm strikes. The discus will leave the hand in line with the right shoulder and should be squeezed out of fingers, each digit applying its force in turn and spinning of the first fingers last. The discus is spun clockwise. A good thrower will release the discus at a 35°-40° angle. The release must be smooth and rhythmic using the force generated from the lower body.

The stance

He should stand facing the rear of the ring with his back in the direction that he is going to throw. The shot should be held in right hand, supported by thumb and fingers. The hand holding the shot will be placed into the hollow of the collar bone in such a manner that it does not rest on such a manner that it does not rest on the shoulder but against the right side of the neck and the jaw. The elbow of the right arm is slightly raised and pressed forward. The upper arm points forward and downward. The head remains in its normal position. The eyes should be focused on a point to the rear of the ring and about five to ten yards away. He should stand erect in a telexed attitude, the left arm is held either out in front of the face or relaxed above the head the left front behind the right about one foot with just the toes touching for balance.

The glide or drive

The purpose of the glide is to gain momentum while moving across the ring and to lead into the correct position for the delivery. The initial movement is to lower the trunk and raise the left leg causing the body to form a "T" shape with all weight carried on the right leg. The head, shoulders and hip remain square to the rear of the circle, and the right leg flexes in preparation for the drive across the ring proper balance at this point is extremely important.

2. The Rotation or Disco-put Technique

The Starting Position

The putter stands at the rear of the circle facing 180° away from the throwing direction. The left foot is along the centre line of the circle and the right foot is placed laterally to the right of the centre line about shoulder width apart or just this point in most cases. The grounding of the left foot at the stop board denotes the arrival of the thrower into the delivery stance.

Preliminary Movements

To start the turn, the putter begins by swinging the shoulders, trunk and left arm along with the left and then to the right, as the body weight shifts correspondingly from leg to leg in coordination with the rhythm of the shoulders, trunk and left arm. Both knees are semi – flexed while this side to side swaying movement is taking place to break the inertia and set the pattern of movement to follow.

Turn

The double support phase of the turn begins at the end of the preliminary movements. The thrower is completely over his right leg with the trunk and shoulders well twisted to the right. From this position the thrower begins unwinding his upper body in the direction of turning with a wide

throwing arm bang to the right side along the thrower's thigh with the head and eyes focused to a point about 5 meters behind the circle. There are generally three positions that a thrower may adopt in relation to the line of direction. The experience, technical skill and comfort of the thrower must decide which of the three starting positions suit their ability.

The left foot is generally placed a few centimeters back from the rim of the circle, in order to avoid fouling by bursting the sole of the foot on the top edge of the rim of the circle as the pivot is executed.

The preliminary swings

The thrower should position himself at the rear edge of the circle with his back to the generally facing the direction of throw and his feet slightly wider than hips. The discus should be flat and facing downwards on the arm swung at shoulder height so that the arm and discus go well behind the right shoulder. The free arm rests comfortably across the chest. The thrower's weight should move easily from one foot to the other. On the final preliminary swing, the arm is swung back as far as possible so that the body weight is over a straight right leg.

Coming across the circle

The initial movement is begun the hips are turned and a pivot is made on the ball of the right foot as the

Specification of discus

1. Weight of the discus for men : 2 kg to 2.025 kg
2. Weight of the discus for women : 1 kg to 1.025 kg
3. Diameter of the discus for men : 21.9 cm to 22.1 cm
4. Diameter of the discus for women: 18 cm to 18.2 cm
5. Angle of sector is : 34.92°

Various Stages

Hold

The hand is placed flat against the discus surface, the upper joints of the fingers grasp the rim of the discus. Its center of gravity lies between the index and middle finger. Due to a slight bending at the wrist the upper face of the discus touches the arm, because it prevents the discus from falling out of the hand in the subsequent movements.

Starting position

The starting position at the rear of the circle is with the thrower facing 180 degrees away from the throwing direction. The two feet are usually placed about shoulder width apart or slightly more in the case of very tall throwers. The toes point naturally outwards with the weight of the body evenly distributed over both feet. The discus and

sweeping left arm action parallel to the ground, a slight forward tilt to trunk in a semi sitting position. The single support phase of the initial part of the turn is followed by a brief non support phase when both feet are off the ground and the whole body is turning on its vertical axis, and continues turning after the right foot lands around about the center of the circle.

Follow through (or) Reverse

When the right leg has driven really well and effectively and the action has been timed correctly the athlete will be well over the left foot as the arm strikes. Immediately after the shot has left the hand, he will find himself falling over the stop – board. In order to prevent himself fouling, the left foot is rapidly withdrawn and the right leg brought forward, the toe of the right foot striking the inside edge of the stop – board. At the same time the body weight is lowered in order to be more on balance by lowering the centre of gravity.

Valid Trial

For a valid trial, the shot shall fall completely within the inner edges of the landing sector.

Fouls

1. Throwing the shot from behind the shoulder
2. Touching outside the circle or the top of the stop Board

3. Shot landing on the sector line or outside the sector line
4. Delaying more than 60 seconds to throw.

Rules

1. The use of gloves is not allowed
2. At the competition area, each competitor may have a maximum of two practice trials which should be made in draw order, under the supervision of the judges.
3. Once the competition has begun, competitors are not permitted to use implements for practice purposes or to use the runway or ground within the sector for practice trials, with or without implements.
4. No device of any kind – i.e., taping of two or more fingers together, which in anyway assists a competitor when making a throw, shall be allowed. The use of tape on the hand shall not be allowed except in the case of the need to cover an open cut or wound.
5. A better grip, competitors are permitted to use a suitable substance on their hands only.
6. To protect the spine from injury, a competitor may wear a belt of feather or other suitable material.

7. For a valid trail, the tip of the javelin shall fall completely within the inner edges of the landing sector.
8. If the implements breaks during a throw or while in the air, and if the competitor thereby loses his balance and contravenes, it shall not count as a foul throw, provided one attempt was made in accordance with the Rule.
9. Implements shall be carried back to the starting line and never thrown back.
10. The competitor shall not leave the runway until the implement has touched the ground.

2. THROWING THE DISCUS

The object of the spin in the discus throw is to generate power and speed within the circle to apply to the discus itself, and the more power that is applied to the discus, then further it will go the angle to release of discus, the position of the discus during its flight are important factors. It has three types,

1. Half rotation
2. Full rotation
3. One and half rotation

6. 5000m Run – Arc start **or** Group start
7. 10000m Run – Arc start **or** Group start
8. 400mts Hurdles - Full stagger distance
9. 4 x 100m Relay – Full stagger distance
10. 4 x 400m Relay – One and Half stagger distance with diagonal distance.

2.Non- Standard Track

The track which is not satisfying the conditions of standard track is called as Non-standard track and the 400mts track without curb (raised border) is also treated as Non-standard track. Usually 200mts track is called as Non – standard track.

Some of the disadvantages of Non-standard track:

- a) Sprinters very difficult to show their real capacity.
- b) Very difficult to run more than 6 competitors at a time.
- c) Very difficult to conduct Hurdles and Relay races.
- d) Very difficult to conduct both track and field events simultaneously.

Method of finding Running Distance Radius for 200 mts track if 36 mts as straight.

3. Five – stride – Rhythm

The three known stride Rhythms – the three stride rhythm. The five stride Rhythm and seven stride rhythm. It is five stride – Rhythm which is the most widely accepted, which comprises the following phases:

- (i) The withdrawal of the javelin
- (ii) The impulse stride
- (iii) The throwing position
- (iv) The release
- (v) The recovery

(i) Withdrawal of the javelin

The withdrawal starts at the second stride of the five-stride rhythm and ends at the third stride. The throwing arm is drawn back in alignment with the shoulder axis. The palm of the hand is turned upward and extend the forearm, when the withdrawal is completed, the athlete's body has a marked backward lean.

(II) Impulse stride /Cross step / Three step (or) Five step Rhythm

When an athlete reaches the check mark with the left leg the action of throwing should be starts. The right hand is stretched backward with the javelin and left hand is brought in forward in front of chest. That is otherwise called "with drawl of the javelin".

The toe of the right foot must be deviate more than 30° from the run up direction. The left leg presses the body down low into the fourth stride, preventing the body's centre of gravity from lifting at the landing of the right leg, which must be allowed to bend when it receives the body weight.

(iii) Throwing Position

The throwing position starts at the moment when the athletes right foot makes contact with the ground after the impulse stride. The right leg can start to extend and doing s introduce the release, the full extension of the forearm by the hand is important under no circumstances must the arm be flexed at the wrist.

(iv) The Release

The release is initiated by a forward and upward stretching of the right leg at the knee and ankle joints, driving the right hip forward. The shoulder and the hip axes now run parallel and almost at right angles to the direction of the throw. The throwing arm is not yet stretched while the right leg is extended, the heel is raised, allowing the pressure of the ball of the foot to act longer on the body. The throwing arm now comes into its sphere of action. When the throwing arm begins to strike, the elbows are raised until it is level with the heed and pointing in the throwing direction.

Method of Finding Running Distance Radius for 400 mts if 80 mts as straight.

$$2pr = 240 \text{ (Circumference of two curves)}$$

$$r = 240/2 \pi$$

$$240/2 \times 3.1416 = \frac{240}{2 \times 3.1416} = \frac{240}{6.2832}$$

$$= 38.20 \text{ mts}$$

For Standard Track (With Kerb)

Marking Distance Radius (MDR or CR) = RDR – 0.30 m

$$\text{MDR} = 38.20 - 0.30 = 37.90\text{m}$$

For Non-standard Track (without kerb)

$$\text{MDR} = \text{RDR} - 0.20 \text{ m} = 38.20 - 0.20 \text{ m} = 38.00\text{m}$$

Starting points in 400 mts Track

1. 100m Run Men & Women
100m Hurdles for Women - Parallel Method
110m Hurdles for Men
2. 200m Run – Half stagger distance
3. 400m Run – Full stagger distance
4. 800m Run – Half stagger with diagonal excess **Or** Arc start / group start
5. 1500m Run – Arc start **or** Group start

Running Distance Radius (RDR)

RDR is the path in which an athlete has to run in the curve to cover the exact distance. The chart below shows that RDR, CDR and area required to lay 400mts raised bordered track when the straights length varies.

Straight length in mts	Rdr in mts	Cdr in mts
79MTS	38.50	38.20
80MTS	38.18	37.88
84.39mts	36.80	36.50

The chart below shows that RDR, CDR and area required to lay 200mts Non raised bordered track when the straights length varies.

Straight length in mts	Rdr in mts	Cdr in mts
37.50MTS	19.89	19.67
40.00MTS	19.09	18.89

During the release the left side of the body must be in a flexed position. This is achieved by a sudden arrest of the backward movement of the left arm just when the right side of the body overtakes the left side the angle of release is between 30 and 36 degrees.

(v) The recovery

A distance of at least two meters from the arc will be required merely checks the forward speed of the body. Thus preventing from fouling. After the release, the right leg is forward in a springing movement. The reverse takes places to avoid stepping over the right foot must be planted transversely to the throwing direction, the upper body must be lean forward, the left leg is raised and brought back into the direction of the run-up. Javelin consists of three parts namely the head, shaft and grip. The shaft is made up of either Aluminium or fiber. At the tip of the shaft a sharp head is fixed. At the center a grip made of thread is fixed. The Javelin is round and broad at the center. The circumference is small in the front and rear.

Follow throw

After releasing the javelin the thrower to avoid his forward momentum (or) foul, then he placed his rear leg to brought forward for his rear leg and placed nearer to the board and to do hopping twice or threes. Then he come back behind the runway should not make foul.

Correct throw

The javelin should be caught in the grip. The javelin must be thrown forward from behind the shoulders. While throwing thrower should not cross the line of runway either in front or side. After releasing, the javelin should fall within the sector lines with the tip first touching the ground. The thrower still remains (leave) the runway only after the javelin lands on the ground.

6. THROWING THE HAMMER

The technique of hammer throwing is determined by the specific nature of the implement and the measurement of the throwing circle, which comply with the international rules. A complete throw consists of two preliminary swings and three turns on the left foot with an active push-off from the right leg at each turn. The following are the parts of hammer throw:

1. The Grip
2. The Initial position
3. The preliminary Arm swings
4. The Transition
5. The turns

Top Layer

Now-a-days all international competitions are being held on synthetic tracks. The thickness and material used for various layers of a synthetic track depend upon the product and preference of the particular firm (construction agency). Although, the material used for top layer by all the firms are synthetic tracks, but of different variations. It is advisable that whenever 8 lane synthetic tracks are being laid, efforts should be made for laying of another 4 lane synthetic track of the same material for training purposes.

Lane

Lane is the space between the two parallel lines.

Kerb

Kerb is the raised border (both inner and outer line) which is fixed permanently through the inner line of the first line and outer line of the last lane. Dimensions of curb is 5 x 5 cm (5 cm height, 5 cm width).

Curb Radius (CR)

Curb radius is the radius which is used to draw the curve. It is otherwise known as Marking Distance Radius (MDR). The curb radius varies according into the nature of the track.

TRACK MARKING

Track must be prepared according to the rules and regulations laid by **International Association Of Athletic Federation** (IAAF). The inner raised border should be 5cm in height and width by using brick, wood or any other suitable material. There shall be a minimum of 8 lanes and width of lane is 1.22mts and width of the line is 5cm. The straight lines are always marked by north to south direction and finishing line must be same for all races.

a) TYPES OF TRACK

The track is classified into two types based on its specifications.

1. Standard Track (with curb)
2. Non- standard Track (without curb)

1. Standard Track

The tracks are made either on plan surface (grass) or with the help of cinder/synthetic material which is skid proof and not too hard. To get maximum benefit from the cinder/right synthetic tracks, it is essential that proper care be taken at the time of the construction so that right materials are mixed in various layers as per required thickness.

6. The Release

7. The Recovery

The Grip

The inside grip of the hammer handle is laid against the pads of the middle phalanges of the left hand fingers. The right hand cuffs the left by putting the four fingers over the back of the middle and basal phalanges of the left hand fingers. The hammer must be held firmly but not tensely.

The initial position

The thrower stands at the rear edge of the circle with his back facing in the direction of the throw his feet are a little more than shoulder width apart and his knees are bent for stability during the arm swings. The thrower now places the hammer head behind his right leg as far to his rear as possible. He then turns to the right until the right shoulder points in the direction of throwing. The hammer wire forms a straight line with the extended left arm.

The preliminary arm swings

The main function of the preliminary swings is to break the inertia of the thrower and hammer and to set a rhythmic pattern of movement by which initial acceleration is transmitted to the hammer. During the preliminary swings, the arms are kept long and relaxed and form and extension

of the hammer wire. They begin with this movement when the hammer is at its lowest point and end it by turning the trunk to the right. The thrower must counteract the increasing centrifugal force.

When the hammer moves backwards, he presses his hips forward. After the first arm swing the thrower keeps the lowest point of his hammer well to the right, at around 290 to 300 degrees, and the highest point somewhere around 120 degrees.

The Release

The delivery phase begins when the right foot touches the ground after the third turn. The landing of the right foot must be fast and firm in order to match the acceleration of the implement, which is racing down to the lowest point with the beginning of the active straightening of the legs. Just before the hammer is released, the left knee straightens. When the implement leaves the hand, the vertical line of projection of the thrower's head should not go beyond the right heel. If the feet are in a stationary position, thus is a clear proof of a correctly executed delivery. The hammer is released at shoulder height. The left shoulder points in throwing direction and back is well arched. The most valuable angle of release in the hammer throw is 42 and 44°.

1st Day Events

1. 100 mts Hurdles
2. High Jump
3. Shot put
4. 200 mts Run

2. Decathlon

Decathlon consist of 10 events which shall be conducted on 2 consecutive days in the following order.

1st Day Events

1. 100 mts Run
2. Discuss throw
3. Pole vault
4. Javelin throw
5. 400 mts Run

2nd Day Events

5. Long Jump
6. Javelin
7. 800 mts Run

2nd Day Events

6. 100 mts Hurdles
7. Long Jump
8. Shot put
9. High Jump
10. 1500 mts Run

Note :

1. Winners will be decided based on the points of all events.
2. There is no heats in the running events and every running events are treated as finals.
3. Three attempts only will be given to field events.
4. Two false start should be permitted.

3. Decathlon

Decathlon consist of 10 events which shall be conducted on two consecutive days in the following order, with minimum 30 minutes interval between two consecutive events and 10 hours interval for last event of first day and first event of second day.

1st Day Events

1. 100 mts Run
2. Long Jump
3. Shot put
4. High Jump
5. 400 mts Run

2nd Day Events

6. 110 mts Hurdles
7. Discus throw
8. Pole vault
9. Javelin throw
10. 1500 mts Run

Combined Events For Women

Combined events for women there are two category mentioned as follows.

1. Heptathlon
2. Decathlon

1. Heptathlon

Heptathlon consist of 7 events which shall be conducted on 2 consecutive days in the following order.

The Recovery or Follow Through

To avoid stepping over to thrower must absorb the impact by reversing the legs and lowering the body's centre of gravity, thus increasing stability.

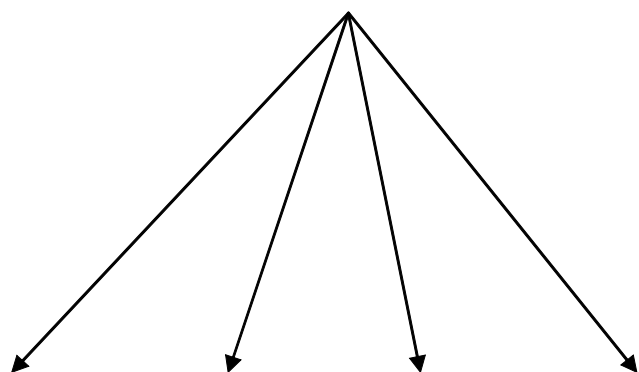
C.COMBINED EVENTS

Multi-discipline events has been included in athletics programmes since eight century B.C. though originally the five events for men included a run, long jump, discus throw, javelin throw and wrestling. The 10 events with we are familiar today were practiced first in Scandinavia, and the event is now developed in importance for the genuine all – rounder, who may not be one event, but who can maintain a high overall standard. Today it is an event for the decathlon or heptathlon specialist who prepares for it and competes in the event as a whole rather than in series of separate competitions. The decathlete or heptathlete needs to be a balanced personality with well –rounded physical development.

The Combined events are an individual events consist of several number of events of different category. For men and women combined events are classified into 4 types according to the level of competitors. The events are held over two days, and they are chose as a true test of skill, stamina and technique. The decathlon combines sprints with middle distance running, throwing, jumping, hurdling and vaulting.

There is a rest period of 30minutes between each event. A competitor is awarded points for his best performance in each event, as calculated by reference to scoring tables produced by the IAAF. The decathlon entered the Olympic programme in 1912.

COMBINED EVENTS



Pentathlon

Heptathlon

Octathlon

Decathlon

They are as follows.

1. Pentathlon - 5 events
2. Heptathlon - 7 events
3. Octathlon - 8 events
4. Decathlon - 10 events

The Combined events such as pentathlon, which shall be conducted on one day, and other combined events such as Heptathlon, Decathlon and Octathlon should be conducted on two consecutive days as in the prescribed order.

Combined Events for Men

1. Pentathlon
2. Octathlon (Youth Boys)
3. Decathlon

1. Pentathlon

The pentathlon is a five-events test of all-round ability. The men's version comprises the long jump, javelin, 200m., discus and 1500 m in that order on one day. Scoring is on the same basis as the decathlon. The pentathlon has long been a most popular women's event, and was introduced into the Olympic schedule in 1964.

2. Octathlon (Youth Boys)

Octathlon consist of 8 events which shall be conducted on consecutive two days in the following order.

1st day Events

1. 100 m Hurdle
2. Long Jump
3. Shot put
4. 400 mts Run

2nd day Events

5. 110mts Hurdles
6. High Jump
7. Javelin
8. 1000 mts Run

i) By seeing their timing in 1/100 of second. If the tie still remains.

ii) Lot shall be used to decide the best loser.

b) Field events

During horizontal or distance events, where there are more than eight competitors, each competitor shall be allocated three trials and the competitors with the best valid performances shall be allowed three additional trials.

In the event of a tie for the last qualifying place it shall be resolved by seeing the second and third best performance among the tied competitors and if tie still remains, the tied competitors shall also be allowed to perform the three additional trials.

In the event of a tie for any position, it shall be decided first by using the available rules. If the tie still remains it concerns for the first place, the competition shall be re-run to decide the winner which is known as concerns any other place, the result will stand. That means the tied competitors shall be awarded the same place.

Note; Its best performance as achieved during field marking, it shall also be considered.

$$2\pi r = 128 \text{ (Circumference of two curves = } 200 - 72 \text{ (} 2 \times 36 \text{))}$$

$$2 \times 3.14 \times r = 128$$

$$\text{RDR or 'r' = } 128 \times \frac{1}{2} \times \frac{1}{3.14} = 20.37 \text{ m}$$

$$\text{MDR = RDR - 0.20 m}$$

$$\text{MDR = } 20.37 - 0.20 = 20.17 \text{ m}$$

b) TYPES OF RUNNING SURFACE

1. Mud
2. Grass
3. Cinder
4. Synthetic Track

c) NEED FOR A STANDARD TRACK

1. Track must be prepared according to the rules and regulations laid by International Association of Athletic Federation (IAAF).
2. The length of the standard track shall be 400 mts.
3. The track should be laid out from North to South direction.
4. Track shall consist of two parallel straights and two curves of same radius. The length of the curve will be more than the straight.

5. The track should have minimum of 6 lanes and maximum of 8 lanes.
6. The inside and outside of the track shall be bordered by a kerb. That is raised border of maximum 5 x 5 cm.
7. The track should have common finishing point.
8. To conduct all the running events up to 10,000 mts within a track and also the jumping and the throwing events simultaneously with the track events.
9. The track should have proper drainage system.
10. The track should be leveled without any ups and downs.
11. The running direction is such that the athlete's left hand side is towards the centre of the track.
12. The synthetic material will be used as the surface of the track.

STAGGER DISTANCE

1. There will be no stagger for the first lane athlete.
2. As and when the width of the lanes changes, the stagger distance also changes.
3. Staggers are needed only when the athletes are required to run in curves also in their lane.
4. Staggers will not change according to the increase in the length of curves.

6. Angle sector is : 34.92°
7. Wire : Single up broken and straight length of string steel wire 3 mm in diameter
8. Handle : Curved or straight grip with maximum width inside of 130 mm and maximum length inside of 110mm.

BREAKING TIES IN ATHLETICS

Tie breaking in can be steadied separately during preliminary rounds and finals to decide the positions.

1) Preliminary rounds;

a) Track events

Preliminary rounds (heats) shall be held in track events when the number of competitors is more in number to reduce the number of competitors to 6 or 8 to conduct the finals. In all preliminary rounds at least first and second in each heat shall qualify for the next round and it possible at least three in each heat shall qualify. The qualification for the next race shall be decided either according to their placings or according to their times (best losers). During this selection if there is a tie among the best loser, the following steps shall be applied to decide the best loser for the next round.

The Ring

The ring shall be placed to the level of outside ground. It must have a height of 1.4cm to 2.6 cm from the inside floor of the circle and 6mm thickness.

Specification of Hammer

The hammer consist of three parts, a metal head, a wire and a grip. The head shall be of solid iron or other metal not softer than brass. The head should be spherical in shape with smooth surface. A steel wire, with a diameter of 3mm, is attached with the head at one end and with a handle on the other end.

Overall weight of the hammer

1. Men : 7.26 kg to 7.285 kg
2. Women : 4 kg to 4.025 kg

Overall length of the hammer

1. Men : 117.5 cm to 121.5 cm
2. Women : 116 cm to 119.5 cm
3. Diameter for men : 11 cm to 13 cm
4. Diameter for women : 95 cm to 110 cm
5. Head : Solid or other suitable material

5. When staggers are marked, the diagonal excess distance also to be taken into consideration.

Formula

$$\text{Half stagger} = [W (N-1) - \alpha 0.10 \text{ m}] \pi$$

$$\text{Full stagger} = [W (N-1) - \alpha 0.10 \text{ m}] 2\pi$$

$$\text{One and Half stagger} = [W(N-1) - 0.10\text{m}] \times 3\pi$$

Where,

W – Width of the lane,

N – Number of the lane

π – 3.1416 (Standard value)

Stagger distances for Non- standard Track

$$\text{Half stagger} = W (N-1) \times \pi$$

$$\text{Full stagger} = W(N-1) \times 2\pi$$

$$\text{One and Half stagger} = W (N-1) \times 3\pi$$

Diagonal (excess) Distance

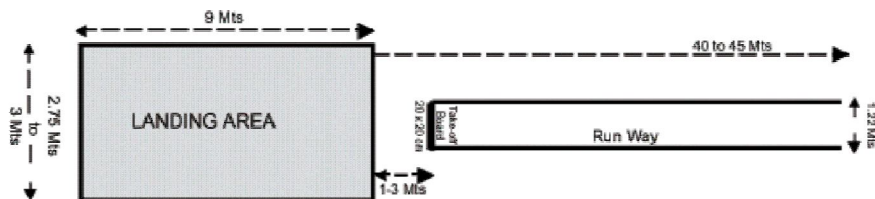
The excessive distance run by the athletes other than the first lane runner for 800mts and 4 x 400mts relay to reach the first lane after the first and three curve respectively is called diagonal excess. This diagonal distance should be calculated for each lane and it should be added with half stagger, and 1½ stagger respectively in the starting point itself.

UNIT - V

FIELD MARKING

Layout of Area for all Field Events with all Specifications

a) LONG JUMP



Specifications

Runway

Approach run - 40-45mts

Width of the lane - 1.22

Width of the line - 5cm

Jumping pit

Length - 9 mts

Width - 2.75 mts to 3 mts

Distance of the take off Board from the nearest edge - 1 – 3 mts of landing area

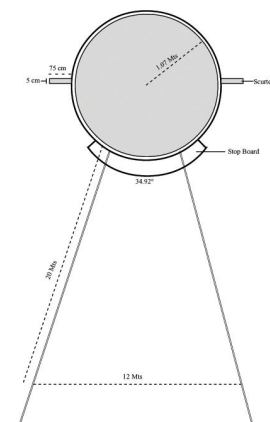
(84)

9. Width of the cord grip : 150 mm to 160 mm for men

10. Width of the cord grip : 140 mm to 150 mm for women

11. Angle of sector is : 29°

h) THROWING THE HAMMER CIRCLE



The hammer is thrown from a circle, shielded on three sides by a netting a cage on a metal frame, and must land within the marked sector. The competitor who achieves the best distance with his throw is declared winner. A total number of five judges watch for infringement within the circle, the other three judges supervise the field. If the hammer breaks while attempting a throw, then the attempt shall not be counted. Under such circumstances, if the competitor loses his balance and commits a foul, it won't go against him.

(93)

The javelin is made of wood or metal shaft with a sharp metal head. There shall be a cord grip around the centre of gravity of javelin. The cord grip should not exceed the diameter of the shaft by more than 8mm. The grip shall be of uniform thickness.

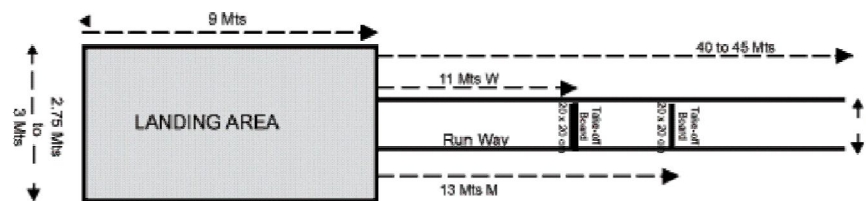
SPECIFICATIONS

1. Length of the runway : 30 to 36.5 mts
2. Width of the runway : Two parallel White lines 5 cm wide and. 4 mts apart
3. Width of the arc : 7 cm extended by 75cm long and 7 cm wide.
4. Weight of the javelin : 800gms to 825 gms for men
5. Weight of the javelin : 600gms to 625gms for women
6. Over all length of the javelin : 2.60 mts to 2.70 mts for men
7. Over all length of the javelin : 2.20 mts to 2.30 mts for women
8. Metal head : 250 mm to 330 mm for men and women

Dimension of the Take- off Board (Wooden Board)

- Length - 1.20 mts to 1.21 mts
 Width - 20 cm
 Depth- 10 cm

b) TRIPLE JUMP



Specifications

Runway

- Approach run - 40-45mts
 Width of the lane - 1.22
 Width of the line - 5cm

Jumping pit

- Length - 9 mts
 Width - 2.75 mts to 3 mts
 Distance of the take off board from the nearest edge - 11m (w)
 of landing area 13m (m)

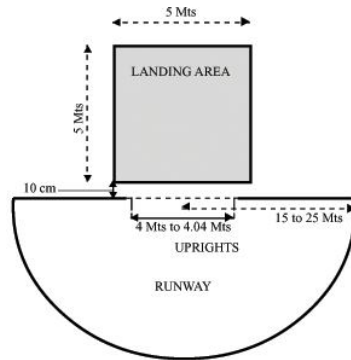
Dimension of the take off board

Length - 1.20 mts to 1.21 mts

Width - 20 cm

Depth- 10 cm

c) HIGH JUMP



Specifications

Runway

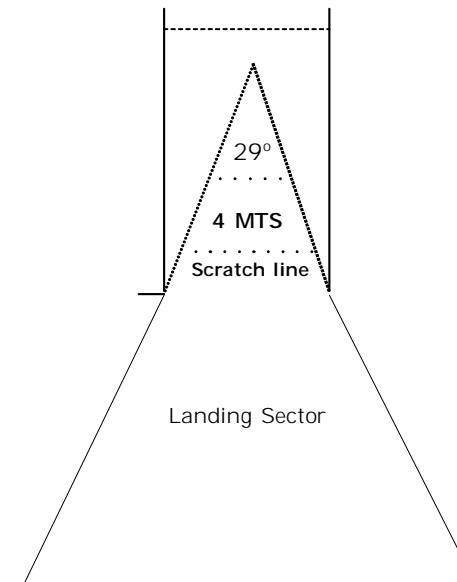
The minimum length of the runway shall be 15 meters. Except in international competitions, where the minimum shall be 20 meters. If conditions permit, the minimum length should be 25 meters.

High Jump Landing Pit

Pit : The pit is made of foam. The length of the pit shall be at least 5m, width 3m and height 60cm.

(86)

Javelin Throw Sector



IMPLEMENTS



Javelin



cord grip

(91)

Specifications

RUNWAY

The minimum length of the runway shall be 15 meters. Except in international competitions where the minimum shall be 20 meters. If conditions permit, the minimum length should be 25 meters.

High Jump Landing Pit

Pit : The pit is made of foam. The length of the pit shall be at least 5m, width 3m and height 60cm.

Uprights

The uprights should be of a rigid or any other suitable material, marked in centimeters. The uprights shall extend at least 10cm above the point up to which the cross bar can be raised. The distance between the uprights shall be between 4.00 - 4.04m.

Cross bar support

The support for the cross bar should be made of rigid or any other suitable material, which can be raised or lowered and can be adjusted up to a height of 2.30m.

Uprights

The uprights should be of a rigid or any other suitable material, marked in centimeters. The uprights shall extend at least 10cm above the point up to which the Cross bar can be raised. The distance between the uprights shall be between 4.00-4.04m.

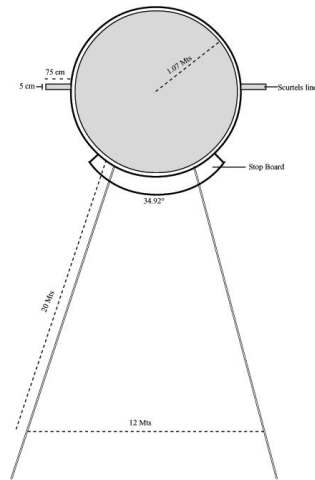
Cross bar support

The support for the cross bar should be made of rigid or any other suitable material, which can be raised or lowered and can be adjusted up to a height of 2.30m.

Cross bar

The cross bar is made of wood, or metal or any other suitable material. The cross bar should be circular with a diameter of 29 mm to 31 mm. The end of the bar shall be of concave or flattened surface of 150-200 mm in length and 29-35 mm in width. The length of the cross bar shall be between 3.98, to 4.02m.

d) SHOT PUT CIRCLE



The Ring

The ring shall be placed to the level of outside ground. It must have a height of 1.4cm to 2.6 cm from the inside floor of the circle and 6mm thickness.

Shot

The shot is made from solid Iron, brass or other hard metal. The men's shot weight is 7.26 kg with a diameter between 110-130mm. The women's shot is of 4kg with a diameter between 95-110mm. The shot should be spherical in shape with smooth surface.

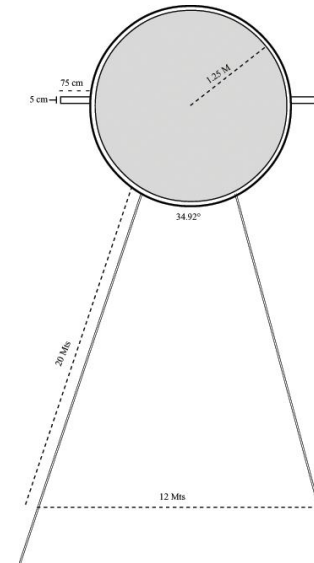
Stop Board

A curved piece of wood 10 cm thick affixed to the front of the shot put circle. When throwing, the shot putter braces his foot against the stop board to avoid falling forwards out of the circle.

(88)

f) DISCUS CIRCLE

Discus



The discus is made of wood, or other suitable material, with a rounded metal rim. The cross section of the edge shall be rounded in a circle of 6mm radius. The thickness of the rim should be at least 12m. The diameter of men's discus shall be between 219-212 mm and its weight should be 2 kg. The diameter of women's discus shall be between 180-182 mm and weight 1kg. The diameter of metal plate or flat centre area should be between 50-57mm.

(89)

a) Track Events

The judges shall decide the order in which the competition finish and if they cannot arrive at a decision shall refer the matter to the Referee, who shall decide.

Dead Heat

If there is a tie for the first place in any track event, the event shall be held after to giving adequate rest. And if it is not possible to conduct event once again due to time factor, the tied competitions shall be awarded first place jointly. This method is known as "dead heat". If tie remains for any other place, the result will stand. Rerace shall not be held to decide the second, third and other place.

Note: If photo finish facilities is available, the positions may be decided, easily.

b) Distance events

When there is a tie for any place, it shall be solved by seeing the second best performance and it necessary third, fourth best, etc. If tie still remains and concerns first place, the tied competitors will complete again in the some order in a new attempt until the tie is result. For remaining places the result will stand. That means same place shall be given to the field competitors.

Height events

When there is a tie for any place in high jump and pole vault it shall be solved by using two rules in order as following

- i) The tie competitor with lowest number of failures at the field height (last cleared height) shall be given higher place.
- ii) If tie shall remain; the competitor with lowest total number of failures throughout the competition shall be given higher place.

If the tie still remains and if it concerns the first place, the field competitors shall be given one more jump at the height where the competition is stopped (height which is immediate next to the field height), and if no decision is reached, the bar shall be raised or lowered 2cm for high jump and 5cm for pole vault. The competitors are allowed only one attempt at each height until the tie is decided. The best performance achieved during jump, if any, shall also be considered.

If the tie concerns any other place, the tied competitors shall be awarded the same place in the competition.

Note: If the same place is given the immediate next place shall not be awarded to any competitors.

competitors shall be placed in the order in which any part of their bodies (i.e. torso, as distinguished from the heads neck, arms, legs, hands or feet) reaches the vertical plane of the nearer edge of the finish line.

B. MIDDLE DISTANCE RUNNING

Distance running can be split into two groups, Middle distance and Long distance. For middle distance running the athlete needs to both speed and stamina. For long distance running, stamina is the most important thing. Stamina means building up our body so that it can be last the race distance, but at race speed.

Middle Distance Events

1. 800 mts
2. 1500 mts
3. 3000 mts

The middle distance runner must apply his effort correctly throughout the race; this can be achieved only by a knowledge of pace and tactics.

The events which fall into the middle distance category range from 800m to 3000m. With the relentless advance in performance in athletics the 800 meter race now attracts athletes who in the past would have been sprinters. His running style is a model of mechanical efficiency, and even

UNIT - I

INTRODUCTION

A. Meaning of Athletics

Athletics comprise of a wide range of skills and can be divided in two broad categories of track and field events. Track events include sprint races, middle distance races, long distance races, relays and hurdles. The field events are those which are being played either inside or outside the track area or outside the stadium, which include throwing events and jumping events.

The track events include races of 100m, 200m, 400m, 800m, 1500m, 5000, 10000m, and relay races of 4x100m, 4x400m in both men and women categories. In all races shorter than 800m the competitors have to run the length in their respective lanes. The competitors of relay races are required to carry a baton and pass over the same to his/her partner within the take over zone. The starting points are arranged in such false a way that distance from start to finish is same for each competitor. In case of two false starts, the athletes declared disqualified. The competitor who jostles, runs across, or obstructs other competitor(s) can also be disqualified. Timings of competitors are recorded by the official time keeper from stop watches or through electronic time keeping equipment. The hurdle events include 110m and 400m for men and 100m and 400m for women. The competitors are required to jump over specified number of hurdles, which are made of metal with

a wooden top bar. The steeplechase hurdle event comprises of 28 hurdle jumps and 7 water jumps spread over a 3000m run-way.

The throwing events include throw of shot-put, javelin, discus and hammer. Each competitor generally gets six trials and the winner is decided on the best distance covered in any one of his six trials. The Jumping events comprise of High Jump, Pole Vault, Long Jump and Triple Jump. In the first two events, athletes are required to jump over a crossbar. In Triple jump the competitors are required to complete a hop, step and Jump sequence. Winner of jumping event is decided based on the distance measured between the take-off line and the nearest break in the landing area lead by the competitor's body part.

A standard international track is 400 mts in circumference. It has 8 lanes and the width of each lane is 1.22 mts. Track and field events include Sprints, Middle distance running, Long distances race, Hurdles, Steeple Chase, Relay races, throwing events and jumping events. Track and field events are conducted by International Association of Athletic Federation (**IAAF**).

Athletics

The term "Athletics" is derived from the Greek word "Athlon" which means a contest. The word "Athlete" denotes a person who takes part in contests which involve physical activity. "Athletics" is the oldest forms of the organized sport contested between individuals and or teams.

3. Run through

A forward dip during the last stride before the finish line is the most commonly used technique.

Photo Finish Camera

It is impossible for the naked eye to be able to determine accurately the finishing sequence of runners for in a blanket finish. The problem has been solved by photo-finish cameras. A photo-finish camera has very narrow slit lens which photograph an area of the finish line not more than 5-10cm across. It uses a continuous strip of film that moves across the lens at a speed proportionate to the speed of athletes and records the arrival of each competitor at the finish line. The space between each athlete shown in the film exhibits the time elapsed between the arrivals of each of them at the finish line. Photo – finish camera also doubles up as an electronic timing device, recording finishing timings of athletes up to one hundredth of a second. The camera gives a developed photograph that gives positions of athletes and time when their torso reached the finish line.

FINISH POSTS

Except where their use may interfere with the photo finish equipment, two white posts may be placed along the prolongation of the finish line at least 0.30 mts from the edge of the track. They should be of rigid construction and approximately 1.40m high, 8 cm wide and 2 cm thick. The

the foot to push against at the start of the race. The foot plates shall be slopped to suit the starting position of the athlete and can be either flat or slightly concave. To monitor the false starts the blocks can be connected with a devise. The blocks can be used up to and including 400 meters (including the first) leg of the 4x200m and 4x400m).

TYPES OF FINISHING

The finish line should be 5cm in width drawn across the track at right angles to the inner edge. Two white posts of rigid material (80mm in width and 20mm in thickness) shall be placed at a 30cm distance from the edge of the track. Competitors are place in the order in which any part of their torso (as distinguished from the head, neck, arms, legs, hands, or feet) reaches the vertical plane of the edge of the finish line nearest to the star.

Technique

There are three finishing technique used particularly during the sprint events. They are as follows.

1. Lunge finish

The torso reached the finish line first, i.e. leaning torso forward.

2. Diagonal finish (or) Shoulder Shrug

At the finish line crossing it by making the shoulder in diagonal, towards midline of the finish line. It is more difficult type.

B. IAAF

The IAAF (International Association of Athletic Federation) is the supreme governing body controlling international athletics throughout the word. It was founded in Stockholm on July 17th, 1912, to draw up and enforce rules and regulations and a common amateur definition, and to recognize world records, The IAAF now promotes its own World Champions in track and field every four years, with annual World Cross- Country Champions for men and women every march.

IAAF- Structure and Functions

In 1912, two days after the Olympic games a congress was held in Stockholm for the formation of an International Association of Athletic Federation. Seventeen countries were attended the historic meeting. The meeting was urged the Athletics to develop and promote international competitions and the Olympic games. The meeting was also urged the importance of having universal code of rules and regulation and a common definition for Amateur and also an athletic register of world and Olympic records.

One year later in 1963 at Berlin the congress once again met and accepted the first constitution and 34 nations figured on the most membership list. J.Sigfrid Edstrom (Sweden) was elected as first president and Kristvan Hailstorm as honorary secretary. The technical rules for International and domestic competition were framed and presented for approval in 1914 at the third congress in France.

In 1946 the IAAF Head Quarters moved from Stockholm to London. Over the years, the IAAF grew into a huge and dynamic organization as the world governing body of track and field athletics, road running, race walking and cross country. The congress decided to move the head quarters once again from London to Morte Carlo in 1993. The Steady growth of the Federation accelerated in the last decades. By 1997 member countries in addition numbered 209. The IAAF council comprising of 27 members from various countries.

AFI (Athletic Federation of India)

Athletics in its present form was born in our country during past decade of 19th century. Nothing much is known of its early stages till first known participation of Norman G.Pitchard in 2nd Olympic games in 1900 at Paris, where he won a Silver medal in 200mts run. The Indian Olympic Association (IOA) was formed in 1926 and its control athletics. But India unofficially participated in the 1920 and 1924 Olympic games under the leadership of H.C.Buck of Y.M.C.A Madras. The official participation of Indian athletes started in the 1928 Olympic games at Amsterdam till 1936 Berlin Olympics. India participated in the Olympics under the IOA BANNER. Then 1940 and 1944 Olympic Games were not conducted because of second World War.

Structure and Functions

Amateur Athletic Federation of India was formed in 1946 at the initiative of Maharaja Yadindra Singh then

in a natural relaxed position. An angle of about 90° at the front knee and of about 110° to 130° at the rear knee will be appropriate.

(iii) The Long Start (or) Elongated Start

The front starting block is situated 3 foot lengths from the starting line and there is one foot length between the starting blocks. The angle of rear leg about 110°. The long starting position is certainly the most difficult one. It should be applied carefully. Any athletes find this position rather ineffective. The long start, although still known, is hardly used nowadays.

For good starts a sprinter must,

- a) push back against the blocks
- b) moving the hands and arms as quickly as possible in reaction to the gun.
- c) move the hips quickly from the starting position to running position.
- d) run out of the blocks, do not jump.

STARTING BLOCKS

The starting blocks should be made of rigid material. It should be adjustable, but must be without springs. The blocks are fixed to the track, so that it provide firm base for

'On your marks' – position – his body weight resting comfortably on the legs in the crouch position. The hands are shoulder width apart to touch the ground behind the starting line with fingers and thumb pointing away from each other. The eyes are focused downward and forward.

Set position

The block settings should result, the athletes having a 90° angle at the front knee and 110° to 120° angle in the back of the knee. That gives a set position with the hips just slightly higher than shoulders slightly forward. The hands are placed just slightly wider than shoulder width apart, with the fingers and thumbs in a **"high bridge"** position. The shoulders are above and slightly ahead of the hands, the arms are straight, but not locked. He should feel pressure against rear block in the set position since the center of gravity is located high, the first strides are shorter and less powerful.

(ii) The Middle Start (or) Medium Start.

The front starting block is located two foot lengths (21 inches) from the starting line and the rear starting block is one foot length further. Kneel down with the right knee against the instep or toe of the left foot, and keep the trunk erect. The angle for the rear leg is about 130°. The slope of the body from the hips to the shoulders is not very steep. The body weight is on the legs and arms. The head remains

president of IOA with prof.G.D.Sondhi as its first president. The AAFI got affiliated to IAAF in the year 1946. The AAFI for the first time selected 8 athletes who participated in 1948 Olympic games at London. Indian women competed in the Olympic games for the first time in 1948.

Mr.M.C.Dhawn was elected by secretary of AAFI in 1950 and was the technical secretary in the first Asian games held at New Delhi in 1951. Raja Bhalendra Singh become the president of AAFI in 1952 and continued of guide athletic till 1968 along with Mr.M.C.Dhawn. This team acted a yeoman service to athletics in India and strengthened the AAFI to make it the leading federation. The federation produced by group competitors open national championship, Zonal and Inter Zonal Competition.

Many distinguished personalities are acted as president and secretary of AAFI till 1987 from 1988 to till date Mr.Suresh Kalmadi and Mr.Lalit K.Bhanot formed the new team of president and secretary respectively. The main function of AAFI is to prepare a year long sports calendar at the state and national level. They are sending teams to international level competitions based on merit.

D. AGE GROUPS

Under the Jurisdiction of the IAAF is split into five age groups.

1. Men and women there is no age limit
2. Seniors - 19 Years
3. Juniors - 17 and 18 Years
4. Youths - 15 and 16 Years
5. Boys - 13 and 14 Years

UNIT - II

TRACK EVENTS

Athletics is great fun and people of all ages, can enjoy it. Athletic activities can be traced back of the ancient Greeks, who used to take part in games of running, jumping and throwing. Track events include sprint races, middle distance races, long distance races, relays and hurdles.

The track events include races of 100m, 200m, 400m, 800m, 1500m, 5000, 10000m, and relay races of 4x100m, 4x400m in both men and women categories. In the track events all races are run with the competitor's left hand side of the track and finish in the same position. The competitors are required to wear their numbers on their vests.

A. SPRINT EVENTS

Sprints

"To cover the distance in the shortest time with maximum speed"

A. Sprint Events

1. 100 mts
2. 200 mts
3. 400 mts

1. Bunch start (or) Bullet start
2. Medium start
3. Elongated start

Three types of foot spacing bullet, medium and elongated starts. Each sprinter will have his own particular measurements so the following procedure is suggested to enable him to get into a correct starting position.

Block placement

The three block placement positions are determined by the location of the blocks relative to the starting line.

(i) The Bunch or Bullet Start

Stand with the right toe beside the rear of the left heel. Kneel down with trunk erect and rock forward in the same way. In this starting position the starting blocks are close to the starting line. The front block should be placed one foot length (16 inches) from the starting line, with 11 inches between the blocks results in low velocity and fast block clearance Track events, up to and including 400 meters, run at full speed for the entire race distance. Sprinter press their feet against two blocks, which are spaced apart and connected to a shaft, to improve their initial movement. The main features to look for in the sprinter's highly distinctive running action are the high knee-lift, the long strides, the thrusting arm action and the controlled breathing.

should immediately rise to final starting position retaining the contact of the hands with the ground and of the feet with the foot plates of the blocks.

A competitor shall not touch either the starting line or the ground in front of it with his hands or his feet on his marks. The three starting positions are measured from the starting line to the front leg of the starting block. Starting is the first stages in all the running events, should be conducted either track or road. There are only two types of starting should be followed by the athletes.

1. Crouch start
2. Arc start (Standing start)

CROUCH START

Crouch start can be used by the athletes those who are run up to and including 400mts and even the first runner of 4 x 100mts Relay and 4 x 400mts Relay.

In crouch start the following commands to be used,

1. On your mark
2. Set
3. The gun fire or clapping with clap board

It has three (divisions) method should be used according to the height of the individuals.

Sprinter

There is no ideal shape or size for the sprinter. He must, however, be well built and have good all-round muscular development and a quick reaction time. Regular, even and relaxed arm action must be learned first. The legs follow the arms, and the faster the arms are moved the faster the leg action will become. In the arm action emphasis should be on a forward and upward motion.

Most important factors for sprinting

1. Reaction time
2. Starting position
3. Powerful Muscles
4. Acceleration Technique.
5. Effective stride length
6. Curve running technique (200 mts, and 400 mts).
7. Technique at the finish line.
8. The condition of the Track surface
9. Wind and Weather conditions.

Stride Length

“It is the distance between touchdown of the toe of one foot and the touchdown of the toe of the other foot”. Stride length may and usually will be vary from left to right

or right to left on individual at the same velocity. This variance may be influenced by dominance, weakness, injuries and even leg length. Stride length will be vary with the speed of running and during the various phases of a race.

Stride Cadence or Stride frequency

"It is the number of strides per second". The stride cadence for sprinters is 4.5 to 10 strides per second with little difference found between the strides. The method of determining stride rate is to divide the number of strides in a race by the elapsed time for the race.

STARTING

There are varieties of running events for which the track is used . The finishing line for all races must be the same. But the starting line of all the races cannot be the same. It will vary from race to race. While 100mts race, 100mts hurdles and 110mts, hurdles races have to be run in straight courses, appropriate distance shall be measured backward from the beginning of home stretch and starting lines are marked. The extended lines are broken.

The start and finish of a race shall each be denoted by a white line 5 cm wide. The distance of the race shall be measured from the edge of the starting line farther from the finish, to the edge of the finish line nearer to the start.

All races shall be started by the report of the starter's gun or approved starting apparatus fixed upwards after he has ascertained that competitors are steady and in the correct starting position.

At all international sports competitions meetings, the commands of the starter in his own language shall, in races up to and including 400m be "on your marks", "set", and when all competitors are "set" the gun shall be fired, or approved starting apparatus activated.

In races longer than 400m, the commands shall be, "on your marks" and when all competitors are steady, the gun shall be fired, or approved starting apparatus activated. A competitors shall not touch the ground with his hands.

In all races up to and including 400m, and 4 x 100 mts Relay, 4 x 400mts relay first runner a crouch start and the use of starting blocks are compulsory. In competition held under IAAF, competitors must use starting blocks provided by the organizers of the meet. In other meet on all weather tracks, the organizers may insist that only starting blocks provided by them may be used. After the "on your marks" command, the competitor shall approach the starting line, assume a position completely within his allocated lane and behind the starting line. Both hands and one knee shall be in contact with the ground and both feet, in contact with the starting blocks. At the "set" command, the competitor

decreases. A study of the body movements involved in these activities pinpoints the causes. In normal walking and running the knee of the supporting leg is bent as it passes through the vertical position (i.e. when the centre of mass passes vertically over the foot), but in race walking the knee of this leg is straight in the vertical position. The technique is such a way that race walking does not become a modified run. Briefly, contact with the ground must be maintained at all times, a heel-and-toe action must be used, and the supporting leg must be straight at the knee as it passes through the vertical position.

Judging a fast walk is an extremely difficult skill, since it is almost impossible to see whether a walker has a foot on the ground at all times or that the knee is straight through the vertical for it takes only a fraction of a second to pass through the position. Race walking is not a natural skill as normal walking and running are, because the latter are the locomotion skills learnt from very early childhood.

As in most other athlete events, flexibility is an asset and hip mobility especially is an important factor in stride length in normal walking in which the line through the hip of the forward swinging leg is allowed to twist forward with the leg, the stride length is increased considerably. Stride length is also maximized, if the feet move along a straight line.

in the later stages of a race when fatigue is sapping his strength his skill does not break down.

C.LONG DISTANCE EVENTS

1. 5000 mts
2. 10000 mts
3. Marathon

The three main long distance events are 5,000m 10,000m and the marathon. Stamina is the basic quality needed by a long-distance runner, but speed has also become an essential requirement for would-be world beaters.

However, in the long distance the steady pacer must beware of the fast finisher who sits on his shoulder, until the final run-in. the steady runner without an equivalent fast finish must attempt to put himself far enough ahead of the sprint finishers by either a punishing pace throughout the race or by putting in bursts of speed during several laps from the finish. There is nothing more motivating for the training runner than to see his rival a few strides in front of him, but also nothing more demoralizing than for his rival to be 20 meters or more in front.

D.HURDLES – VARIOUS STAGES

MEANING

Running over the barriers (or) obstacles are known as Hurdles. The Hurdle race should be conducted for men and

women, senior boys and senior girls in various height and distance. Every hurdle race is based on certain conditions laid down in the rules of the International Association of Athletic Federation (IAAF).

The hurdles are made of steel with wooden top bar. The height of hurdles can be adjusted as per the length of the race and sex of the athlete. The hurdles are made in such a way that when force of 3.6-4kg. is being applied to the centre of the top, it should overturn automatically. The height required for, men's 110m race is 106.7 cm. The women's 100m sprint hurdles are 84 cm in height. In 400 m race the men's hurdle is 91.4 cm high and women's is 76.2 cm. The length of the wood used for the top bar should be 1.20m and width at least 7cm. The top bar should be striped in black or white or in some other contrasting colors.

The following are the standard distances, it can be classified into two categories,

- Men - 110 & 400 mts
- Women - 100 & 400 mts

Distance of Hurdles	Category	Height of the Hurdles	Distance Start to first Hurdle	Distance Between the Hurdles	Distance Last Hurdle to Finish
100mts	Women	0.840mts	13mts	8.50mts	10.50mts
110mts	Men	1.067mts	13.72mts	9.14mts	14.02mts
400mts	Men	0.914mts	45mts	35mts	40mts
400mts	Women	0.762mts	45mts	35mts	40mts

Substitution

Once a relay team has participated in a competition only two additional athletes may be used as substitutes in the composition of the team for subsequent rounds. Once an athlete, who has participated in a previous round has been replaced by a substitute, he may not return to the team.

RELAY BATON

The relay baton is made of a rigid material. It should be a single piece of smooth, circular and hollow tube of 280-300 mm length. The minimum weight required for baton is 50 grams and its circumference should be between 120-130mm. The batons should be colored so that it can be easily visible during the race.

Specification

- Weight of the baton : not less than 50 gm
- Length of the baton : 28 to 30 cm
- Circumference of the baton : 10 cm
- Color of the baton : Visible color
- Minimum baton required : 6 Nos.
- Maximum baton required : 8 Nos.

D. WALKING

Race walking may appear to be the natural link between ordinary walking and running, and in some respects this is true-with increase in speed, the force-time

runner only. The baton should not be exchanged within the acceleration zone(Advance Zone).

During the exchange the baton must be delivered firmly and safely into the hands of the receiving runner. When the incoming runner has approached his partner within 2 to 3 mts he indicated to him by a signal when to extend his receiving arm backwards. The signal comes too early or too late, or the runner receiving the baton moves his arm up, down or to the side, the results in an unsteady baton pass and consequently in a loss of time. The baton should be put firmly into the grasping hand between the spread thumb and the four locked fingers.

2. 4 x 400 mts Relay

The runners use a visual pass. The incoming runner carries the baton in the right hand and passes to the outgoing runner's left hand. The primary responsibility for the pass rests on the outgoing runner due to fatigue on the part of the passer. Once the baton has been taken, the athlete immediately transfer it to the other hand.

The four athletes shall run 400mts each to cover 1600mts distance by means exchanging a baton. The first leg of the 4x 400 mts relay run in lanes and so is the first curve of the second leg; only after crossing the line making the exit from the first curve, runners free to move to the inside of the track.

110mts Hurdles

There shall be Ten flights of hurdles in each lane, set out in accordance with the below table.

Starting line to First Hurdle	:	=13.72mts
" "	Second Hurdle	: 13.72+9.14 =22.86mts
" "	Third Hurdle	: 22.86+9.14 =32.00mts
" "	Fourth Hurdle	: 32.00+9.14 =41.14mts
" "	Fifth Hurdle	: 41.14+9.14 =50.28mts
" "	Sixth Hurdle	: 50.28+9.14 =59.42mts
" "	Seventh Hurdle	: 59.42+9.14 =68.56mts
" "	Eight Hurdle	: 68.56+9.14 =77.70mts
" "	Ninth Hurdle	: 77.50+9.14 =86.84mts
" "	Tenth Hurdle	: 86.84+9.14 =95.98mts
" "	Finishing line	: 95.98+9.14=110mts

VARIOUS STAGES

110mts Hurdles the Hurdling Technique is classified into the following:

1. Starting
2. Approach to the First Hurdle
3. Hurdle Clearance (Departure)

4. Running between the hurdles
5. The finish

1.Starting

Hurdling is basically a sprinting event, the mechanics of the starting do not vary much from that of the sprint start. In order to get eight (8) strides to the first hurdle to take – off foot should be placed in the first block. If the hurdler wants seven (7) strides to the first hurdle, take – off foot should be placed in the rear block.

2. Approach to the First Hurdle

The distance from the starting line to the first hurdle is 13.72 mts. The first three strides out of the blocks are the same as in a sprinter’s start. On the fourth stride, the hurdler begins to concentrate on the first hurdle. In perfecting the approach to the first hurdle make any adjustments on the 4th, 5th and 6th strides. The first three and last two should be kept constant. The last stride is slightly shorter to permit to get his centre of gravity slightly ahead of the take-off foot. This approach sets the pattern for the entire race.

3. Hurdle clearance

The take – off distance from the hurdle depends on four factors. The height of the athlete, speed of the approach length of the lead leg speed of the lead leg action. Each

The baton must be carried by hand throughout the race, if dropped, it must be recovered by the athlete who dropped it. He may leave his own lane to retrieve the baton provided this procedure is adopted and no other athlete is impeded, dropping the baton shall not result in disqualification.

Stages of Relay Running

The start

The starting of the 4 x 100 mts Relay is basically same as for the 400 mts. The starting blocks are placed close to the outer line of the track. The baton lies between the forefinger and the thumb is enclosed by the other fingers. After a successful start the runner quickly passes to the inside of his lane.

Checkmarks

The second, third and fourth runners place a checkmarks on their lanes just behind their starting positions. This is a check mark for the out going runner. The distance between the checkmark and the starting position depends on the speed of the incoming runner and on the acceleration of the outgoing runner.

The Baton exchange

The relay baton should be exchanged from one to another competitor with in the take over zone. The exchange is completed when the baton is in the hand of the receiving

when hearing the signal from the incoming runner moves the appropriate arm backwards in a positive and slightly angled manner to a level not higher than the shoulder line. The upper arm is straight at the elbow, the back of the hand is facing down wards the thumb and index fingers are widely spaced forming obtuse angle. The baton is received into such a palm from the incoming runner with an outstretched arm. In the final phase of the change over the elbow joint locks quickly and the baton is passed in a down sweep action.

The best result in both techniques the change over should occur when both runners are traveling at maximum speed and the actual change over should be as quick as possible. The majority of experts consider that the speediest change over occurs when the baton is actually changed over a distance of 2 to 4 mts from the end of the exchange zone.

Acceleration Zone

The acceleration zone lets the outgoing runner accelerate properly and allows the athletes more time to reach top speed at the exchange.

Exchange Zone or Take over Zone

The incoming runner can signals the exchange with verbal commands at a specific point when the incoming runner ready to pass the baton. The incoming runners can also use nonverbal signals. The outgoing runner can count the incoming runner's stride from the check mark to the exchange point.

hurdler must be cleared quickly and safely. The first prerequisite of movements much as in the ordinary running stride. For this action the lead leg is slightly flexed at the knee joint, and leading foot to track beyond the hurdle.

The average take-off distance from the hurdle in men's hurdles will be 1.90 mts to 2.20 mts to allow the leading leg to sweep forward and upward in a straight line. Too short a distance for the take-off results in a "jump" over the hurdle. The hurdle clearance are having the following factors.

Action of the Leading leg

The complete action consists of a quick forward and upward thrust of the leading leg in the direction of the leading of introduces the sequences.

Once the take-off foot leaves the track it becomes the trail leg. The heel of the trail leg moves actively toward the buttocks as the knee moves in a exaggerated motion upward and to the side to avoid hitting the hurdle. For the clearance of the hurdle, the trailing leg must be stretched away from the body when clearing the hurdle. This movement requires good mobility of the hip. The sequence of the athlete's movements should be as follows: after a rigorous push from the ground follows a phase of relaxation for the take-off leg. An action forward movement of the high should begin only when the foot of the leading leg has reached the edge of the hurdle.

Action of the Arms

The usual movements during running are also executed during hurdle clearance. With the sole difference that in the hurdle stride the arms perform additional functions. The arms contribute in a greater degree to maintaining body balance. When the trailing leg comes forward, the trailing arm swings backward to counter balance this movement. It is either almost stretched or flexed at the elbow.

4. Running between the hurdles (The three-step Rhythm)

In the 110 mts hurdle run the distance between the hurdles is 9.14 mts. If we reduce from the length of the hurdle stride, there remains for three strides between the hurdles or three-step rhythm a distance of about 5.065 meters. So that is 1.88 mts for each step. But practice shows clearly that the three steps are not of equal length. The first stride after the landing which is of about 1.55 to 1.60 mts follows a wide second stride measuring 2.00 to 2.20 meters and this is the longest between the hurdles. The last stride before the hurdle is always slightly shorter than the previous one.

5. Finish

The athlete has to use any one technique similar to sprint to finish the race.

Baton Exchange

There are two methods of baton (Exchange) passing

1. Up sweep method
2. Down sweep method

1. The up sweep method

In this method the passing of the baton occurs in an upward movement by a straight arm. At the same time the baton is received by an arm which is pointing backward and locked at the elbow. The outgoing runner upon hearing the agreed signal from the incoming runner, quickly extends his arm backwards locking it at the elbow, the thumb and fingers are separated and pointing downwards forming an obtuse angle. The time that he receives the baton the outgoing runner tries to keep his arm as still as possible. This outstretched arm the incoming runner quickly moves his straight arm upwards and in such a way that the outgoing runner can grasp the baton as near to the incoming runner's palm as is possible. In the upsweep method the baton is passed from the right hand to the left hand and then the left hand passing it to the right.

2. Down sweep method

In the down sweep method the baton – exchange takes place over a distance of 2 to 3 mts. The out-going runner

2. The baton must be passed inside a short distance to be covered by some three to four strides and without unnecessary loss of time.
3. The baton must be exchanged by non – visual method.

Visual Method

The visual method of baton exchange is used only in 4x400 mts relay. When the out going runner receive the baton, he must see the incoming runner while receiving the baton. The incoming runner gripping the baton at its base, then passes the baton into the receiver hand with a forward down sweep motion. The outgoing runner reaches arm straight back, palm facing upward and takes the baton, gripping the upper portion.

Non Visual Method

The non-visual method of baton exchange is used only in 4x400 mts relay. When the out going runner receive the baton, he doesn't to see the incoming runner while receiving the baton. The incoming runner gripping the baton at its base, incoming alerts the receiver, then passes the baton into his or her hand with a forward pushing, down sweep motion. The outgoing runner reaches arm back, palm facing upward and takes the baton, gripping the upper portion. then rotates the receiving arm down, under and forward, to ready the baton for the next exchange.

400 mts Hurdles

Hurdling is a sprinting, rhythmic event. In this race a full circuit of the track is run with 10 hurdles, 91.4 cm high, placed 35 mts apart. The distance from the starting to the first hurdle is 45 mts, while the last hurdle to the finish line measures 40 mts. There are ten flights of hurdles in each lane, set out in accordance with the below table.

Placement of Hurdles in 100mts Hurdle race

Starting line to First Hurdle	:	=13.00mts
" "	Second Hurdle	: 13+8.50 =21.50mts
" "	Third Hurdle	: 21.5+8.50=30.00mts
" "	Fourth Hurdle	: 30+8.50 =38.50mts
" "	Fifth Hurdle	: 38.5+8.50=47.00mts
" "	Sixth Hurdle	: 47+8.50 =55.50mts
" "	Seventh Hurdle	: 55.5+8.50 =64.00mts
" "	Eight Hurdle	: 64 +8.50 =72.50mts
" "	Ninth Hurdle	: 72.5+8.50=81.00mts
" "	Tenth Hurdle	: 81+8.50 =89.50mts
" "	Finishing line	: 89.5+10.5=100mts

Placement of 400mts Hurdles in Standard Track

(Men and Women)

Starting line to First Hurdle	:	=45.00mts
" "	Second Hurdle	: 45+35 =80mts
" "	Third Hurdle	: 80+35=115mts

"	"	Fourth Hurdle :115+35=150mts
"	"	Fifth Hurdle : 50+35=185mts
"	"	Sixth Hurdle : 185+35=220mts
"	"	Seventh Hurdle : 220+35=255mts
"	"	Eight Hurdle : 255 +35=290mts
"	"	Ninth Hurdle : 290+35=325mts
"	"	Tenth Hurdle : 325 +35=360mts
"	"	Finishing line: 360+40=400mts

E. RELAY

There are two relay events comprising of 4x100m for men and women, and 4x400m for men and women. All the four members of a team are required to run one stage of the race along with the relay baton in their hands throughout the race. The baton must be picked up by the athlete who dropped it. He/She may leave the lane in order to retrieve the baton, provided no other player is impeded.

4x100m relay races are run entirely in respective lanes with staggered starts. In 4x400m relay races the first lap and the same part, of the track, of the second lap shall be run in lanes. The position of the teams at the start shall be retained at each take- over zone, except in case of races where lanes are not used. The waiting runners can move to inside zone, after handing over the baton, until the course is clear to avoid obstruction to other competitors.

Relay races are a popular and exciting feature of track and field. It is a team event in an individual oriented sport. They give the opportunity for team work and cooperation is not available in the other events. The key to good relay racing is the baton exchange. Commonly the relay events are as mentioned below,

1. 4 x 100 mts
2. 4 x 400 mts

1. 4 x 100 mts Relay

The 4 x 100 relay is undoubtedly the most beautiful and one of the most difficult events of the athletics spectrum. This relay uses four sprinters running a complete lap of the track, passing on a baton which has to arrive at the finish line with the runner of the last leg.

The main objective in the baton pass is to keep the baton moving at top speed throughout the relay. The baton must be passed only within a 20 meters take – over zone (exchange zone). This zone begins 10 mts before the scratch line (100 mts marking) and ends 10 mts after it. A good baton – exchange needs to satisfy the following three conditions.

1. The baton – exchange must take place after some 12 to 16 mts running, measured from the beginning of the take – over zone.

forward and upward. Then he goes upward the body position is in vertical (or) hanging and elbows are flexed.

5. Clearing the bar

When the body is in hanging position lift and swings upward both the legs, at the same time the pole straightened, turn the upside down. Then pushing the pole down by hands the legs are throw over the cross bar. After clearing the cross bar push the pole away from the pit with the wrist action to avoid foul or touching the bar.

6. Landing

Safe landing is required on the landing area.

B.THROWING EVENTS

General conditions

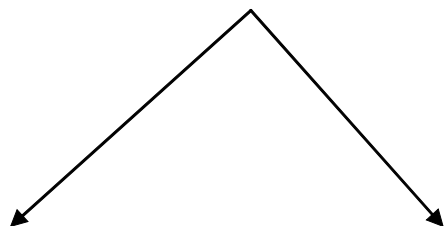
The person who has more body weight and mass of the muscles can choose throwing events. The following qualities are essential for throwers.

1. Body weight
2. Height
3. Leg power
4. Shoulder strength
5. Flexibility
6. Co-ordination
7. Speed

Race walking, of course, involves a rapid leg cadence and if the arms too are no maintain their synchronous swings they have to be bent at the elbows to reduce their moments of inertia, as in running. However, more emphasis is placed on the arm and shoulder action in race walking than in running, because of the need to counterbalancing the exaggerated eccentric thrust of the legs and movements of the hips. But in addition to counterbalancing the leg action, they also aid the forward drive with their swinging the strong upward swing of both arms evokes extra forces from the ground through the driving leg.

UNIT- III

FIELD EVENTS



DISTANCE EVENTS

1. Long Jump
2. Triple Jump
3. Shot Put
4. Discus
5. Javelin
6. Hammer

HEIGHT EVENTS

1. High Jump
2. Pole Vault

A. JUMPING EVENTS

1. LONG JUMP

The following techniques should involve while doing long jump.

1. Approach run
2. Penultimate stride
3. Take – off

1. Grip

Athletes who take off with the left foot, the pole must be carried on the right hand side, the left arm, half bent, supports the pole with the palm of the same hand turned downwards, while the right arm grips about 60-70cm higher with the hand lightly turned out. Keep the pole straight near the cross bar on the uprights. Hold the pole slightly lower than the height of the cross bar. Keep the pole parallel to the ground pointing to the pit or above the right hand palm facing upward and with left hand palm facing down ward.

2. Carry the Pole

The pole should be raised at 50° or 45° to the ground and keep right side. The left hand should be kept flexed at chest level and the right hand at the back. While carrying the pole, the body balance is very important.

3. Approach run

20 to 30 mts away from the vaulting box to start the running with the pole steadily and high knee action. When you reach the check mark, plant the pole in the vaulting box and kick the floor to go up.

4. Planting the pole

When the competitor reaches the check mark he should plant the pole into the box. Join the left hand with the right hand, push the right shoulder and both the hands

(iii) Supports for the cross bar

The cross bar shall rest on pegs pointing in the direction towards the landing area. The supports shall extend not more than 5.5 cm and not more than 1.3 cm in diameter, which should extend 35 – 40 mm above the pegs.

The distance between supports is minimum of 4.30 meters and maximum of 4.37 meters.

(iv) End Pieces of Cross Bar

It shall have 30 mm to 35 mm in diameter, square the length of the end piece is between 15 cm to 20 cm and should be semi circular.

(v) Landing (Pit) Area

The minimum dimensions of the landing area is 5 x 5 meters, for international competitions the length, width and height of the landing area will be 7 x 6 meters. The front pieces must be 2 m long.

VARIOUS STAGES

1. Grip
2. Carry the pole
3. Approach run
4. Planting
5. Crossing the bar
6. Landing

4. Flight in the air
5. Landing

1. Approach run

The length of the un-up is determined by the height of the jumper and his ability to accelerate in the run. According to analyzes carried out at recent Olympic Games, the best athletes use a run-up from 37-50m in length (incase for women 33-40). The athlete should mark the starting check mark 14 to 16 strides from the take – off board. If the athlete who is taking off with left leg, he should start running with right leg. Then he starts the approach run steadily and gradually increase the speed towards the take – off board.

2. Penultimate stride

The last two strides before the take off is called penultimate stride. In this time, the athlete shrugs his body little downward and the length of the stride decreases. That is easy way to fly in the air.

3. Take – off

The length of the jump depends not only on horizontal speed but also on the speed and power of the take-off. After completion of Approach run (penultimate stride), step on the take off board with the stronger foot and jump up in the air by pushing the take off board. After take off (or) jumping in the air the hands should be vertically raised. The Non-

take off leg should be raised high. The last step is executed more quickly and the whole foot is placed on the board, ahead of the projection of the center of gravity.

Plasticine Indicator (No Jump indicator)

Plasticine indicator is called no jump indicator, it is placed at the inner edge of the Take-off board. The judge at the take off board must watch the competitors does not overstep the scratch line. If a no jump indicator is not available the judge should build one moist sand which will clearly show if it is touched by toe or spike. It is a foul only if contact is made with the ground or the no jump indicator.

4. Flight

Jumping styles vary according to the development of the athlete and his muscular characteristics and the bone structure. The most common techniques are,

1. The Sail (common among beginners)
2. The Hitch kick (1-2-3 strides and a half in the air)
3. Hang (extended jump or glide)

(i) Hitch Kick

After jumping in the air from the take off board the athlete swing (or) rotate their legs like pedaling in cycle in the air into 2 or 3 pedaling style, and the legs are closed together before landing. When legs are pedaling the arms alternatively with legs movement.

4. POLE VAULT

Runway

The minimum length of the runway shall be 40 meters, when the conditions permit it is 45 meters.

1. The width of the runway is 1.22 meters.
2. The runway should be marked by white lines with 5cm as width.

Implements

(i) Upright

Any style of uprights or posts may be used provided they are rigid.

(ii) Cross Bar

It is made up of Fiber glass, Metal or other suitable material.

1. The length of the cross bar is 4.48 mts to 4.52 mts.
2. The maximum weight of the cross bar is 2.25 kg.
3. The circular shape of the cross bar is 30 mm diameter.
4. It should have the gap of maximum 3 mm

3.Fosbury Flop

The Fosbury flop was introduced by Dick Fosbury, who won the high jump at the Mexico Olympics in 1968. His technique for clearing the bar, his run up was also very notable because it was in the form of a semi- circle, and he took off with his foot at an angle of about 20 degree relative to the plane of the uprights. At the point of take – off Dick Fosbury with a vigorous bending action and driving up of the free leg, supported by an alternated movement of the upper limbs, rose completing a rotation on the longitudinal axis of the body and then prepared for flight with his back to the cross-bar.

Next he performed his rotation on the transverse axis of the body and at the extreme point of the parabola, he arched himself and continued his trajectory on this position until, so as not to knock down the cross - bar, he straightened his leg and landed on his back bowing his head on to his trunk so that the impact was taken by the top part of the back, avoiding unpleasant injuries to the cervical part of the spinal column.

4. Landing

Safe landing is required on the landing area.

(ii) Hang style

After the take off the athlete do the back arch the arms should be vertically raised above the head, the legs are straighten back, and before landing brings the legs and arms to extend forward, and the legs are closed together before landing.

5. LANDING

After completion of his style in the air, before landing, the athletes should extend both the legs forward / straightened. While landing both the heels should be landed first on the pit. There are three landing techniques should be used to come out of the landing area. They are as follows.

1. Collapsed landing
2. Swing out landing
3. Scoop landing

1. Collapsed landing

While landing both the heels should be touched first on the pit and then toe, the whole body should brought forward and place the knees on the pit, at the same time the buttocks should be kept back on both the heels.

2. Swing out landing

After landing in the pit the athletes should turn his body 45° either right or left in forward and fall down on the ground with shoulder, first then buttocks and so on.

3. Scoop landing

Landing by heels on the pit and push forcefully the sand and makes a dig and place the buttocks on the dig by extending the legs straight.

The competitor commits fouls if he;

1. Take off beyond the take off line.
2. Delaying more than 60 seconds.
3. After landing walking back towards the run way.
4. Performing acrobatics during the jump.
5. Uses illegal style of jump.

Rules

1. The order in which the competitors make their attempts must be decided by drawing lots.
2. Each competitor will be placed according to his best jump.
3. When there are more than eight competitors, each one is given 3 attempts and the 8 competitors with the best jumps are given further three jumps.
4. In case of a tie for the eight position, each competitor involved in the tie has three additional attempts.
5. When there are eight or less competitors, each one is allowed six trials.

3. Clearing the bar

1.The scissors

Towards the end of the 19th century, an American named Mike Sweeny proposed the scissors jump as an alternative to the frontal clearance. The scissors involved passing one leg over after the other at the same time bending the trunk towards the knees when clearing the bar. It consisted of the following movement:

1. While the forward leg was the cross – bar the other one kicked upwards, causing the chest to rotate towards the direction of jumping and a landing on the feet.
2. With the use of this style the world record began to rise this style, the world high-jumpers introduced minor adjustments to the technique according to their physical characteristics and talents.

2.The Straddle

Towards the middle of the 1930s another American Dave Albritton, proposed a radical new technique for clearing the bar, involving the body being parallel to the bar, but with the stomach downwards rather than with the body sideways. Thus the straddle was born, which was clearly demonstrated by the Soviet trainer Vladimir Mihailovic Dyachkov and put to good effect by Valeri Brumel, who took the world record to 2.28m in 1963.

1. Scissors
2. Straddle Roll (or) Belly Roll
3. Fosbury Flop

Various stages

1. Approach run
2. Take – off
3. Crossing the bar/ clearing the bar
4. Landing

1. Approach run

The jumper can approach either from the left side or right side of the cross bar with 25 mts long and medium speed. The angle of approach run and the number of steps vary according to the level of the athlete.

2. Take off

Jumper can stand either right or left one arm away from the cross bar. Then down vertically draw the line that may be considered as take off line. When the jumper start to approach towards crossbar, used his power leg on the take off line for make a jump.

6. Once the competition is under way, competitors are not allowed to use the runway for trail attempts.
7. All jumps must be measured from the nearest mark in the landing area made by any part of the body or limbs of the athlete to the take-off line or its extension and at right angles with the take-off line.
8. If a competitor takes off before the board or the line this does not constitute a foul.

2. TRIPLE JUMP

The triple jump shall consist of a Hop, step and jump in that order. This is the English definition of the jump. The hop must be executed on the same leg which was used for the take off (right-right or left-left). In the step the support is transferred to the other leg. The final jump is a proper long jump.

1. It shall not be considered a failure if the competitor, while jumping, touches the ground, with the “sleeping” leg.
2. There are six stages when taking Triple jump. They are as follows
 - (1) Approach run
 - (2) Take – off
 - (3) Hop

(4) Step

(5) Flight

(6) Landing

1. Approach run

The length of the run-up is determined by the height of the jumper and his ability to accelerate in the run. According to analyzes carried out at recent Olympic Games, the best athletes use a run-up from 37-50m in length (incase for women 33-40). The athlete should mark the starting check mark 14 to 16 strides from the take – off board. If the athlete who are taking off with left leg, he should start running with right leg. Then he start the approach run steadily and gradually increase the speed towards the take – off board.

2. Take – off

The length of the jump depends not only on horizontal speed but also on the speed and power of the take-off. After completion of Approach run (penultimate stride), step on the take off board with the stronger foot and jump up in the air by pushing the take off board. After take off (or) jumping in the air the hands should be vertically raised. The Non-take off leg should raised highly. The last step is executed more quickly and the whole foot is placed on the board, ahead of the projection of the center of gravity.

3. Hopping

The athlete should be used to land on the ground which he was used to take off. For example: The athlete has take off for his left leg means he should land or hop in the same leg. During hopping the non take off leg (or) rear leg has no movement, that's why it is called sleeping leg.

4. Step

After completion of hopping the athlete used to take one more step with his non take – off, foot before landing is called step. Here the athlete does the bounding action to do the step.

5. **Flight** and

6. **Landing** procedures are similar to long jump.

3. HIGH JUMP

The high jump as we know it today first became popular in the 19th century. Subsequent perfecting of the jumping technique took place in the development stages, but it has depended particularly on modification of the rules for the event and on the elimination of some restrictive conditions.

Various techniques should be used by the jumper to cross the bar. Depends upon their ability they used any one of the following techniques.

c) High carry

High carry method is associated with those throwers who tend to use a direct over the shoulder type withdrawal which ends with a turning back of the shoulders at the arm and javelin is reaching near full backward extension (To held on above the head).

A thrower must develop his carry position to suit his technique of withdrawal of the javelin in preparation for the delivery stride.

2. Approach run

During approach run the thrower has to mark the point of starting and the point of check mark with javelin. While running the javelin should move front and back, and slowly increase the running speed still you reach you the check mark.

The Run-up : The run – up has two parts. They are

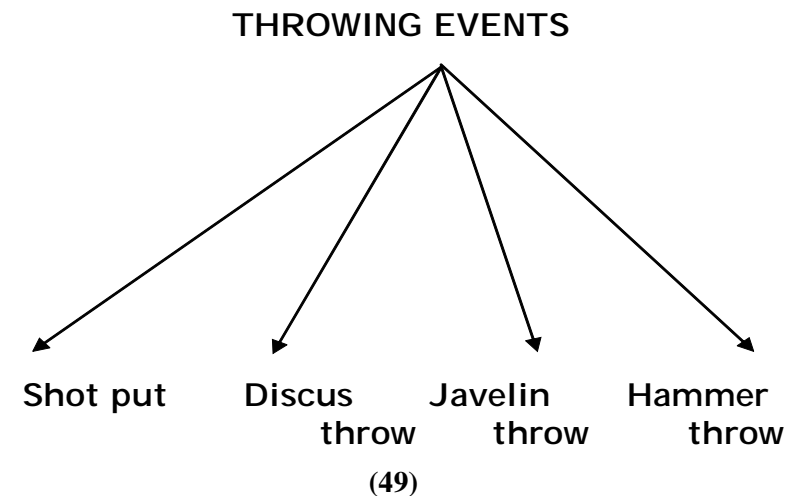
- (i) The cyclic part
- (ii) The acyclic part

The cyclic part speed is built up sufficiently so as to allow for a further increase over the last strides. The run-up should be easy and relaxed, heading the thrower to a powerful explosive all-out release.

- 8. Arm length
- 9. Balance
- 10. Endurance

The competitors are allowed three to six trails and three to eight of the best competitors are allowed three more trails. Incase of a tie for the final place, the competitor shall be allowed three additional trails. The conditions of the competition must be explained to the competitors before its commencement. The best throw of the competition out of all trails taken by the competitors shall be credited in resolving a first place tie. No markers or marks are allowed to be put in the throwing sector.

Competitors may use an adhesive substance on their hands for better grip, and can also wear a belt of leather or some other material to protect the spine from injury. However, taping of the fingers or use of any other devise on their hand which might assist in throwing is not allowed.



1. THROWING THE SHOT PUT

The competitor must begin the throw from a stationary position within the circle. The shot shall be put from the shoulder with one hand only and, shall touch or be in close contact with the chin. The hand shall not be dropped below this position during the act of putting.

Practice trials are not allowed after the commencement of the competition. Competitors are not allowed to put on gloves nor are they allowed to spray or spread any substance either on the surface of the throwing circle or on their shoes.

Basic Principles

1. Forces must be applied along a straight line.
2. Newton's 3rd law – Action and Reaction are equal and opposite.

Specifications

1. Weight of the shot for men - 7.260 Kg
2. Weight of the shot for women - 4.00 Kg
3. Diameter of the shot put circle- 2.135 m
4. Angle of the shot put sector - 34.92
5. Dimension of the sector - 20 x 12 m

a) Normal grip

The above thumb and middle finger is behind the edge of the grip cord and the index finger is partly curled around and behind on the javelin's shaft.

b) Middle and Thumb grip

The index finger and thumb is behind the edge of the cord binder and the rest of the fingers around the cord itself.

c) 'V' grip (or) Glow grip

The Javelin is held between the index and the middle fingers at the edge of the cord binder and rest of the fingers around the cord itself.

Carry

The javelin is carried above the shoulder of the throwing arm. Three commonly used methods of carrying the javelin during the approach run's cyclic phase.

a) Low carry

The low carry is generally associated with a circular type arm action in the 'withdrawal' (To held on waist level).

b) Medium carry

The medium carry is generally favored expansion in the withdrawal. (To held on eye level).

1. A head
2. A shaft and
3. A cord grip

The javelin throw comprises the following technical elements.

1. The grip and carry
2. The Approach run
3. The withdrawal
4. The impulse stride
5. The throwing stride
6. The release
7. The recovery

1. Grip

When executing their throws, javelin throwers may hold the javelin only by the whipcord grip. They may hold the javelin at the end of the cord grip with one or more fingers and the thumb touching the javelin shaft. Javelin throwers have some leeway in how they grip the javelin. It has three types how they can hold the javelin. The javelin is held behind the cord binder the rear edge of which offers a slightly raise border for gripping the javelin.

Stages / Method

1. Holding of the shot
2. Tucking (or) Placement of the shot
3. Stance
4. Glide
5. Release

1. Holding the shot

- a. The shot rest on the root of the fingers, and should not touch the palm.
- b. All the fingers are carry the shot except the little finger which is only support.

2. Placing (Tucking) the shot

1. The shot must be placed between chin and clavicle.
2. The shot does not go beyond the shoulder line.
3. The hand should be parallel to the ground.

3. Stance

The stance varied according to the using the style of Athletes.

Techniques (Style Of Putting)

The thrower can be used 3 style when putting the shot

1. Standing throw
2. 'O' Brien technique (or) Gliding
3. Rotation (or) Disco put

1. The 'O' Brien Technique

The distance a shot travels depends upon its height of release, velocity at the moment of release and the Angle of projection. The optimum angle of projection will vary depending on the height of the release, and the distance of the put, it will be approximately 34.95. The correct technique is the one that will result in the greatest velocity at release. The motion of a projected object is influenced by the exact point of application of the propelling force.

Holding the shot

The procedure for gripping the shot is to hold it in the left hand and lay the right hand loosely on top with the fingers spread slightly. The putter holds the shot in his right hand. Where it rests on the "base" of the fingers. The three middle fingers are only slightly splayed while the thumb and the little finger give the shot lateral support, securing a safe position of the shot.

The Reverse

The reversal is to serve as a follow through after the thrust and to retain balance in order to avoid fouling. After the discus has left the hand the thrower will have to reverse the feet rapidly and lower the body weight to maintain balance. The right leg must be brought forward quickly and planted firmly close to the rim of the circle, mean time the left leg swings back the body is bent at hips and right knee flexes to drop the centre of gravity into a stable position.

3. THROWING THE JAVELIN

The javelin throw distinguishes itself from other throwing events of shot-put, discus throw and hammer throw. These throwing events must be from a circle, the javelin must be thrown from behind the arc of a sector drawn with a radius of 8 mts. Due to the aerodynamic nature of the implement and its relative weight, the event does not require great strength. The event does require few less technique in order to achieve high level results.

Javelin consists of three parts namely the head, shaft and grip. The shaft is made up of either Aluminium or fiber. At the tip of the shaft a sharp head is fixed. At the center a grip made of thread is fixed. The Javelin is round and broad at the center. The circumference is small in the front and rear. It has three main parts

athlete drives off the left foot. The effective throwing position is one of "muscular wind" the hips displaced from the feet, shoulders from the hips and discus from the shoulders.

The run across the circle is initiated by the driving action of the left leg. Synchronized with the swing of the right leg. This drive carries the thrower halfway across the circle. The right foot landing approximately on the centre line with the leg well bent and the shoulder and body weight back. His left leg is pointing toward the direction of the throw, his right shoulder is facing the rear, his throwing arm is well behind the shoulder his left arm is curled and the discus is flat.

The Release

The throw begins with a forward and upward drive from the right foot. The shoulder should now come in slightly after the hip and the arm strikes from the low point, the thrower reaching out as far as possible to give as much distance from axis of rotation as he can. The left leg should now straighten, as the arm strikes. The discus will leave the hand in line with the right shoulder and should be squeezed out of fingers, each digit applying its force in turn and spinning of the first fingers last. The discus is spun clockwise. A good thrower will release the discus at a 35°-40° angle. The release must be smooth and rhythmic using the force generated from the lower body.

The stance

He should stand facing the rear of the ring with his back in the direction that he is going to throw. The shot should be held in right hand, supported by thumb and fingers. The hand holding the shot will be placed into the hollow of the collar bone in such a manner that it does not rest on such a manner that it does not rest on the shoulder but against the right side of the neck and the jaw. The elbow of the right arm is slightly raised and pressed forward. The upper arm points forward and downward. The head remains in its normal position. The eyes should be focused on a point to the rear of the ring and about five to ten yards away. He should stand erect in a telexed attitude, the left arm is held either out in front of the face or relaxed above the head the left front behind the right about one foot with just the toes touching for balance.

The glide or drive

The purpose of the glide is to gain momentum while moving across the ring and to lead into the correct position for the delivery. The initial movement is to lower the trunk and raise the left leg causing the body to form a "T" shape with all weight carried on the right leg. The head, shoulders and hip remain square to the rear of the circle, and the right leg flexes in preparation for the drive across the ring proper balance at this point is extremely important.

2. The Rotation or Disco-put Technique

The Starting Position

The putter stands at the rear of the circle facing 180° away from the throwing direction. The left foot is along the centre line of the circle and the right foot is placed laterally to the right of the centre line about shoulder width apart or just this point in most cases. The grounding of the left foot at the stop board denotes the arrival of the thrower into the delivery stance.

Preliminary Movements

To start the turn, the putter begins by swinging the shoulders, trunk and left arm along with the left and then to the right, as the body weight shifts correspondingly from leg to leg in coordination with the rhythm of the shoulders, trunk and left arm. Both knees are semi – flexed while this side to side swaying movement is taking place to break the inertia and set the pattern of movement to follow.

Turn

The double support phase of the turn begins at the end of the preliminary movements. The thrower is completely over his right leg with the trunk and shoulders well twisted to the right. From this position the thrower begins unwinding his upper body in the direction of turning with a wide

throwing arm bang to the right side along the thrower's thigh with the head and eyes focused to a point about 5 meters behind the circle. There are generally three positions that a thrower may adopt in relation to the line of direction. The experience, technical skill and comfort of the thrower must decide which of the three starting positions suit their ability.

The left foot is generally placed a few centimeters back from the rim of the circle, in order to avoid fouling by bursting the sole of the foot on the top edge of the rim of the circle as the pivot is executed.

The preliminary swings

The thrower should position himself at the rear edge of the circle with his back to the generally facing the direction of throw and his feet slightly wider than hips. The discus should be flat and facing downwards on the arm swung at shoulder height so that the arm and discus go well behind the right shoulder. The free arm rests comfortably across the chest. The thrower's weight should move easily from one foot to the other. On the final preliminary swing, the arm is swung back as far as possible so that the body weight is over a straight right leg.

Coming across the circle

The initial movement is begun the hips are turned and a pivot is made on the ball of the right foot as the

Specification of discus

1. Weight of the discus for men : 2 kg to 2.025 kg
2. Weight of the discus for women : 1 kg to 1.025 kg
3. Diameter of the discus for men : 21.9 cm to 22.1 cm
4. Diameter of the discus for women: 18 cm to 18.2 cm
5. Angle of sector is : 34.92°

Various Stages

Hold

The hand is placed flat against the discus surface, the upper joints of the fingers grasp the rim of the discus. Its center of gravity lies between the index and middle finger. Due to a slight bending at the wrist the upper face of the discus touches the arm, because it prevents the discus from falling out of the hand in the subsequent movements.

Starting position

The starting position at the rear of the circle is with the thrower facing 180 degrees away from the throwing direction. The two feet are usually placed about shoulder width apart or slightly more in the case of very tall throwers. The toes point naturally outwards with the weight of the body evenly distributed over both feet. The discus and

sweeping left arm action parallel to the ground, a slight forward tilt to trunk in a semi sitting position. The single support phase of the initial part of the turn is followed by a brief non support phase when both feet are off the ground and the whole body is turning on its vertical axis, and continues turning after the right foot lands around about the center of the circle.

Follow through (or) Reverse

When the right leg has driven really well and effectively and the action has been timed correctly the athlete will be well over the left foot as the arm strikes. Immediately after the shot has left the hand, he will find himself falling over the stop – board. In order to prevent himself fouling, the left foot is rapidly withdrawn and the right leg brought forward, the toe of the right foot striking the inside edge of the stop – board. At the same time the body weight is lowered in order to be more on balance by lowering the centre of gravity.

Valid Trial

For a valid trial, the shot shall fall completely within the inner edges of the landing sector.

Fouls

1. Throwing the shot from behind the shoulder
2. Touching outside the circle or the top of the stop Board

3. Shot landing on the sector line or outside the sector line
4. Delaying more than 60 seconds to throw.

Rules

1. The use of gloves is not allowed
2. At the competition area, each competitor may have a maximum of two practice trials which should be made in draw order, under the supervision of the judges.
3. Once the competition has begun, competitors are not permitted to use implements for practice purposes or to use the runway or ground within the sector for practice trials, with or without implements.
4. No device of any kind – i.e., taping of two or more fingers together, which in anyway assists a competitor when making a throw, shall be allowed. The use of tape on the hand shall not be allowed except in the case of the need to cover an open cut or wound.
5. A better grip, competitors are permitted to use a suitable substance on their hands only.
6. To protect the spine from injury, a competitor may wear a belt of feather or other suitable material.

7. For a valid trail, the tip of the javelin shall fall completely within the inner edges of the landing sector.
8. If the implements breaks during a throw or while in the air, and if the competitor thereby loses his balance and contravenes, it shall not count as a foul throw, provided one attempt was made in accordance with the Rule.
9. Implements shall be carried back to the starting line and never thrown back.
10. The competitor shall not leave the runway until the implement has touched the ground.

2. THROWING THE DISCUS

The object of the spin in the discus throw is to generate power and speed within the circle to apply to the discus itself, and the more power that is applied to the discus, then further it will go the angle to release of discus, the position of the discus during its flight are important factors. It has three types,

1. Half rotation
2. Full rotation
3. One and half rotation

6. 5000m Run – Arc start **or** Group start
7. 10000m Run – Arc start **or** Group start
8. 400mts Hurdles - Full stagger distance
9. 4 x 100m Relay – Full stagger distance
10. 4 x 400m Relay – One and Half stagger distance with diagonal distance.

2.Non- Standard Track

The track which is not satisfying the conditions of standard track is called as Non-standard track and the 400mts track without curb (raised border) is also treated as Non-standard track. Usually 200mts track is called as Non – standard track.

Some of the disadvantages of Non-standard track:

- a) Sprinters very difficult to show their real capacity.
- b) Very difficult to run more than 6 competitors at a time.
- c) Very difficult to conduct Hurdles and Relay races.
- d) Very difficult to conduct both track and field events simultaneously.

Method of finding Running Distance Radius for 200 mts track if 36 mts as straight.

3. Five – stride – Rhythm

The three known stride Rhythms – the three stride rhythm. The five stride Rhythm and seven stride rhythm. It is five stride – Rhythm which is the most widely accepted, which comprises the following phases:

- (i) The withdrawal of the javelin
- (ii) The impulse stride
- (iii) The throwing position
- (iv) The release
- (v) The recovery

(i) Withdrawal of the javelin

The withdrawal starts at the second stride of the five-stride rhythm and ends at the third stride. The throwing arm is drawn back in alignment with the shoulder axis. The palm of the hand is turned upward and extend the forearm, when the withdrawal is completed, the athlete's body has a marked backward lean.

(II) Impulse stride /Cross step / Three step (or) Five step Rhythm

When an athlete reaches the check mark with the left leg the action of throwing should be starts. The right hand is stretched backward with the javelin and left hand is brought in forward in front of chest. That is otherwise called "with drawl of the javelin".

The toe of the right foot must be deviate more than 30° from the run up direction. The left leg presses the body down low into the fourth stride, preventing the body's centre of gravity from lifting at the landing of the right leg, which must be allowed to bend when it receives the body weight.

(iii) Throwing Position

The throwing position starts at the moment when the athletes right foot makes contact with the ground after the impulse stride. The right leg can start to extend and doing s introduce the release, the full extension of the forearm by the hand is important under no circumstances must the arm be flexed at the wrist.

(iv) The Release

The release is initiated by a forward and upward stretching of the right leg at the knee and ankle joints, driving the right hip forward. The shoulder and the hip axes now run parallel and almost at right angles to the direction of the throw. The throwing arm is not yet stretched while the right leg is extended, the heel is raised, allowing the pressure of the ball of the foot to act longer on the body. The throwing arm now comes into its sphere of action. When the throwing arm begins to strike, the elbows are raised until it is level with the heed and pointing in the throwing direction.

Method of Finding Running Distance Radius for 400 mts if 80 mts as straight.

$$2pr = 240 \text{ (Circumference of two curves)}$$

$$r = 240/2 \pi$$

$$240/2 \times 3.1416 = \frac{240}{2 \times 3.1416} = \frac{240}{6.2832}$$

$$= 38.20 \text{ mts}$$

For Standard Track (With Kerb)

Marking Distance Radius (MDR or CR) = RDR – 0.30 m

MDR = 38.20 – 0.30 = 37.90m

For Non-standard Track (without kerb)

MDR = RDR – 0.20 m = 38.20 – 0.20 m = 38.00m

Starting points in 400 mts Track

1. 100m Run Men & Women
100m Hurdles for Women - Parallel Method
110m Hurdles for Men
2. 200m Run – Half stagger distance
3. 400m Run – Full stagger distance
4. 800m Run – Half stagger with diagonal excess **Or** Arc start / group start
5. 1500m Run – Arc start **or** Group start

Running Distance Radius (RDR)

RDR is the path in which an athlete has to run in the curve to cover the exact distance. The chart below shows that RDR, CDR and area required to lay 400mts raised bordered track when the straights length varies.

Straight length in mts	Rdr in mts	Cdr in mts
79MTS	38.50	38.20
80MTS	38.18	37.88
84.39mts	36.80	36.50

The chart below shows that RDR, CDR and area required to lay 200mts Non raised bordered track when the straights length varies.

Straight length in mts	Rdr in mts	Cdr in mts
37.50MTS	19.89	19.67
40.00MTS	19.09	18.89

During the release the left side of the body must be in a flexed position. This is achieved by a sudden arrest of the backward movement of the left arm just when the right side of the body overtakes the left side the angle of release is between 30 and 36 degrees.

(v) The recovery

A distance of at least two meters from the arc will be required merely checks the forward speed of the body. Thus preventing from fouling. After the release, the right leg is forward in a springing movement. The reverse takes places to avoid stepping over the right foot must be planted transversely to the throwing direction, the upper body must be lean forward, the left leg is raised and brought back into the direction of the run-up. Javelin consists of three parts namely the head, shaft and grip. The shaft is made up of either Aluminium or fiber. At the tip of the shaft a sharp head is fixed. At the center a grip made of thread is fixed. The Javelin is round and broad at the center. The circumference is small in the front and rear.

Follow throw

After releasing the javelin the thrower to avoid his forward momentum (or) foul, then he placed his rear leg to brought forward for his rear leg and placed nearer to the board and to do hopping twice or threes. Then he come back behind the runway should not make foul.

Correct throw

The javelin should be caught in the grip. The javelin must be thrown forward from behind the shoulders. While throwing thrower should not cross the line of runway either in front or side. After releasing, the javelin should fall within the sector lines with the tip first touching the ground. The thrower still remains (leave) the runway only after the javelin lands on the ground.

6. THROWING THE HAMMER

The technique of hammer throwing is determined by the specific nature of the implement and the measurement of the throwing circle, which comply with the international rules. A complete throw consists of two preliminary swings and three turns on the left foot with an active push-off from the right leg at each turn. The following are the parts of hammer throw:

1. The Grip
2. The Initial position
3. The preliminary Arm swings
4. The Transition
5. The turns

Top Layer

Now-a-days all international competitions are being held on synthetic tracks. The thickness and material used for various layers of a synthetic track depend upon the product and preference of the particular firm (construction agency). Although, the material used for top layer by all the firms are synthetic tracks, but of different variations. It is advisable that whenever 8 lane synthetic tracks are being laid, efforts should be made for laying of another 4 lane synthetic track of the same material for training purposes.

Lane

Lane is the space between the two parallel lines.

Kerb

Kerb is the raised border (both inner and outer line) which is fixed permanently through the inner line of the first line and outer line of the last lane. Dimensions of curb is 5 x 5 cm (5 cm height, 5 cm width).

Curb Radius (CR)

Curb radius is the radius which is used to draw the curve. It is otherwise known as Marking Distance Radius (MDR). The curb radius varies according into the nature of the track.

TRACK MARKING

Track must be prepared according to the rules and regulations laid by **International Association Of Athletic Federation** (IAAF). The inner raised border should be 5cm in height and width by using brick, wood or any other suitable material. There shall be a minimum of 8 lanes and width of lane is 1.22mts and width of the line is 5cm. The straight lines are always marked by north to south direction and finishing line must be same for all races.

a) TYPES OF TRACK

The track is classified into two types based on its specifications.

1. Standard Track (with curb)
2. Non- standard Track (without curb)

1. Standard Track

The tracks are made either on plan surface (grass) or with the help of cinder/synthetic material which is skid proof and not too hard. To get maximum benefit from the cinder/right synthetic tracks, it is essential that proper care be taken at the time of the construction so that right materials are mixed in various layers as per required thickness.

6. The Release

7. The Recovery

The Grip

The inside grip of the hammer handle is laid against the pads of the middle phalanges of the left hand fingers. The right hand cuffs the left by putting the four fingers over the back of the middle and basal phalanges of the left hand fingers. The hammer must be held firmly but not tensely.

The initial position

The thrower stands at the rear edge of the circle with his back facing in the direction of the throw his feet are a little more than shoulder width apart and his knees are bent for stability during the arm swings. The thrower now places the hammer head behind his right leg as far to his rear as possible. He then turns to the right until the right shoulder points in the direction of throwing. The hammer wire forms a straight line with the extended left arm.

The preliminary arm swings

The main function of the preliminary swings is to break the inertia of the thrower and hammer and to set a rhythmic pattern of movement by which initial acceleration is transmitted to the hammer. During the preliminary swings, the arms are kept long and relaxed and form and extension

of the hammer wire. They begin with this movement when the hammer is at its lowest point and end it by turning the trunk to the right. The thrower must counteract the increasing centrifugal force.

When the hammer moves backwards, he presses his hips forward. After the first arm swing the thrower keeps the lowest point of his hammer well to the right, at around 290 to 300 degrees, and the highest point somewhere around 120 degrees.

The Release

The delivery phase begins when the right foot touches the ground after the third turn. The landing of the right foot must be fast and firm in order to match the acceleration of the implement, which is racing down to the lowest point with the beginning of the active straightening of the legs. Just before the hammer is released, the left knee straightens. When the implement leaves the hand, the vertical line of projection of the thrower's head should not go beyond the right heel. If the feet are in a stationary position, thus is a clear proof of a correctly executed delivery. The hammer is released at shoulder height. The left shoulder points in throwing direction and back is well arched. The most valuable angle of release in the hammer throw is 42 and 44°.

1st Day Events

1. 100 mts Hurdles
2. High Jump
3. Shot put
4. 200 mts Run

2. Decathlon

Decathlon consist of 10 events which shall be conducted on 2 consecutive days in the following order.

1st Day Events

1. 100 mts Run
2. Discuss throw
3. Pole vault
4. Javelin throw
5. 400 mts Run

2nd Day Events

5. Long Jump
6. Javelin
7. 800 mts Run

2nd Day Events

6. 100 mts Hurdles
7. Long Jump
8. Shot put
9. High Jump
10. 1500 mts Run

Note :

1. Winners will be decided based on the points of all events.
2. There is no heats in the running events and every running events are treated as finals.
3. Three attempts only will be given to field events.
4. Two false start should be permitted.

3. Decathlon

Decathlon consist of 10 events which shall be conducted on two consecutive days in the following order, with minimum 30 minutes interval between two consecutive events and 10 hours interval for last event of first day and first event of second day.

1st Day Events

1. 100 mts Run
2. Long Jump
3. Shot put
4. High Jump
5. 400 mts Run

2nd Day Events

6. 110 mts Hurdles
7. Discus throw
8. Pole vault
9. Javelin throw
10. 1500 mts Run

Combined Events For Women

Combined events for women there are two category mentioned as follows.

1. Heptathlon

2. Decathlon

1. Heptathlon

Heptathlon consist of 7 events which shall be conducted on 2 consecutive days in the following order.

The Recovery or Follow Through

To avoid stepping over to thrower must absorb the impact by reversing the legs and lowering the body's centre of gravity, thus increasing stability.

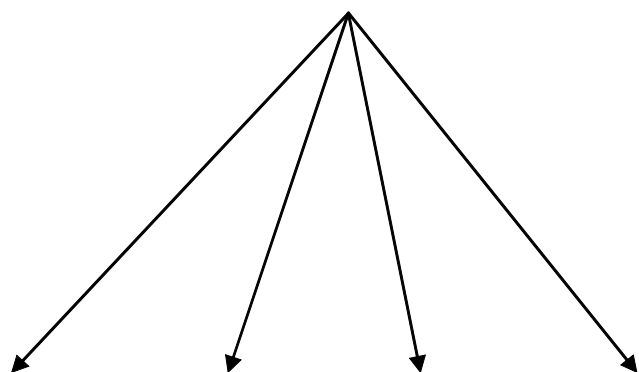
C.COMBINED EVENTS

Multi-discipline events has been included in athletics programmes since eight century B.C. though originally the five events for men included a run, long jump, discus throw, javelin throw and wrestling. The 10 events with we are familiar today were practiced first in Scandinavia, and the event is now developed in importance for the genuine all – rounder, who may not be one event, but who can maintain a high overall standard. Today it is an event for the decathlon or heptathlon specialist who prepares for it and competes in the event as a whole rather than in series of separate competitions. The decathlete or heptathlete needs to be a balanced personality with well –rounded physical development.

The Combined events are an individual events consist of several number of events of different category. For men and women combined events are classified into 4 types according to the level of competitors. The events are held over two days, and they are chose as a true test of skill, stamina and technique. The decathlon combines sprints with middle distance running, throwing, jumping, hurdling and vaulting.

There is a rest period of 30minutes between each event. A competitor is awarded points for his best performance in each event, as calculated by reference to scoring tables produced by the IAAF. The decathlon entered the Olympic programme in 1912.

COMBINED EVENTS



Pentathlon

Heptathlon

Octathlon

Decathlon

They are as follows.

1. Pentathlon - 5 events
2. Heptathlon - 7 events
3. Octathlon - 8 events
4. Decathlon - 10 events

The Combined events such as pentathlon, which shall be conducted on one day, and other combined events such as Heptathlon, Decathlon and Octathlon should be conducted on two consecutive days as in the prescribed order.

Combined Events for Men

1. Pentathlon
2. Octathlon (Youth Boys)
3. Decathlon

1. Pentathlon

The pentathlon is a five-events test of all-round ability. The men's version comprises the long jump, javelin, 200m., discus and 1500 m in that order on one day. Scoring is on the same basis as the decathlon. The pentathlon has long been a most popular women's event, and was introduced into the Olympic schedule in 1964.

2. Octathlon (Youth Boys)

Octathlon consist of 8 events which shall be conducted on consecutive two days in the following order.

1st day Events

1. 100 m Hurdle
2. Long Jump
3. Shot put
4. 400 mts Run

2nd day Events

5. 110mts Hurdles
6. High Jump
7. Javelin
8. 1000 mts Run

i) By seeing their timing in 1/100 of second. If the tie still remains.

ii) Lot shall be used to decide the best loser.

b) Field events

During horizontal or distance events, where there are more than eight competitors, each competitor shall be allocated three trials and the competitors with the best valid performances shall be allowed three additional trials.

In the event of a tie for the last qualifying place it shall be resolved by seeing the second and third best performance among the tied competitors and if tie still remains, the tied competitors shall also be allowed to for the three additional trials.

In the event of a tie for any position, it shall be decided first by using the available rules. If the tie still remains it concerns for the first place, the competition shall be re-run to decide the swimmer which is known as concerns any other place, the result will stand. That means the tied competitors shall be awarded the same place.

Note; Its best performance as achieved during field braking, it shall also be considered.

$$2\pi r = 128 \text{ (Circumference of two curves = } 200 - 72 \text{ (} 2 \times 36 \text{))}$$

$$2 \times 3.14 \times r = 128$$

$$\text{RDR or 'r' = } 128 \times \frac{1}{2} \times \frac{1}{3.14} = 20.37 \text{ m}$$

$$\text{MDR = RDR - 0.20 m}$$

$$\text{MDR = } 20.37 - 0.20 = 20.17 \text{ m}$$

b) TYPES OF RUNNING SURFACE

1. Mud
2. Grass
3. Cinder
4. Synthetic Track

c) NEED FOR A STANDARD TRACK

1. Track must be prepared according to the rules and regulations laid by International Association of Athletic Federation (IAAF).
2. The length of the standard track shall be 400 mts.
3. The track should be laid out from North to South direction.
4. Track shall consist of two parallel straights and two curves of same radius. The length of the curve will be more than the straight.

5. The track should have minimum of 6 lanes and maximum of 8 lanes.
6. The inside and outside of the track shall be bordered by a kerb. That is raised border of maximum 5 x 5 cm.
7. The track should have common finishing point.
8. To conduct all the running events up to 10,000 mts within a track and also the jumping and the throwing events simultaneously with the track events.
9. The track should have proper drainage system.
10. The track should be leveled without any ups and downs.
11. The running direction is such that the athlete's left hand side is towards the centre of the track.
12. The synthetic material will be used as the surface of the track.

STAGGER DISTANCE

1. There will be no stagger for the first lane athlete.
2. As and when the width of the lanes changes, the stagger distance also changes.
3. Staggers are needed only when the athletes are required to run in curves also in their lane.
4. Staggers will not change according to the increase in the length of curves.

6. Angle sector is : 34.92°
7. Wire : Single up broken and straight length of string steel wire 3 mm in diameter
8. Handle : Curved or straight grip with maximum width inside of 130 mm and maximum length inside of 110mm.

BREAKING TIES IN ATHLETICS

Tie breaking in can be steadied separately during preliminary rounds and finals to decide the positions.

1) Preliminary rounds;

a) Track events

Preliminary rounds (heats) shall be held in track events when the number of competitors is more in number to reduce the number of competitors to 6 or 8 to conduct the finals. In all preliminary rounds at least first and second in each heat shall qualify for the next round and it possible at least three in each heat shall qualify. The qualification for the next race shall be decided either according to their placings or according to their times (best losers). During this selection if there is a tie among the best loser, the following steps shall be applied to decide the best loser for the next round.

The Ring

The ring shall be placed to the level of outside ground. It must have a height of 1.4cm to 2.6 cm from the inside floor of the circle and 6mm thickness.

Specification of Hammer

The hammer consist of three parts, a metal head, a wire and a grip. The head shall be of solid iron or other metal not softer than brass. The head should be spherical in shape with smooth surface. A steel wire, with a diameter of 3mm, is attached with the head at one end and with a handle on the other end.

Overall weight of the hammer

1. Men : 7.26 kg to 7.285 kg
2. Women : 4 kg to 4.025 kg

Overall length of the hammer

1. Men : 117.5 cm to 121.5 cm
2. Women : 116 cm to 119.5 cm
3. Diameter for men : 11 cm to 13 cm
4. Diameter for women : 95 cm to 110 cm
5. Head : Solid or other suitable material

5. When staggers are marked, the diagonal excess distance also to be taken into consideration.

Formula

$$\text{Half stagger} = [W (N-1) - \alpha 0.10 \text{ m}] \pi$$

$$\text{Full stagger} = [W (N-1) - \alpha 0.10 \text{ m}] 2\pi$$

$$\text{One and Half stagger} = [W(N-1) - 0.10\text{m}] \times 3\pi$$

Where,

W – Width of the lane,

N – Number of the lane

π – 3.1416 (Standard value)

Stagger distances for Non- standard Track

$$\text{Half stagger} = W (N-1) \times \pi$$

$$\text{Full stagger} = W(N-1) \times 2\pi$$

$$\text{One and Half stagger} = W (N-1) \times 3\pi$$

Diagonal (excess) Distance

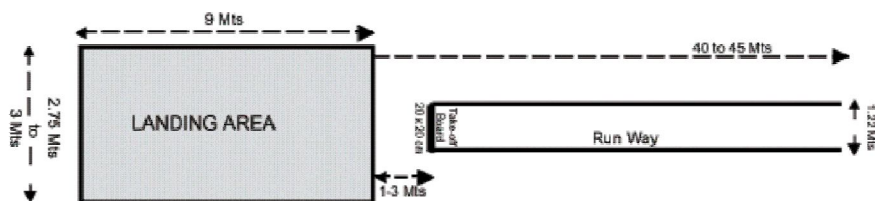
The excessive distance run by the athletes other than the first lane runner for 800mts and 4 x 400mts relay to reach the first lane after the first and three curve respectively is called diagonal excess. This diagonal distance should be calculated for each lane and it should be added with half stagger, and 1½ stagger respectively in the starting point itself.

UNIT - V

FIELD MARKING

Layout of Area for all Field Events with all Specifications

a) LONG JUMP



Specifications

Runway

Approach run - 40-45mts

Width of the lane - 1.22

Width of the line - 5cm

Jumping pit

Length - 9 mts

Width - 2.75 mts to 3 mts

Distance of the take off Board from the nearest edge - 1 – 3 mts of landing area

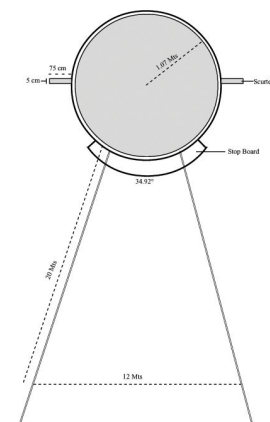
(84)

9. Width of the cord grip : 150 mm to 160 mm for men

10. Width of the cord grip : 140 mm to 150 mm for women

11. Angle of sector is : 29°

h) THROWING THE HAMMER CIRCLE



The hammer is thrown from a circle, shielded on three sides by a netting a cage on a metal frame, and must land within the marked sector. The competitor who achieves the best distance with his throw is declared winner. A total number of five judges watch for infringement within the circle, the other three judges supervise the field. If the hammer breaks while attempting a throw, then the attempt shall not be counted. Under such circumstances, if the competitor loses his balance and commits a foul, it won't go against him.

(93)

The javelin is made of wood or metal shaft with a sharp metal head. There shall be a cord grip around the centre of gravity of javelin. The cord grip should not exceed the diameter of the shaft by more than 8mm. The grip shall be of uniform thickness.

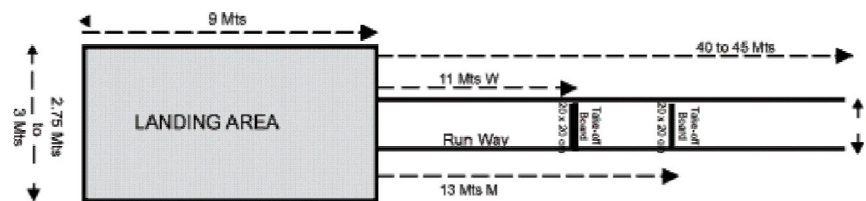
SPECIFICATIONS

1. Length of the runway : 30 to 36.5 mts
2. Width of the runway : Two parallel White lines 5 cm wide and. 4 mts apart
3. Width of the arc : 7 cm extended by 75cm long and 7 cm wide.
4. Weight of the javelin : 800gms to 825 gms for men
5. Weight of the javelin : 600gms to 625gms for women
6. Over all length of the javelin : 2.60 mts to 2.70 mts for men
7. Over all length of the javelin : 2.20 mts to 2.30 mts for women
8. Metal head : 250 mm to 330 mm for men and women

Dimension of the Take- off Board (Wooden Board)

- Length - 1.20 mts to 1.21 mts
 Width - 20 cm
 Depth- 10 cm

b) TRIPLE JUMP



Specifications

Runway

- Approach run - 40-45mts
 Width of the lane - 1.22
 Width of the line - 5cm

Jumping pit

- Length - 9 mts
 Width - 2.75 mts to 3 mts
 Distance of the take off board from the nearest edge of landing area - 11m (w) 13m (m)

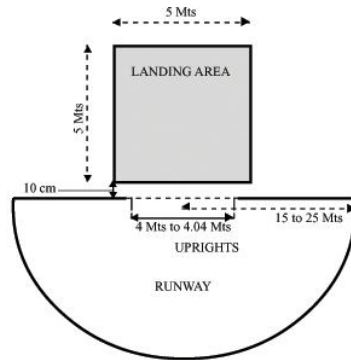
Dimension of the take off board

Length - 1.20 mts to 1.21 mts

Width - 20 cm

Depth- 10 cm

c) HIGH JUMP



Specifications

Runway

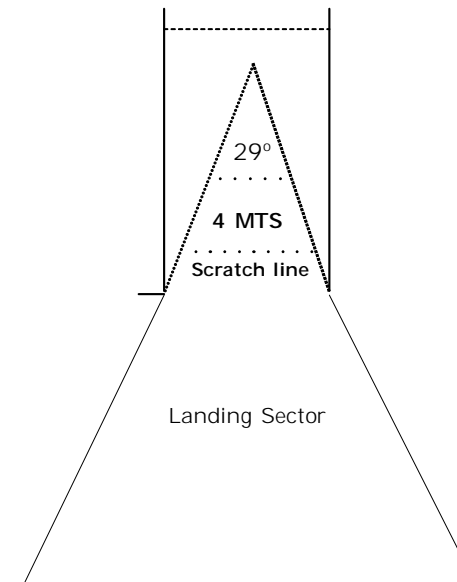
The minimum length of the runway shall be 15 meters. Except in international competitions, where the minimum shall be 20 meters. If conditions permit, the minimum length should be 25 meters.

High Jump Landing Pit

Pit : The pit is made of foam. The length of the pit shall be at least 5m, width 3m and height 60cm.

(86)

Javelin Throw Sector



IMPLEMENTS



Javelin



cord grip

(91)

Specifications

RUNWAY

The minimum length of the runway shall be 15 meters. Except in international competitions where the minimum shall be 20 meters. If conditions permit, the minimum length should be 25 meters.

High Jump Landing Pit

Pit : The pit is made of foam. The length of the pit shall be at least 5m, width 3m and height 60cm.

Uprights

The uprights should be of a rigid or any other suitable material, marked in centimeters. The uprights shall extend at least 10cm above the point up to which the cross bar can be raised. The distance between the uprights shall be between 4.00 - 4.04m.

Cross bar support

The support for the cross bar should be made of rigid or any other suitable material, which can be raised or lowered and can be adjusted up to a height of 2.30m.

Uprights

The uprights should be of a rigid or any other suitable material, marked in centimeters. The uprights shall extend at least 10cm above the point up to which the Cross bar can be raised. The distance between the uprights shall be between 4.00-4.04m.

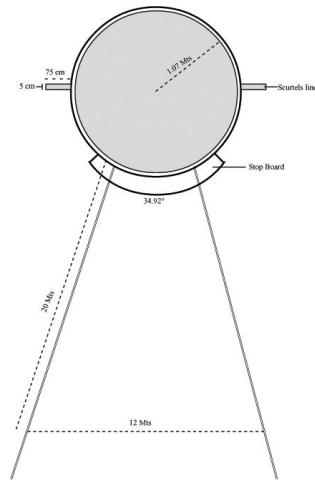
Cross bar support

The support for the cross bar should be made of rigid or any other suitable material, which can be raised or lowered and can be adjusted up to a height of 2.30m.

Cross bar

The cross bar is made of wood, or metal or any other suitable material. The cross bar should be circular with a diameter of 29 mm to 31 mm. The end of the bar shall be of concave or flattened surface of 150-200 mm in length and 29-35 mm in width. The length of the cross bar shall be between 3.98, to 4.02m.

d) SHOT PUT CIRCLE



The Ring

The ring shall be placed to the level of outside ground. It must have a height of 1.4cm to 2.6 cm from the inside floor of the circle and 6mm thickness.

Shot

The shot is made from solid Iron, brass or other hard metal. The men's shot weight is 7.26 kg with a diameter between 110-130mm. The women's shot is of 4kg with a diameter between 95-110mm. The shot should be spherical in shape with smooth surface.

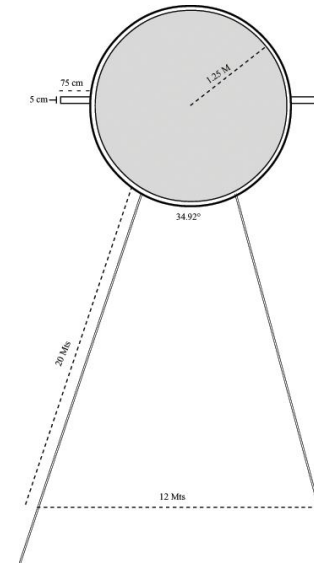
Stop Board

A curved piece of wood 10 cm thick affixed to the front of the shot put circle. When throwing, the shot putter braces his foot against the stop board to avoid falling forwards out of the circle.

(88)

f) DISCUS CIRCLE

Discus



The discus is made of wood, or other suitable material, with a rounded metal rim. The cross section of the edge shall be rounded in a circle of 6mm radius. The thickness of the rim should be at least 12m. The diameter of men's discus shall be between 219-212 mm and its weight should be 2 kg. The diameter of women's discus shall be between 180-182 mm and weight 1kg. The diameter of metal plate or flat centre area should be between 50-57mm.

(89)

a) Track Events

The judges shall decide the order in which the competition finish and if they cannot arrive at a decision shall refer the matter to the Referee, who shall decide.

Dead Heat

If there is a tie for the first place in any track event, the event shall be held after to giving adequate rest. And if it is not possible to conduct event once again due to time factor, the tied competitions shall be awarded first place jointly. This method is known as "dead heat". If tie remains for any other place, the result will stand. Rerace shall not be held to decide the second, third and other place.

Note: If photo finish facilities is available, the positions may be decided, easily.

b) Distance events

When there is a tie for any place, it shall be solved by seeing the second best performance and it necessary third, fourth best, etc. If tie still remains and concerns first place, the tied competitors will complete again in the some order in a new attempt until the tie is result. For remaining places the result will stand. That means same place shall be given to the field competitors.

Height events

When there is a tie for any place in high jump and pole vault it shall be solved by using two rules in order as following

- i) The tie competitor with lowest number of failures at the field height (last cleared height) shall be given higher place.
- ii) If tie shall remain; the competitor with lowest total number of failures throughout the competition shall be given higher place.

If the tie still remains and if it concerns the first place, the field competitors shall be given one more jump at the height where the competition is stopped (height which is immediate next to the field height), and if no decision is reached, the bar shall be raised or lowered 2cm for high jump and 5cm for pole vault. The competitors are allowed only one attempt at each height until the tie is decided. The best performance achieved during jump, if any, shall also be considered.

If the tie concerns any other place, the tied competitors shall be awarded the same place in the competition.

Note: If the same place is given the immediate next place shall not be awarded to any competitors.

competitors shall be placed in the order in which any part of their bodies (i.e. torso, as distinguished from the heads neck, arms, legs, hands or feet) reaches the vertical plane of the nearer edge of the finish line.

B. MIDDLE DISTANCE RUNNING

Distance running can be split into two groups, Middle distance and Long distance. For middle distance running the athlete needs to both speed and stamina. For long distance running, stamina is the most important thing. Stamina means building up our body so that it can be last the race distance, but at race speed.

Middle Distance Events

1. 800 mts
2. 1500 mts
3. 3000 mts

The middle distance runner must apply his effort correctly throughout the race; this can be achieved only by a knowledge of pace and tactics.

The events which fall into the middle distance category range from 800m to 3000m. With the relentless advance in performance in athletics the 800 meter race now attracts athletes who in the past would have been sprinters. His running style is a model of mechanical efficiency, and even

UNIT - I

INTRODUCTION

A. Meaning of Athletics

Athletics comprise of a wide range of skills and can be divided in two broad categories of track and field events. Track events include sprint races, middle distance races, long distance races, relays and hurdles. The field events are those which are being played either inside or outside the track area or outside the stadium, which include throwing events and jumping events.

The track events include races of 100m, 200m, 400m, 800m, 1500m, 5000, 10000m, and relay races of 4x100m, 4x400m in both men and women categories. In all races shorter than 800m the competitors have to run the length in their respective lanes. The competitors of relay races are required to carry a baton and pass over the same to his/her partner within the take over zone. The starting points are arranged in such false a way that distance from start to finish is same for each competitor. In case of two false starts, the athletes declared disqualified. The competitor who jostles, runs across, or obstructs other competitor(s) can also be disqualified. Timings of competitors are recorded by the official time keeper from stop watches or through electronic time keeping equipment. The hurdle events include 110m and 400m for men and 100m and 400m for women. The competitors are required to jump over specified number of hurdles, which are made of metal with

a wooden top bar. The steeplechase hurdle event comprises of 28 hurdle jumps and 7 water jumps spread over a 3000m run-way.

The throwing events include throw of shot-put, javelin, discus and hammer. Each competitor generally gets six trials and the winner is decided on the best distance covered in any one of his six trials. The Jumping events comprise of High Jump, Pole Vault, Long Jump and Triple Jump. In the first two events, athletes are required to jump over a crossbar. In Triple jump the competitors are required to complete a hop, step and Jump sequence. Winner of jumping event is decided based on the distance measured between the take-off line and the nearest break in the landing area lead by the competitor's body part.

A standard international track is 400 mts in circumference. It has 8 lanes and the width of each lane is 1.22 mts. Track and field events include Sprints, Middle distance running, Long distances race, Hurdles, Steeple Chase, Relay races, throwing events and jumping events. Track and field events are conducted by International Association of Athletic Federation (**IAAF**).

Athletics

The term "Athletics" is derived from the Greek word "Athlon" which means a contest. The word "Athlete" denotes a person who takes part in contests which involve physical activity. "Athletics" is the oldest forms of the organized sport contested between individuals and or teams.

3. Run through

A forward dip during the last stride before the finish line is the most commonly used technique.

Photo Finish Camera

It is impossible for the naked eye to be able to determine accurately the finishing sequence of runners for in a blanket finish. The problem has been solved by photo-finish cameras. A photo-finish camera has very narrow slit lens which photograph an area of the finish line not more than 5-10cm across. It uses a continuous strip of film that moves across the lens at a speed proportionate to the speed of athletes and records the arrival of each competitor at the finish line. The space between each athlete shown in the film exhibits the time elapsed between the arrivals of each of them at the finish line. Photo – finish camera also doubles up as an electronic timing device, recording finishing timings of athletes up to one hundredth of a second. The camera gives a developed photograph that gives positions of athletes and time when their torso reached the finish line.

FINISH POSTS

Except where their use may interfere with the photo finish equipment, two white posts may be placed along the prolongation of the finish line at least 0.30 mts from the edge of the track. They should be of rigid construction and approximately 1.40m high, 8 cm wide and 2 cm thick. The

the foot to push against at the start of the race. The foot plates shall be slopped to suit the starting position of the athlete and can be either flat or slightly concave. To monitor the false starts the blocks can be connected with a devise. The blocks can be used up to and including 400 meters (including the first) leg of the 4x200m and 4x400m).

TYPES OF FINISHING

The finish line should be 5cm in width drawn across the track at right angles to the inner edge. Two white posts of rigid material (80mm in width and 20mm in thickness) shall be placed at a 30cm distance from the edge of the track. Competitors are place in the order in which any part of their torso (as distinguished from the head, neck, arms, legs, hands, or feet) reaches the vertical plane of the edge of the finish line nearest to the star.

Technique

There are three finishing technique used particularly during the sprint events. They are as follows.

1. Lunge finish

The torso reached the finish line first, i.e. leaning torso forward.

2. Diagonal finish (or) Shoulder Shrug

At the finish line crossing it by making the shoulder in diagonal, towards midline of the finish line. It is more difficult type.

B. IAAF

The IAAF (International Association of Athletic Federation) is the supreme governing body controlling international athletics throughout the word. It was founded in Stockholm on July 17th, 1912, to draw up and enforce rules and regulations and a common amateur definition, and to recognize world records, The IAAF now promotes its own World Champions in track and field every four years, with annual World Cross- Country Champions for men and women every march.

IAAF- Structure and Functions

In 1912, two days after the Olympic games a congress was held in Stockholm for the formation of an International Association of Athletic Federation. Seventeen countries were attended the historic meeting. The meeting was urged the Athletics to develop and promote international competitions and the Olympic games. The meeting was also urged the importance of having universal code of rules and regulation and a common definition for Amateur and also an athletic register of world and Olympic records.

One year later in 1963 at Berlin the congress once again met and accepted the first constitution and 34 nations figured on the most membership list. J.Sigfrid Edstrom (Sweden) was elected as first president and Kristvan Hailstorm as honorary secretary. The technical rules for International and domestic competition were framed and presented for approval in 1914 at the third congress in France.

In 1946 the IAAF Head Quarters moved from Stockholm to London. Over the years, the IAAF grew into a huge and dynamic organization as the world governing body of track and field athletics, road running, race walking and cross country. The congress decided to move the head quarters once again from London to Morte Carlo in 1993. The Steady growth of the Federation accelerated in the last decades. By 1997 member countries in addition numbered 209. The IAAF council comprising of 27 members from various countries.

AFI (Athletic Federation of India)

Athletics in its present form was born in our country during past decade of 19th century. Nothing much is known of its early stages till first known participation of Norman G.Pitchard in 2nd Olympic games in 1900 at Paris, where he won a Silver medal in 200mts run. The Indian Olympic Association (IOA) was formed in 1926 and its control athletics. But India unofficially participated in the 1920 and 1924 Olympic games under the leadership of H.C.Buck of Y.M.C.A Madras. The official participation of Indian athletes started in the 1928 Olympic games at Amsterdam till 1936 Berlin Olympics. India participated in the Olympics under the IOA BANNER. Then 1940 and 1944 Olympic Games were not conducted because of second World War.

Structure and Functions

Amateur Athletic Federation of India was formed in 1946 at the initiative of Maharaja Yadindra Singh then

in a natural relaxed position. An angle of about 90° at the front knee and of about 110° to 130° at the rear knee will be appropriate.

(iii) The Long Start (or) Elongated Start

The front starting block is situated 3 foot lengths from the starting line and there is one foot length between the starting blocks. The angle of rear leg about 110°. The long starting position is certainly the most difficult one. It should be applied carefully. Any athlete finds this position rather ineffective. The long start, although still known, is hardly used nowadays.

For good starts a sprinter must,

- a) push back against the blocks
- b) moving the hands and arms as quickly as possible in reaction to the gun.
- c) move the hips quickly from the starting position to running position.
- d) run out of the blocks, do not jump.

STARTING BLOCKS

The starting blocks should be made of rigid material. It should be adjustable, but must be without springs. The blocks are fixed to the track, so that it provide firm base for

'On your marks' – position – his body weight resting comfortably on the legs in the crouch position. The hands are shoulder width apart to touch the ground behind the starting line with fingers and thumb pointing away from each other. The eyes are focused downward and forward.

Set position

The block settings should result, the athletes having a 90° angle at the front knee and 110° to 120° angle in the back of the knee. That gives a set position with the hips just slightly higher than shoulders slightly forward. The hands are placed just slightly wider than shoulder width apart, with the fingers and thumbs in a **"high bridge"** position. The shoulders are above and slightly ahead of the hands, the arms are straight, but not locked. He should feel pressure against rear block in the set position since the center of gravity is located high, the first strides are shorter and less powerful.

(ii) The Middle Start (or) Medium Start.

The front starting block is located two foot lengths (21 inches) from the starting line and the rear starting block is one foot length further. Kneel down with the right knee against the instep or toe of the left foot, and keep the trunk erect. The angle for the rear leg is about 130°. The slope of the body from the hips to the shoulders is not very steep. The body weight is on the legs and arms. The head remains

president of IOA with prof.G.D.Sondhi as its first president. The AAFI got affiliated to IAAF in the year 1946. The AAFI for the first time selected 8 athletes who participated in 1948 Olympic games at London. Indian women competed in the Olympic games for the first time in 1948.

Mr.M.C.Dhawn was elected by secretary of AAFI in 1950 and was the technical secretary in the first Asian games held at New Delhi in 1951. Raja Bhalendra Singh become the president of AAFI in 1952 and continued of guide athletic till 1968 along with Mr.M.C.Dhawn. This team acted a yeoman service to athletics in India and strengthened the AAFI to make it the leading federation. The federation produced by group competitors open national championship, Zonal and Inter Zonal Competition.

Many distinguished personalities are acted as president and secretary of AAFI till 1987 from 1988 to till date Mr.Suresh Kalmadi and Mr.Lalit K.Bhanot formed the new team of president and secretary respectively. The main function of AAFI is to prepare a year long sports calendar at the state and national level. They are sending teams to international level competitions based on merit.

D. AGE GROUPS

Under the Jurisdiction of the IAAF is split into five age groups.

1. Men and women there is no age limit
2. Seniors - 19 Years
3. Juniors - 17 and 18 Years
4. Youths - 15 and 16 Years
5. Boys - 13 and 14 Years

UNIT - II

TRACK EVENTS

Athletics is great fun and people of all ages, can enjoy it. Athletic activities can be traced back of the ancient Greeks, who used to take part in games of running, jumping and throwing. Track events include sprint races, middle distance races, long distance races, relays and hurdles.

The track events include races of 100m, 200m, 400m, 800m, 1500m, 5000, 10000m, and relay races of 4x100m, 4x400m in both men and women categories. In the track events all races are run with the competitor's left hand side of the track and finish in the same position. The competitors are required to wear their numbers on their vests.

A. SPRINT EVENTS

Sprints

"To cover the distance in the shortest time with maximum speed"

A. Sprint Events

1. 100 mts
2. 200 mts
3. 400 mts

1. Bunch start (or) Bullet start
2. Medium start
3. Elongated start

Three types of foot spacing bullet, medium and elongated starts. Each sprinter will have his own particular measurements so the following procedure is suggested to enable him to get into a correct starting position.

Block placement

The three block placement positions are determined by the location of the blocks relative to the starting line.

(i) The Bunch or Bullet Start

Stand with the right toe beside the rear of the left heel. Kneel down with trunk erect and rock forward in the same way. In this starting position the starting blocks are close to the starting line. The front block should be placed one foot length (16 inches) from the starting line, with 11 inches between the blocks results in low velocity and fast block clearance Track events, up to and including 400 meters, run at full speed for the entire race distance. Sprinter press their feet against two blocks, which are spaced apart and connected to a shaft, to improve their initial movement. The main features to look for in the sprinter's highly distinctive running action are the high knee-lift, the long strides, the thrusting arm action and the controlled breathing.

should immediately rise to final starting position retaining the contact of the hands with the ground and of the feet with the foot plates of the blocks.

A competitor shall not touch either the starting line or the ground in front of it with his hands or his feet on his marks. The three starting positions are measured from the starting line to the front leg of the starting block. Starting is the first stages in all the running events, should be conducted either track or road. There are only two types of starting should be followed by the athletes.

1. Crouch start
2. Arc start (Standing start)

CROUCH START

Crouch start can be used by the athletes those who are run up to and including 400mts and even the first runner of 4 x 100mts Relay and 4 x 400mts Relay.

In crouch start the following commands to be used,

1. On your mark
2. Set
3. The gun fire or clapping with clap board

It has three (divisions) method should be used according to the height of the individuals.

Sprinter

There is no ideal shape or size for the sprinter. He must, however, be well built and have good all-round muscular development and a quick reaction time. Regular, even and relaxed arm action must be learned first. The legs follow the arms, and the faster the arms are moved the faster the leg action will become. In the arm action emphasis should be on a forward and upward motion.

Most important factors for sprinting

1. Reaction time
2. Starting position
3. Powerful Muscles
4. Acceleration Technique.
5. Effective stride length
6. Curve running technique (200 mts, and 400 mts).
7. Technique at the finish line.
8. The condition of the Track surface
9. Wind and Weather conditions.

Stride Length

“It is the distance between touchdown of the toe of one foot and the touchdown of the toe of the other foot”. Stride length may and usually will be vary from left to right

or right to left on individual at the same velocity. This variance may be influenced by dominance, weakness, injuries and even leg length. Stride length will be vary with the speed of running and during the various phases of a race.

Stride Cadence or Stride frequency

"It is the number of strides per second". The stride cadence for sprinters is 4.5 to 10 strides per second with little difference found between the strides. The method of determining stride rate is to divide the number of strides in a race by the elapsed time for the race.

STARTING

There are varieties of running events for which the track is used . The finishing line for all races must be the same. But the starting line of all the races cannot be the same. It will vary from race to race. While 100mts race, 100mts hurdles and 110mts, hurdles races have to be run in straight courses, appropriate distance shall be measured backward from the beginning of home stretch and starting lines are marked. The extended lines are broken.

The start and finish of a race shall each be denoted by a white line 5 cm wide. The distance of the race shall be measured from the edge of the starting line farther from the finish, to the edge of the finish line nearer to the start.

All races shall be started by the report of the starter's gun or approved starting apparatus fixed upwards after he has ascertained that competitors are steady and in the correct starting position.

At all international sports competitions meetings, the commands of the starter in his own language shall, in races up to and including 400m be "on your marks", "set", and when all competitors are "set" the gun shall be fired, or approved starting apparatus activated.

In races longer than 400m, the commands shall be, "on your marks" and when all competitors are steady, the gun shall be fired, or approved starting apparatus activated. A competitors shall not touch the ground with his hands.

In all races up to and including 400m, and 4 x 100 mts Relay, 4 x 400mts relay first runner a crouch start and the use of starting blocks are compulsory. In competition held under IAAF, competitors must use starting blocks provided by the organizers of the meet. In other meet on all weather tracks, the organizers may insist that only starting blocks provided by them may be used. After the "on your marks" command, the competitor shall approach the starting line, assume a position completely within his allocated lane and behind the starting line. Both hands and one knee shall be in contact with the ground and both feet, in contact with the starting blocks. At the "set" command, the competitor

decreases. A study of the body movements involved in these activities pinpoints the causes. In normal walking and running the knee of the supporting leg is bent as it passes through the vertical position (i.e. when the centre of mass passes vertically over the foot), but in race walking the knee of this leg is straight in the vertical position. The technique is such a way that race walking does not become a modified run. Briefly, contact with the ground must be maintained at all times, a heel-and-toe action must be used, and the supporting leg must be straight at the knee as it passes through the vertical position.

Judging a fast walk is an extremely difficult skill, since it is almost impossible to see whether a walker has a foot on the ground at all times or that the knee is straight through the vertical for it takes only a fraction of a second to pass through the position. Race walking is not a natural skill as normal walking and running are, because the latter are the locomotion skills learnt from very early childhood.

As in most other athlete events, flexibility is an asset and hip mobility especially is an important factor in stride length in normal walking in which the line through the hip of the forward swinging leg is allowed to twist forward with the leg, the stride length is increased considerably. Stride length is also maximized, if the feet move along a straight line.

in the later stages of a race when fatigue is sapping his strength his skill does not break down.

C.LONG DISTANCE EVENTS

1. 5000 mts
2. 10000 mts
3. Marathon

The three main long distance events are 5,000m 10,000m and the marathon. Stamina is the basic quality needed by a long-distance runner, but speed has also become an essential requirement for would-be world beaters.

However, in the long distance the steady pacer must beware of the fast finisher who sits on his shoulder, until the final run-in. the steady runner without an equivalent fast finish must attempt to put himself far enough ahead of the sprint finishers by either a punishing pace throughout the race or by putting in bursts of speed during several laps from the finish. There is nothing more motivating for the training runner than to see his rival a few strides in front of him, but also nothing more demoralizing than for his rival to be 20 meters or more in front.

D.HURDLES – VARIOUS STAGES

MEANING

Running over the barriers (or) obstacles are known as Hurdles. The Hurdle race should be conducted for men and

women, senior boys and senior girls in various height and distance. Every hurdle race is based on certain conditions laid down in the rules of the International Association of Athletic Federation (IAAF).

The hurdles are made of steel with wooden top bar. The height of hurdles can be adjusted as per the length of the race and sex of the athlete. The hurdles are made in such a way that when force of 3.6-4kg. is being applied to the centre of the top, it should overturn automatically. The height required for, men's 110m race is 106.7 cm. The women's 100m sprint hurdles are 84 cm in height. In 400 m race the men's hurdle is 91.4 cm high and women's is 76.2 cm. The length of the wood used for the top bar should be 1.20m and width at least 7cm. The top bar should be striped in black or white or in some other contrasting colors.

The following are the standard distances, it can be classified into two categories,

- Men - 110 & 400 mts
- Women - 100 & 400 mts

Distance of Hurdles	Category	Height of the Hurdles	Distance Start to first Hurdle	Distance Between the Hurdles	Distance Last Hurdle to Finish
100mts	Women	0.840mts	13mts	8.50mts	10.50mts
110mts	Men	1.067mts	13.72mts	9.14mts	14.02mts
400mts	Men	0.914mts	45mts	35mts	40mts
400mts	Women	0.762mts	45mts	35mts	40mts

Substitution

Once a relay team has participated in a competition only two additional athletes may be used as substitutes in the composition of the team for subsequent rounds. Once an athlete, who has participated in a previous round has been replaced by a substitute, he may not return to the team.

RELAY BATON

The relay baton is made of a rigid material. It should be a single piece of smooth, circular and hollow tube of 280-300 mm length. The minimum weight required for baton is 50 grams and its circumference should be between 120-130mm. The batons should be colored so that it can be easily visible during the race.

Specification

- Weight of the baton : not less than 50 gm
- Length of the baton : 28 to 30 cm
- Circumference of the baton : 10 cm
- Color of the baton : Visible color
- Minimum baton required : 6 Nos.
- Maximum baton required : 8 Nos.

D. WALKING

Race walking may appear to be the natural link between ordinary walking and running, and in some respects this is true-with increase in speed, the force-time

runner only. The baton should not be exchanged within the acceleration zone(Advance Zone).

During the exchange the baton must be delivered firmly and safely into the hands of the receiving runner. When the incoming runner has approached his partner within 2 to 3 mts he indicated to him by a signal when to extend his receiving arm backwards. The signal comes too early or too late, or the runner receiving the baton moves his arm up, down or to the side, the results in an unsteady baton pass and consequently in a loss of time. The baton should be put firmly into the grasping hand between the spread thumb and the four locked fingers.

2. 4 x 400 mts Relay

The runners use a visual pass. The incoming runner carries the baton in the right hand and passes to the outgoing runner's left hand. The primary responsibility for the pass rests on the outgoing runner due to fatigue on the part of the passer. Once the baton has been taken, the athlete immediately transfer it to the other hand.

The four athletes shall run 400mts each to cover 1600mts distance by means exchanging a baton. The first leg of the 4x 400 mts relay run in lanes and so is the first curve of the second leg; only after crossing the line making the exit from the first curve, runners free to move to the inside of the track.

110mts Hurdles

There shall be Ten flights of hurdles in each lane, set out in accordance with the below table.

Starting line to First Hurdle	:	=13.72mts
" "	Second Hurdle	: 13.72+9.14 =22.86mts
" "	Third Hurdle	: 22.86+9.14 =32.00mts
" "	Fourth Hurdle	: 32.00+9.14 =41.14mts
" "	Fifth Hurdle	: 41.14+9.14 =50.28mts
" "	Sixth Hurdle	: 50.28+9.14 =59.42mts
" "	Seventh Hurdle	: 59.42+9.14 =68.56mts
" "	Eight Hurdle	: 68.56+9.14 =77.70mts
" "	Ninth Hurdle	: 77.50+9.14 =86.84mts
" "	Tenth Hurdle	: 86.84+9.14 =95.98mts
" "	Finishing line	: 95.98+9.14=110mts

VARIOUS STAGES

110mts Hurdles the Hurdling Technique is classified into the following:

1. Starting
2. Approach to the First Hurdle
3. Hurdle Clearance (Departure)

4. Running between the hurdles
5. The finish

1.Starting

Hurdling is basically a sprinting event, the mechanics of the starting do not vary much from that of the sprint start. In order to get eight (8) strides to the first hurdle to take – off foot should be placed in the first block. If the hurdler wants seven (7) strides to the first hurdle, take – off foot should be placed in the rear block.

2. Approach to the First Hurdle

The distance from the starting line to the first hurdle is 13.72 mts. The first three strides out of the blocks are the same as in a sprinter’s start. On the fourth stride, the hurdler begins to concentrate on the first hurdle. In perfecting the approach to the first hurdle make any adjustments on the 4th, 5th and 6th strides. The first three and last two should be kept constant. The last stride is slightly shorter to permit to get his centre of gravity slightly ahead of the take-off foot. This approach sets the pattern for the entire race.

3. Hurdle clearance

The take – off distance from the hurdle depends on four factors. The height of the athlete, speed of the approach length of the lead leg speed of the lead leg action. Each

The baton must be carried by hand throughout the race, if dropped, it must be recovered by the athlete who dropped it. He may leave his own lane to retrieve the baton provided this procedure is adopted and no other athlete is impeded, dropping the baton shall not result in disqualification.

Stages of Relay Running

The start

The starting of the 4 x 100 mts Relay is basically same as for the 400 mts. The starting blocks are placed close to the outer line of the track. The baton lies between the forefinger and the thumb is enclosed by the other fingers. After a successful start the runner quickly passes to the inside of his lane.

Checkmarks

The second, third and fourth runners place a checkmarks on their lanes just behind their starting positions. This is a check mark for the out going runner. The distance between the checkmark and the starting position depends on the speed of the incoming runner and on the acceleration of the outgoing runner.

The Baton exchange

The relay baton should be exchanged from one to another competitor with in the take over zone. The exchange is completed when the baton is in the hand of the receiving

when hearing the signal from the incoming runner moves the appropriate arm backwards in a positive and slightly angled manner to a level not higher than the shoulder line. The upper arm is straight at the elbow, the back of the hand is facing down wards the thumb and index fingers are widely spaced forming obtuse angle. The baton is received into such a palm from the incoming runner with an outstretched arm. In the final phase of the change over the elbow joint locks quickly and the baton is passed in a down sweep action.

The best result in both techniques the change over should occur when both runners are traveling at maximum speed and the actual change over should be as quick as possible. The majority of experts consider that the speediest change over occurs when the baton is actually changed over a distance of 2 to 4 mts from the end of the exchange zone.

Acceleration Zone

The acceleration zone lets the outgoing runner accelerate properly and allows the athletes more time to reach top speed at the exchange.

Exchange Zone or Take over Zone

The incoming runner can signals the exchange with verbal commands at a specific point when the incoming runner ready to pass the baton. The incoming runners can also use nonverbal signals. The outgoing runner can count the incoming runner's stride from the check mark to the exchange point.

hurdler must be cleared quickly and safely. The first prerequisite of movements much as in the ordinary running stride. For this action the lead leg is slightly flexed at the knee joint, and leading foot to track beyond the hurdle.

The average take-off distance from the hurdle in men's hurdles will be 1.90 mts to 2.20 mts to allow the leading leg to sweep forward and upward in a straight line. Too short a distance for the take-off results in a "jump" over the hurdle. The hurdle clearance are having the following factors.

Action of the Leading leg

The complete action consists of a quick forward and upward thrust of the leading leg in the direction of the leading of introduces the sequences.

Once the take-off foot leaves the track it becomes the trail leg. The heel of the trail leg moves actively toward the buttocks as the knee moves in a exaggerated motion upward and to the side to avoid hitting the hurdle. For the clearance of the hurdle, the trailing leg must be stretched away from the body when clearing the hurdle. This movement requires good mobility of the hip. The sequence of the athlete's movements should be as follows: after a rigorous push from the ground follows a phase of relaxation for the take-off leg. An action forward movement of the high should begin only when the foot of the leading leg has reached the edge of the hurdle.

Action of the Arms

The usual movements during running are also executed during hurdle clearance. With the sole difference that in the hurdle stride the arms perform additional functions. The arms contribute in a greater degree to maintaining body balance. When the trailing leg comes forward, the trailing arm swings backward to counter balance this movement. It is either almost stretched or flexed at the elbow.

4. Running between the hurdles (The three-step Rhythm)

In the 110 mts hurdle run the distance between the hurdles is 9.14 mts. If we reduce from the length of the hurdle stride, there remains for three strides between the hurdles or three-step rhythm a distance of about 5.065 meters. So that is 1.88 mts for each step. But practice shows clearly that the three steps are not of equal length. The first stride after the landing which is of about 1.55 to 1.60 mts follows a wide second stride measuring 2.00 to 2.20 meters and this is the longest between the hurdles. The last stride before the hurdle is always slightly shorter than the previous one.

5. Finish

The athlete has to use any one technique similar to sprint to finish the race.

Baton Exchange

There are two methods of baton (Exchange) passing

1. Up sweep method
2. Down sweep method

1. The up sweep method

In this method the passing of the baton occurs in an upward movement by a straight arm. At the same time the baton is received by an arm which is pointing backward and locked at the elbow. The outgoing runner upon hearing the agreed signal from the incoming runner, quickly extends his arm backwards locking it at the elbow, the thumb and fingers are separated and pointing downwards forming an obtuse angle. The time that he receives the baton the outgoing runner tries to keep his arm as still as possible. This outstretched arm the incoming runner quickly moves his straight arm upwards and in such a way that the outgoing runner can grasp the baton as near to the incoming runner's palm as is possible. In the upsweep method the baton is passed from the right hand to the left hand and then the left hand passing it to the right.

2. Down sweep method

In the down sweep method the baton – exchange takes place over a distance of 2 to 3 mts. The out-going runner

2. The baton must be passed inside a short distance to be covered by some three to four strides and without unnecessary loss of time.
3. The baton must be exchanged by non – visual method.

Visual Method

The visual method of baton exchange is used only in 4x400 mts relay. When the out going runner receive the baton, he must see the incoming runner while receiving the baton. The incoming runner gripping the baton at its base, then passes the baton into the receiver hand with a forward down sweep motion. The outgoing runner reaches arm straight back, palm facing upward and takes the baton, gripping the upper portion.

Non Visual Method

The non-visual method of baton exchange is used only in 4x400 mts relay. When the out going runner receive the baton, he doesn't to see the incoming runner while receiving the baton. The incoming runner gripping the baton at its base, incoming alerts the receiver, then passes the baton into his or her hand with a forward pushing, down sweep motion. The outgoing runner reaches arm back, palm facing upward and takes the baton, gripping the upper portion. then rotates the receiving arm down, under and forward, to ready the baton for the next exchange.

400 mts Hurdles

Hurdling is a sprinting, rhythmic event. In this race a full circuit of the track is run with 10 hurdles, 91.4 cm high, placed 35 mts apart. The distance from the starting to the first hurdle is 45 mts, while the last hurdle to the finish line measures 40 mts. There are ten flights of hurdles in each lane, set out in accordance with the below table.

Placement of Hurdles in 100mts Hurdle race

Starting line to First Hurdle	:	=13.00mts
" "	Second Hurdle	: 13+8.50 =21.50mts
" "	Third Hurdle	: 21.5+8.50=30.00mts
" "	Fourth Hurdle	: 30+8.50 =38.50mts
" "	Fifth Hurdle	: 38.5+8.50=47.00mts
" "	Sixth Hurdle	: 47+8.50 =55.50mts
" "	Seventh Hurdle	: 55.5+8.50 =64.00mts
" "	Eight Hurdle	: 64 +8.50 =72.50mts
" "	Ninth Hurdle	: 72.5+8.50=81.00mts
" "	Tenth Hurdle	: 81+8.50 =89.50mts
" "	Finishing line	: 89.5+10.5=100mts

Placement of 400mts Hurdles in Standard Track

(Men and Women)

Starting line to First Hurdle	:	=45.00mts
" "	Second Hurdle	: 45+35 =80mts
" "	Third Hurdle	: 80+35=115mts

"	"	Fourth Hurdle :115+35=150mts
"	"	Fifth Hurdle : 50+35=185mts
"	"	Sixth Hurdle : 185+35=220mts
"	"	Seventh Hurdle : 220+35=255mts
"	"	Eight Hurdle : 255 +35=290mts
"	"	Ninth Hurdle : 290+35=325mts
"	"	Tenth Hurdle : 325 +35=360mts
"	"	Finishing line: 360+40=400mts

E. RELAY

There are two relay events comprising of 4x100m for men and women, and 4x400m for men and women. All the four members of a team are required to run one stage of the race along with the relay baton in their hands throughout the race. The baton must be picked up by the athlete who dropped it. He/She may leave the lane in order to retrieve the baton, provided no other player is impeded.

4x100m relay races are run entirely in respective lanes with staggered starts. In 4x400m relay races the first lap and the same part, of the track, of the second lap shall be run in lanes. The position of the teams at the start shall be retained at each take- over zone, except in case of races where lanes are not used. The waiting runners can move to inside zone, after handing over the baton, until the course is clear to avoid obstruction to other competitors.

Relay races are a popular and exciting feature of track and field. It is a team event in an individual oriented sport. They give the opportunity for team work and cooperation is not available in the other events. The key to good relay racing is the baton exchange. Commonly the relay events are as mentioned below,

1. 4 x 100 mts
2. 4 x 400 mts

1. 4 x 100 mts Relay

The 4 x 100 relay is undoubtedly the most beautiful and one of the most difficult events of the athletics spectrum. This relay uses four sprinters running a complete lap of the track, passing on a baton which has to arrive at the finish line with the runner of the last leg.

The main objective in the baton pass is to keep the baton moving at top speed throughout the relay. The baton must be passed only within a 20 meters take – over zone (exchange zone). This zone begins 10 mts before the scratch line (100 mts marking) and ends 10 mts after it. A good baton – exchange needs to satisfy the following three conditions.

1. The baton – exchange must take place after some 12 to 16 mts running, measured from the beginning of the take – over zone.

forward and upward. Then he goes upward the body position is in vertical (or) hanging and elbows are flexed.

5. Clearing the bar

When the body is in hanging position lift and swings upward both the legs, at the same time the pole straightened, turn the upside down. Then pushing the pole down by hands the legs are throw over the cross bar. After clearing the cross bar push the pole away from the pit with the wrist action to avoid foul or touching the bar.

6. Landing

Safe landing is required on the landing area.

B.THROWING EVENTS

General conditions

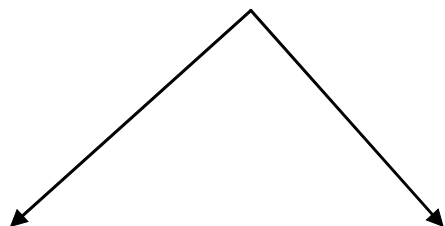
The person who has more body weight and mass of the muscles can choose throwing events. The following qualities are essential for throwers.

1. Body weight
2. Height
3. Leg power
4. Shoulder strength
5. Flexibility
6. Co-ordination
7. Speed

Race walking, of course, involves a rapid leg cadence and if the arms too are no maintain their synchronous swings they have to be bent at the elbows to reduce their moments of inertia, as in running. However, more emphasis is placed on the arm and shoulder action in race walking than in running, because of the need to counterbalancing the exaggerated eccentric thrust of the legs and movements of the hips. But in addition to counterbalancing the leg action, they also aid the forward drive with their swinging the strong upward swing of both arms evokes extra forces from the ground through the driving leg.

UNIT- III

FIELD EVENTS



DISTANCE EVENTS

1. Long Jump
2. Triple Jump
3. Shot Put
4. Discus
5. Javelin
6. Hammer

HEIGHT EVENTS

1. High Jump
2. Pole Vault

A. JUMPING EVENTS

1. LONG JUMP

The following techniques should involve while doing long jump.

1. Approach run
2. Penultimate stride
3. Take – off

(34)

1. Grip

Athletes who take off with the left foot, the pole must be carried on the right hand side, the left arm, half bent, supports the pole with the palm of the same hand turned downwards, while the right arm grips about 60-70cm higher with the hand lightly turned out. Keep the pole straight near the cross bar on the uprights. Hold the pole slightly lower than the height of the cross bar. Keep the pole parallel to the ground pointing to the pit or above the right hand palm facing upward and with left hand palm facing down ward.

2. Carry the Pole

The pole should be raised at 50° or 45° to the ground and keep right side. The left hand should be kept flexed at chest level and the right hand at the back. While carrying the pole, the body balance is very important.

3. Approach run

20 to 30 mts away from the vaulting box to start the running with the pole steadily and high knee action. When you reach the check mark, plant the pole in the vaulting box and kick the floor to go up.

4. Planting the pole

When the competitor reaches the check mark he should plant the pole into the box. Join the left hand with the right hand, push the right shoulder and both the hands

(47)

(iii) Supports for the cross bar

The cross bar shall rest on pegs pointing in the direction towards the landing area. The supports shall extend not more than 5.5 cm and not more than 1.3 cm in diameter, which should extend 35 – 40 mm above the pegs.

The distance between supports is minimum of 4.30 meters and maximum of 4.37 meters.

(iv) End Pieces of Cross Bar

It shall have 30 mm to 35 mm in diameter, square the length of the end piece is between 15 cm to 20 cm and should be semi circular.

(v) Landing (Pit) Area

The minimum dimensions of the landing area is 5 x 5 meters, for international competitions the length, width and height of the landing area will be 7 x 6 meters. The front pieces must be 2 m long.

VARIOUS STAGES

1. Grip
2. Carry the pole
3. Approach run
4. Planting
5. Crossing the bar
6. Landing

4. Flight in the air
5. Landing

1. Approach run

The length of the un-up is determined by the height of the jumper and his ability to accelerate in the run. According to analyzes carried out at recent Olympic Games, the best athletes use a run-up from 37-50m in length (incase for women 33-40). The athlete should mark the starting check mark 14 to 16 strides from the take – off board. If the athlete who is taking off with left leg, he should start running with right leg. Then he starts the approach run steadily and gradually increase the speed towards the take – off board.

2. Penultimate stride

The last two strides before the take off is called penultimate stride. In this time, the athlete shrugs his body little downward and the length of the stride decreases. That is easy way to fly in the air.

3. Take – off

The length of the jump depends not only on horizontal speed but also on the speed and power of the take-off. After completion of Approach run (penultimate stride), step on the take off board with the stronger foot and jump up in the air by pushing the take off board. After take off (or) jumping in the air the hands should be vertically raised. The Non-

take off leg should be raised high. The last step is executed more quickly and the whole foot is placed on the board, ahead of the projection of the center of gravity.

Plasticine Indicator (No Jump indicator)

Plasticine indicator is called no jump indicator, it is placed at the inner edge of the Take-off board. The judge at the take off board must watch the competitors does not overstep the scratch line. If a no jump indicator is not available the judge should build one moist sand which will clearly show if it is touched by toe or spike. It is a foul only if contact is made with the ground or the no jump indicator.

4. Flight

Jumping styles vary according to the development of the athlete and his muscular characteristics and the bone structure. The most common techniques are,

1. The Sail (common among beginners)
2. The Hitch kick (1-2-3 strides and a half in the air)
3. Hang (extended jump or glide)

(i) Hitch Kick

After jumping in the air from the take off board the athlete swing (or) rotate their legs like pedaling in cycle in the air into 2 or 3 pedaling style, and the legs are closed together before landing. When legs are pedaling the arms alternatively with legs movement.

4. POLE VAULT

Runway

The minimum length of the runway shall be 40 meters, when the conditions permit it is 45 meters.

1. The width of the runway is 1.22 meters.
2. The runway should be marked by white lines with 5cm as width.

Implements

(i) Upright

Any style of uprights or posts may be used provided they are rigid.

(ii) Cross Bar

It is made up of Fiber glass, Metal or other suitable material.

1. The length of the cross bar is 4.48 mts to 4.52 mts.
2. The maximum weight of the cross bar is 2.25 kg.
3. The circular shape of the cross bar is 30 mm diameter.
4. It should have the gap of maximum 3 mm

3.Fosbury Flop

The Fosbury flop was introduced by Dick Fosbury, who won the high jump at the Mexico Olympics in 1968. His technique for clearing the bar, his run up was also very notable because it was in the form of a semi- circle, and he took off with his foot at an angle of about 20 degree relative to the plane of the uprights. At the point of take – off Dick Fosbury with a vigorous bending action and driving up of the free leg, supported by an alternated movement of the upper limbs, rose completing a rotation on the longitudinal axis of the body and then prepared for flight with his back to the cross-bar.

Next he performed his rotation on the transverse axis of the body and at the extreme point of the parabola, he arched himself and continued his trajectory on this position until, so as not to knock down the cross - bar, he straightened his leg and landed on his back bowing his head on to his trunk so that the impact was taken by the top part of the back, avoiding unpleasant injuries to the cervical part of the spinal column.

4. Landing

Safe landing is required on the landing area.

(ii) Hang style

After the take off the athlete do the back arch the arms should be vertically raised above the head, the legs are straighten back, and before landing brings the legs and arms to extend forward, and the legs are closed together before landing.

5. LANDING

After completion of his style in the air, before landing, the athletes should extend both the legs forward / straightened. While landing both the heels should be landed first on the pit. There are three landing techniques should be used to come out of the landing area. They are as follows.

1. Collapsed landing
2. Swing out landing
3. Scoop landing

1. Collapsed landing

While landing both the heels should be touched first on the pit and then toe, the whole body should brought forward and place the knees on the pit, at the same time the buttocks should be kept back on both the heels.

2. Swing out landing

After landing in the pit the athletes should turn his body 45° either right or left in forward and fall down on the ground with shoulder, first then buttocks and so on.

3. Scoop landing

Landing by heels on the pit and push forcefully the sand and makes a dig and place the buttocks on the dig by extending the legs straight.

The competitor commits fouls if he;

1. Take off beyond the take off line.
2. Delaying more than 60 seconds.
3. After landing walking back towards the run way.
4. Performing acrobatics during the jump.
5. Uses illegal style of jump.

Rules

1. The order in which the competitors make their attempts must be decided by drawing lots.
2. Each competitor will be placed according to his best jump.
3. When there are more than eight competitors, each one is given 3 attempts and the 8 competitors with the best jumps are given further three jumps.
4. In case of a tie for the eight position, each competitor involved in the tie has three additional attempts.
5. When there are eight or less competitors, each one is allowed six trials.

3. Clearing the bar

1.The scissors

Towards the end of the 19th century, an American named Mike Sweeny proposed the scissors jump as an alternative to the frontal clearance. The scissors involved passing one leg over after the other at the same time bending the trunk towards the knees when clearing the bar. It consisted of the following movement:

1. While the forward leg was the cross – bar the other one kicked upwards, causing the chest to rotate towards the direction of jumping and a landing on the feet.
2. With the use of this style the world record began to rise this style, the world high-jumpers introduced minor adjustments to the technique according to their physical characteristics and talents.

2.The Straddle

Towards the middle of the 1930s another American Dave Albritton, proposed a radical new technique for clearing the bar, involving the body being parallel to the bar, but with the stomach downwards rather than with the body sideways. Thus the straddle was born, which was clearly demonstrated by the Soviet trainer Vladimir Mihailovic Dyachkov and put to good effect by Valeri Brumel, who took the world record to 2.28m in 1963.

1. Scissors
2. Straddle Roll (or) Belly Roll
3. Fosbury Flop

Various stages

1. Approach run
2. Take – off
3. Crossing the bar/ clearing the bar
4. Landing

1. Approach run

The jumper can approach either from the left side or right side of the cross bar with 25 mts long and medium speed. The angle of approach run and the number of steps vary according to the level of the athlete.

2. Take off

Jumper can stand either right or left one arm away from the cross bar. Then down vertically draw the line that may be considered as take off line. When the jumper start to approach towards crossbar, used his power leg on the take off line for make a jump.

6. Once the competition is under way, competitors are not allowed to use the runway for trail attempts.
7. All jumps must be measured from the nearest mark in the landing area made by any part of the body or limbs of the athlete to the take-off line or its extension and at right angles with the take-off line.
8. If a competitor takes off before the board or the line this does not constitute a foul.

2. TRIPLE JUMP

The triple jump shall consist of a Hop, step and jump in that order. This is the English definition of the jump. The hop must be executed on the same leg which was used for the take off (right-right or left-left). In the step the support is transferred to the other leg. The final jump is a proper long jump.

1. It shall not be considered a failure if the competitor, while jumping, touches the ground, with the “sleeping” leg.
2. There are six stages when taking Triple jump. They are as follows
 - (1) Approach run
 - (2) Take – off
 - (3) Hop

(4) Step

(5) Flight

(6) Landing

1. Approach run

The length of the run-up is determined by the height of the jumper and his ability to accelerate in the run. According to analyzes carried out at recent Olympic Games, the best athletes use a run-up from 37-50m in length (in case for women 33-40). The athlete should mark the starting check mark 14 to 16 strides from the take – off board. If the athlete who are taking off with left leg, he should start running with right leg. Then he start the approach run steadily and gradually increase the speed towards the take – off board.

2. Take – off

The length of the jump depends not only on horizontal speed but also on the speed and power of the take-off. After completion of Approach run (penultimate stride), step on the take off board with the stronger foot and jump up in the air by pushing the take off board. After take off (or) jumping in the air the hands should be vertically raised. The Non-take off leg should raised highly. The last step is executed more quickly and the whole foot is placed on the board, ahead of the projection of the center of gravity.

3. Hopping

The athlete should be used to land on the ground which he was used to take off. For example: The athlete has take off for his left leg means he should land or hop in the same leg. During hopping the non take off leg (or) rear leg has no movement, that's why it is called sleeping leg.

4. Step

After completion of hopping the athlete used to take one more step with his non take – off, foot before landing is called step. Here the athlete does the bounding action to do the step.

5. **Flight** and

6. **Landing** procedures are similar to long jump.

3. HIGH JUMP

The high jump as we know it today first became popular in the 19th century. Subsequent perfecting of the jumping technique took place in the development stages, but it has depended particularly on modification of the rules for the event and on the elimination of some restrictive conditions.

Various techniques should be used by the jumper to cross the bar. Depends upon their ability they used any one of the following techniques.

c) High carry

High carry method is associated with those throwers who tend to use a direct over the shoulder type withdrawal which ends with a turning back of the shoulders at the arm and javelin is reaching near full backward extension (To held on above the head).

A thrower must develop his carry position to suit his technique of withdrawal of the javelin in preparation for the delivery stride.

2. Approach run

During approach run the thrower has to mark the point of starting and the point of check mark with javelin. While running the javelin should move front and back, and slowly increase the running speed still you reach you the check mark.

The Run-up : The run – up has two parts. They are

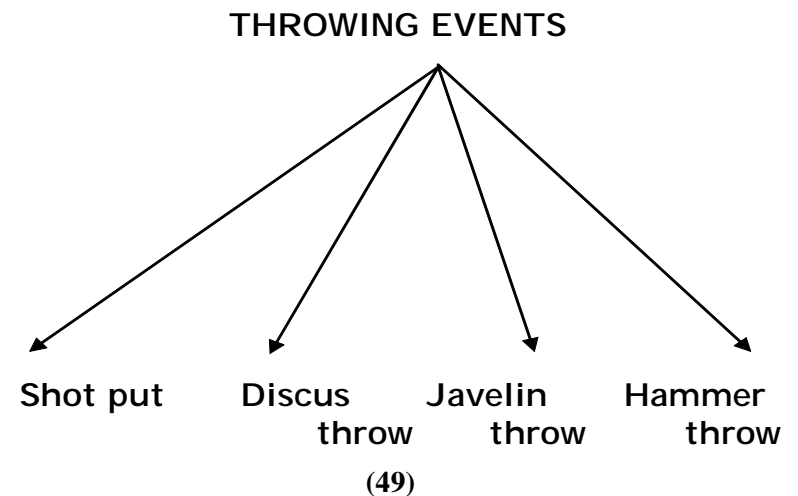
- (i) The cyclic part
- (ii) The acyclic part

The cyclic part speed is built up sufficiently so as to allow for a further increase over the last strides. The run-up should be easy and relaxed, heading the thrower to a powerful explosive all-out release.

- 8. Arm length
- 9. Balance
- 10. Endurance

The competitors are allowed three to six trails and three to eight of the best competitors are allowed three more trails. Incase of a tie for the final place, the competitor shall be allowed three additional trails. The conditions of the competition must be explained to the competitors before its commencement. The best throw of the competition out of all trails taken by the competitors shall be credited in resolving a first place tie. No markers or marks are allowed to be put in the throwing sector.

Competitors may use an adhesive substance on their hands for better grip, and can also wear a belt of leather or some other material to protect the spine from injury. However, taping of the fingers or use of any other devise on their hand which might assist in throwing is not allowed.



1. THROWING THE SHOT PUT

The competitor must begin the throw from a stationary position within the circle. The shot shall be put from the shoulder with one hand only and, shall touch or be in close contact with the chin. The hand shall not be dropped below this position during the act of putting.

Practice trials are not allowed after the commencement of the competition. Competitors are not allowed to put on gloves nor are they allowed to spray or spread any substance either on the surface of the throwing circle or on their shoes.

Basic Principles

1. Forces must be applied along a straight line.
2. Newton's 3rd law – Action and Reaction are equal and opposite.

Specifications

1. Weight of the shot for men - 7.260 Kg
2. Weight of the shot for women - 4.00 Kg
3. Diameter of the shot put circle- 2.135 m
4. Angle of the shot put sector - 34.92
5. Dimension of the sector - 20 x 12 m

a) Normal grip

The above thumb and middle finger is behind the edge of the grip cord and the index finger is partly curled around and behind on the javelin's shaft.

b) Middle and Thumb grip

The index finger and thumb is behind the edge of the cord binder and the rest of the fingers around the cord itself.

c) 'V' grip (or) Glow grip

The Javelin is held between the index and the middle fingers at the edge of the cord binder and rest of the fingers around the cord itself.

Carry

The javelin is carried above the shoulder of the throwing arm. Three commonly used methods of carrying the javelin during the approach run's cyclic phase.

a) Low carry

The low carry is generally associated with a circular type arm action in the 'withdrawal' (To held on waist level).

b) Medium carry

The medium carry is generally favored expansion in the withdrawal. (To held on eye level).

1. A head
2. A shaft and
3. A cord grip

The javelin throw comprises the following technical elements.

1. The grip and carry
2. The Approach run
3. The withdrawal
4. The impulse stride
5. The throwing stride
6. The release
7. The recovery

1. Grip

When executing their throws, javelin throwers may hold the javelin only by the whipcord grip. They may hold the javelin at the end of the cord grip with one or more fingers and the thumb touching the javelin shaft. Javelin throwers have some leeway in how they grip the javelin. It has three types how they can hold the javelin. The javelin is held behind the cord binder the rear edge of which offers a slightly raise border for gripping the javelin.

Stages / Method

1. Holding of the shot
2. Tucking (or) Placement of the shot
3. Stance
4. Glide
5. Release

1. Holding the shot

- a. The shot rest on the root of the fingers, and should not touch the palm.
- b. All the fingers are carry the shot except the little finger which is only support.

2. Placing (Tucking) the shot

1. The shot must be placed between chin and clavicle.
2. The shot does not go beyond the shoulder line.
3. The hand should be parallel to the ground.

3. Stance

The stance varied according to the using the style of Athletes.

Techniques (Style Of Putting)

The thrower can be used 3 style when putting the shot

1. Standing throw
2. 'O' Brien technique (or) Gliding
3. Rotation (or) Disco put

1. The 'O' Brien Technique

The distance a shot travels depends upon its height of release, velocity at the moment of release and the Angle of projection. The optimum angle of projection will vary depending on the height of the release, and the distance of the put, it will be approximately 34.95. The correct technique is the one that will result in the greatest velocity at release. The motion of a projected object is influenced by the exact point of application of the propelling force.

Holding the shot

The procedure for gripping the shot is to hold it in the left hand and lay the right hand loosely on top with the fingers spread slightly. The putter holds the shot in his right hand. Where it rests on the "base" of the fingers. The three middle fingers are only slightly splayed while the thumb and the little finger give the shot lateral support, securing a safe position of the shot.

The Reverse

The reversal is to serve as a follow through after the thrust and to retain balance in order to avoid fouling. After the discus has left the hand the thrower will have to reverse the feet rapidly and lower the body weight to maintain balance. The right leg must be brought forward quickly and planted firmly close to the rim of the circle, mean time the left leg swings back the body is bent at hips and right knee flexes to drop the centre of gravity into a stable position.

3. THROWING THE JAVELIN

The javelin throw distinguishes itself from other throwing events of shot-put, discus throw and hammer throw. These throwing events must be from a circle, the javelin must be thrown from behind the arc of a sector drawn with a radius of 8 mts. Due to the aerodynamic nature of the implement and its relative weight, the event does not require great strength. The event does require few less technique in order to achieve high level results.

Javelin consists of three parts namely the head, shaft and grip. The shaft is made up of either Aluminium or fiber. At the tip of the shaft a sharp head is fixed. At the center a grip made of thread is fixed. The Javelin is round and broad at the center. The circumference is small in the front and rear. It has three main parts

athlete drives off the left foot. The effective throwing position is one of "muscular wind" the hips displaced from the feet, shoulders from the hips and discus from the shoulders.

The run across the circle is initiated by the driving action of the left leg. Synchronized with the swing of the right leg. This drive carries the thrower halfway across the circle. The right foot landing approximately on the centre line with the leg well bent and the shoulder and body weight back. His left leg is pointing toward the direction of the throw, his right shoulder is facing the rear, his throwing arm is well behind the shoulder his left arm is curled and the discus is flat.

The Release

The throw begins with a forward and upward drive from the right foot. The shoulder should now come in slightly after the hip and the arm strikes from the low point, the thrower reaching out as far as possible to give as much distance from axis of rotation as he can. The left leg should now straighten, as the arm strikes. The discus will leave the hand in line with the right shoulder and should be squeezed out of fingers, each digit applying its force in turn and spinning of the first fingers last. The discus is spun clockwise. A good thrower will release the discus at a 35°-40° angle. The release must be smooth and rhythmic using the force generated from the lower body.

The stance

He should stand facing the rear of the ring with his back in the direction that he is going to throw. The shot should be held in right hand, supported by thumb and fingers. The hand holding the shot will be placed into the hollow of the collar bone in such a manner that it does not rest on such a manner that it does not rest on the shoulder but against the right side of the neck and the jaw. The elbow of the right arm is slightly raised and pressed forward. The upper arm points forward and downward. The head remains in its normal position. The eyes should be focused on a point to the rear of the ring and about five to ten yards away. He should stand erect in a telexed attitude, the left arm is held either out in front of the face or relaxed above the head the left front behind the right about one foot with just the toes touching for balance.

The glide or drive

The purpose of the glide is to gain momentum while moving across the ring and to lead into the correct position for the delivery. The initial movement is to lower the trunk and raise the left leg causing the body to form a "T" shape with all weight carried on the right leg. The head, shoulders and hip remain square to the rear of the circle, and the right leg flexes in preparation for the drive across the ring proper balance at this point is extremely important.

2. The Rotation or Disco-put Technique

The Starting Position

The putter stands at the rear of the circle facing 180° away from the throwing direction. The left foot is along the centre line of the circle and the right foot is placed laterally to the right of the centre line about shoulder width apart or just this point in most cases. The grounding of the left foot at the stop board denotes the arrival of the thrower into the delivery stance.

Preliminary Movements

To start the turn, the putter begins by swinging the shoulders, trunk and left arm along with the left and then to the right, as the body weight shifts correspondingly from leg to leg in coordination with the rhythm of the shoulders, trunk and left arm. Both knees are semi – flexed while this side to side swaying movement is taking place to break the inertia and set the pattern of movement to follow.

Turn

The double support phase of the turn begins at the end of the preliminary movements. The thrower is completely over his right leg with the trunk and shoulders well twisted to the right. From this position the thrower begins unwinding his upper body in the direction of turning with a wide

throwing arm bang to the right side along the thrower's thigh with the head and eyes focused to a point about 5 meters behind the circle. There are generally three positions that a thrower may adopt in relation to the line of direction. The experience, technical skill and comfort of the thrower must decide which of the three starting positions suit their ability.

The left foot is generally placed a few centimeters back from the rim of the circle, in order to avoid fouling by bursting the sole of the foot on the top edge of the rim of the circle as the pivot is executed.

The preliminary swings

The thrower should position himself at the rear edge of the circle with his back to the generally facing the direction of throw and his feet slightly wider than hips. The discus should be flat and facing downwards on the arm swung at shoulder height so that the arm and discus go well behind the right shoulder. The free arm rests comfortably across the chest. The thrower's weight should move easily from one foot to the other. On the final preliminary swing, the arm is swung back as far as possible so that the body weight is over a straight right leg.

Coming across the circle

The initial movement is begun the hips are turned and a pivot is made on the ball of the right foot as the

Specification of discus

1. Weight of the discus for men : 2 kg to 2.025 kg
2. Weight of the discus for women : 1 kg to 1.025 kg
3. Diameter of the discus for men : 21.9 cm to 22.1 cm
4. Diameter of the discus for women: 18 cm to 18.2 cm
5. Angle of sector is : 34.92°

Various Stages

Hold

The hand is placed flat against the discus surface, the upper joints of the fingers grasp the rim of the discus. Its center of gravity lies between the index and middle finger. Due to a slight bending at the wrist the upper face of the discus touches the arm, because it prevents the discus from falling out of the hand in the subsequent movements.

Starting position

The starting position at the rear of the circle is with the thrower facing 180 degrees away from the throwing direction. The two feet are usually placed about shoulder width apart or slightly more in the case of very tall throwers. The toes point naturally outwards with the weight of the body evenly distributed over both feet. The discus and

sweeping left arm action parallel to the ground, a slight forward tilt to trunk in a semi sitting position. The single support phase of the initial part of the turn is followed by a brief non support phase when both feet are off the ground and the whole body is turning on its vertical axis, and continues turning after the right foot lands around about the center of the circle.

Follow through (or) Reverse

When the right leg has driven really well and effectively and the action has been timed correctly the athlete will be well over the left foot as the arm strikes. Immediately after the shot has left the hand, he will find himself falling over the stop – board. In order to prevent himself fouling, the left foot is rapidly withdrawn and the right leg brought forward, the toe of the right foot striking the inside edge of the stop – board. At the same time the body weight is lowered in order to be more on balance by lowering the centre of gravity.

Valid Trial

For a valid trial, the shot shall fall completely within the inner edges of the landing sector.

Fouls

1. Throwing the shot from behind the shoulder
2. Touching outside the circle or the top of the stop Board

3. Shot landing on the sector line or outside the sector line
4. Delaying more than 60 seconds to throw.

Rules

1. The use of gloves is not allowed
2. At the competition area, each competitor may have a maximum of two practice trials which should be made in draw order, under the supervision of the judges.
3. Once the competition has begun, competitors are not permitted to use implements for practice purposes or to use the runway or ground within the sector for practice trials, with or without implements.
4. No device of any kind – i.e., taping of two or more fingers together, which in anyway assists a competitor when making a throw, shall be allowed. The use of tape on the hand shall not be allowed except in the case of the need to cover an open cut or wound.
5. A better grip, competitors are permitted to use a suitable substance on their hands only.
6. To protect the spine from injury, a competitor may wear a belt of feather or other suitable material.

7. For a valid trail, the tip of the javelin shall fall completely within the inner edges of the landing sector.
8. If the implements breaks during a throw or while in the air, and if the competitor thereby loses his balance and contravenes, it shall not count as a foul throw, provided one attempt was made in accordance with the Rule.
9. Implements shall be carried back to the starting line and never thrown back.
10. The competitor shall not leave the runway until the implement has touched the ground.

2. THROWING THE DISCUS

The object of the spin in the discus throw is to generate power and speed within the circle to apply to the discus itself, and the more power that is applied to the discus, then further it will go the angle to release of discus, the position of the discus during its flight are important factors. It has three types,

1. Half rotation
2. Full rotation
3. One and half rotation

6. 5000m Run – Arc start **or** Group start
7. 10000m Run – Arc start **or** Group start
8. 400mts Hurdles - Full stagger distance
9. 4 x 100m Relay – Full stagger distance
10. 4 x 400m Relay – One and Half stagger distance with diagonal distance.

2.Non- Standard Track

The track which is not satisfying the conditions of standard track is called as Non-standard track and the 400mts track without curb (raised border) is also treated as Non-standard track. Usually 200mts track is called as Non – standard track.

Some of the disadvantages of Non-standard track:

- a) Sprinters very difficult to show their real capacity.
- b) Very difficult to run more than 6 competitors at a time.
- c) Very difficult to conduct Hurdles and Relay races.
- d) Very difficult to conduct both track and field events simultaneously.

Method of finding Running Distance Radius for 200 mts track if 36 mts as straight.

3. Five – stride – Rhythm

The three known stride Rhythms – the three stride rhythm. The five stride Rhythm and seven stride rhythm. It is five stride – Rhythm which is the most widely accepted, which comprises the following phases:

- (i) The withdrawal of the javelin
- (ii) The impulse stride
- (iii) The throwing position
- (iv) The release
- (v) The recovery

(i) Withdrawal of the javelin

The withdrawal starts at the second stride of the five-stride rhythm and ends at the third stride. The throwing arm is drawn back in alignment with the shoulder axis. The palm of the hand is turned upward and extend the forearm, when the withdrawal is completed, the athlete's body has a marked backward lean.

(II) Impulse stride /Cross step / Three step (or) Five step Rhythm

When an athlete reaches the check mark with the left leg the action of throwing should be starts. The right hand is stretched backward with the javelin and left hand is brought in forward in front of chest. That is otherwise called "with drawl of the javelin".

The toe of the right foot must be deviate more than 30° from the run up direction. The left leg presses the body down low into the fourth stride, preventing the body's centre of gravity from lifting at the landing of the right leg, which must be allowed to bend when it receives the body weight.

(iii) Throwing Position

The throwing position starts at the moment when the athletes right foot makes contact with the ground after the impulse stride. The right leg can start to extend and doing s introduce the release, the full extension of the forearm by the hand is important under no circumstances must the arm be flexed at the wrist.

(iv) The Release

The release is initiated by a forward and upward stretching of the right leg at the knee and ankle joints, driving the right hip forward. The shoulder and the hip axes now run parallel and almost at right angles to the direction of the throw. The throwing arm is not yet stretched while the right leg is extended, the heel is raised, allowing the pressure of the ball of the foot to act longer on the body. The throwing arm now comes into its sphere of action. When the throwing arm begins to strike, the elbows are raised until it is level with the heed and pointing in the throwing direction.

Method of Finding Running Distance Radius for 400 mts if 80 mts as straight.

$$2pr = 240 \text{ (Circumference of two curves)}$$

$$r = 240/2 \pi$$

$$240/2 \times 3.1416 = \frac{240}{2 \times 3.1416} = \frac{240}{6.2832}$$

$$= 38.20 \text{ mts}$$

For Standard Track (With Kerb)

Marking Distance Radius (MDR or CR) = RDR – 0.30 m

$$\text{MDR} = 38.20 - 0.30 = 37.90\text{m}$$

For Non-standard Track (without kerb)

$$\text{MDR} = \text{RDR} - 0.20 \text{ m} = 38.20 - 0.20 \text{ m} = 38.00\text{m}$$

Starting points in 400 mts Track

1. 100m Run Men & Women
100m Hurdles for Women - Parallel Method
110m Hurdles for Men
2. 200m Run – Half stagger distance
3. 400m Run – Full stagger distance
4. 800m Run – Half stagger with diagonal excess **Or** Arc start / group start
5. 1500m Run – Arc start **or** Group start

Running Distance Radius (RDR)

RDR is the path in which an athlete has to run in the curve to cover the exact distance. The chart below shows that RDR, CDR and area required to lay 400mts raised bordered track when the straights length varies.

Straight length in mts	Rdr in mts	Cdr in mts
79MTS	38.50	38.20
80MTS	38.18	37.88
84.39mts	36.80	36.50

The chart below shows that RDR, CDR and area required to lay 200mts Non raised bordered track when the straights length varies.

Straight length in mts	Rdr in mts	Cdr in mts
37.50MTS	19.89	19.67
40.00MTS	19.09	18.89

During the release the left side of the body must be in a flexed position. This is achieved by a sudden arrest of the backward movement of the left arm just when the right side of the body overtakes the left side the angle of release is between 30 and 36 degrees.

(v) The recovery

A distance of at least two meters from the arc will be required merely checks the forward speed of the body. Thus preventing from fouling. After the release, the right leg is forward in a springing movement. The reverse takes places to avoid stepping over the right foot must be planted transversely to the throwing direction, the upper body must be lean forward, the left leg is raised and brought back into the direction of the run-up. Javelin consists of three parts namely the head, shaft and grip. The shaft is made up of either Aluminium or fiber. At the tip of the shaft a sharp head is fixed. At the center a grip made of thread is fixed. The Javelin is round and broad at the center. The circumference is small in the front and rear.

Follow throw

After releasing the javelin the thrower to avoid his forward momentum (or) foul, then he placed his rear leg to brought forward for his rear leg and placed nearer to the board and to do hopping twice or threes. Then he come back behind the runway should not make foul.

Correct throw

The javelin should be caught in the grip. The javelin must be thrown forward from behind the shoulders. While throwing thrower should not cross the line of runway either in front or side. After releasing, the javelin should fall within the sector lines with the tip first touching the ground. The thrower still remains (leave) the runway only after the javelin lands on the ground.

6. THROWING THE HAMMER

The technique of hammer throwing is determined by the specific nature of the implement and the measurement of the throwing circle, which comply with the international rules. A complete throw consists of two preliminary swings and three turns on the left foot with an active push-off from the right leg at each turn. The following are the parts of hammer throw:

1. The Grip
2. The Initial position
3. The preliminary Arm swings
4. The Transition
5. The turns

Top Layer

Now-a-days all international competitions are being held on synthetic tracks. The thickness and material used for various layers of a synthetic track depend upon the product and preference of the particular firm (construction agency). Although, the material used for top layer by all the firms are synthetic tracks, but of different variations. It is advisable that whenever 8 lane synthetic tracks are being laid, efforts should be made for laying of another 4 lane synthetic track of the same material for training purposes.

Lane

Lane is the space between the two parallel lines.

Kerb

Kerb is the raised border (both inner and outer line) which is fixed permanently through the inner line of the first line and outer line of the last lane. Dimensions of curb is 5 x 5 cm (5 cm height, 5 cm width).

Curb Radius (CR)

Curb radius is the radius which is used to draw the curve. It is otherwise known as Marking Distance Radius (MDR). The curb radius varies according into the nature of the track.

TRACK MARKING

Track must be prepared according to the rules and regulations laid by **International Association Of Athletic Federation** (IAAF). The inner raised border should be 5cm in height and width by using brick, wood or any other suitable material. There shall be a minimum of 8 lanes and width of lane is 1.22mts and width of the line is 5cm. The straight lines are always marked by north to south direction and finishing line must be same for all races.

a) TYPES OF TRACK

The track is classified into two types based on its specifications.

1. Standard Track (with curb)
2. Non- standard Track (without curb)

1. Standard Track

The tracks are made either on plan surface (grass) or with the help of cinder/synthetic material which is skid proof and not too hard. To get maximum benefit from the cinder/right synthetic tracks, it is essential that proper care be taken at the time of the construction so that right materials are mixed in various layers as per required thickness.

6. The Release

7. The Recovery

The Grip

The inside grip of the hammer handle is laid against the pads of the middle phalanges of the left hand fingers. The right hand cuffs the left by putting the four fingers over the back of the middle and basal phalanges of the left hand fingers. The hammer must be held firmly but not tensely.

The initial position

The thrower stands at the rear edge of the circle with his back facing in the direction of the throw his feet are a little more than shoulder width apart and his knees are bent for stability during the arm swings. The thrower now places the hammer head behind his right leg as far to his rear as possible. He then turns to the right until the right shoulder points in the direction of throwing. The hammer wire forms a straight line with the extended left arm.

The preliminary arm swings

The main function of the preliminary swings is to break the inertia of the thrower and hammer and to set a rhythmic pattern of movement by which initial acceleration is transmitted to the hammer. During the preliminary swings, the arms are kept long and relaxed and form and extension

of the hammer wire. They begin with this movement when the hammer is at its lowest point and end it by turning the trunk to the right. The thrower must counteract the increasing centrifugal force.

When the hammer moves backwards, he presses his hips forward. After the first arm swing the thrower keeps the lowest point of his hammer well to the right, at around 290 to 300 degrees, and the highest point somewhere around 120 degrees.

The Release

The delivery phase begins when the right foot touches the ground after the third turn. The landing of the right foot must be fast and firm in order to match the acceleration of the implement, which is racing down to the lowest point with the beginning of the active straightening of the legs. Just before the hammer is released, the left knee straightens. When the implement leaves the hand, the vertical line of projection of the thrower's head should not go beyond the right heel. If the feet are in a stationary position, thus is a clear proof of a correctly executed delivery. The hammer is released at shoulder height. The left shoulder points in throwing direction and back is well arched. The most valuable angle of release in the hammer throw is 42 and 44°.

1st Day Events

1. 100 mts Hurdles
2. High Jump
3. Shot put
4. 200 mts Run

2. Decathlon

Decathlon consist of 10 events which shall be conducted on 2 consecutive days in the following order.

1st Day Events

1. 100 mts Run
2. Discuss throw
3. Pole vault
4. Javelin throw
5. 400 mts Run

2nd Day Events

5. Long Jump
6. Javelin
7. 800 mts Run

2nd Day Events

6. 100 mts Hurdles
7. Long Jump
8. Shot put
9. High Jump
10. 1500 mts Run

Note :

1. Winners will be decided based on the points of all events.
2. There is no heats in the running events and every running events are treated as finals.
3. Three attempts only will be given to field events.
4. Two false start should be permitted.

3. Decathlon

Decathlon consist of 10 events which shall be conducted on two consecutive days in the following order, with minimum 30 minutes interval between two consecutive events and 10 hours interval for last event of first day and first event of second day.

1st Day Events

1. 100 mts Run
2. Long Jump
3. Shot put
4. High Jump
5. 400 mts Run

2nd Day Events

6. 110 mts Hurdles
7. Discus throw
8. Pole vault
9. Javelin throw
10. 1500 mts Run

Combined Events For Women

Combined events for women there are two category mentioned as follows.

1. Heptathlon
2. Decathlon

1. Heptathlon

Heptathlon consist of 7 events which shall be conducted on 2 consecutive days in the following order.

The Recovery or Follow Through

To avoid stepping over to thrower must absorb the impact by reversing the legs and lowering the body's centre of gravity, thus increasing stability.

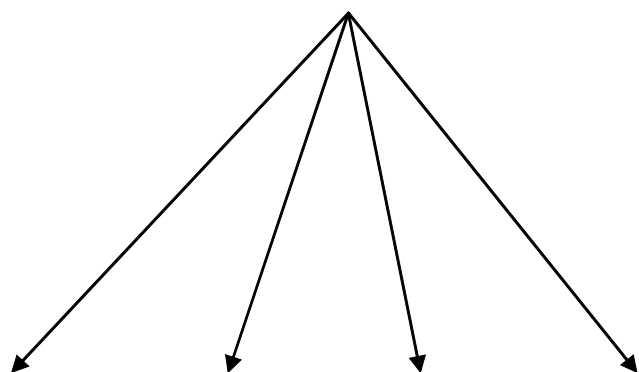
C.COMBINED EVENTS

Multi-discipline events has been included in athletics programmes since eight century B.C. though originally the five events for men included a run, long jump, discus throw, javelin throw and wrestling. The 10 events with we are familiar today were practiced first in Scandinavia, and the event is now developed in importance for the genuine all – rounder, who may not be one event, but who can maintain a high overall standard. Today it is an event for the decathlon or heptathlon specialist who prepares for it and competes in the event as a whole rather than in series of separate competitions. The decathlete or heptathlete needs to be a balanced personality with well –rounded physical development.

The Combined events are an individual events consist of several number of events of different category. For men and women combined events are classified into 4 types according to the level of competitors. The events are held over two days, and they are chose as a true test of skill, stamina and technique. The decathlon combines sprints with middle distance running, throwing, jumping, hurdling and vaulting.

There is a rest period of 30minutes between each event. A competitor is awarded points for his best performance in each event, as calculated by reference to scoring tables produced by the IAAF. The decathlon entered the Olympic programme in 1912.

COMBINED EVENTS



Pentathlon

Heptathlon

Octathlon

Decathlon

They are as follows.

1. Pentathlon - 5 events
2. Heptathlon - 7 events
3. Octathlon - 8 events
4. Decathlon - 10 events

The Combined events such as pentathlon, which shall be conducted on one day, and other combined events such as Heptathlon, Decathlon and Octathlon should be conducted on two consecutive days as in the prescribed order.

Combined Events for Men

1. Pentathlon
2. Octathlon (Youth Boys)
3. Decathlon

1. Pentathlon

The pentathlon is a five-events test of all-round ability. The men's version comprises the long jump, javelin, 200m., discus and 1500 m in that order on one day. Scoring is on the same basis as the decathlon. The pentathlon has long been a most popular women's event, and was introduced into the Olympic schedule in 1964.

2. Octathlon (Youth Boys)

Octathlon consist of 8 events which shall be conducted on consecutive two days in the following order.

1st day Events

1. 100 m Hurdle
2. Long Jump
3. Shot put
4. 400 mts Run

2nd day Events

5. 110mts Hurdles
6. High Jump
7. Javelin
8. 1000 mts Run

i) By seeing their timing in 1/100 of second. If the tie still remains.

ii) Lot shall be used to decide the best loser.

b) Field events

During horizontal or distance events, where there are more than eight competitors, each competitor shall be allocated three trials and the competitors with the best valid performances shall be allowed three additional trials.

In the event of a tie for the last qualifying place it shall be resolved by seeing the second and third best performance among the tied competitors and if tie still remains, the tied competitors shall also be allowed to for the three additional trials.

In the event of a tie for any position, it shall be decided first by using the available rules. If the tie still remains it concerns for the first place, the competition shall be re-run to decide the swimmer which is known as concerns any other place, the result will stand. That means the tied competitors shall be awarded the same place.

Note; Its best performance as achieved during field braking, it shall also be considered.

$$2\pi r = 128 \text{ (Circumference of two curves = } 200 - 72 \text{ (} 2 \times 36 \text{))}$$

$$2 \times 3.14 \times r = 128$$

$$\text{RDR or 'r' = } 128 \times \frac{1}{2} \times \frac{1}{3.14} = 20.37 \text{ m}$$

$$\text{MDR = RDR - 0.20 m}$$

$$\text{MDR = } 20.37 - 0.20 = 20.17 \text{ m}$$

b) TYPES OF RUNNING SURFACE

1. Mud
2. Grass
3. Cinder
4. Synthetic Track

c) NEED FOR A STANDARD TRACK

1. Track must be prepared according to the rules and regulations laid by International Association of Athletic Federation (IAAF).
2. The length of the standard track shall be 400 mts.
3. The track should be laid out from North to South direction.
4. Track shall consist of two parallel straights and two curves of same radius. The length of the curve will be more than the straight.

5. The track should have minimum of 6 lanes and maximum of 8 lanes.
6. The inside and outside of the track shall be bordered by a kerb. That is raised border of maximum 5 x 5 cm.
7. The track should have common finishing point.
8. To conduct all the running events up to 10,000 mts within a track and also the jumping and the throwing events simultaneously with the track events.
9. The track should have proper drainage system.
10. The track should be leveled without any ups and downs.
11. The running direction is such that the athlete's left hand side is towards the centre of the track.
12. The synthetic material will be used as the surface of the track.

STAGGER DISTANCE

1. There will be no stagger for the first lane athlete.
2. As and when the width of the lanes changes, the stagger distance also changes.
3. Staggers are needed only when the athletes are required to run in curves also in their lane.
4. Staggers will not change according to the increase in the length of curves.

6. Angle sector is : 34.92°
7. Wire : Single up broken and straight length of string steel wire 3 mm in diameter
8. Handle : Curved or straight grip with maximum width inside of 130 mm and maximum length inside of 110mm.

BREAKING TIES IN ATHLETICS

Tie breaking in can be steadied separately during preliminary rounds and finals to decide the positions.

1) Preliminary rounds;

a) Track events

Preliminary rounds (heats) shall be held in track events when the number of competitors is more in number to reduce the number of competitors to 6 or 8 to conduct the finals. In all preliminary rounds at least first and second in each heat shall qualify for the next round and it possible at least three in each heat shall qualify. The qualification for the next race shall be decided either according to their placings or according to their times (best losers). During this selection if there is a tie among the best loser, the following steps shall be applied to decide the best loser for the next round.

The Ring

The ring shall be placed to the level of outside ground. It must have a height of 1.4cm to 2.6 cm from the inside floor of the circle and 6mm thickness.

Specification of Hammer

The hammer consist of three parts, a metal head, a wire and a grip. The head shall be of solid iron or other metal not softer than brass. The head should be spherical in shape with smooth surface. A steel wire, with a diameter of 3mm, is attached with the head at one end and with a handle on the other end.

Overall weight of the hammer

1. Men : 7.26 kg to 7.285 kg
2. Women : 4 kg to 4.025 kg

Overall length of the hammer

1. Men : 117.5 cm to 121.5 cm
2. Women : 116 cm to 119.5 cm
3. Diameter for men : 11 cm to 13 cm
4. Diameter for women : 95 cm to 110 cm
5. Head : Solid or other suitable material

5. When staggers are marked, the diagonal excess distance also to be taken into consideration.

Formula

$$\text{Half stagger} = [W (N-1) - \alpha 0.10 \text{ m}] \pi$$

$$\text{Full stagger} = [W (N-1) - \alpha 0.10 \text{ m}] 2\pi$$

$$\text{One and Half stagger} = [W(N-1) - 0.10\text{m}] \times 3\pi$$

Where,

W – Width of the lane,

N – Number of the lane

π – 3.1416 (Standard value)

Stagger distances for Non- standard Track

$$\text{Half stagger} = W (N-1) \times \pi$$

$$\text{Full stagger} = W(N-1) \times 2\pi$$

$$\text{One and Half stagger} = W (N-1) \times 3\pi$$

Diagonal (excess) Distance

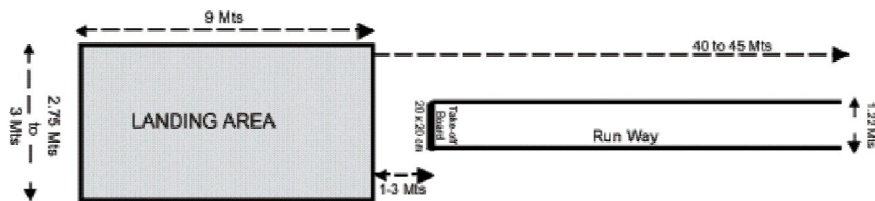
The excessive distance run by the athletes other than the first lane runner for 800mts and 4 x 400mts relay to reach the first lane after the first and three curve respectively is called diagonal excess. This diagonal distance should be calculated for each lane and it should be added with half stagger, and 1½ stagger respectively in the starting point itself.

UNIT - V

FIELD MARKING

Layout of Area for all Field Events with all Specifications

a) LONG JUMP



Specifications

Runway

- Approach run - 40-45mts
- Width of the lane - 1.22
- Width of the line - 5cm

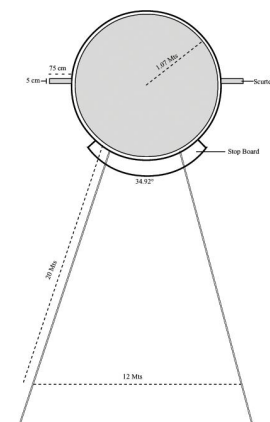
Jumping pit

- Length - 9 mts
- Width - 2.75 mts to 3 mts
- Distance of the take off Board from the nearest edge - 1 – 3 mts of landing area

(84)

- 9. Width of the cord grip : 150 mm to 160 mm for men
- 10. Width of the cord grip : 140 mm to 150 mm for women
- 11. Angle of sector is : 29°

h) THROWING THE HAMMER CIRCLE



The hammer is thrown from a circle, shielded on three sides by a netting a cage on a metal frame, and must land within the marked sector. The competitor who achieves the best distance with his throw is declared winner. A total number of five judges watch for infringement within the circle, the other three judges supervise the field. If the hammer breaks while attempting a throw, then the attempt shall not be counted. Under such circumstances, if the competitor loses his balance and commits a foul, it won't go against him.

(93)

The javelin is made of wood or metal shaft with a sharp metal head. There shall be a cord grip around the centre of gravity of javelin. The cord grip should not exceed the diameter of the shaft by more than 8mm. The grip shall be of uniform thickness.

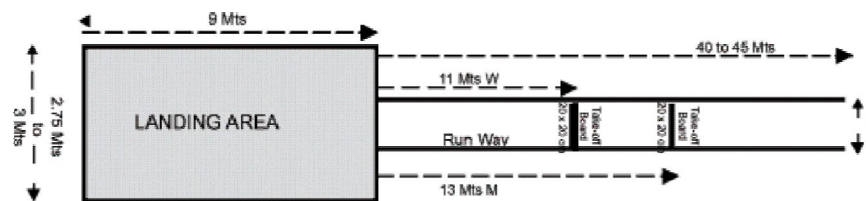
SPECIFICATIONS

1. Length of the runway : 30 to 36.5 mts
2. Width of the runway : Two parallel White lines 5 cm wide and. 4 mts apart
3. Width of the arc : 7 cm extended by 75cm long and 7 cm wide.
4. Weight of the javelin : 800gms to 825 gms for men
5. Weight of the javelin : 600gms to 625gms for women
6. Over all length of the javelin : 2.60 mts to 2.70 mts for men
7. Over all length of the javelin : 2.20 mts to 2.30 mts for women
8. Metal head : 250 mm to 330 mm for men and women

Dimension of the Take- off Board (Wooden Board)

- Length - 1.20 mts to 1.21 mts
- Width - 20 cm
- Depth- 10 cm

b) TRIPLE JUMP



Specifications

Runway

- Approach run - 40-45mts
- Width of the lane - 1.22
- Width of the line - 5cm

Jumping pit

- Length - 9 mts
- Width - 2.75 mts to 3 mts
- Distance of the take off board from the nearest edge - 11m (w)
- of landing area 13m (m)

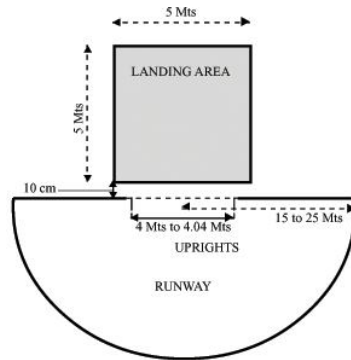
Dimension of the take off board

Length - 1.20 mts to 1.21 mts

Width - 20 cm

Depth- 10 cm

c) HIGH JUMP



Specifications

Runway

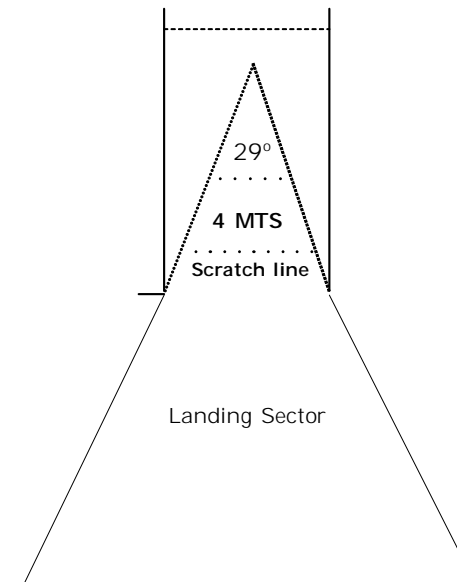
The minimum length of the runway shall be 15 meters. Except in international competitions, where the minimum shall be 20 meters. If conditions permit, the minimum length should be 25 meters.

High Jump Landing Pit

Pit : The pit is made of foam. The length of the pit shall be at least 5m, width 3m and height 60cm.

(86)

Javelin Throw Sector



IMPLEMENTS



Javelin



cord grip

(91)

Specifications

RUNWAY

The minimum length of the runway shall be 15 meters. Except in international competitions where the minimum shall be 20 meters. If conditions permit, the minimum length should be 25 meters.

High Jump Landing Pit

Pit : The pit is made of foam. The length of the pit shall be at least 5m, width 3m and height 60cm.

Uprights

The uprights should be of a rigid or any other suitable material, marked in centimeters. The uprights shall extend at least 10cm above the point up to which the cross bar can be raised. The distance between the uprights shall be between 4.00 - 4.04m.

Cross bar support

The support for the cross bar should be made of rigid or any other suitable material, which can be raised or lowered and can be adjusted up to a height of 2.30m.

Uprights

The uprights should be of a rigid or any other suitable material, marked in centimeters. The uprights shall extend at least 10cm above the point up to which the Cross bar can be raised. The distance between the uprights shall be between 4.00-4.04m.

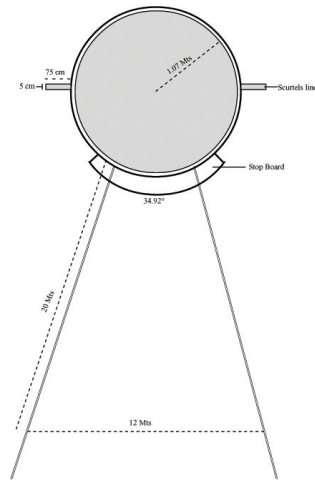
Cross bar support

The support for the cross bar should be made of rigid or any other suitable material, which can be raised or lowered and can be adjusted up to a height of 2.30m.

Cross bar

The cross bar is made of wood, or metal or any other suitable material. The cross bar should be circular with a diameter of 29 mm to 31 mm. The end of the bar shall be of concave or flattened surface of 150-200 mm in length and 29-35 mm in width. The length of the cross bar shall be between 3.98, to 4.02m.

d) SHOT PUT CIRCLE



The Ring

The ring shall be placed to the level of outside ground. It must have a height of 1.4cm to 2.6 cm from the inside floor of the circle and 6mm thickness.

Shot

The shot is made from solid Iron, brass or other hard metal. The men's shot weight is 7.26 kg with a diameter between 110-130mm. The women's shot is of 4kg with a diameter between 95-110mm. The shot should be spherical in shape with smooth surface.

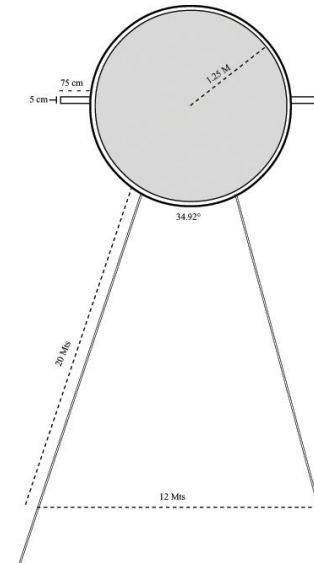
Stop Board

A curved piece of wood 10 cm thick affixed to the front of the shot put circle. When throwing, the shot putter braces his foot against the stop board to avoid falling forwards out of the circle.

(88)

f) DISCUS CIRCLE

Discus



The discus is made of wood, or other suitable material, with a rounded metal rim. The cross section of the edge shall be rounded in a circle of 6mm radius. The thickness of the rim should be at least 12m. The diameter of men's discus shall be between 219-212 mm and its weight should be 2 kg. The diameter of women's discus shall be between 180-182 mm and weight 1kg. The diameter of metal plate or flat centre area should be between 50-57mm.

(89)

a) Track Events

The judges shall decide the order in which the competition finish and if they cannot arrive at a decision shall refer the matter to the Referee, who shall decide.

Dead Heat

If there is a tie for the first place in any track event, the event shall be held after to giving adequate rest. And if it is not possible to conduct event once again due to time factor, the tied competitions shall be awarded first place jointly. This method is known as "dead heat". If tie remains for any other place, the result will stand. Rerace shall not be held to decide the second, third and other place.

Note: If photo finish facilities is available, the positions may be decided, easily.

b) Distance events

When there is a tie for any place, it shall be solved by seeing the second best performance and it necessary third, fourth best, etc. If tie still remains and concerns first place, the tied competitors will complete again in the some order in a new attempt until the tie is result. For remaining places the result will stand. That means same place shall be given to the field competitors.

Height events

When there is a tie for any place in high jump and pole vault it shall be solved by using two rules in order as following

- i) The tie competitor with lowest number of failures at the field height (last cleared height) shall be given higher place.
- ii) If tie shall remain; the competitor with lowest total number of failures throughout the competition shall be given higher place.

If the tie still remains and if it concerns the first place, the field competitors shall be given one more jump at the height where the competition is stopped (height which is immediate next to the field height), and if no decision is reached, the bar shall be raised or lowered 2cm for high jump and 5cm for pole vault. The competitors are allowed only one attempt at each height until the tie is decided. The best performance achieved during jump, if any, shall also be considered.

If the tie concerns any other place, the tied competitors shall be awarded the same place in the competition.

Note: If the same place is given, the immediate next place shall not be awarded to any competitors.

competitors shall be placed in the order in which any part of their bodies (i.e. torso, as distinguished from the heads neck, arms, legs, hands or feet) reaches the vertical plane of the nearer edge of the finish line.

B. MIDDLE DISTANCE RUNNING

Distance running can be split into two groups, Middle distance and Long distance. For middle distance running the athlete needs to both speed and stamina. For long distance running, stamina is the most important thing. Stamina means building up our body so that it can be last the race distance, but at race speed.

Middle Distance Events

1. 800 mts
2. 1500 mts
3. 3000 mts

The middle distance runner must apply his effort correctly throughout the race; this can be achieved only by a knowledge of pace and tactics.

The events which fall into the middle distance category range from 800m to 3000m. With the relentless advance in performance in athletics the 800 meter race now attracts athletes who in the past would have been sprinters. His running style is a model of mechanical efficiency, and even

UNIT - I

INTRODUCTION

A. Meaning of Athletics

Athletics comprise of a wide range of skills and can be divided in two broad categories of track and field events. Track events include sprint races, middle distance races, long distance races, relays and hurdles. The field events are those which are being played either inside or outside the track area or outside the stadium, which include throwing events and jumping events.

The track events include races of 100m, 200m, 400m, 800m, 1500m, 5000, 10000m, and relay races of 4x100m, 4x400m in both men and women categories. In all races shorter than 800m the competitors have to run the length in their respective lanes. The competitors of relay races are required to carry a baton and pass over the same to his/her partner within the take over zone. The starting points are arranged in such false a way that distance from start to finish is same for each competitor. In case of two false starts, the athletes declared disqualified. The competitor who jostles, runs across, or obstructs other competitor(s) can also be disqualified. Timings of competitors are recorded by the official time keeper from stop watches or through electronic time keeping equipment. The hurdle events include 110m and 400m for men and 100m and 400m for women. The competitors are required to jump over specified number of hurdles, which are made of metal with

a wooden top bar. The steeplechase hurdle event comprises of 28 hurdle jumps and 7 water jumps spread over a 3000m run-way.

The throwing events include throw of shot-put, javelin, discus and hammer. Each competitor generally gets six trials and the winner is decided on the best distance covered in any one of his six trials. The Jumping events comprise of High Jump, Pole Vault, Long Jump and Triple Jump. In the first two events, athletes are required to jump over a crossbar. In Triple jump the competitors are required to complete a hop, step and Jump sequence. Winner of jumping event is decided based on the distance measured between the take-off line and the nearest break in the landing area lead by the competitor's body part.

A standard international track is 400 mts in circumference. It has 8 lanes and the width of each lane is 1.22 mts. Track and field events include Sprints, Middle distance running, Long distances race, Hurdles, Steeple Chase, Relay races, throwing events and jumping events. Track and field events are conducted by International Association of Athletic Federation (**IAAF**).

Athletics

The term "Athletics" is derived from the Greek word "Athlon" which means a contest. The word "Athlete" denotes a person who takes part in contests which involve physical activity. "Athletics" is the oldest forms of the organized sport contested between individuals and or teams.

3. Run through

A forward dip during the last stride before the finish line is the most commonly used technique.

Photo Finish Camera

It is impossible for the naked eye to be able to determine accurately the finishing sequence of runners for in a blanket finish. The problem has been solved by photo-finish cameras. A photo-finish camera has very narrow slit lens which photograph an area of the finish line not more than 5-10cm across. It uses a continuous strip of film that moves across the lens at a speed proportionate to the speed of athletes and records the arrival of each competitor at the finish line. The space between each athlete shown in the film exhibits the time elapsed between the arrivals of each of them at the finish line. Photo – finish camera also doubles up as an electronic timing device, recording finishing timings of athletes up to one hundredth of a second. The camera gives a developed photograph that gives positions of athletes and time when their torso reached the finish line.

FINISH POSTS

Except where their use may interfere with the photo finish equipment, two white posts may be placed along the prolongation of the finish line at least 0.30 mts from the edge of the track. They should be of rigid construction and approximately 1.40m high, 8 cm wide and 2 cm thick. The

the foot to push against at the start of the race. The foot plates shall be slopped to suit the starting position of the athlete and can be either flat or slightly concave. To monitor the false starts the blocks can be connected with a devise. The blocks can be used up to and including 400 meters (including the first) leg of the 4x200m and 4x400m).

TYPES OF FINISHING

The finish line should be 5cm in width drawn across the track at right angles to the inner edge. Two white posts of rigid material (80mm in width and 20mm in thickness) shall be placed at a 30cm distance from the edge of the track. Competitors are place in the order in which any part of their torso (as distinguished from the head, neck, arms, legs, hands, or feet) reaches the vertical plane of the edge of the finish line nearest to the star.

Technique

There are three finishing technique used particularly during the sprint events. They are as follows.

1. Lunge finish

The torso reached the finish line first, i.e. leaning torso forward.

2. Diagonal finish (or) Shoulder Shrug

At the finish line crossing it by making the shoulder in diagonal, towards midline of the finish line. It is more difficult type.

B. IAAF

The IAAF (International Association of Athletic Federation) is the supreme governing body controlling international athletics throughout the word. It was founded in Stockholm on July 17th, 1912, to draw up and enforce rules and regulations and a common amateur definition, and to recognize world records, The IAAF now promotes its own World Champions in track and field every four years, with annual World Cross- Country Champions for men and women every march.

IAAF- Structure and Functions

In 1912, two days after the Olympic games a congress was held in Stockholm for the formation of an International Association of Athletic Federation. Seventeen countries were attended the historic meeting. The meeting was urged the Athletics to develop and promote international competitions and the Olympic games. The meeting was also urged the importance of having universal code of rules and regulation and a common definition for Amateur and also an athletic register of world and Olympic records.

One year later in 1963 at Berlin the congress once again met and accepted the first constitution and 34 nations figured on the most membership list. J.Sigfrid Edstrom (Sweden) was elected as first president and Kristvan Hailstorm as honorary secretary. The technical rules for International and domestic competition were framed and presented for approval in 1914 at the third congress in France.

In 1946 the IAAF Head Quarters moved from Stockholm to London. Over the years, the IAAF grew into a huge and dynamic organization as the world governing body of track and field athletics, road running, race walking and cross country. The congress decided to move the head quarters once again from London to Morte Carlo in 1993. The Steady growth of the Federation accelerated in the last decades. By 1997 member countries in addition numbered 209. The IAAF council comprising of 27 members from various countries.

AFI (Athletic Federation of India)

Athletics in its present form was born in our country during past decade of 19th century. Nothing much is known of its early stages till first known participation of Norman G.Pitchard in 2nd Olympic games in 1900 at Paris, where he won a Silver medal in 200mts run. The Indian Olympic Association (IOA) was formed in 1926 and its control athletics. But India unofficially participated in the 1920 and 1924 Olympic games under the leadership of H.C.Buck of Y.M.C.A Madras. The official participation of Indian athletes started in the 1928 Olympic games at Amsterdam till 1936 Berlin Olympics. India participated in the Olympics under the IOA BANNER. Then 1940 and 1944 Olympic Games were not conducted because of second World War.

Structure and Functions

Amateur Athletic Federation of India was formed in 1946 at the initiative of Maharaja Yadindra Singh then

in a natural relaxed position. An angle of about 90° at the front knee and of about 110° to 130° at the rear knee will be appropriate.

(iii) The Long Start (or) Elongated Start

The front starting block is situated 3 foot lengths from the starting line and there is one foot length between the starting blocks. The angle of rear leg about 110°. The long starting position is certainly the most difficult one. It should be applied carefully. Any athlete finds this position rather ineffective. The long start, although still known, is hardly used nowadays.

For good starts a sprinter must,

- a) push back against the blocks
- b) moving the hands and arms as quickly as possible in reaction to the gun.
- c) move the hips quickly from the starting position to running position.
- d) run out of the blocks, do not jump.

STARTING BLOCKS

The starting blocks should be made of rigid material. It should be adjustable, but must be without springs. The blocks are fixed to the track, so that it provide firm base for

'On your marks' – position – his body weight resting comfortably on the legs in the crouch position. The hands are shoulder width apart to touch the ground behind the starting line with fingers and thumb pointing away from each other. The eyes are focused downward and forward.

Set position

The block settings should result, the athletes having a 90° angle at the front knee and 110° to 120° angle in the back of the knee. That gives a set position with the hips just slightly higher than shoulders slightly forward. The hands are placed just slightly wider than shoulder width apart, with the fingers and thumbs in a **"high bridge"** position. The shoulders are above and slightly ahead of the hands, the arms are straight, but not locked. He should feel pressure against rear block in the set position since the center of gravity is located high, the first strides are shorter and less powerful.

(ii) The Middle Start (or) Medium Start.

The front starting block is located two foot lengths (21 inches) from the starting line and the rear starting block is one foot length further. Kneel down with the right knee against the instep or toe of the left foot, and keep the trunk erect. The angle for the rear leg is about 130°. The slope of the body from the hips to the shoulders is not very steep. The body weight is on the legs and arms. The head remains

president of IOA with prof.G.D.Sondhi as its first president. The AAFI got affiliated to IAAF in the year 1946. The AAFI for the first time selected 8 athletes who participated in 1948 Olympic games at London. Indian women competed in the Olympic games for the first time in 1948.

Mr.M.C.Dhawn was elected by secretary of AAFI in 1950 and was the technical secretary in the first Asian games held at New Delhi in 1951. Raja Bhalendra Singh become the president of AAFI in 1952 and continued of guide athletic till 1968 along with Mr.M.C.Dhawn. This team acted a yeoman service to athletics in India and strengthened the AAFI to make it the leading federation. The federation produced by group competitors open national championship, Zonal and Inter Zonal Competition.

Many distinguished personalities are acted as president and secretary of AAFI till 1987 from 1988 to till date Mr.Suresh Kalmadi and Mr.Lalit K.Bhanot formed the new team of president and secretary respectively. The main function of AAFI is to prepare a year long sports calendar at the state and national level. They are sending teams to international level competitions based on merit.

D. AGE GROUPS

Under the Jurisdiction of the IAAF is split into five age groups.

1. Men and women there is no age limit
2. Seniors - 19 Years
3. Juniors - 17 and 18 Years
4. Youths - 15 and 16 Years
5. Boys - 13 and 14 Years

UNIT - II

TRACK EVENTS

Athletics is great fun and people of all ages, can enjoy it. Athletic activities can be traced back of the ancient Greeks, who used to take part in games of running, jumping and throwing. Track events include sprint races, middle distance races, long distance races, relays and hurdles.

The track events include races of 100m, 200m, 400m, 800m, 1500m, 5000, 10000m, and relay races of 4x100m, 4x400m in both men and women categories. In the track events all races are run with the competitor's left hand side of the track and finish in the same position. The competitors are required to wear their numbers on their vests.

A. SPRINT EVENTS

Sprints

"To cover the distance in the shortest time with maximum speed"

A. Sprint Events

1. 100 mts
2. 200 mts
3. 400 mts

1. Bunch start (or) Bullet start
2. Medium start
3. Elongated start

Three types of foot spacing bullet, medium and elongated starts. Each sprinter will have his own particular measurements so the following procedure is suggested to enable him to get into a correct starting position.

Block placement

The three block placement positions are determined by the location of the blocks relative to the starting line.

(i) The Bunch or Bullet Start

Stand with the right toe beside the rear of the left heel. Kneel down with trunk erect and rock forward in the same way. In this starting position the starting blocks are close to the starting line. The front block should be placed one foot length (16 inches) from the starting line, with 11 inches between the blocks results in low velocity and fast block clearance Track events, up to and including 400 meters, run at full speed for the entire race distance. Sprinter press their feet against two blocks, which are spaced apart and connected to a shaft, to improve their initial movement. The main features to look for in the sprinter's highly distinctive running action are the high knee-lift, the long strides, the thrusting arm action and the controlled breathing.

should immediately rise to final starting position retaining the contact of the hands with the ground and of the feet with the foot plates of the blocks.

A competitor shall not touch either the starting line or the ground in front of it with his hands or his feet on his marks. The three starting positions are measured from the starting line to the front leg of the starting block. Starting is the first stages in all the running events, should be conducted either track or road. There are only two types of starting should be followed by the athletes.

1. Crouch start
2. Arc start (Standing start)

CROUCH START

Crouch start can be used by the athletes those who are run up to and including 400mts and even the first runner of 4 x 100mts Relay and 4 x 400mts Relay.

In crouch start the following commands to be used,

1. On your mark
2. Set
3. The gun fire or clapping with clap board

It has three (divisions) method should be used according to the height of the individuals.

Sprinter

There is no ideal shape or size for the sprinter. He must, however, be well built and have good all-round muscular development and a quick reaction time. Regular, even and relaxed arm action must be learned first. The legs follow the arms, and the faster the arms are moved the faster the leg action will become. In the arm action emphasis should be on a forward and upward motion.

Most important factors for sprinting

1. Reaction time
2. Starting position
3. Powerful Muscles
4. Acceleration Technique.
5. Effective stride length
6. Curve running technique (200 mts, and 400 mts).
7. Technique at the finish line.
8. The condition of the Track surface
9. Wind and Weather conditions.

Stride Length

“It is the distance between touchdown of the toe of one foot and the touchdown of the toe of the other foot”. Stride length may and usually will be vary from left to right

or right to left on individual at the same velocity. This variance may be influenced by dominance, weakness, injuries and even leg length. Stride length will be vary with the speed of running and during the various phases of a race.

Stride Cadence or Stride frequency

"It is the number of strides per second". The stride cadence for sprinters is 4.5 to 10 strides per second with little difference found between the strides. The method of determining stride rate is to divide the number of strides in a race by the elapsed time for the race.

STARTING

There are varieties of running events for which the track is used . The finishing line for all races must be the same. But the starting line of all the races cannot be the same. It will vary from race to race. While 100mts race, 100mts hurdles and 110mts, hurdles races have to be run in straight courses, appropriate distance shall be measured backward from the beginning of home stretch and starting lines are marked. The extended lines are broken.

The start and finish of a race shall each be denoted by a white line 5 cm wide. The distance of the race shall be measured from the edge of the starting line farther from the finish, to the edge of the finish line nearer to the start.

All races shall be started by the report of the starter's gun or approved starting apparatus fixed upwards after he has ascertained that competitors are steady and in the correct starting position.

At all international sports competitions meetings, the commands of the starter in his own language shall, in races up to and including 400m be "on your marks", "set", and when all competitors are "set" the gun shall be fired, or approved starting apparatus activated.

In races longer than 400m, the commands shall be, "on your marks" and when all competitors are steady, the gun shall be fired, or approved starting apparatus activated. A competitors shall not touch the ground with his hands.

In all races up to and including 400m, and 4 x 100 mts Relay, 4 x 400mts relay first runner a crouch start and the use of starting blocks are compulsory. In competition held under IAAF, competitors must use starting blocks provided by the organizers of the meet. In other meet on all weather tracks, the organizers may insist that only starting blocks provided by them may be used. After the "on your marks" command, the competitor shall approach the starting line, assume a position completely within his allocated lane and behind the starting line. Both hands and one knee shall be in contact with the ground and both feet, in contact with the starting blocks. At the "set" command, the competitor

decreases. A study of the body movements involved in these activities pinpoints the causes. In normal walking and running the knee of the supporting leg is bent as it passes through the vertical position (i.e. when the centre of mass passes vertically over the foot), but in race walking the knee of this leg is straight in the vertical position. The technique is such a way that race walking does not become a modified run. Briefly, contact with the ground must be maintained at all times, a heel-and-toe action must be used, and the supporting leg must be straight at the knee as it passes through the vertical position.

Judging a fast walk is an extremely difficult skill, since it is almost impossible to see whether a walker has a foot on the ground at all times or that the knee is straight through the vertical for it takes only a fraction of a second to pass through the position. Race walking is not a natural skill as normal walking and running are, because the latter are the locomotion skills learnt from very early childhood.

As in most other athlete events, flexibility is an asset and hip mobility especially is an important factor in stride length in normal walking in which the line through the hip of the forward swinging leg is allowed to twist forward with the leg, the stride length is increased considerably. Stride length is also maximized, if the feet move along a straight line.

in the later stages of a race when fatigue is sapping his strength his skill does not break down.

C.LONG DISTANCE EVENTS

1. 5000 mts
2. 10000 mts
3. Marathon

The three main long distance events are 5,000m 10,000m and the marathon. Stamina is the basic quality needed by a long-distance runner, but speed has also become an essential requirement for would-be world beaters.

However, in the long distance the steady pacer must beware of the fast finisher who sits on his shoulder, until the final run-in. the steady runner without an equivalent fast finish must attempt to put himself far enough ahead of the sprint finishers by either a punishing pace throughout the race or by putting in bursts of speed during several laps from the finish. There is nothing more motivating for the training runner than to see his rival a few strides in front of him, but also nothing more demoralizing than for his rival to be 20 meters or more in front.

D.HURDLES – VARIOUS STAGES

MEANING

Running over the barriers (or) obstacles are known as Hurdles. The Hurdle race should be conducted for men and

women, senior boys and senior girls in various height and distance. Every hurdle race is based on certain conditions laid down in the rules of the International Association of Athletic Federation (IAAF).

The hurdles are made of steel with wooden top bar. The height of hurdles can be adjusted as per the length of the race and sex of the athlete. The hurdles are made in such a way that when force of 3.6-4kg. is being applied to the centre of the top, it should overturn automatically. The height required for, men's 110m race is 106.7 cm. The women's 100m sprint hurdles are 84 cm in height. In 400 m race the men's hurdle is 91.4 cm high and women's is 76.2 cm. The length of the wood used for the top bar should be 1.20m and width at least 7cm. The top bar should be striped in black or white or in some other contrasting colors.

The following are the standard distances, it can be classified into two categories,

- Men - 110 & 400 mts
- Women - 100 & 400 mts

Distance of Hurdles	Category	Height of the Hurdles	Distance Start to first Hurdle	Distance Between the Hurdles	Distance Last Hurdle to Finish
100mts	Women	0.840mts	13mts	8.50mts	10.50mts
110mts	Men	1.067mts	13.72mts	9.14mts	14.02mts
400mts	Men	0.914mts	45mts	35mts	40mts
400mts	Women	0.762mts	45mts	35mts	40mts

Substitution

Once a relay team has participated in a competition only two additional athletes may be used as substitutes in the composition of the team for subsequent rounds. Once an athlete, who has participated in a previous round has been replaced by a substitute, he may not return to the team.

RELAY BATON

The relay baton is made of a rigid material. It should be a single piece of smooth, circular and hollow tube of 280-300 mm length. The minimum weight required for baton is 50 grams and its circumference should be between 120-130mm. The batons should be colored so that it can be easily visible during the race.

Specification

- Weight of the baton : not less than 50 gm
- Length of the baton : 28 to 30 cm
- Circumference of the baton : 10 cm
- Color of the baton : Visible color
- Minimum baton required : 6 Nos.
- Maximum baton required : 8 Nos.

D. WALKING

Race walking may appear to be the natural link between ordinary walking and running, and in some respects this is true-with increase in speed, the force-time

runner only. The baton should not be exchanged within the acceleration zone(Advance Zone).

During the exchange the baton must be delivered firmly and safely into the hands of the receiving runner. When the incoming runner has approached his partner within 2 to 3 mts he indicated to him by a signal when to extend his receiving arm backwards. The signal comes too early or too late, or the runner receiving the baton moves his arm up, down or to the side, the results in an unsteady baton pass and consequently in a loss of time. The baton should be put firmly into the grasping hand between the spread thumb and the four locked fingers.

2. 4 x 400 mts Relay

The runners use a visual pass. The incoming runner carries the baton in the right hand and passes to the outgoing runner's left hand. The primary responsibility for the pass rests on the outgoing runner due to fatigue on the part of the passer. Once the baton has been taken, the athlete immediately transfer it to the other hand.

The four athletes shall run 400mts each to cover 1600mts distance by means exchanging a baton. The first leg of the 4x 400 mts relay run in lanes and so is the first curve of the second leg; only after crossing the line making the exit from the first curve, runners free to move to the inside of the track.

110mts Hurdles

There shall be Ten flights of hurdles in each lane, set out in accordance with the below table.

Starting line to First Hurdle	:	=13.72mts
" "	Second Hurdle	: 13.72+9.14 =22.86mts
" "	Third Hurdle	: 22.86+9.14 =32.00mts
" "	Fourth Hurdle	: 32.00+9.14 =41.14mts
" "	Fifth Hurdle	: 41.14+9.14 =50.28mts
" "	Sixth Hurdle	: 50.28+9.14 =59.42mts
" "	Seventh Hurdle	: 59.42+9.14 =68.56mts
" "	Eight Hurdle	: 68.56+9.14 =77.70mts
" "	Ninth Hurdle	: 77.50+9.14 =86.84mts
" "	Tenth Hurdle	: 86.84+9.14 =95.98mts
" "	Finishing line	: 95.98+9.14=110mts

VARIOUS STAGES

110mts Hurdles the Hurdling Technique is classified into the following:

1. Starting
2. Approach to the First Hurdle
3. Hurdle Clearance (Departure)

4. Running between the hurdles
5. The finish

1.Starting

Hurdling is basically a sprinting event, the mechanics of the starting do not vary much from that of the sprint start. In order to get eight (8) strides to the first hurdle to take – off foot should be placed in the first block. If the hurdler wants seven (7) strides to the first hurdle, take – off foot should be placed in the rear block.

2. Approach to the First Hurdle

The distance from the starting line to the first hurdle is 13.72 mts. The first three strides out of the blocks are the same as in a sprinter’s start. On the fourth stride, the hurdler begins to concentrate on the first hurdle. In perfecting the approach to the first hurdle make any adjustments on the 4th, 5th and 6th strides. The first three and last two should be kept constant. The last stride is slightly shorter to permit to get his centre of gravity slightly ahead of the take-off foot. This approach sets the pattern for the entire race.

3. Hurdle clearance

The take – off distance from the hurdle depends on four factors. The height of the athlete, speed of the approach length of the lead leg speed of the lead leg action. Each

The baton must be carried by hand throughout the race, if dropped, it must be recovered by the athlete who dropped it. He may leave his own lane to retrieve the baton provided this procedure is adopted and no other athlete is impeded, dropping the baton shall not result in disqualification.

Stages of Relay Running

The start

The starting of the 4 x 100 mts Relay is basically same as for the 400 mts. The starting blocks are placed close to the outer line of the track. The baton lies between the forefinger and the thumb is enclosed by the other fingers. After a successful start the runner quickly passes to the inside of his lane.

Checkmarks

The second, third and fourth runners place a checkmarks on their lanes just behind their starting positions. This is a check mark for the out going runner. The distance between the checkmark and the starting position depends on the speed of the incoming runner and on the acceleration of the outgoing runner.

The Baton exchange

The relay baton should be exchanged from one to another competitor with in the take over zone. The exchange is completed when the baton is in the hand of the receiving

when hearing the signal from the incoming runner moves the appropriate arm backwards in a positive and slightly angled manner to a level not higher than the shoulder line. The upper arm is straight at the elbow, the back of the hand is facing down wards the thumb and index fingers are widely spaced forming obtuse angle. The baton is received into such a palm from the incoming runner with an outstretched arm. In the final phase of the change over the elbow joint locks quickly and the baton is passed in a down sweep action.

The best result in both techniques the change over should occur when both runners are traveling at maximum speed and the actual change over should be as quick as possible. The majority of experts consider that the speediest change over occurs when the baton is actually changed over a distance of 2 to 4 mts from the end of the exchange zone.

Acceleration Zone

The acceleration zone lets the outgoing runner accelerate properly and allows the athletes more time to reach top speed at the exchange.

Exchange Zone or Take over Zone

The incoming runner can signals the exchange with verbal commands at a specific point when the incoming runner ready to pass the baton. The incoming runners can also use nonverbal signals. The outgoing runner can count the incoming runner's stride from the check mark to the exchange point.

hurdler must be cleared quickly and safely. The first prerequisite of movements much as in the ordinary running stride. For this action the lead leg is slightly flexed at the knee joint, and leading foot to track beyond the hurdle.

The average take-off distance from the hurdle in men's hurdles will be 1.90 mts to 2.20 mts to allow the leading leg to sweep forward and upward in a straight line. Too short a distance for the take-off results in a "jump" over the hurdle. The hurdle clearance are having the following factors.

Action of the Leading leg

The complete action consists of a quick forward and upward thrust of the leading leg in the direction of the leading of introduces the sequences.

Once the take-off foot leaves the track it becomes the trail leg. The heel of the trail leg moves actively toward the buttocks as the knee moves in a exaggerated motion upward and to the side to avoid hitting the hurdle. For the clearance of the hurdle, the trailing leg must be stretched away from the body when clearing the hurdle. This movement requires good mobility of the hip. The sequence of the athlete's movements should be as follows: after a rigorous push from the ground follows a phase of relaxation for the take-off leg. An action forward movement of the high should begin only when the foot of the leading leg has reached the edge of the hurdle.

Action of the Arms

The usual movements during running are also executed during hurdle clearance. With the sole difference that in the hurdle stride the arms perform additional functions. The arms contribute in a greater degree to maintaining body balance. When the trailing leg comes forward, the trailing arm swings backward to counter balance this movement. It is either almost stretched or flexed at the elbow.

4. Running between the hurdles (The three-step Rhythm)

In the 110 mts hurdle run the distance between the hurdles is 9.14 mts. If we reduce from the length of the hurdle stride, there remains for three strides between the hurdles or three-step rhythm a distance of about 5.065 meters. So that is 1.88 mts for each step. But practice shows clearly that the three steps are not of equal length. The first stride after the landing which is of about 1.55 to 1.60 mts follows a wide second stride measuring 2.00 to 2.20 meters and this is the longest between the hurdles. The last stride before the hurdle is always slightly shorter than the previous one.

5. Finish

The athlete has to use any one technique similar to sprint to finish the race.

Baton Exchange

There are two methods of baton (Exchange) passing

1. Up sweep method
2. Down sweep method

1. The up sweep method

In this method the passing of the baton occurs in an upward movement by a straight arm. At the same time the baton is received by an arm which is pointing backward and locked at the elbow. The outgoing runner upon hearing the agreed signal from the incoming runner, quickly extends his arm backwards locking it at the elbow, the thumb and fingers are separated and pointing downwards forming an obtuse angle. The time that he receives the baton the outgoing runner tries to keep his arm as still as possible. This outstretched arm the incoming runner quickly moves his straight arm upwards and in such a way that the outgoing runner can grasp the baton as near to the incoming runner's palm as is possible. In the upsweep method the baton is passed from the right hand to the left hand and then the left hand passing it to the right.

2. Down sweep method

In the down sweep method the baton – exchange takes place over a distance of 2 to 3 mts. The out-going runner

2. The baton must be passed inside a short distance to be covered by some three to four strides and without unnecessary loss of time.
3. The baton must be exchanged by non – visual method.

Visual Method

The visual method of baton exchange is used only in 4x400 mts relay. When the out going runner receive the baton, he must see the incoming runner while receiving the baton. The incoming runner gripping the baton at its base, then passes the baton into the receiver hand with a forward down sweep motion. The outgoing runner reaches arm straight back, palm facing upward and takes the baton, gripping the upper portion.

Non Visual Method

The non-visual method of baton exchange is used only in 4x400 mts relay. When the out going runner receive the baton, he doesn't to see the incoming runner while receiving the baton. The incoming runner gripping the baton at its base, incoming alerts the receiver, then passes the baton into his or her hand with a forward pushing, down sweep motion. The outgoing runner reaches arm back, palm facing upward and takes the baton, gripping the upper portion. then rotates the receiving arm down, under and forward, to ready the baton for the next exchange.

400 mts Hurdles

Hurdling is a sprinting, rhythmic event. In this race a full circuit of the track is run with 10 hurdles, 91.4 cm high, placed 35 mts apart. The distance from the starting to the first hurdle is 45 mts, while the last hurdle to the finish line measures 40 mts. There are ten flights of hurdles in each lane, set out in accordance with the below table.

Placement of Hurdles in 100mts Hurdle race

Starting line to First Hurdle	:	=13.00mts
" "	Second Hurdle	: 13+8.50 =21.50mts
" "	Third Hurdle	: 21.5+8.50=30.00mts
" "	Fourth Hurdle	: 30+8.50 =38.50mts
" "	Fifth Hurdle	: 38.5+8.50=47.00mts
" "	Sixth Hurdle	: 47+8.50 =55.50mts
" "	Seventh Hurdle	: 55.5+8.50 =64.00mts
" "	Eight Hurdle	: 64 +8.50 =72.50mts
" "	Ninth Hurdle	: 72.5+8.50=81.00mts
" "	Tenth Hurdle	: 81+8.50 =89.50mts
" "	Finishing line	: 89.5+10.5=100mts

Placement of 400mts Hurdles in Standard Track

(Men and Women)

Starting line to First Hurdle	:	=45.00mts
" "	Second Hurdle	: 45+35 =80mts
" "	Third Hurdle	: 80+35=115mts

"	"	Fourth Hurdle :115+35=150mts
"	"	Fifth Hurdle : 50+35=185mts
"	"	Sixth Hurdle : 185+35=220mts
"	"	Seventh Hurdle : 220+35=255mts
"	"	Eight Hurdle : 255 +35=290mts
"	"	Ninth Hurdle : 290+35=325mts
"	"	Tenth Hurdle : 325 +35=360mts
"	"	Finishing line: 360+40=400mts

E. RELAY

There are two relay events comprising of 4x100m for men and women, and 4x400m for men and women. All the four members of a team are required to run one stage of the race along with the relay baton in their hands throughout the race. The baton must be picked up by the athlete who dropped it. He/She may leave the lane in order to retrieve the baton, provided no other player is impeded.

4x100m relay races are run entirely in respective lanes with staggered starts. In 4x400m relay races the first lap and the same part, of the track, of the second lap shall be run in lanes. The position of the teams at the start shall be retained at each take- over zone, except in case of races where lanes are not used. The waiting runners can move to inside zone, after handing over the baton, until the course is clear to avoid obstruction to other competitors.

Relay races are a popular and exciting feature of track and field. It is a team event in an individual oriented sport. They give the opportunity for team work and cooperation is not available in the other events. The key to good relay racing is the baton exchange. Commonly the relay events are as mentioned below,

1. 4 x 100 mts
2. 4 x 400 mts

1. 4 x 100 mts Relay

The 4 x 100 relay is undoubtedly the most beautiful and one of the most difficult events of the athletics spectrum. This relay uses four sprinters running a complete lap of the track, passing on a baton which has to arrive at the finish line with the runner of the last leg.

The main objective in the baton pass is to keep the baton moving at top speed throughout the relay. The baton must be passed only within a 20 meters take – over zone (exchange zone). This zone begins 10 mts before the scratch line (100 mts marking) and ends 10 mts after it. A good baton – exchange needs to satisfy the following three conditions.

1. The baton – exchange must take place after some 12 to 16 mts running, measured from the beginning of the take – over zone.

forward and upward. Then he goes upward the body position is in vertical (or) hanging and elbows are flexed.

5. Clearing the bar

When the body is in hanging position lift and swings upward both the legs, at the same time the pole straightened, turn the upside down. Then pushing the pole down by hands the legs are throw over the cross bar. After clearing the cross bar push the pole away from the pit with the wrist action to avoid foul or touching the bar.

6. Landing

Safe landing is required on the landing area.

B.THROWING EVENTS

General conditions

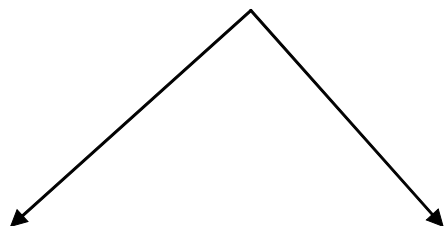
The person who has more body weight and mass of the muscles can choose throwing events. The following qualities are essential for throwers.

1. Body weight
2. Height
3. Leg power
4. Shoulder strength
5. Flexibility
6. Co-ordination
7. Speed

Race walking, of course, involves a rapid leg cadence and if the arms too are no maintain their synchronous swings they have to be bent at the elbows to reduce their moments of inertia, as in running. However, more emphasis is placed on the arm and shoulder action in race walking than in running, because of the need to counterbalancing the exaggerated eccentric thrust of the legs and movements of the hips. But in addition to counterbalancing the leg action, they also aid the forward drive with their swinging the strong upward swing of both arms evokes extra forces from the ground through the driving leg.

UNIT- III

FIELD EVENTS



DISTANCE EVENTS

1. Long Jump
2. Triple Jump
3. Shot Put
4. Discus
5. Javelin
6. Hammer

HEIGHT EVENTS

1. High Jump
2. Pole Vault

A. JUMPING EVENTS

1. LONG JUMP

The following techniques should involve while doing long jump.

1. Approach run
2. Penultimate stride
3. Take – off

(34)

1. Grip

Athletes who take off with the left foot, the pole must be carried on the right hand side, the left arm, half bent, supports the pole with the palm of the same hand turned downwards, while the right arm grips about 60-70cm higher with the hand lightly turned out. Keep the pole straight near the cross bar on the uprights. Hold the pole slightly lower than the height of the cross bar. Keep the pole parallel to the ground pointing to the pit or above the right hand palm facing upward and with left hand palm facing down ward.

2. Carry the Pole

The pole should be raised at 50° or 45° to the ground and keep right side. The left hand should be kept flexed at chest level and the right hand at the back. While carrying the pole, the body balance is very important.

3. Approach run

20 to 30 mts away from the vaulting box to start the running with the pole steadily and high knee action. When you reach the check mark, plant the pole in the vaulting box and kick the floor to go up.

4. Planting the pole

When the competitor reaches the check mark he should plant the pole into the box. Join the left hand with the right hand, push the right shoulder and both the hands

(47)

(iii) Supports for the cross bar

The cross bar shall rest on pegs pointing in the direction towards the landing area. The supports shall extend not more than 5.5 cm and not more than 1.3 cm in diameter, which should extend 35 – 40 mm above the pegs.

The distance between supports is minimum of 4.30 meters and maximum of 4.37 meters.

(iv) End Pieces of Cross Bar

It shall have 30 mm to 35 mm in diameter, square the length of the end piece is between 15 cm to 20 cm and should be semi circular.

(v) Landing (Pit) Area

The minimum dimensions of the landing area is 5 x 5 meters, for international competitions the length, width and height of the landing area will be 7 x 6 meters. The front pieces must be 2 m long.

VARIOUS STAGES

1. Grip
2. Carry the pole
3. Approach run
4. Planting
5. Crossing the bar
6. Landing

4. Flight in the air
5. Landing

1. Approach run

The length of the un-up is determined by the height of the jumper and his ability to accelerate in the run. According to analyzes carried out at recent Olympic Games, the best athletes use a run-up from 37-50m in length (incase for women 33-40). The athlete should mark the starting check mark 14 to 16 strides from the take – off board. If the athlete who is taking off with left leg, he should start running with right leg. Then he starts the approach run steadily and gradually increase the speed towards the take – off board.

2. Penultimate stride

The last two strides before the take off is called penultimate stride. In this time, the athlete shrugs his body little downward and the length of the stride decreases. That is easy way to fly in the air.

3. Take – off

The length of the jump depends not only on horizontal speed but also on the speed and power of the take-off. After completion of Approach run (penultimate stride), step on the take off board with the stronger foot and jump up in the air by pushing the take off board. After take off (or) jumping in the air the hands should be vertically raised. The Non-

take off leg should be raised high. The last step is executed more quickly and the whole foot is placed on the board, ahead of the projection of the center of gravity.

Plasticine Indicator (No Jump indicator)

Plasticine indicator is called no jump indicator, it is placed at the inner edge of the Take-off board. The judge at the take-off board must watch the competitors does not overstep the scratch line. If a no jump indicator is not available the judge should build one moist sand which will clearly show if it is touched by toe or spike. It is a foul only if contact is made with the ground or the no jump indicator.

4. Flight

Jumping styles vary according to the development of the athlete and his muscular characteristics and the bone structure. The most common techniques are,

1. The Sail (common among beginners)
2. The Hitch kick (1-2-3 strides and a half in the air)
3. Hang (extended jump or glide)

(i) Hitch Kick

After jumping in the air from the take-off board the athlete swings (or) rotates their legs like pedaling in a cycle in the air into 2 or 3 pedaling styles, and the legs are closed together before landing. When legs are pedaling the arms alternatively with leg movement.

4. POLE VAULT

Runway

The minimum length of the runway shall be 40 meters, when the conditions permit it is 45 meters.

1. The width of the runway is 1.22 meters.
2. The runway should be marked by white lines with 5cm as width.

Implements

(i) Upright

Any style of uprights or posts may be used provided they are rigid.

(ii) Cross Bar

It is made up of Fiber glass, Metal or other suitable material.

1. The length of the cross bar is 4.48 mts to 4.52 mts.
2. The maximum weight of the cross bar is 2.25 kg.
3. The circular shape of the cross bar is 30 mm diameter.
4. It should have the gap of maximum 3 mm

3.Fosbury Flop

The Fosbury flop was introduced by Dick Fosbury, who won the high jump at the Mexico Olympics in 1968. His technique for clearing the bar, his run up was also very notable because it was in the form of a semi- circle, and he took off with his foot at an angle of about 20 degree relative to the plane of the uprights. At the point of take – off Dick Fosbury with a vigorous bending action and driving up of the free leg, supported by an alternated movement of the upper limbs, rose completing a rotation on the longitudinal axis of the body and then prepared for flight with his back to the cross-bar.

Next he performed his rotation on the transverse axis of the body and at the extreme point of the parabola, he arched himself and continued his trajectory on this position until, so as not to knock down the cross - bar, he straightened his leg and landed on his back bowing his head on to his trunk so that the impact was taken by the top part of the back, avoiding unpleasant injuries to the cervical part of the spinal column.

4. Landing

Safe landing is required on the landing area.

(ii) Hang style

After the take off the athlete do the back arch the arms should be vertically raised above the head, the legs are straighten back, and before landing brings the legs and arms to extend forward, and the legs are closed together before landing.

5. LANDING

After completion of his style in the air, before landing, the athletes should extend both the legs forward / straightened. While landing both the heels should be landed first on the pit. There are three landing techniques should be used to come out of the landing area. They are as follows.

1. Collapsed landing
2. Swing out landing
3. Scoop landing

1. Collapsed landing

While landing both the heels should be touched first on the pit and then toe, the whole body should brought forward and place the knees on the pit, at the same time the buttocks should be kept back on both the heels.

2. Swing out landing

After landing in the pit the athletes should turn his body 45° either right or left in forward and fall down on the ground with shoulder, first then buttocks and so on.

3. Scoop landing

Landing by heels on the pit and push forcefully the sand and makes a dig and place the buttocks on the dig by extending the legs straight.

The competitor commits fouls if he;

1. Take off beyond the take off line.
2. Delaying more than 60 seconds.
3. After landing walking back towards the run way.
4. Performing acrobatics during the jump.
5. Uses illegal style of jump.

Rules

1. The order in which the competitors make their attempts must be decided by drawing lots.
2. Each competitor will be placed according to his best jump.
3. When there are more than eight competitors, each one is given 3 attempts and the 8 competitors with the best jumps are given further three jumps.
4. In case of a tie for the eight position, each competitor involved in the tie has three additional attempts.
5. When there are eight or less competitors, each one is allowed six trials.

3. Clearing the bar

1.The scissors

Towards the end of the 19th century, an American named Mike Sweeny proposed the scissors jump as an alternative to the frontal clearance. The scissors involved passing one leg over after the other at the same time bending the trunk towards the knees when clearing the bar. It consisted of the following movement:

1. While the forward leg was the cross – bar the other one kicked upwards, causing the chest to rotate towards the direction of jumping and a landing on the feet.
2. With the use of this style the world record began to rise this style, the world high-jumpers introduced minor adjustments to the technique according to their physical characteristics and talents.

2.The Straddle

Towards the middle of the 1930s another American Dave Albritton, proposed a radical new technique for clearing the bar, involving the body being parallel to the bar, but with the stomach downwards rather than with the body sideways. Thus the straddle was born, which was clearly demonstrated by the Soviet trainer Vladimir Mihailovic Dyachkov and put to good effect by Valeri Brumel, who took the world record to 2.28m in 1963.

1. Scissors
2. Straddle Roll (or) Belly Roll
3. Fosbury Flop

Various stages

1. Approach run
2. Take – off
3. Crossing the bar/ clearing the bar
4. Landing

1. Approach run

The jumper can approach either from the left side or right side of the cross bar with 25 mts long and medium speed. The angle of approach run and the number of steps vary according to the level of the athlete.

2. Take off

Jumper can stand either right or left one arm away from the cross bar. Then down vertically draw the line that may be considered as take off line. When the jumper start to approach towards crossbar, used his power leg on the take off line for make a jump.

6. Once the competition is under way, competitors are not allowed to use the runway for trail attempts.
7. All jumps must be measured from the nearest mark in the landing area made by any part of the body or limbs of the athlete to the take-off line or its extension and at right angles with the take-off line.
8. If a competitor takes off before the board or the line this does not constitute a foul.

2. TRIPLE JUMP

The triple jump shall consist of a Hop, step and jump in that order. This is the English definition of the jump. The hop must be executed on the same leg which was used for the take off (right-right or left-left). In the step the support is transferred to the other leg. The final jump is a proper long jump.

1. It shall not be considered a failure if the competitor, while jumping, touches the ground, with the “sleeping” leg.
2. There are six stages when taking Triple jump. They are as follows
 - (1) Approach run
 - (2) Take – off
 - (3) Hop

(4) Step

(5) Flight

(6) Landing

1. Approach run

The length of the run-up is determined by the height of the jumper and his ability to accelerate in the run. According to analyzes carried out at recent Olympic Games, the best athletes use a run-up from 37-50m in length (incase for women 33-40). The athlete should mark the starting check mark 14 to 16 strides from the take – off board. If the athlete who are taking off with left leg, he should start running with right leg. Then he start the approach run steadily and gradually increase the speed towards the take – off board.

2. Take – off

The length of the jump depends not only on horizontal speed but also on the speed and power of the take-off. After completion of Approach run (penultimate stride), step on the take off board with the stronger foot and jump up in the air by pushing the take off board. After take off (or) jumping in the air the hands should be vertically raised. The Non-take off leg should raised highly. The last step is executed more quickly and the whole foot is placed on the board, ahead of the projection of the center of gravity.

3. Hopping

The athlete should be used to land on the ground which he was used to take off. For example: The athlete has take off for his left leg means he should land or hop in the same leg. During hopping the non take off leg (or) rear leg has no movement, that's why it is called sleeping leg.

4. Step

After completion of hopping the athlete used to take one more step with his non take – off, foot before landing is called step. Here the athlete does the bounding action to do the step.

5. **Flight** and

6. **Landing** procedures are similar to long jump.

3. HIGH JUMP

The high jump as we know it today first became popular in the 19th century. Subsequent perfecting of the jumping technique took place in the development stages, but it has depended particularly on modification of the rules for the event and on the elimination of some restrictive conditions.

Various techniques should be used by the jumper to cross the bar. Depends upon their ability they used any one of the following techniques.

c) High carry

High carry method is associated with those throwers who tend to use a direct over the shoulder type withdrawal which ends with a turning back of the shoulders at the arm and javelin is reaching near full backward extension (To held on above the head).

A thrower must develop his carry position to suit his technique of withdrawal of the javelin in preparation for the delivery stride.

2. Approach run

During approach run the thrower has to mark the point of starting and the point of check mark with javelin. While running the javelin should move front and back, and slowly increase the running speed still you reach you the check mark.

The Run-up : The run – up has two parts. They are

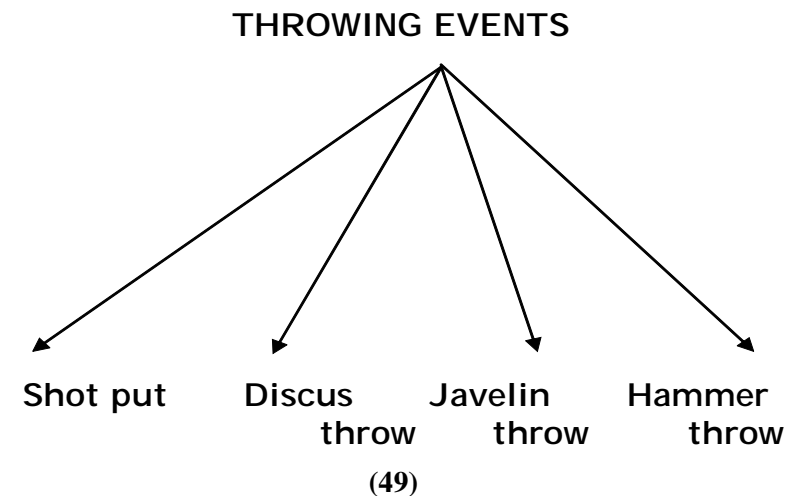
- (i) The cyclic part
- (ii) The acyclic part

The cyclic part speed is built up sufficiently so as to allow for a further increase over the last strides. The run-up should be easy and relaxed, heading the thrower to a powerful explosive all-out release.

- 8. Arm length
- 9. Balance
- 10. Endurance

The competitors are allowed three to six trails and three to eight of the best competitors are allowed three more trails. Incase of a tie for the final place, the competitor shall be allowed three additional trails. The conditions of the competition must be explained to the competitors before its commencement. The best throw of the competition out of all trails taken by the competitors shall be credited in resolving a first place tie. No markers or marks are allowed to be put in the throwing sector.

Competitors may use an adhesive substance on their hands for better grip, and can also wear a belt of leather or some other material to protect the spine from injury. However, taping of the fingers or use of any other devise on their hand which might assist in throwing is not allowed.



1. THROWING THE SHOT PUT

The competitor must begin the throw from a stationary position within the circle. The shot shall be put from the shoulder with one hand only and, shall touch or be in close contact with the chin. The hand shall not be dropped below this position during the act of putting.

Practice trials are not allowed after the commencement of the competition. Competitors are not allowed to put on gloves nor are they allowed to spray or spread any substance either on the surface of the throwing circle or on their shoes.

Basic Principles

1. Forces must be applied along a straight line.
2. Newton's 3rd law – Action and Reaction are equal and opposite.

Specifications

1. Weight of the shot for men - 7.260 Kg
2. Weight of the shot for women - 4.00 Kg
3. Diameter of the shot put circle- 2.135 m
4. Angle of the shot put sector - 34.92
5. Dimension of the sector - 20 x 12 m

a) Normal grip

The above thumb and middle finger is behind the edge of the grip cord and the index finger is partly curled around and behind on the javelin's shaft.

b) Middle and Thumb grip

The index finger and thumb is behind the edge of the cord binder and the rest of the fingers around the cord itself.

c) 'V' grip (or) Glow grip

The Javelin is held between the index and the middle fingers at the edge of the cord binder and rest of the fingers around the cord itself.

Carry

The javelin is carried above the shoulder of the throwing arm. Three commonly used methods of carrying the javelin during the approach run's cyclic phase.

a) Low carry

The low carry is generally associated with a circular type arm action in the 'withdrawal' (To held on waist level).

b) Medium carry

The medium carry is generally favored expansion in the withdrawal. (To held on eye level).

1. A head
2. A shaft and
3. A cord grip

The javelin throw comprises the following technical elements.

1. The grip and carry
2. The Approach run
3. The withdrawal
4. The impulse stride
5. The throwing stride
6. The release
7. The recovery

1. Grip

When executing their throws, javelin throwers may hold the javelin only by the whipcord grip. They may hold the javelin at the end of the cord grip with one or more fingers and the thumb touching the javelin shaft. Javelin throwers have some leeway in how they grip the javelin. It has three types how they can hold the javelin. The javelin is held behind the cord binder the rear edge of which offers a slightly raise border for gripping the javelin.

Stages / Method

1. Holding of the shot
2. Tucking (or) Placement of the shot
3. Stance
4. Glide
5. Release

1. Holding the shot

- a. The shot rest on the root of the fingers, and should not touch the palm.
- b. All the fingers are carry the shot except the little finger which is only support.

2. Placing (Tucking) the shot

1. The shot must be placed between chin and clavicle.
2. The shot does not go beyond the shoulder line.
3. The hand should be parallel to the ground.

3. Stance

The stance varied according to the using the style of Athletes.

Techniques (Style Of Putting)

The thrower can be used 3 style when putting the shot

1. Standing throw
2. 'O' Brien technique (or) Gliding
3. Rotation (or) Disco put

1. The 'O' Brien Technique

The distance a shot travels depends upon its height of release, velocity at the moment of release and the Angle of projection. The optimum angle of projection will vary depending on the height of the release, and the distance of the put, it will be approximately 34.95. The correct technique is the one that will result in the greatest velocity at release. The motion of a projected object is influenced by the exact point of application of the propelling force.

Holding the shot

The procedure for gripping the shot is to hold it in the left hand and lay the right hand loosely on top with the fingers spread slightly. The putter holds the shot in his right hand. Where it rests on the "base" of the fingers. The three middle fingers are only slightly splayed while the thumb and the little finger give the shot lateral support, securing a safe position of the shot.

The Reverse

The reversal is to serve as a follow through after the thrust and to retain balance in order to avoid fouling. After the discus has left the hand the thrower will have to reverse the feet rapidly and lower the body weight to maintain balance. The right leg must be brought forward quickly and planted firmly close to the rim of the circle, mean time the left leg swings back the body is bent at hips and right knee flexes to drop the centre of gravity into a stable position.

3. THROWING THE JAVELIN

The javelin throw distinguishes itself from other throwing events of shot-put, discus throw and hammer throw. These throwing events must be from a circle, the javelin must be thrown from behind the arc of a sector drawn with a radius of 8 mts. Due to the aerodynamic nature of the implement and its relative weight, the event does not require great strength. The event does require few less technique in order to achieve high level results.

Javelin consists of three parts namely the head, shaft and grip. The shaft is made up of either Aluminium or fiber. At the tip of the shaft a sharp head is fixed. At the center a grip made of thread is fixed. The Javelin is round and broad at the center. The circumference is small in the front and rear. It has three main parts

athlete drives off the left foot. The effective throwing position is one of "muscular wind" the hips displaced from the feet, shoulders from the hips and discus from the shoulders.

The run across the circle is initiated by the driving action of the left leg. Synchronized with the swing of the right leg. This drives carries the thrower halfway across the circle. The right foot landing approximately on the centre line with the leg well bent and the shoulder and body weight back. His left leg is pointing toward the direction of the throw, his right shoulder is facing the rear, his throwing arm is well behind the shoulder his left arm is curled and the discus is flat.

The Release

The throw begins with a forward and upward drive from the right foot. The shoulder should now come in slightly after the hip and the arm strikes from the low point, the thrower reaching out as far as possible to give as much distance from axis of rotation as he can. The left leg should now straighten, as the arm strikes. The discus will leave the hand in line with the right shoulder and should be squeezed out of fingers, each digit applying its force in turn and spinning of the first fingers last. The discus is spun clockwise. A good thrower will release the discus at a 35°-40° angle. The release must be smooth and rhythmic using the force generated from the lower body.

The stance

He should stand facing the rear of the ring with his back in the direction that he is going to throw. The shot should be held in right hand, supported by thumb and fingers. The hand holding the shot will be placed into the hollow of the collar bone in such a manner that it does not rest on such a manner that it does not rest on the shoulder but against the right side of the neck and the jaw. The elbow of the right arm is slightly raised and pressed forward. The upper arm points forward and downward. The head remains in its normal position. The eyes should be focused on a point to the rear of the ring and about five to ten yards away. He should stand erect in a telexed attitude, the left arm is held either out in front of the face or relaxed above the head the left front behind the right about one foot with just the toes touching for balance.

The glide or drive

The purpose of the glide is to gain momentum while moving across the ring and to lead into the correct position for the delivery. The initial movement is to lower the trunk and raise the left leg causing the body to form a "T" shape with all weight carried on the right leg. The head, shoulders and hip remain square to the rear of the circle, and the right leg flexes in preparation for the drive across the ring proper balance at this point is extremely important.

2. The Rotation or Disco-put Technique

The Starting Position

The putter stands at the rear of the circle facing 180° away from the throwing direction. The left foot is along the centre line of the circle and the right foot is placed laterally to the right of the centre line about shoulder width apart or just this point in most cases. The grounding of the left foot at the stop board denotes the arrival of the thrower into the delivery stance.

Preliminary Movements

To start the turn, the putter begins by swinging the shoulders, trunk and left arm along with the left and then to the right, as the body weight shifts correspondingly from leg to leg in coordination with the rhythm of the shoulders, trunk and left arm. Both knees are semi – flexed while this side to side swaying movement is taking place to break the inertia and set the pattern of movement to follow.

Turn

The double support phase of the turn begins at the end of the preliminary movements. The thrower is completely over his right leg with the trunk and shoulders well twisted to the right. From this position the thrower begins unwinding his upper body in the direction of turning with a wide

throwing arm bang to the right side along the thrower's thigh with the head and eyes focused to a point about 5 meters behind the circle. There are generally three positions that a thrower may adopt in relation to the line of direction. The experience, technical skill and comfort of the thrower must decide which of the three starting positions suit their ability.

The left foot is generally placed a few centimeters back from the rim of the circle, in order to avoid fouling by bursting the sole of the foot on the top edge of the rim of the circle as the pivot is executed.

The preliminary swings

The thrower should position himself at the rear edge of the circle with his back to the generally facing the direction of throw and his feet slightly wider than hips. The discus should be flat and facing downwards on the arm swung at shoulder height so that the arm and discus go well behind the right shoulder. The free arm rests comfortably across the chest. The thrower's weight should move easily from one foot to the other. On the final preliminary swing, the arm is swung back as far as possible so that the body weight is over a straight right leg.

Coming across the circle

The initial movement is begun the hips are turned and a pivot is made on the ball of the right foot as the

Specification of discus

1. Weight of the discus for men : 2 kg to 2.025 kg
2. Weight of the discus for women : 1 kg to 1.025 kg
3. Diameter of the discus for men : 21.9 cm to 22.1 cm
4. Diameter of the discus for women: 18 cm to 18.2 cm
5. Angle of sector is : 34.92°

Various Stages

Hold

The hand is placed flat against the discus surface, the upper joints of the fingers grasp the rim of the discus. Its center of gravity lies between the index and middle finger. Due to a slight bending at the wrist the upper face of the discus touches the arm, because it prevents the discus from falling out of the hand in the subsequent movements.

Starting position

The starting position at the rear of the circle is with the thrower facing 180 degrees away from the throwing direction. The two feet are usually placed about shoulder width apart or slightly more in the case of very tall throwers. The toes point naturally outwards with the weight of the body evenly distributed over both feet. The discus and

sweeping left arm action parallel to the ground, a slight forward tilt to trunk in a semi sitting position. The single support phase of the initial part of the turn is followed by a brief non support phase when both feet are off the ground and the whole body is turning on its vertical axis, and continues turning after the right foot lands around about the center of the circle.

Follow through (or) Reverse

When the right leg has driven really well and effectively and the action has been timed correctly the athlete will be well over the left foot as the arm strikes. Immediately after the shot has left the hand, he will find himself falling over the stop – board. In order to prevent himself fouling, the left foot is rapidly withdrawn and the right leg brought forward, the toe of the right foot striking the inside edge of the stop – board. At the same time the body weight is lowered in order to be more on balance by lowering the centre of gravity.

Valid Trial

For a valid trial, the shot shall fall completely within the inner edges of the landing sector.

Fouls

1. Throwing the shot from behind the shoulder
2. Touching outside the circle or the top of the stop Board

3. Shot landing on the sector line or outside the sector line
4. Delaying more than 60 seconds to throw.

Rules

1. The use of gloves is not allowed
2. At the competition area, each competitor may have a maximum of two practice trials which should be made in draw order, under the supervision of the judges.
3. Once the competition has begun, competitors are not permitted to use implements for practice purposes or to use the runway or ground within the sector for practice trials, with or without implements.
4. No device of any kind – i.e., taping of two or more fingers together, which in anyway assists a competitor when making a throw, shall be allowed. The use of tape on the hand shall not be allowed except in the case of the need to cover an open cut or wound.
5. A better grip, competitors are permitted to use a suitable substance on their hands only.
6. To protect the spine from injury, a competitor may wear a belt of feather or other suitable material.

7. For a valid trail, the tip of the javelin shall fall completely within the inner edges of the landing sector.
8. If the implements breaks during a throw or while in the air, and if the competitor thereby loses his balance and contravenes, it shall not count as a foul throw, provided one attempt was made in accordance with the Rule.
9. Implements shall be carried back to the starting line and never thrown back.
10. The competitor shall not leave the runway until the implement has touched the ground.

2. THROWING THE DISCUS

The object of the spin in the discus throw is to generate power and speed within the circle to apply to the discus itself, and the more power that is applied to the discus, then further it will go the angle to release of discus, the position of the discus during its flight are important factors. It has three types,

1. Half rotation
2. Full rotation
3. One and half rotation

6. 5000m Run – Arc start **or** Group start
7. 10000m Run – Arc start **or** Group start
8. 400mts Hurdles - Full stagger distance
9. 4 x 100m Relay – Full stagger distance
10. 4 x 400m Relay – One and Half stagger distance with diagonal distance.

2.Non- Standard Track

The track which is not satisfying the conditions of standard track is called as Non-standard track and the 400mts track without curb (raised border) is also treated as Non-standard track. Usually 200mts track is called as Non – standard track.

Some of the disadvantages of Non-standard track:

- a) Sprinters very difficult to show their real capacity.
- b) Very difficult to run more than 6 competitors at a time.
- c) Very difficult to conduct Hurdles and Relay races.
- d) Very difficult to conduct both track and field events simultaneously.

Method of finding Running Distance Radius for 200 mts track if 36 mts as straight.

3. Five – stride – Rhythm

The three known stride Rhythms – the three stride rhythm. The five stride Rhythm and seven stride rhythm. It is five stride – Rhythm which is the most widely accepted, which comprises the following phases:

- (i) The withdrawal of the javelin
- (ii) The impulse stride
- (iii) The throwing position
- (iv) The release
- (v) The recovery

(i) Withdrawal of the javelin

The withdrawal starts at the second stride of the five-stride rhythm and ends at the third stride. The throwing arm is drawn back in alignment with the shoulder axis. The palm of the hand is turned upward and extend the forearm, when the withdrawal is completed, the athlete's body has a marked backward lean.

(II) Impulse stride /Cross step / Three step (or) Five step Rhythm

When an athlete reaches the check mark with the left leg the action of throwing should be starts. The right hand is stretched backward with the javelin and left hand is brought in forward in front of chest. That is otherwise called "with drawl of the javelin".

The toe of the right foot must be deviate more than 30° from the run up direction. The left leg presses the body down low into the fourth stride, preventing the body's centre of gravity from lifting at the landing of the right leg, which must be allowed to bend when it receives the body weight.

(iii) Throwing Position

The throwing position starts at the moment when the athletes right foot makes contact with the ground after the impulse stride. The right leg can start to extend and doing s introduce the release, the full extension of the forearm by the hand is important under no circumstances must the arm be flexed at the wrist.

(iv) The Release

The release is initiated by a forward and upward stretching of the right leg at the knee and ankle joints, driving the right hip forward. The shoulder and the hip axes now run parallel and almost at right angles to the direction of the throw. The throwing arm is not yet stretched while the right leg is extended, the heel is raised, allowing the pressure of the ball of the foot to act longer on the body. The throwing arm now comes into its sphere of action. When the throwing arm begins to strike, the elbows are raised until it is level with the heed and pointing in the throwing direction.

Method of Finding Running Distance Radius for 400 mts if 80 mts as straight.

$$2pr = 240 \text{ (Circumference of two curves)}$$

$$r = 240/2 \pi$$

$$240/2 \times 3.1416 = \frac{240}{2 \times 3.1416} = \frac{240}{6.2832}$$

$$= 38.20 \text{ mts}$$

For Standard Track (With Kerb)

Marking Distance Radius (MDR or CR) = RDR – 0.30 m

$$\text{MDR} = 38.20 - 0.30 = 37.90\text{m}$$

For Non-standard Track (without kerb)

$$\text{MDR} = \text{RDR} - 0.20 \text{ m} = 38.20 - 0.20 \text{ m} = 38.00\text{m}$$

Starting points in 400 mts Track

1. 100m Run Men & Women
100m Hurdles for Women - Parallel Method
110m Hurdles for Men
2. 200m Run – Half stagger distance
3. 400m Run – Full stagger distance
4. 800m Run – Half stagger with diagonal excess **Or** Arc start / group start
5. 1500m Run – Arc start **or** Group start

Running Distance Radius (RDR)

RDR is the path in which an athlete has to run in the curve to cover the exact distance. The chart below shows that RDR, CDR and area required to lay 400mts raised bordered track when the straights length varies.

Straight length in mts	Rdr in mts	Cdr in mts
79MTS	38.50	38.20
80MTS	38.18	37.88
84.39mts	36.80	36.50

The chart below shows that RDR, CDR and area required to lay 200mts Non raised bordered track when the straights length varies.

Straight length in mts	Rdr in mts	Cdr in mts
37.50MTS	19.89	19.67
40.00MTS	19.09	18.89

During the release the left side of the body must be in a flexed position. This is achieved by a sudden arrest of the backward movement of the left arm just when the right side of the body overtakes the left side the angle of release is between 30 and 36 degrees.

(v) The recovery

A distance of at least two meters from the arc will be required merely checks the forward speed of the body. Thus preventing from fouling. After the release, the right leg is forward in a springing movement. The reverse takes places to avoid stepping over the right foot must be planted transversely to the throwing direction, the upper body must be lean forward, the left leg is raised and brought back into the direction of the run-up. Javelin consists of three parts namely the head, shaft and grip. The shaft is made up of either Aluminium or fiber. At the tip of the shaft a sharp head is fixed. At the center a grip made of thread is fixed. The Javelin is round and broad at the center. The circumference is small in the front and rear.

Follow throw

After releasing the javelin the thrower to avoid his forward momentum (or) foul, then he placed his rear leg to brought forward for his rear leg and placed nearer to the board and to do hopping twice or threes. Then he come back behind the runway should not make foul.

Correct throw

The javelin should be caught in the grip. The javelin must be thrown forward from behind the shoulders. While throwing thrower should not cross the line of runway either in front or side. After releasing, the javelin should fall within the sector lines with the tip first touching the ground. The thrower still remains (leave) the runway only after the javelin lands on the ground.

6. THROWING THE HAMMER

The technique of hammer throwing is determined by the specific nature of the implement and the measurement of the throwing circle, which comply with the international rules. A complete throw consists of two preliminary swings and three turns on the left foot with an active push-off from the right leg at each turn. The following are the parts of hammer throw:

1. The Grip
2. The Initial position
3. The preliminary Arm swings
4. The Transition
5. The turns

Top Layer

Now-a-days all international competitions are being held on synthetic tracks. The thickness and material used for various layers of a synthetic track depend upon the product and preference of the particular firm (construction agency). Although, the material used for top layer by all the firms are synthetic tracks, but of different variations. It is advisable that whenever 8 lane synthetic tracks are being laid, efforts should be made for laying of another 4 lane synthetic track of the same material for training purposes.

Lane

Lane is the space between the two parallel lines.

Kerb

Kerb is the raised border (both inner and outer line) which is fixed permanently through the inner line of the first line and outer line of the last lane. Dimensions of curb is 5 x 5 cm (5 cm height, 5 cm width).

Curb Radius (CR)

Curb radius is the radius which is used to draw the curve. It is otherwise known as Marking Distance Radius (MDR). The curb radius varies according into the nature of the track.

TRACK MARKING

Track must be prepared according to the rules and regulations laid by **International Association Of Athletic Federation** (IAAF). The inner raised border should be 5cm in height and width by using brick, wood or any other suitable material. There shall be a minimum of 8 lanes and width of lane is 1.22mts and width of the line is 5cm. The straight lines are always marked by north to south direction and finishing line must be same for all races.

a) TYPES OF TRACK

The track is classified into two types based on its specifications.

1. Standard Track (with curb)
2. Non- standard Track (without curb)

1. Standard Track

The tracks are made either on plan surface (grass) or with the help of cinder/synthetic material which is skid proof and not too hard. To get maximum benefit from the cinder/right synthetic tracks, it is essential that proper care be taken at the time of the construction so that right materials are mixed in various layers as per required thickness.

6. The Release

7. The Recovery

The Grip

The inside grip of the hammer handle is laid against the pads of the middle phalanges of the left hand fingers. The right hand cuffs the left by putting the four fingers over the back of the middle and basal phalanges of the left hand fingers. The hammer must be held firmly but not tensely.

The initial position

The thrower stands at the rear edge of the circle with his back facing in the direction of the throw his feet are a little more than shoulder width apart and his knees are bent for stability during the arm swings. The thrower now places the hammer head behind his right leg as far to his rear as possible. He then turns to the right until the right shoulder points in the direction of throwing. The hammer wire forms a straight line with the extended left arm.

The preliminary arm swings

The main function of the preliminary swings is to break the inertia of the thrower and hammer and to set a rhythmic pattern of movement by which initial acceleration is transmitted to the hammer. During the preliminary swings, the arms are kept long and relaxed and form and extension

of the hammer wire. They begin with this movement when the hammer is at its lowest point and end it by turning the trunk to the right. The thrower must counteract the increasing centrifugal force.

When the hammer moves backwards, he presses his hips forward. After the first arm swing the thrower keeps the lowest point of his hammer well to the right, at around 290 to 300 degrees, and the highest point somewhere around 120 degrees.

The Release

The delivery phase begins when the right foot touches the ground after the third turn. The landing of the right foot must be fast and firm in order to match the acceleration of the implement, which is racing down to the lowest point with the beginning of the active straightening of the legs. Just before the hammer is released, the left knee straightens. When the implement leaves the hand, the vertical line of projection of the thrower's head should not go beyond the right heel. If the feet are in a stationary position, thus is a clear proof of a correctly executed delivery. The hammer is released at shoulder height. The left shoulder points in throwing direction and back is well arched. The most valuable angle of release in the hammer throw is 42 and 44°.

1st Day Events

1. 100 mts Hurdles
2. High Jump
3. Shot put
4. 200 mts Run

2. Decathlon

Decathlon consist of 10 events which shall be conducted on 2 consecutive days in the following order.

1st Day Events

1. 100 mts Run
2. Discuss throw
3. Pole vault
4. Javelin throw
5. 400 mts Run

2nd Day Events

5. Long Jump
6. Javelin
7. 800 mts Run

2nd Day Events

6. 100 mts Hurdles
7. Long Jump
8. Shot put
9. High Jump
10. 1500 mts Run

Note :

1. Winners will be decided based on the points of all events.
2. There is no heats in the running events and every running events are treated as finals.
3. Three attempts only will be given to field events.
4. Two false start should be permitted.

3. Decathlon

Decathlon consist of 10 events which shall be conducted on two consecutive days in the following order, with minimum 30 minutes interval between two consecutive events and 10 hours interval for last event of first day and first event of second day.

1st Day Events

1. 100 mts Run
2. Long Jump
3. Shot put
4. High Jump
5. 400 mts Run

2nd Day Events

6. 110 mts Hurdles
7. Discus throw
8. Pole vault
9. Javelin throw
10. 1500 mts Run

Combined Events For Women

Combined events for women there are two category mentioned as follows.

1. Heptathlon
2. Decathlon

1. Heptathlon

Heptathlon consist of 7 events which shall be conducted on 2 consecutive days in the following order.

The Recovery or Follow Through

To avoid stepping over to thrower must absorb the impact by reversing the legs and lowering the body's centre of gravity, thus increasing stability.

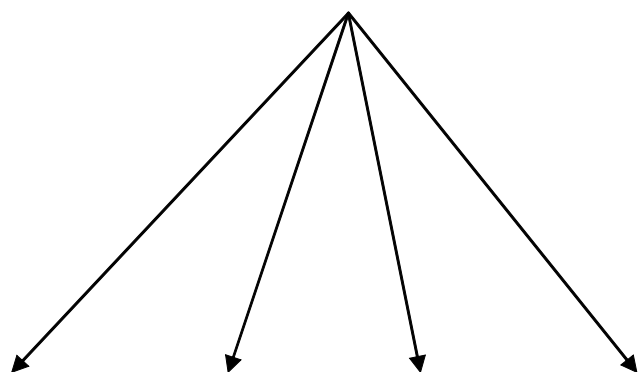
C.COMBINED EVENTS

Multi-discipline events has been included in athletics programmes since eight century B.C. though originally the five events for men included a run, long jump, discus throw, javelin throw and wrestling. The 10 events with we are familiar today were practiced first in Scandinavia, and the event is now developed in importance for the genuine all – rounder, who may not be one event, but who can maintain a high overall standard. Today it is an event for the decathlon or heptathlon specialist who prepares for it and competes in the event as a whole rather than in series of separate competitions. The decathlete or heptathlete needs to be a balanced personality with well –rounded physical development.

The Combined events are an individual events consist of several number of events of different category. For men and women combined events are classified into 4 types according to the level of competitors. The events are held over two days, and they are chose as a true test of skill, stamina and technique. The decathlon combines sprints with middle distance running, throwing, jumping, hurdling and vaulting.

There is a rest period of 30minutes between each event. A competitor is awarded points for his best performance in each event, as calculated by reference to scoring tables produced by the IAAF. The decathlon entered the Olympic programme in 1912.

COMBINED EVENTS



Pentathlon

Heptathlon

Octathlon

Decathlon

They are as follows.

1. Pentathlon - 5 events
2. Heptathlon - 7 events
3. Octathlon - 8 events
4. Decathlon - 10 events

The Combined events such as pentathlon, which shall be conducted on one day, and other combined events such as Heptathlon, Decathlon and Octathlon should be conducted on two consecutive days as in the prescribed order.

Combined Events for Men

1. Pentathlon
2. Octathlon (Youth Boys)
3. Decathlon

1. Pentathlon

The pentathlon is a five-events test of all-round ability. The men's version comprises the long jump, javelin, 200m., discus and 1500 m in that order on one day. Scoring is on the same basis as the decathlon. The pentathlon has long been a most popular women's event, and was introduced into the Olympic schedule in 1964.

2. Octathlon (Youth Boys)

Octathlon consist of 8 events which shall be conducted on consecutive two days in the following order.

1st day Events

1. 100 m Hurdle
2. Long Jump
3. Shot put
4. 400 mts Run

2nd day Events

5. 110mts Hurdles
6. High Jump
7. Javelin
8. 1000 mts Run

i) By seeing their timing in 1/100 of second. If the tie still remains.

ii) Lot shall be used to decide the best loser.

b) Field events

During horizontal or distance events, where there are more than eight competitors, each competitor shall be allocated three trials and the competitors with the best valid performances shall be allowed three additional trials.

In the event of a tie for the last qualifying place it shall be resolved by seeing the second and third best performance among the tied competitors and if tie still remains, the tied competitors shall also be allowed to perform three additional trials.

In the event of a tie for any position, it shall be decided first by using the available rules. If the tie still remains it concerns for the first place, the competition shall be re-run to decide the winner which is known as concerns any other place, the result will stand. That means the tied competitors shall be awarded the same place.

Note; Its best performance as achieved during field marking, it shall also be considered.

$$2\pi r = 128 \text{ (Circumference of two curves = } 200 - 72 \text{ (} 2 \times 36 \text{))}$$

$$2 \times 3.14 \times r = 128$$

$$\text{RDR or 'r' = } 128 \times \frac{1}{2} \times \frac{1}{3.14} = 20.37 \text{ m}$$

$$\text{MDR = RDR - 0.20 m}$$

$$\text{MDR = } 20.37 - 0.20 = 20.17 \text{ m}$$

b) TYPES OF RUNNING SURFACE

1. Mud
2. Grass
3. Cinder
4. Synthetic Track

c) NEED FOR A STANDARD TRACK

1. Track must be prepared according to the rules and regulations laid by International Association of Athletic Federation (IAAF).
2. The length of the standard track shall be 400 mts.
3. The track should be laid out from North to South direction.
4. Track shall consist of two parallel straights and two curves of same radius. The length of the curve will be more than the straight.

5. The track should have minimum of 6 lanes and maximum of 8 lanes.
6. The inside and outside of the track shall be bordered by a kerb. That is raised border of maximum 5 x 5 cm.
7. The track should have common finishing point.
8. To conduct all the running events up to 10,000 mts within a track and also the jumping and the throwing events simultaneously with the track events.
9. The track should have proper drainage system.
10. The track should be leveled without any ups and downs.
11. The running direction is such that the athlete's left hand side is towards the centre of the track.
12. The synthetic material will be used as the surface of the track.

STAGGER DISTANCE

1. There will be no stagger for the first lane athlete.
2. As and when the width of the lanes changes, the stagger distance also changes.
3. Staggers are needed only when the athletes are required to run in curves also in their lane.
4. Staggers will not change according to the increase in the length of curves.

6. Angle sector is : 34.92°
7. Wire : Single up broken and straight length of string steel wire 3 mm in diameter
8. Handle : Curved or straight grip with maximum width inside of 130 mm and maximum length inside of 110mm.

BREAKING TIES IN ATHLETICS

Tie breaking in can be steadied separately during preliminary rounds and finals to decide the positions.

1) Preliminary rounds;

a) Track events

Preliminary rounds (heats) shall be held in track events when the number of competitors is more in number to reduce the number of competitors to 6 or 8 to conduct the finals. In all preliminary rounds at least first and second in each heat shall qualify for the next round and it possible at least three in each heat shall qualify. The qualification for the next race shall be decided either according to their placings or according to their times (best losers). During this selection if there is a tie among the best loser, the following steps shall be applied to decide the best loser for the next round.

The Ring

The ring shall be placed to the level of outside ground. It must have a height of 1.4cm to 2.6 cm from the inside floor of the circle and 6mm thickness.

Specification of Hammer

The hammer consist of three parts, a metal head, a wire and a grip. The head shall be of solid iron or other metal not softer than brass. The head should be spherical in shape with smooth surface. A steel wire, with a diameter of 3mm, is attached with the head at one end and with a handle on the other end.

Overall weight of the hammer

1. Men : 7.26 kg to 7.285 kg
2. Women : 4 kg to 4.025 kg

Overall length of the hammer

1. Men : 117.5 cm to 121.5 cm
2. Women : 116 cm to 119.5 cm
3. Diameter for men : 11 cm to 13 cm
4. Diameter for women : 95 cm to 110 cm
5. Head : Solid or other suitable material

5. When staggers are marked, the diagonal excess distance also to be taken into consideration.

Formula

$$\text{Half stagger} = [W (N-1) - \alpha 0.10 \text{ m}] \pi$$

$$\text{Full stagger} = [W (N-1) - \alpha 0.10 \text{ m}] 2\pi$$

$$\text{One and Half stagger} = [W(N-1) - 0.10\text{m}] \times 3\pi$$

Where,

W – Width of the lane,

N – Number of the lane

π – 3.1416 (Standard value)

Stagger distances for Non- standard Track

$$\text{Half stagger} = W (N-1) \times \pi$$

$$\text{Full stagger} = W(N-1) \times 2\pi$$

$$\text{One and Half stagger} = W (N-1) \times 3\pi$$

Diagonal (excess) Distance

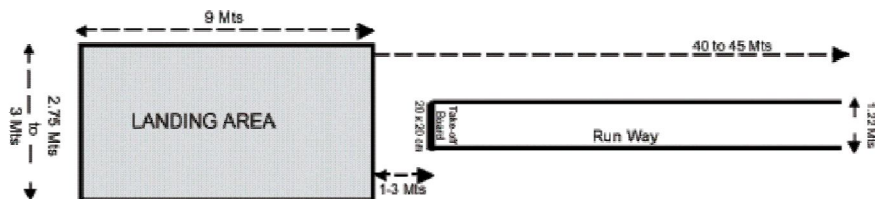
The excessive distance run by the athletes other than the first lane runner for 800mts and 4 x 400mts relay to reach the first lane after the first and three curve respectively is called diagonal excess. This diagonal distance should be calculated for each lane and it should be added with half stagger, and 1½ stagger respectively in the starting point itself.

UNIT - V

FIELD MARKING

Layout of Area for all Field Events with all Specifications

a) LONG JUMP



Specifications

Runway

Approach run - 40-45mts

Width of the lane - 1.22

Width of the line - 5cm

Jumping pit

Length - 9 mts

Width - 2.75 mts to 3 mts

Distance of the take off Board from the nearest edge - 1 – 3 mts of landing area

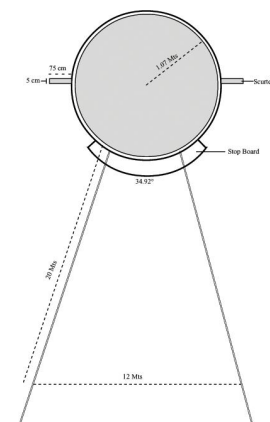
(84)

9. Width of the cord grip : 150 mm to 160 mm for men

10. Width of the cord grip : 140 mm to 150 mm for women

11. Angle of sector is : 29°

h) THROWING THE HAMMER CIRCLE



The hammer is thrown from a circle, shielded on three sides by a netting a cage on a metal frame, and must land within the marked sector. The competitor who achieves the best distance with his throw is declared winner. A total number of five judges watch for infringement within the circle, the other three judges supervise the field. If the hammer breaks while attempting a throw, then the attempt shall not be counted. Under such circumstances, if the competitor loses his balance and commits a foul, it won't go against him.

(93)

The javelin is made of wood or metal shaft with a sharp metal head. There shall be a cord grip around the centre of gravity of javelin. The cord grip should not exceed the diameter of the shaft by more than 8mm. The grip shall be of uniform thickness.

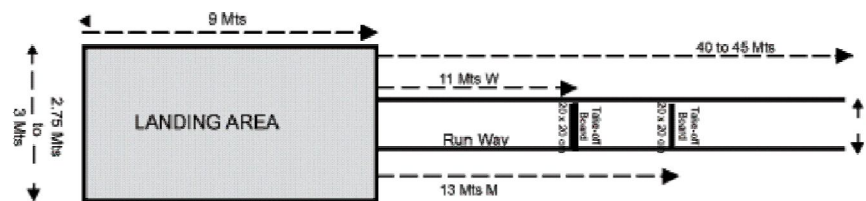
SPECIFICATIONS

1. Length of the runway : 30 to 36.5 mts
2. Width of the runway : Two parallel White lines 5 cm wide and. 4 mts apart
3. Width of the arc : 7 cm extended by 75cm long and 7 cm wide.
4. Weight of the javelin : 800gms to 825 gms for men
5. Weight of the javelin : 600gms to 625gms for women
6. Over all length of the javelin : 2.60 mts to 2.70 mts for men
7. Over all length of the javelin : 2.20 mts to 2.30 mts for women
8. Metal head : 250 mm to 330 mm for men and women

Dimension of the Take- off Board (Wooden Board)

- Length - 1.20 mts to 1.21 mts
 Width - 20 cm
 Depth- 10 cm

b) TRIPLE JUMP



Specifications

Runway

- Approach run - 40-45mts
 Width of the lane - 1.22
 Width of the line - 5cm

Jumping pit

- Length - 9 mts
 Width - 2.75 mts to 3 mts
 Distance of the take off board from the nearest edge - 11m (w)
 of landing area 13m (m)

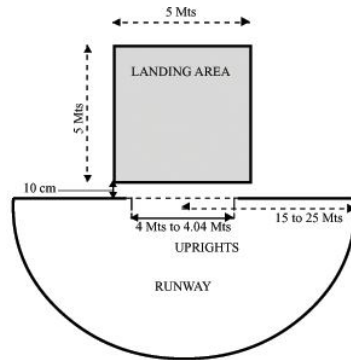
Dimension of the take off board

Length - 1.20 mts to 1.21 mts

Width - 20 cm

Depth- 10 cm

c) HIGH JUMP



Specifications

Runway

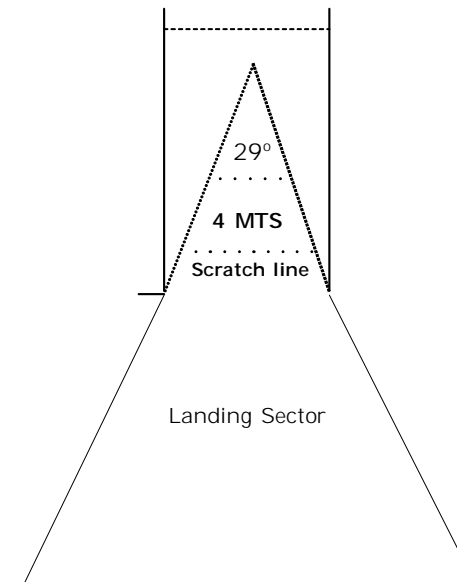
The minimum length of the runway shall be 15 meters. Except in international competitions, where the minimum shall be 20 meters. If conditions permit, the minimum length should be 25 meters.

High Jump Landing Pit

Pit : The pit is made of foam. The length of the pit shall be at least 5m, width 3m and height 60cm.

(86)

Javelin Throw Sector



IMPLEMENTS



Javelin



cord grip

(91)

Specifications

RUNWAY

The minimum length of the runway shall be 15 meters. Except in international competitions where the minimum shall be 20 meters. If conditions permit, the minimum length should be 25 meters.

High Jump Landing Pit

Pit : The pit is made of foam. The length of the pit shall be at least 5m, width 3m and height 60cm.

Uprights

The uprights should be of a rigid or any other suitable material, marked in centimeters. The uprights shall extend at least 10cm above the point up to which the cross bar can be raised. The distance between the uprights shall be between 4.00 - 4.04m.

Cross bar support

The support for the cross bar should be made of rigid or any other suitable material, which can be raised or lowered and can be adjusted up to a height of 2.30m.

Uprights

The uprights should be of a rigid or any other suitable material, marked in centimeters. The uprights shall extend at least 10cm above the point up to which the Cross bar can be raised. The distance between the uprights shall be between 4.00-4.04m.

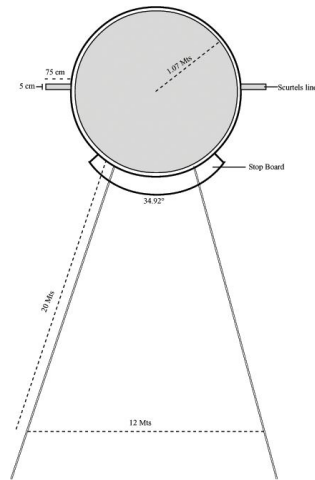
Cross bar support

The support for the cross bar should be made of rigid or any other suitable material, which can be raised or lowered and can be adjusted up to a height of 2.30m.

Cross bar

The cross bar is made of wood, or metal or any other suitable material. The cross bar should be circular with a diameter of 29 mm to 31 mm. The end of the bar shall be of concave or flattened surface of 150-200 mm in length and 29-35 mm in width. The length of the cross bar shall be between 3.98, to 4.02m.

d) SHOT PUT CIRCLE



The Ring

The ring shall be placed to the level of outside ground. It must have a height of 1.4cm to 2.6 cm from the inside floor of the circle and 6mm thickness.

Shot

The shot is made from solid Iron, brass or other hard metal. The men's shot weight is 7.26 kg with a diameter between 110-130mm. The women's shot is of 4kg with a diameter between 95-110mm. The shot should be spherical in shape with smooth surface.

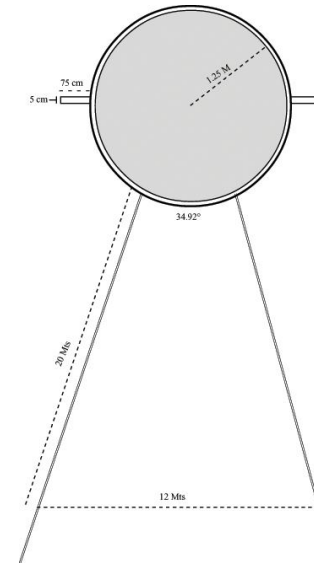
Stop Board

A curved piece of wood 10 cm thick affixed to the front of the shot put circle. When throwing, the shot putter braces his foot against the stop board to avoid falling forwards out of the circle.

(88)

f) DISCUS CIRCLE

Discus



The discus is made of wood, or other suitable material, with a rounded metal rim. The cross section of the edge shall be rounded in a circle of 6mm radius. The thickness of the rim should be at least 12m. The diameter of men's discus shall be between 219-212 mm and its weight should be 2 kg. The diameter of women's discus shall be between 180-182 mm and weight 1kg. The diameter of metal plate or flat centre area should be between 50-57mm.

(89)

a) Track Events

The judges shall decide the order in which the competition finish and if they cannot arrive at a decision shall refer the matter to the Referee, who shall decide.

Dead Heat

If there is a tie for the first place in any track event, the event shall be held after to giving adequate rest. And if it is not possible to conduct event once again due to time factor, the tied competitions shall be awarded first place jointly. This method is known as "dead heat". If tie remains for any other place, the result will stand. Rerace shall not be held to decide the second, third and other place.

Note: If photo finish facilities is available, the positions may be decided, easily.

b) Distance events

When there is a tie for any place, it shall be solved by seeing the second best performance and it necessary third, fourth best, etc. If tie still remains and concerns first place, the tied competitors will complete again in the some order in a new attempt until the tie is result. For remaining places the result will stand. That means same place shall be given to the field competitors.

Height events

When there is a tie for any place in high jump and pole vault it shall be solved by using two rules in order as following

- i) The tie competitor with lowest number of failures at the field height (last cleared height) shall be given higher place.
- ii) If tie shall remain; the competitor with lowest total number of failures throughout the competition shall be given higher place.

If the tie still remains and if it concerns the first place, the field competitors shall be given one more jump at the height where the competition is stopped (height which is immediate next to the field height), and if no decision is reached, the bar shall be raised or lowered 2cm for high jump and 5cm for pole vault. The competitors are allowed only one attempt at each height until the tie is decided. The best performance achieved during jump, if any, shall also be considered.

If the tie concerns any other place, the tied competitors shall be awarded the same place in the competition.

Note: If the same place is given, the immediate next place shall not be awarded to any competitors.

competitors shall be placed in the order in which any part of their bodies (i.e. torso, as distinguished from the heads neck, arms, legs, hands or feet) reaches the vertical plane of the nearer edge of the finish line.

B. MIDDLE DISTANCE RUNNING

Distance running can be split into two groups, Middle distance and Long distance. For middle distance running the athlete needs to both speed and stamina. For long distance running, stamina is the most important thing. Stamina means building up our body so that it can be last the race distance, but at race speed.

Middle Distance Events

1. 800 mts
2. 1500 mts
3. 3000 mts

The middle distance runner must apply his effort correctly throughout the race; this can be achieved only by a knowledge of pace and tactics.

The events which fall into the middle distance category range from 800m to 3000m. With the relentless advance in performance in athletics the 800 meter race now attracts athletes who in the past would have been sprinters. His running style is a model of mechanical efficiency, and even

UNIT - I

INTRODUCTION

A. Meaning of Athletics

Athletics comprise of a wide range of skills and can be divided in two broad categories of track and field events. Track events include sprint races, middle distance races, long distance races, relays and hurdles. The field events are those which are being played either inside or outside the track area or outside the stadium, which include throwing events and jumping events.

The track events include races of 100m, 200m, 400m, 800m, 1500m, 5000, 10000m, and relay races of 4x100m, 4x400m in both men and women categories. In all races shorter than 800m the competitors have to run the length in their respective lanes. The competitors of relay races are required to carry a baton and pass over the same to his/her partner within the take over zone. The starting points are arranged in such false a way that distance from start to finish is same for each competitor. In case of two false starts, the athletes declared disqualified. The competitor who jostles, runs across, or obstructs other competitor(s) can also be disqualified. Timings of competitors are recorded by the official time keeper from stop watches or through electronic time keeping equipment. The hurdle events include 110m and 400m for men and 100m and 400m for women. The competitors are required to jump over specified number of hurdles, which are made of metal with

a wooden top bar. The steeplechase hurdle event comprises of 28 hurdle jumps and 7 water jumps spread over a 3000m run-way.

The throwing events include throw of shot-put, javelin, discus and hammer. Each competitor generally gets six trials and the winner is decided on the best distance covered in any one of his six trials. The Jumping events comprise of High Jump, Pole Vault, Long Jump and Triple Jump. In the first two events, athletes are required to jump over a crossbar. In Triple jump the competitors are required to complete a hop, step and Jump sequence. Winner of jumping event is decided based on the distance measured between the take-off line and the nearest break in the landing area lead by the competitor's body part.

A standard international track is 400 mts in circumference. It has 8 lanes and the width of each lane is 1.22 mts. Track and field events include Sprints, Middle distance running, Long distances race, Hurdles, Steeple Chase, Relay races, throwing events and jumping events. Track and field events are conducted by International Association of Athletic Federation (**IAAF**).

Athletics

The term "Athletics" is derived from the Greek word "Athlon" which means a contest. The word "Athlete" denotes a person who takes part in contests which involve physical activity. "Athletics" is the oldest forms of the organized sport contested between individuals and or teams.

3. Run through

A forward dip during the last stride before the finish line is the most commonly used technique.

Photo Finish Camera

It is impossible for the naked eye to be able to determine accurately the finishing sequence of runners for in a blanket finish. The problem has been solved by photo-finish cameras. A photo-finish camera has very narrow slit lens which photograph an area of the finish line not more than 5-10cm across. It uses a continuous strip of film that moves across the lens at a speed proportionate to the speed of athletes and records the arrival of each competitor at the finish line. The space between each athlete shown in the film exhibits the time elapsed between the arrivals of each of them at the finish line. Photo – finish camera also doubles up as an electronic timing device, recording finishing timings of athletes up to one hundredth of a second. The camera gives a developed photograph that gives positions of athletes and time when their torso reached the finish line.

FINISH POSTS

Except where their use may interfere with the photo finish equipment, two white posts may be placed along the prolongation of the finish line at least 0.30 mts from the edge of the track. They should be of rigid construction and approximately 1.40m high, 8 cm wide and 2 cm thick. The

the foot to push against at the start of the race. The foot plates shall be slopped to suit the starting position of the athlete and can be either flat or slightly concave. To monitor the false starts the blocks can be connected with a devise. The blocks can be used up to and including 400 meters (including the first) leg of the 4x200m and 4x400m).

TYPES OF FINISHING

The finish line should be 5cm in width drawn across the track at right angles to the inner edge. Two white posts of rigid material (80mm in width and 20mm in thickness) shall be placed at a 30cm distance from the edge of the track. Competitors are place in the order in which any part of their torso (as distinguished from the head, neck, arms, legs, hands, or feet) reaches the vertical plane of the edge of the finish line nearest to the star.

Technique

There are three finishing technique used particularly during the sprint events. They are as follows.

1. Lunge finish

The torso reached the finish line first, i.e. leaning torso forward.

2. Diagonal finish (or) Shoulder Shrug

At the finish line crossing it by making the shoulder in diagonal, towards midline of the finish line. It is more difficult type.

B. IAAF

The IAAF (International Association of Athletic Federation) is the supreme governing body controlling international athletics throughout the word. It was founded in Stockholm on July 17th, 1912, to draw up and enforce rules and regulations and a common amateur definition, and to recognize world records, The IAAF now promotes its own World Champions in track and field every four years, with annual World Cross- Country Champions for men and women every march.

IAAF- Structure and Functions

In 1912, two days after the Olympic games a congress was held in Stockholm for the formation of an International Association of Athletic Federation. Seventeen countries were attended the historic meeting. The meeting was urged the Athletics to develop and promote international competitions and the Olympic games. The meeting was also urged the importance of having universal code of rules and regulation and a common definition for Amateur and also an athletic register of world and Olympic records.

One year later in 1963 at Berlin the congress once again met and accepted the first constitution and 34 nations figured on the most membership list. J.Sigfrid Edstrom (Sweden) was elected as first president and Kristvan Hailstorm as honorary secretary. The technical rules for International and domestic competition were framed and presented for approval in 1914 at the third congress in France.

In 1946 the IAAF Head Quarters moved from Stockholm to London. Over the years, the IAAF grew into a huge and dynamic organization as the world governing body of track and field athletics, road running, race walking and cross country. The congress decided to move the head quarters once again from London to Morte Carlo in 1993. The Steady growth of the Federation accelerated in the last decades. By 1997 member countries in addition numbered 209. The IAAF council comprising of 27 members from various countries.

AFI (Athletic Federation of India)

Athletics in its present form was born in our country during past decade of 19th century. Nothing much is known of its early stages till first known participation of Norman G.Pitchard in 2nd Olympic games in 1900 at Paris, where he won a Silver medal in 200mts run. The Indian Olympic Association (IOA) was formed in 1926 and its control athletics. But India unofficially participated in the 1920 and 1924 Olympic games under the leadership of H.C.Buck of Y.M.C.A Madras. The official participation of Indian athletes started in the 1928 Olympic games at Amsterdam till 1936 Berlin Olympics. India participated in the Olympics under the IOA BANNER. Then 1940 and 1944 Olympic Games were not conducted because of second World War.

Structure and Functions

Amateur Athletic Federation of India was formed in 1946 at the initiative of Maharaja Yadvindra Singh then

in a natural relaxed position. An angle of about 90° at the front knee and of about 110° to 130° at the rear knee will be appropriate.

(iii) The Long Start (or) Elongated Start

The front starting block is situated 3 foot lengths from the starting line and there is one foot length between the starting blocks. The angle of rear leg about 110°. The long starting position is certainly the most difficult one. It should be applied carefully. Any athletes find this position rather ineffective. The long start, although still known, is hardly used nowadays.

For good starts a sprinter must,

- a) push back against the blocks
- b) moving the hands and arms as quickly as possible in reaction to the gun.
- c) move the hips quickly from the starting position to running position.
- d) run out of the blocks, do not jump.

STARTING BLOCKS

The starting blocks should be made of rigid material. It should be adjustable, but must be without springs. The blocks are fixed to the track, so that it provide firm base for

'On your marks' – position – his body weight resting comfortably on the legs in the crouch position. The hands are shoulder width apart to touch the ground behind the starting line with fingers and thumb pointing away from each other. The eyes are focused downward and forward.

Set position

The block settings should result, the athletes having a 90° angle at the front knee and 110° to 120° angle in the back of the knee. That gives a set position with the hips just slightly higher than shoulders slightly forward. The hands are placed just slightly wider than shoulder width apart, with the fingers and thumbs in a **"high bridge"** position. The shoulders are above and slightly ahead of the hands, the arms are straight, but not locked. He should feel pressure against rear block in the set position since the center of gravity is located high, the first strides are shorter and less powerful.

(ii) The Middle Start (or) Medium Start.

The front starting block is located two foot lengths (21 inches) from the starting line and the rear starting block is one foot length further. Kneel down with the right knee against the instep or toe of the left foot, and keep the trunk erect. The angle for the rear leg is about 130°. The slope of the body from the hips to the shoulders is not very steep. The body weight is on the legs and arms. The head remains

president of IOA with prof.G.D.Sondhi as its first president. The AAFI got affiliated to IAAF in the year 1946. The AAFI for the first time selected 8 athletes who participated in 1948 Olympic games at London. Indian women competed in the Olympic games for the first time in 1948.

Mr.M.C.Dhawn was elected by secretary of AAFI in 1950 and was the technical secretary in the first Asian games held at New Delhi in 1951. Raja Bhalendra Singh become the president of AAFI in 1952 and continued of guide athletic till 1968 along with Mr.M.C.Dhawn. This team acted a yeoman service to athletics in India and strengthened the AAFI to make it the leading federation. The federation produced by group competitors open national championship, Zonal and Inter Zonal Competition.

Many distinguished personalities are acted as president and secretary of AAFI till 1987 from 1988 to till date Mr.Suresh Kalmadi and Mr.Lalit K.Bhanot formed the new team of president and secretary respectively. The main function of AAFI is to prepare a year long sports calendar at the state and national level. They are sending teams to international level competitions based on merit.

D. AGE GROUPS

Under the Jurisdiction of the IAAF is split into five age groups.

1. Men and women there is no age limit
2. Seniors - 19 Years
3. Juniors - 17 and 18 Years
4. Youths - 15 and 16 Years
5. Boys - 13 and 14 Years

UNIT - II

TRACK EVENTS

Athletics is great fun and people of all ages, can enjoy it. Athletic activities can be traced back of the ancient Greeks, who used to take part in games of running, jumping and throwing. Track events include sprint races, middle distance races, long distance races, relays and hurdles.

The track events include races of 100m, 200m, 400m, 800m, 1500m, 5000, 10000m, and relay races of 4x100m, 4x400m in both men and women categories. In the track events all races are run with the competitor's left hand side of the track and finish in the same position. The competitors are required to wear their numbers on their vests.

A. SPRINT EVENTS

Sprints

"To cover the distance in the shortest time with maximum speed"

A. Sprint Events

1. 100 mts
2. 200 mts
3. 400 mts

1. Bunch start (or) Bullet start
2. Medium start
3. Elongated start

Three types of foot spacing bullet, medium and elongated starts. Each sprinter will have his own particular measurements so the following procedure is suggested to enable him to get into a correct starting position.

Block placement

The three block placement positions are determined by the location of the blocks relative to the starting line.

(i) The Bunch or Bullet Start

Stand with the right toe beside the rear of the left heel. Kneel down with trunk erect and rock forward in the same way. In this starting position the starting blocks are close to the starting line. The front block should be placed one foot length (16 inches) from the starting line, with 11 inches between the blocks results in low velocity and fast block clearance Track events, up to and including 400 meters, run at full speed for the entire race distance. Sprinter press their feet against two blocks, which are spaced apart and connected to a shaft, to improve their initial movement. The main features to look for in the sprinter's highly distinctive running action are the high knee-lift, the long strides, the thrusting arm action and the controlled breathing.

should immediately rise to final starting position retaining the contact of the hands with the ground and of the feet with the foot plates of the blocks.

A competitor shall not touch either the starting line or the ground in front of it with his hands or his feet on his marks. The three starting positions are measured from the starting line to the front leg of the starting block. Starting is the first stages in all the running events, should be conducted either track or road. There are only two types of starting should be followed by the athletes.

1. Crouch start
2. Arc start (Standing start)

CROUCH START

Crouch start can be used by the athletes those who are run up to and including 400mts and even the first runner of 4 x 100mts Relay and 4 x 400mts Relay.

In crouch start the following commands to be used,

1. On your mark
2. Set
3. The gun fire or clapping with clap board

It has three (divisions) method should be used according to the height of the individuals.

Sprinter

There is no ideal shape or size for the sprinter. He must, however, be well built and have good all-round muscular development and a quick reaction time. Regular, even and relaxed arm action must be learned first. The legs follow the arms, and the faster the arms are moved the faster the leg action will become. In the arm action emphasis should be on a forward and upward motion.

Most important factors for sprinting

1. Reaction time
2. Starting position
3. Powerful Muscles
4. Acceleration Technique.
5. Effective stride length
6. Curve running technique (200 mts, and 400 mts).
7. Technique at the finish line.
8. The condition of the Track surface
9. Wind and Weather conditions.

Stride Length

“It is the distance between touchdown of the toe of one foot and the touchdown of the toe of the other foot”. Stride length may and usually will be vary from left to right

or right to left on individual at the same velocity. This variance may be influenced by dominance, weakness, injuries and even leg length. Stride length will be vary with the speed of running and during the various phases of a race.

Stride Cadence or Stride frequency

"It is the number of strides per second". The stride cadence for sprinters is 4.5 to 10 strides per second with little difference found between the strides. The method of determining stride rate is to divide the number of strides in a race by the elapsed time for the race.

STARTING

There are varieties of running events for which the track is used . The finishing line for all races must be the same. But the starting line of all the races cannot be the same. It will vary from race to race. While 100mts race, 100mts hurdles and 110mts, hurdles races have to be run in straight courses, appropriate distance shall be measured backward from the beginning of home stretch and starting lines are marked. The extended lines are broken.

The start and finish of a race shall each be denoted by a white line 5 cm wide. The distance of the race shall be measured from the edge of the starting line farther from the finish, to the edge of the finish line nearer to the start.

All races shall be started by the report of the starter's gun or approved starting apparatus fixed upwards after he has ascertained that competitors are steady and in the correct starting position.

At all international sports competitions meetings, the commands of the starter in his own language shall, in races up to and including 400m be "on your marks", "set", and when all competitors are "set" the gun shall be fired, or approved starting apparatus activated.

In races longer than 400m, the commands shall be, "on your marks" and when all competitors are steady, the gun shall be fired, or approved starting apparatus activated. A competitors shall not touch the ground with his hands.

In all races up to and including 400m, and 4 x 100 mts Relay, 4 x 400mts relay first runner a crouch start and the use of starting blocks are compulsory. In competition held under IAAF, competitors must use starting blocks provided by the organizers of the meet. In other meet on all weather tracks, the organizers may insist that only starting blocks provided by them may be used. After the "on your marks" command, the competitor shall approach the starting line, assume a position completely within his allocated lane and behind the starting line. Both hands and one knee shall be in contact with the ground and both feet, in contact with the starting blocks. At the "set" command, the competitor

decreases. A study of the body movements involved in these activities pinpoints the causes. In normal walking and running the knee of the supporting leg is bent as it passes through the vertical position (i.e. when the centre of mass passes vertically over the foot), but in race walking the knee of this leg is straight in the vertical position. The technique is such a way that race walking does not become a modified run. Briefly, contact with the ground must be maintained at all times, a heel-and-toe action must be used, and the supporting leg must be straight at the knee as it passes through the vertical position.

Judging a fast walk is an extremely difficult skill, since it is almost impossible to see whether a walker has a foot on the ground at all times or that the knee is straight through the vertical for it takes only a fraction of a second to pass through the position. Race walking is not a natural skill as normal walking and running are, because the latter are the locomotion skills learnt from very early childhood.

As in most other athlete events, flexibility is an asset and hip mobility especially is an important factor in stride length in normal walking in which the line through the hip of the forward swinging leg is allowed to twist forward with the leg, the stride length is increased considerably. Stride length is also maximized, if the feet move along a straight line.

in the later stages of a race when fatigue is sapping his strength his skill does not break down.

C.LONG DISTANCE EVENTS

1. 5000 mts
2. 10000 mts
3. Marathon

The three main long distance events are 5,000m 10,000m and the marathon. Stamina is the basic quality needed by a long-distance runner, but speed has also become an essential requirement for would-be world beaters.

However, in the long distance the steady pacer must beware of the fast finisher who sits on his shoulder, until the final run-in. the steady runner without an equivalent fast finish must attempt to put himself far enough ahead of the sprint finishers by either a punishing pace throughout the race or by putting in bursts of speed during several laps from the finish. There is nothing more motivating for the training runner than to see his rival a few strides in front of him, but also nothing more demoralizing than for his rival to be 20 meters or more in front.

D.HURDLES – VARIOUS STAGES

MEANING

Running over the barriers (or) obstacles are known as Hurdles. The Hurdle race should be conducted for men and

women, senior boys and senior girls in various height and distance. Every hurdle race is based on certain conditions laid down in the rules of the International Association of Athletic Federation (IAAF).

The hurdles are made of steel with wooden top bar. The height of hurdles can be adjusted as per the length of the race and sex of the athlete. The hurdles are made in such a way that when force of 3.6-4kg. is being applied to the centre of the top, it should overturn automatically. The height required for, men's 110m race is 106.7 cm. The women's 100m sprint hurdles are 84 cm in height. In 400 m race the men's hurdle is 91.4 cm high and women's is 76.2 cm. The length of the wood used for the top bar should be 1.20m and width at least 7cm. The top bar should be striped in black or white or in some other contrasting colors.

The following are the standard distances, it can be classified into two categories,

- Men - 110 & 400 mts
- Women - 100 & 400 mts

Distance of Hurdles	Category	Height of the Hurdles	Distance Start to first Hurdle	Distance Between the Hurdles	Distance Last Hurdle to Finish
100mts	Women	0.840mts	13mts	8.50mts	10.50mts
110mts	Men	1.067mts	13.72mts	9.14mts	14.02mts
400mts	Men	0.914mts	45mts	35mts	40mts
400mts	Women	0.762mts	45mts	35mts	40mts

Substitution

Once a relay team has participated in a competition only two additional athletes may be used as substitutes in the composition of the team for subsequent rounds. Once an athlete, who has participated in a previous round has been replaced by a substitute, he may not return to the team.

RELAY BATON

The relay baton is made of a rigid material. It should be a single piece of smooth, circular and hollow tube of 280-300 mm length. The minimum weight required for baton is 50 grams and its circumference should be between 120-130mm. The batons should be colored so that it can be easily visible during the race.

Specification

- Weight of the baton : not less than 50 gm
- Length of the baton : 28 to 30 cm
- Circumference of the baton : 10 cm
- Color of the baton : Visible color
- Minimum baton required : 6 Nos.
- Maximum baton required : 8 Nos.

D. WALKING

Race walking may appear to be the natural link between ordinary walking and running, and in some respects this is true-with increase in speed, the force-time

runner only. The baton should not be exchanged within the acceleration zone(Advance Zone).

During the exchange the baton must be delivered firmly and safely into the hands of the receiving runner. When the incoming runner has approached his partner within 2 to 3 mts he indicated to him by a signal when to extend his receiving arm backwards. The signal comes too early or too late, or the runner receiving the baton moves his arm up, down or to the side, the results in an unsteady baton pass and consequently in a loss of time. The baton should be put firmly into the grasping hand between the spread thumb and the four locked fingers.

2. 4 x 400 mts Relay

The runners use a visual pass. The incoming runner carries the baton in the right hand and passes to the outgoing runner's left hand. The primary responsibility for the pass rests on the outgoing runner due to fatigue on the part of the passer. Once the baton has been taken, the athlete immediately transfer it to the other hand.

The four athletes shall run 400mts each to cover 1600mts distance by means exchanging a baton. The first leg of the 4x 400 mts relay run in lanes and so is the first curve of the second leg; only after crossing the line making the exit from the first curve, runners free to move to the inside of the track.

110mts Hurdles

There shall be Ten flights of hurdles in each lane, set out in accordance with the below table.

Starting line to First Hurdle	:	=13.72mts
" "	Second Hurdle	: 13.72+9.14 =22.86mts
" "	Third Hurdle	: 22.86+9.14 =32.00mts
" "	Fourth Hurdle	: 32.00+9.14 =41.14mts
" "	Fifth Hurdle	: 41.14+9.14 =50.28mts
" "	Sixth Hurdle	: 50.28+9.14 =59.42mts
" "	Seventh Hurdle	: 59.42+9.14 =68.56mts
" "	Eight Hurdle	: 68.56+9.14 =77.70mts
" "	Ninth Hurdle	: 77.50+9.14 =86.84mts
" "	Tenth Hurdle	: 86.84+9.14 =95.98mts
" "	Finishing line	: 95.98+9.14=110mts

VARIOUS STAGES

110mts Hurdles the Hurdling Technique is classified into the following:

1. Starting
2. Approach to the First Hurdle
3. Hurdle Clearance (Departure)

4. Running between the hurdles
5. The finish

1.Starting

Hurdling is basically a sprinting event, the mechanics of the starting do not vary much from that of the sprint start. In order to get eight (8) strides to the first hurdle to take – off foot should be placed in the first block. If the hurdler wants seven (7) strides to the first hurdle, take – off foot should be placed in the rear block.

2. Approach to the First Hurdle

The distance from the starting line to the first hurdle is 13.72 mts. The first three strides out of the blocks are the same as in a sprinter’s start. On the fourth stride, the hurdler begins to concentrate on the first hurdle. In perfecting the approach to the first hurdle make any adjustments on the 4th, 5th and 6th strides. The first three and last two should be kept constant. The last stride is slightly shorter to permit to get his centre of gravity slightly ahead of the take-off foot. This approach sets the pattern for the entire race.

3. Hurdle clearance

The take – off distance from the hurdle depends on four factors. The height of the athlete, speed of the approach length of the lead leg speed of the lead leg action. Each

The baton must be carried by hand throughout the race, if dropped, it must be recovered by the athlete who dropped it. He may leave his own lane to retrieve the baton provided this procedure is adopted and no other athlete is impeded, dropping the baton shall not result in disqualification.

Stages of Relay Running

The start

The starting of the 4 x 100 mts Relay is basically same as for the 400 mts. The starting blocks are placed close to the outer line of the track. The baton lies between the forefinger and the thumb is enclosed by the other fingers. After a successful start the runner quickly passes to the inside of his lane.

Checkmarks

The second, third and fourth runners place a checkmarks on their lanes just behind their starting positions. This is a check mark for the out going runner. The distance between the checkmark and the starting position depends on the speed of the incoming runner and on the acceleration of the outgoing runner.

The Baton exchange

The relay baton should be exchanged from one to another competitor with in the take over zone. The exchange is completed when the baton is in the hand of the receiving

when hearing the signal from the incoming runner moves the appropriate arm backwards in a positive and slightly angled manner to a level not higher than the shoulder line. The upper arm is straight at the elbow, the back of the hand is facing down wards the thumb and index fingers are widely spaced forming obtuse angle. The baton is received into such a palm from the incoming runner with an outstretched arm. In the final phase of the change over the elbow joint locks quickly and the baton is passed in a down sweep action.

The best result in both techniques the change over should occur when both runners are traveling at maximum speed and the actual change over should be as quick as possible. The majority of experts consider that the speediest change over occurs when the baton is actually changed over a distance of 2 to 4 mts from the end of the exchange zone.

Acceleration Zone

The acceleration zone lets the outgoing runner accelerate properly and allows the athletes more time to reach top speed at the exchange.

Exchange Zone or Take over Zone

The incoming runner can signals the exchange with verbal commands at a specific point when the incoming runner ready to pass the baton. The incoming runners can also use nonverbal signals. The outgoing runner can count the incoming runner's stride from the check mark to the exchange point.

hurdler must be cleared quickly and safely. The first prerequisite of movements much as in the ordinary running stride. For this action the lead leg is slightly flexed at the knee joint, and leading foot to track beyond the hurdle.

The average take-off distance from the hurdle in men's hurdles will be 1.90 mts to 2.20 mts to allow the leading leg to sweep forward and upward in a straight line. Too short a distance for the take-off results in a "jump" over the hurdle. The hurdle clearance are having the following factors.

Action of the Leading leg

The complete action consists of a quick forward and upward thrust of the leading leg in the direction of the leading of introduces the sequences.

Once the take-off foot leaves the track it becomes the trail leg. The heel of the trail leg moves actively toward the buttocks as the knee moves in a exaggerated motion upward and to the side to avoid hitting the hurdle. For the clearance of the hurdle, the trailing leg must be stretched away from the body when clearing the hurdle. This movement requires good mobility of the hip. The sequence of the athlete's movements should be as follows: after a rigorous push from the ground follows a phase of relaxation for the take-off leg. An action forward movement of the high should begin only when the foot of the leading leg has reached the edge of the hurdle.

Action of the Arms

The usual movements during running are also executed during hurdle clearance. With the sole difference that in the hurdle stride the arms perform additional functions. The arms contribute in a greater degree to maintaining body balance. When the trailing leg comes forward, the trailing arm swings backward to counter balance this movement. It is either almost stretched or flexed at the elbow.

4. Running between the hurdles (The three-step Rhythm)

In the 110 mts hurdle run the distance between the hurdles is 9.14 mts. If we reduce from the length of the hurdle stride, there remains for three strides between the hurdles or three-step rhythm a distance of about 5.065 meters. So that is 1.88 mts for each step. But practice shows clearly that the three steps are not of equal length. The first stride after the landing which is of about 1.55 to 1.60 mts follows a wide second stride measuring 2.00 to 2.20 meters and this is the longest between the hurdles. The last stride before the hurdle is always slightly shorter than the previous one.

5. Finish

The athlete has to use any one technique similar to sprint to finish the race.

Baton Exchange

There are two methods of baton (Exchange) passing

1. Up sweep method
2. Down sweep method

1. The up sweep method

In this method the passing of the baton occurs in an upward movement by a straight arm. At the same time the baton is received by an arm which is pointing backward and locked at the elbow. The outgoing runner upon hearing the agreed signal from the incoming runner, quickly extends his arm backwards locking it at the elbow, the thumb and fingers are separated and pointing downwards forming an obtuse angle. The time that he receives the baton the outgoing runner tries to keep his arm as still as possible. This outstretched arm the incoming runner quickly moves his straight arm upwards and in such a way that the outgoing runner can grasp the baton as near to the incoming runner's palm as is possible. In the upsweep method the baton is passed from the right hand to the left hand and then the left hand passing it to the right.

2. Down sweep method

In the down sweep method the baton – exchange takes place over a distance of 2 to 3 mts. The out-going runner

2. The baton must be passed inside a short distance to be covered by some three to four strides and without unnecessary loss of time.
3. The baton must be exchanged by non – visual method.

Visual Method

The visual method of baton exchange is used only in 4x400 mts relay. When the out going runner receive the baton, he must see the incoming runner while receiving the baton. The incoming runner gripping the baton at its base, then passes the baton into the receiver hand with a forward down sweep motion. The outgoing runner reaches arm straight back, palm facing upward and takes the baton, gripping the upper portion.

Non Visual Method

The non-visual method of baton exchange is used only in 4x400 mts relay. When the out going runner receive the baton, he doesn't to see the incoming runner while receiving the baton. The incoming runner gripping the baton at its base, incoming alerts the receiver, then passes the baton into his or her hand with a forward pushing, down sweep motion. The outgoing runner reaches arm back, palm facing upward and takes the baton, gripping the upper portion. then rotates the receiving arm down, under and forward, to ready the baton for the next exchange.

400 mts Hurdles

Hurdling is a sprinting, rhythmic event. In this race a full circuit of the track is run with 10 hurdles, 91.4 cm high, placed 35 mts apart. The distance from the starting to the first hurdle is 45 mts, while the last hurdle to the finish line measures 40 mts. There are ten flights of hurdles in each lane, set out in accordance with the below table.

Placement of Hurdles in 100mts Hurdle race

Starting line to First Hurdle	:	=13.00mts
" "	Second Hurdle	: 13+8.50 =21.50mts
" "	Third Hurdle	: 21.5+8.50=30.00mts
" "	Fourth Hurdle	: 30+8.50 =38.50mts
" "	Fifth Hurdle	: 38.5+8.50=47.00mts
" "	Sixth Hurdle	: 47+8.50 =55.50mts
" "	Seventh Hurdle	: 55.5+8.50 =64.00mts
" "	Eight Hurdle	: 64 +8.50 =72.50mts
" "	Ninth Hurdle	: 72.5+8.50=81.00mts
" "	Tenth Hurdle	: 81+8.50 =89.50mts
" "	Finishing line	: 89.5+10.5=100mts

Placement of 400mts Hurdles in Standard Track

(Men and Women)

Starting line to First Hurdle	:	=45.00mts
" "	Second Hurdle	: 45+35 =80mts
" "	Third Hurdle	: 80+35=115mts

"	"	Fourth Hurdle :115+35=150mts
"	"	Fifth Hurdle : 50+35=185mts
"	"	Sixth Hurdle : 185+35=220mts
"	"	Seventh Hurdle : 220+35=255mts
"	"	Eight Hurdle : 255 +35=290mts
"	"	Ninth Hurdle : 290+35=325mts
"	"	Tenth Hurdle : 325 +35=360mts
"	"	Finishing line: 360+40=400mts

E. RELAY

There are two relay events comprising of 4x100m for men and women, and 4x400m for men and women. All the four members of a team are required to run one stage of the race along with the relay baton in their hands throughout the race. The baton must be picked up by the athlete who dropped it. He/She may leave the lane in order to retrieve the baton, provided no other player is impeded.

4x100m relay races are run entirely in respective lanes with staggered starts. In 4x400m relay races the first lap and the same part, of the track, of the second lap shall be run in lanes. The position of the teams at the start shall be retained at each take- over zone, except in case of races where lanes are not used. The waiting runners can move to inside zone, after handing over the baton, until the course is clear to avoid obstruction to other competitors.

Relay races are a popular and exciting feature of track and field. It is a team event in an individual oriented sport. They give the opportunity for team work and cooperation is not available in the other events. The key to good relay racing is the baton exchange. Commonly the relay events are as mentioned below,

1. 4 x 100 mts
2. 4 x 400 mts

1. 4 x 100 mts Relay

The 4 x 100 relay is undoubtedly the most beautiful and one of the most difficult events of the athletics spectrum. This relay uses four sprinters running a complete lap of the track, passing on a baton which has to arrive at the finish line with the runner of the last leg.

The main objective in the baton pass is to keep the baton moving at top speed throughout the relay. The baton must be passed only within a 20 meters take – over zone (exchange zone). This zone begins 10 mts before the scratch line (100 mts marking) and ends 10 mts after it. A good baton – exchange needs to satisfy the following three conditions.

1. The baton – exchange must take place after some 12 to 16 mts running, measured from the beginning of the take – over zone.

forward and upward. Then he goes upward the body position is in vertical (or) hanging and elbows are flexed.

5. Clearing the bar

When the body is in hanging position lift and swings upward both the legs, at the same time the pole straightened, turn the upside down. Then pushing the pole down by hands the legs are throw over the cross bar. After clearing the cross bar push the pole away from the pit with the wrist action to avoid foul or touching the bar.

6. Landing

Safe landing is required on the landing area.

B.THROWING EVENTS

General conditions

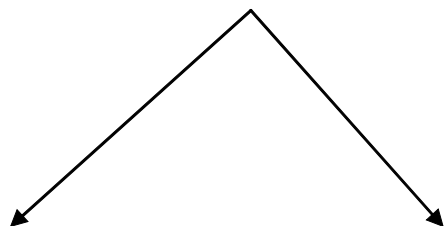
The person who has more body weight and mass of the muscles can choose throwing events. The following qualities are essential for throwers.

1. Body weight
2. Height
3. Leg power
4. Shoulder strength
5. Flexibility
6. Co-ordination
7. Speed

Race walking, of course, involves a rapid leg cadence and if the arms too are no maintain their synchronous swings they have to be bent at the elbows to reduce their moments of inertia, as in running. However, more emphasis is placed on the arm and shoulder action in race walking than in running, because of the need to counterbalancing the exaggerated eccentric thrust of the legs and movements of the hips. But in addition to counterbalancing the leg action, they also aid the forward drive with their swinging the strong upward swing of both arms evokes extra forces from the ground through the driving leg.

UNIT- III

FIELD EVENTS



DISTANCE EVENTS

1. Long Jump
2. Triple Jump
3. Shot Put
4. Discus
5. Javelin
6. Hammer

HEIGHT EVENTS

1. High Jump
2. Pole Vault

A. JUMPING EVENTS

1. LONG JUMP

The following techniques should involve while doing long jump.

1. Approach run
2. Penultimate stride
3. Take – off

(34)

1. Grip

Athletes who take off with the left foot, the pole must be carried on the right hand side, the left arm, half bent, supports the pole with the palm of the same hand turned downwards, while the right arm grips about 60-70cm higher with the hand lightly turned out. Keep the pole straight near the cross bar on the uprights. Hold the pole slightly lower than the height of the cross bar. Keep the pole parallel to the ground pointing to the pit or above the right hand palm facing upward and with left hand palm facing down ward.

2. Carry the Pole

The pole should be raised at 50° or 45° to the ground and keep right side. The left hand should be kept flexed at chest level and the right hand at the back. While carrying the pole, the body balance is very important.

3. Approach run

20 to 30 mts away from the vaulting box to start the running with the pole steadily and high knee action. When you reach the check mark, plant the pole in the vaulting box and kick the floor to go up.

4. Planting the pole

When the competitor reaches the check mark he should plant the pole into the box. Join the left hand with the right hand, push the right shoulder and both the hands

(47)

(iii) Supports for the cross bar

The cross bar shall rest on pegs pointing in the direction towards the landing area. The supports shall extend not more than 5.5 cm and not more than 1.3 cm in diameter, which should extend 35 – 40 mm above the pegs.

The distance between supports is minimum of 4.30 meters and maximum of 4.37 meters.

(iv) End Pieces of Cross Bar

It shall have 30 mm to 35 mm in diameter, square the length of the end piece is between 15 cm to 20 cm and should be semi circular.

(v) Landing (Pit) Area

The minimum dimensions of the landing area is 5 x 5 meters, for international competitions the length, width and height of the landing area will be 7 x 6 meters. The front pieces must be 2 m long.

VARIOUS STAGES

1. Grip
2. Carry the pole
3. Approach run
4. Planting
5. Crossing the bar
6. Landing

4. Flight in the air
5. Landing

1. Approach run

The length of the un-up is determined by the height of the jumper and his ability to accelerate in the run. According to analyzes carried out at recent Olympic Games, the best athletes use a run-up from 37-50m in length (incase for women 33-40). The athlete should mark the starting check mark 14 to 16 strides from the take – off board. If the athlete who is taking off with left leg, he should start running with right leg. Then he starts the approach run steadily and gradually increase the speed towards the take – off board.

2. Penultimate stride

The last two strides before the take off is called penultimate stride. In this time, the athlete shrugs his body little downward and the length of the stride decreases. That is easy way to fly in the air.

3. Take – off

The length of the jump depends not only on horizontal speed but also on the speed and power of the take-off. After completion of Approach run (penultimate stride), step on the take off board with the stronger foot and jump up in the air by pushing the take off board. After take off (or) jumping in the air the hands should be vertically raised. The Non-

take off leg should be raised high. The last step is executed more quickly and the whole foot is placed on the board, ahead of the projection of the center of gravity.

Plasticine Indicator (No Jump indicator)

Plasticine indicator is called no jump indicator, it is placed at the inner edge of the Take-off board. The judge at the take off board must watch the competitors does not overstep the scratch line. If a no jump indicator is not available the judge should build one moist sand which will clearly show if it is touched by toe or spike. It is a foul only if contact is made with the ground or the no jump indicator.

4. Flight

Jumping styles vary according to the development of the athlete and his muscular characteristics and the bone structure. The most common techniques are,

1. The Sail (common among beginners)
2. The Hitch kick (1-2-3 strides and a half in the air)
3. Hang (extended jump or glide)

(i) Hitch Kick

After jumping in the air from the take off board the athlete swing (or) rotate their legs like pedaling in cycle in the air into 2 or 3 pedaling style, and the legs are closed together before landing. When legs are pedaling the arms alternatively with legs movement.

4. POLE VAULT

Runway

The minimum length of the runway shall be 40 meters, when the conditions permit it is 45 meters.

1. The width of the runway is 1.22 meters.
2. The runway should be marked by white lines with 5cm as width.

Implements

(i) Upright

Any style of uprights or posts may be used provided they are rigid.

(ii) Cross Bar

It is made up of Fiber glass, Metal or other suitable material.

1. The length of the cross bar is 4.48 mts to 4.52 mts.
2. The maximum weight of the cross bar is 2.25 kg.
3. The circular shape of the cross bar is 30 mm diameter.
4. It should have the gap of maximum 3 mm

3.Fosbury Flop

The Fosbury flop was introduced by Dick Fosbury, who won the high jump at the Mexico Olympics in 1968. His technique for clearing the bar, his run up was also very notable because it was in the form of a semi- circle, and he took off with his foot at an angle of about 20 degree relative to the plane of the uprights. At the point of take – off Dick Fosbury with a vigorous bending action and driving up of the free leg, supported by an alternated movement of the upper limbs, rose completing a rotation on the longitudinal axis of the body and then prepared for flight with his back to the cross-bar.

Next he performed his rotation on the transverse axis of the body and at the extreme point of the parabola, he arched himself and continued his trajectory on this position until, so as not to knock down the cross - bar, he straightened his leg and landed on his back bowing his head on to his trunk so that the impact was taken by the top part of the back, avoiding unpleasant injuries to the cervical part of the spinal column.

4. Landing

Safe landing is required on the landing area.

(ii) Hang style

After the take off the athlete do the back arch the arms should be vertically raised above the head, the legs are straighten back, and before landing brings the legs and arms to extend forward, and the legs are closed together before landing.

5. LANDING

After completion of his style in the air, before landing, the athletes should extend both the legs forward / straightened. While landing both the heels should be landed first on the pit. There are three landing techniques should be used to come out of the landing area. They are as follows.

1. Collapsed landing
2. Swing out landing
3. Scoop landing

1. Collapsed landing

While landing both the heels should be touched first on the pit and then toe, the whole body should brought forward and place the knees on the pit, at the same time the buttocks should be kept back on both the heels.

2. Swing out landing

After landing in the pit the athletes should turn his body 45° either right or left in forward and fall down on the ground with shoulder, first then buttocks and so on.

3. Scoop landing

Landing by heels on the pit and push forcefully the sand and makes a dig and place the buttocks on the dig by extending the legs straight.

The competitor commits fouls if he;

1. Take off beyond the take off line.
2. Delaying more than 60 seconds.
3. After landing walking back towards the run way.
4. Performing acrobatics during the jump.
5. Uses illegal style of jump.

Rules

1. The order in which the competitors make their attempts must be decided by drawing lots.
2. Each competitor will be placed according to his best jump.
3. When there are more than eight competitors, each one is given 3 attempts and the 8 competitors with the best jumps are given further three jumps.
4. In case of a tie for the eight position, each competitor involved in the tie has three additional attempts.
5. When there are eight or less competitors, each one is allowed six trials.

3. Clearing the bar

1.The scissors

Towards the end of the 19th century, an American named Mike Sweeny proposed the scissors jump as an alternative to the frontal clearance. The scissors involved passing one leg over after the other at the same time bending the trunk towards the knees when clearing the bar. It consisted of the following movement:

1. While the forward leg was the cross – bar the other one kicked upwards, causing the chest to rotate towards the direction of jumping and a landing on the feet.
2. With the use of this style the world record began to rise this style, the world high-jumpers introduced minor adjustments to the technique according to their physical characteristics and talents.

2.The Straddle

Towards the middle of the 1930s another American Dave Albritton, proposed a radical new technique for clearing the bar, involving the body being parallel to the bar, but with the stomach downwards rather than with the body sideways. Thus the straddle was born, which was clearly demonstrated by the Soviet trainer Vladimir Mihailovic Dyachkov and put to good effect by Valeri Brumel, who took the world record to 2.28m in 1963.

1. Scissors
2. Straddle Roll (or) Belly Roll
3. Fosbury Flop

Various stages

1. Approach run
2. Take – off
3. Crossing the bar/ clearing the bar
4. Landing

1. Approach run

The jumper can approach either from the left side or right side of the cross bar with 25 mts long and medium speed. The angle of approach run and the number of steps vary according to the level of the athlete.

2. Take off

Jumper can stand either right or left one arm away from the cross bar. Then down vertically draw the line that may be considered as take off line. When the jumper start to approach towards crossbar, used his power leg on the take off line for make a jump.

6. Once the competition is under way, competitors are not allowed to use the runway for trail attempts.
7. All jumps must be measured from the nearest mark in the landing area made by any part of the body or limbs of the athlete to the take-off line or its extension and at right angles with the take-off line.
8. If a competitor takes off before the board or the line this does not constitute a foul.

2. TRIPLE JUMP

The triple jump shall consist of a Hop, step and jump in that order. This is the English definition of the jump. The hop must be executed on the same leg which was used for the take off (right-right or left-left). In the step the support is transferred to the other leg. The final jump is a proper long jump.

1. It shall not be considered a failure if the competitor, while jumping, touches the ground, with the “sleeping” leg.
2. There are six stages when taking Triple jump. They are as follows
 - (1) Approach run
 - (2) Take – off
 - (3) Hop

(4) Step

(5) Flight

(6) Landing

1. Approach run

The length of the run-up is determined by the height of the jumper and his ability to accelerate in the run. According to analyzes carried out at recent Olympic Games, the best athletes use a run-up from 37-50m in length (incase for women 33-40). The athlete should mark the starting check mark 14 to 16 strides from the take – off board. If the athlete who are taking off with left leg, he should start running with right leg. Then he start the approach run steadily and gradually increase the speed towards the take – off board.

2. Take – off

The length of the jump depends not only on horizontal speed but also on the speed and power of the take-off. After completion of Approach run (penultimate stride), step on the take off board with the stronger foot and jump up in the air by pushing the take off board. After take off (or) jumping in the air the hands should be vertically raised. The Non-take off leg should raised highly. The last step is executed more quickly and the whole foot is placed on the board, ahead of the projection of the center of gravity.

3. Hopping

The athlete should be used to land on the ground which he was used to take off. For example: The athlete has take off for his left leg means he should land or hop in the same leg. During hopping the non take off leg (or) rear leg has no movement, that's why it is called sleeping leg.

4. Step

After completion of hopping the athlete used to take one more step with his non take – off, foot before landing is called step. Here the athlete does the bounding action to do the step.

5. **Flight** and

6. **Landing** procedures are similar to long jump.

3. HIGH JUMP

The high jump as we know it today first became popular in the 19th century. Subsequent perfecting of the jumping technique took place in the development stages, but it has depended particularly on modification of the rules for the event and on the elimination of some restrictive conditions.

Various techniques should be used by the jumper to cross the bar. Depends upon their ability they used any one of the following techniques.

c) High carry

High carry method is associated with those throwers who tend to use a direct over the shoulder type withdrawal which ends with a turning back of the shoulders at the arm and javelin is reaching near full backward extension (To held on above the head).

A thrower must develop his carry position to suit his technique of withdrawal of the javelin in preparation for the delivery stride.

2. Approach run

During approach run the thrower has to mark the point of starting and the point of check mark with javelin. While running the javelin should move front and back, and slowly increase the running speed still you reach you the check mark.

The Run-up : The run – up has two parts. They are

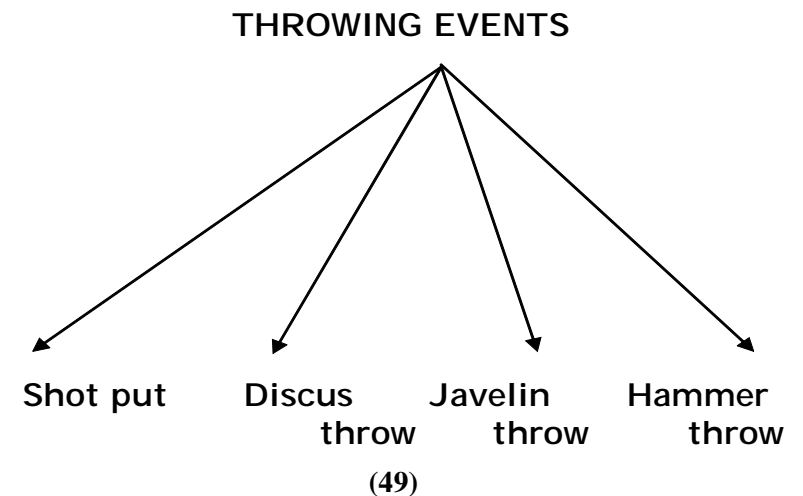
- (i) The cyclic part
- (ii) The acyclic part

The cyclic part speed is built up sufficiently so as to allow for a further increase over the last strides. The run-up should be easy and relaxed, heading the thrower to a powerful explosive all-out release.

- 8. Arm length
- 9. Balance
- 10. Endurance

The competitors are allowed three to six trails and three to eight of the best competitors are allowed three more trails. In case of a tie for the final place, the competitor shall be allowed three additional trails. The conditions of the competition must be explained to the competitors before its commencement. The best throw of the competition out of all trails taken by the competitors shall be credited in resolving a first place tie. No markers or marks are allowed to be put in the throwing sector.

Competitors may use an adhesive substance on their hands for better grip, and can also wear a belt of leather or some other material to protect the spine from injury. However, taping of the fingers or use of any other device on their hand which might assist in throwing is not allowed.



1. THROWING THE SHOT PUT

The competitor must begin the throw from a stationary position within the circle. The shot shall be put from the shoulder with one hand only and, shall touch or be in close contact with the chin. The hand shall not be dropped below this position during the act of putting.

Practice trials are not allowed after the commencement of the competition. Competitors are not allowed to put on gloves nor are they allowed to spray or spread any substance either on the surface of the throwing circle or on their shoes.

Basic Principles

1. Forces must be applied along a straight line.
2. Newton's 3rd law – Action and Reaction are equal and opposite.

Specifications

1. Weight of the shot for men - 7.260 Kg
2. Weight of the shot for women - 4.00 Kg
3. Diameter of the shot put circle- 2.135 m
4. Angle of the shot put sector - 34.92
5. Dimension of the sector - 20 x 12 m

a) Normal grip

The above thumb and middle finger is behind the edge of the grip cord and the index finger is partly curled around and behind on the javelin's shaft.

b) Middle and Thumb grip

The index finger and thumb is behind the edge of the cord binder and the rest of the fingers around the cord itself.

c) 'V' grip (or) Glow grip

The Javelin is held between the index and the middle fingers at the edge of the cord binder and rest of the fingers around the cord itself.

Carry

The javelin is carried above the shoulder of the throwing arm. Three commonly used methods of carrying the javelin during the approach run's cyclic phase.

a) Low carry

The low carry is generally associated with a circular type arm action in the 'withdrawal' (To held on waist level).

b) Medium carry

The medium carry is generally favored expansion in the withdrawal. (To held on eye level).

1. A head
2. A shaft and
3. A cord grip

The javelin throw comprises the following technical elements.

1. The grip and carry
2. The Approach run
3. The withdrawal
4. The impulse stride
5. The throwing stride
6. The release
7. The recovery

1. Grip

When executing their throws, javelin throwers may hold the javelin only by the whipcord grip. They may hold the javelin at the end of the cord grip with one or more fingers and the thumb touching the javelin shaft. Javelin throwers have some leeway in how they grip the javelin. It has three types how they can hold the javelin. The javelin is held behind the cord binder the rear edge of which offers a slightly raise border for gripping the javelin.

Stages / Method

1. Holding of the shot
2. Tucking (or) Placement of the shot
3. Stance
4. Glide
5. Release

1. Holding the shot

- a. The shot rest on the root of the fingers, and should not touch the palm.
- b. All the fingers are carry the shot except the little finger which is only support.

2. Placing (Tucking) the shot

1. The shot must be placed between chin and clavicle.
2. The shot does not go beyond the shoulder line.
3. The hand should be parallel to the ground.

3. Stance

The stance varied according to the using the style of Athletes.

Techniques (Style Of Putting)

The thrower can be used 3 style when putting the shot

1. Standing throw
2. 'O' Brien technique (or) Gliding
3. Rotation (or) Disco put

1. The 'O' Brien Technique

The distance a shot travels depends upon its height of release, velocity at the moment of release and the Angle of projection. The optimum angle of projection will vary depending on the height of the release, and the distance of the put, it will be approximately 34.95. The correct technique is the one that will result in the greatest velocity at release. The motion of a projected object is influenced by the exact point of application of the propelling force.

Holding the shot

The procedure for gripping the shot is to hold it in the left hand and lay the right hand loosely on top with the fingers spread slightly. The putter holds the shot in his right hand. Where it rests on the "base" of the fingers. The three middle fingers are only slightly splayed while the thumb and the little finger give the shot lateral support, securing a safe position of the shot.

The Reverse

The reversal is to serve as a follow through after the thrust and to retain balance in order to avoid fouling. After the discus has left the hand the thrower will have to reverse the feet rapidly and lower the body weight to maintain balance. The right leg must be brought forward quickly and planted firmly close to the rim of the circle, mean time the left leg swings back the body is bent at hips and right knee flexes to drop the centre of gravity into a stable position.

3. THROWING THE JAVELIN

The javelin throw distinguishes itself from other throwing events of shot-put, discus throw and hammer throw. These throwing events must be from a circle, the javelin must be thrown from behind the arc of a sector drawn with a radius of 8 mts. Due to the aerodynamic nature of the implement and its relative weight, the event does not require great strength. The event does require few less technique in order to achieve high level results.

Javelin consists of three parts namely the head, shaft and grip. The shaft is made up of either Aluminium or fiber. At the tip of the shaft a sharp head is fixed. At the center a grip made of thread is fixed. The Javelin is round and broad at the center. The circumference is small in the front and rear. It has three main parts

athlete drives off the left foot. The effective throwing position is one of "muscular wind" the hips displaced from the feet, shoulders from the hips and discus from the shoulders.

The run across the circle is initiated by the driving action of the left leg. Synchronized with the swing of the right leg. This drive carries the thrower halfway across the circle. The right foot landing approximately on the centre line with the leg well bent and the shoulder and body weight back. His left leg is pointing toward the direction of the throw, his right shoulder is facing the rear, his throwing arm is well behind the shoulder his left arm is curled and the discus is flat.

The Release

The throw begins with a forward and upward drive from the right foot. The shoulder should now come in slightly after the hip and the arm strikes from the low point, the thrower reaching out as far as possible to give as much distance from axis of rotation as he can. The left leg should now straighten, as the arm strikes. The discus will leave the hand in line with the right shoulder and should be squeezed out of fingers, each digit applying its force in turn and spinning of the first fingers last. The discus is spun clockwise. A good thrower will release the discus at a 35°-40° angle. The release must be smooth and rhythmic using the force generated from the lower body.

The stance

He should stand facing the rear of the ring with his back in the direction that he is going to throw. The shot should be held in right hand, supported by thumb and fingers. The hand holding the shot will be placed into the hollow of the collar bone in such a manner that it does not rest on such a manner that it does not rest on the shoulder but against the right side of the neck and the jaw. The elbow of the right arm is slightly raised and pressed forward. The upper arm points forward and downward. The head remains in its normal position. The eyes should be focused on a point to the rear of the ring and about five to ten yards away. He should stand erect in a telexed attitude, the left arm is held either out in front of the face or relaxed above the head the left front behind the right about one foot with just the toes touching for balance.

The glide or drive

The purpose of the glide is to gain momentum while moving across the ring and to lead into the correct position for the delivery. The initial movement is to lower the trunk and raise the left leg causing the body to form a "T" shape with all weight carried on the right leg. The head, shoulders and hip remain square to the rear of the circle, and the right leg flexes in preparation for the drive across the ring proper balance at this point is extremely important.

2. The Rotation or Disco-put Technique

The Starting Position

The putter stands at the rear of the circle facing 180° away from the throwing direction. The left foot is along the centre line of the circle and the right foot is placed laterally to the right of the centre line about shoulder width apart or just this point in most cases. The grounding of the left foot at the stop board denotes the arrival of the thrower into the delivery stance.

Preliminary Movements

To start the turn, the putter begins by swinging the shoulders, trunk and left arm along with the left and then to the right, as the body weight shifts correspondingly from leg to leg in coordination with the rhythm of the shoulders, trunk and left arm. Both knees are semi – flexed while this side to side swaying movement is taking place to break the inertia and set the pattern of movement to follow.

Turn

The double support phase of the turn begins at the end of the preliminary movements. The thrower is completely over his right leg with the trunk and shoulders well twisted to the right. From this position the thrower begins unwinding his upper body in the direction of turning with a wide

throwing arm bang to the right side along the thrower's thigh with the head and eyes focused to a point about 5 meters behind the circle. There are generally three positions that a thrower may adopt in relation to the line of direction. The experience, technical skill and comfort of the thrower must decide which of the three starting positions suit their ability.

The left foot is generally placed a few centimeters back from the rim of the circle, in order to avoid fouling by bursting the sole of the foot on the top edge of the rim of the circle as the pivot is executed.

The preliminary swings

The thrower should position himself at the rear edge of the circle with his back to the generally facing the direction of throw and his feet slightly wider than hips. The discus should be flat and facing downwards on the arm swung at shoulder height so that the arm and discus go well behind the right shoulder. The free arm rests comfortably across the chest. The thrower's weight should move easily from one foot to the other. On the final preliminary swing, the arm is swung back as far as possible so that the body weight is over a straight right leg.

Coming across the circle

The initial movement is begun the hips are turned and a pivot is made on the ball of the right foot as the

Specification of discus

1. Weight of the discus for men : 2 kg to 2.025 kg
2. Weight of the discus for women : 1 kg to 1.025 kg
3. Diameter of the discus for men : 21.9 cm to 22.1 cm
4. Diameter of the discus for women: 18 cm to 18.2 cm
5. Angle of sector is : 34.92°

Various Stages

Hold

The hand is placed flat against the discus surface, the upper joints of the fingers grasp the rim of the discus. Its center of gravity lies between the index and middle finger. Due to a slight bending at the wrist the upper face of the discus touches the arm, because it prevents the discus from falling out of the hand in the subsequent movements.

Starting position

The starting position at the rear of the circle is with the thrower facing 180 degrees away from the throwing direction. The two feet are usually placed about shoulder width apart or slightly more in the case of very tall throwers. The toes point naturally outwards with the weight of the body evenly distributed over both feet. The discus and

sweeping left arm action parallel to the ground, a slight forward tilt to trunk in a semi sitting position. The single support phase of the initial part of the turn is followed by a brief non support phase when both feet are off the ground and the whole body is turning on its vertical axis, and continues turning after the right foot lands around about the center of the circle.

Follow through (or) Reverse

When the right leg has driven really well and effectively and the action has been timed correctly the athlete will be well over the left foot as the arm strikes. Immediately after the shot has left the hand, he will find himself falling over the stop – board. In order to prevent himself fouling, the left foot is rapidly withdrawn and the right leg brought forward, the toe of the right foot striking the inside edge of the stop – board. At the same time the body weight is lowered in order to be more on balance by lowering the centre of gravity.

Valid Trial

For a valid trial, the shot shall fall completely within the inner edges of the landing sector.

Fouls

1. Throwing the shot from behind the shoulder
2. Touching outside the circle or the top of the stop Board

3. Shot landing on the sector line or outside the sector line
4. Delaying more than 60 seconds to throw.

Rules

1. The use of gloves is not allowed
2. At the competition area, each competitor may have a maximum of two practice trials which should be made in draw order, under the supervision of the judges.
3. Once the competition has begun, competitors are not permitted to use implements for practice purposes or to use the runway or ground within the sector for practice trials, with or without implements.
4. No device of any kind – i.e., taping of two or more fingers together, which in anyway assists a competitor when making a throw, shall be allowed. The use of tape on the hand shall not be allowed except in the case of the need to cover an open cut or wound.
5. A better grip, competitors are permitted to use a suitable substance on their hands only.
6. To protect the spine from injury, a competitor may wear a belt of feather or other suitable material.

7. For a valid trail, the tip of the javelin shall fall completely within the inner edges of the landing sector.
8. If the implements breaks during a throw or while in the air, and if the competitor thereby loses his balance and contravenes, it shall not count as a foul throw, provided one attempt was made in accordance with the Rule.
9. Implements shall be carried back to the starting line and never thrown back.
10. The competitor shall not leave the runway until the implement has touched the ground.

2. THROWING THE DISCUS

The object of the spin in the discus throw is to generate power and speed within the circle to apply to the discus itself, and the more power that is applied to the discus, then further it will go the angle to release of discus, the position of the discus during its flight are important factors. It has three types,

1. Half rotation
2. Full rotation
3. One and half rotation

6. 5000m Run – Arc start **or** Group start
7. 10000m Run – Arc start **or** Group start
8. 400mts Hurdles - Full stagger distance
9. 4 x 100m Relay – Full stagger distance
10. 4 x 400m Relay – One and Half stagger distance with diagonal distance.

2.Non- Standard Track

The track which is not satisfying the conditions of standard track is called as Non-standard track and the 400mts track without curb (raised border) is also treated as Non-standard track. Usually 200mts track is called as Non – standard track.

Some of the disadvantages of Non-standard track:

- a) Sprinters very difficult to show their real capacity.
- b) Very difficult to run more than 6 competitors at a time.
- c) Very difficult to conduct Hurdles and Relay races.
- d) Very difficult to conduct both track and field events simultaneously.

Method of finding Running Distance Radius for 200 mts track if 36 mts as straight.

3. Five – stride – Rhythm

The three known stride Rhythms – the three stride rhythm. The five stride Rhythm and seven stride rhythm. It is five stride – Rhythm which is the most widely accepted, which comprises the following phases:

- (i) The withdrawal of the javelin
- (ii) The impulse stride
- (iii) The throwing position
- (iv) The release
- (v) The recovery

(i) Withdrawal of the javelin

The withdrawal starts at the second stride of the five-stride rhythm and ends at the third stride. The throwing arm is drawn back in alignment with the shoulder axis. The palm of the hand is turned upward and extend the forearm, when the withdrawal is completed, the athlete's body has a marked backward lean.

(II) Impulse stride /Cross step / Three step (or) Five step Rhythm

When an athlete reaches the check mark with the left leg the action of throwing should be starts. The right hand is stretched backward with the javelin and left hand is brought in forward in front of chest. That is otherwise called "with drawl of the javelin".

The toe of the right foot must be deviate more than 30° from the run up direction. The left leg presses the body down low into the fourth stride, preventing the body's centre of gravity from lifting at the landing of the right leg, which must be allowed to bend when it receives the body weight.

(iii) Throwing Position

The throwing position starts at the moment when the athletes right foot makes contact with the ground after the impulse stride. The right leg can start to extend and doing s introduce the release, the full extension of the forearm by the hand is important under no circumstances must the arm be flexed at the wrist.

(iv) The Release

The release is initiated by a forward and upward stretching of the right leg at the knee and ankle joints, driving the right hip forward. The shoulder and the hip axes now run parallel and almost at right angles to the direction of the throw. The throwing arm is not yet stretched while the right leg is extended, the heel is raised, allowing the pressure of the ball of the foot to act longer on the body. The throwing arm now comes into its sphere of action. When the throwing arm begins to strike, the elbows are raised until it is level with the heed and pointing in the throwing direction.

Method of Finding Running Distance Radius for 400 mts if 80 mts as straight.

$$2pr = 240 \text{ (Circumference of two curves)}$$

$$r = 240/2 \pi$$

$$240/2 \times 3.1416 = \frac{240}{2 \times 3.1416} = \frac{240}{6.2832}$$

$$= 38.20 \text{ mts}$$

For Standard Track (With Kerb)

Marking Distance Radius (MDR or CR) = RDR – 0.30 m

MDR = 38.20 – 0.30 = 37.90m

For Non-standard Track (without kerb)

MDR = RDR – 0.20 m = 38.20 – 0.20 m = 38.00m

Starting points in 400 mts Track

1. 100m Run Men & Women
100m Hurdles for Women - Parallel Method
110m Hurdles for Men
2. 200m Run – Half stagger distance
3. 400m Run – Full stagger distance
4. 800m Run – Half stagger with diagonal excess **Or** Arc start / group start
5. 1500m Run – Arc start **or** Group start

Running Distance Radius (RDR)

RDR is the path in which an athlete has to run in the curve to cover the exact distance. The chart below shows that RDR,CDR and area required to lay 400mts raised bordered track when the straights length varies.

Straight length in mts	Rdr in mts	Cdr in mts
79MTS	38.50	38.20
80MTS	38.18	37.88
84.39mts	36.80	36.50

The chart below shows that RDR,CDR and area required to lay 200mts Non raised bordered track when the straights length varies.

Straight length in mts	Rdr in mts	Cdr in mts
37.50MTS	19.89	19.67
40.00MTS	19.09	18.89

During the release the left side of the body must be in a flexed position. This is achieved by a sudden arrest of the backward movement of the left arm just when the right side of the body overtakes the left side the angle of release is between 30 and 36 degrees.

(v) The recovery

A distance of at least two meters from the arc will be required merely checks the forward speed of the body. Thus preventing from fouling. After the release, the right leg is forward in a springing movement. The reverse takes places to avoid stepping over the right foot must be planted transversely to the throwing direction, the upper body must be lean forward, the left leg is raised and brought back into the direction of the run-up. Javelin consists of three parts namely the head, shaft and grip. The shaft is made up of either Aluminium or fiber. At the tip of the shaft a sharp head is fixed. At the center a grip made of thread is fixed. The Javelin is round and broad at the center. The circumference is small in the front and rear.

Follow throw

After releasing the javelin the thrower to avoid his forward momentum (or) foul, then he placed his rear leg to brought forward for his rear leg and placed nearer to the board and to do hopping twice or threes. Then he come back behind the runway should not make foul.

Correct throw

The javelin should be caught in the grip. The javelin must be thrown forward from behind the shoulders. While throwing thrower should not cross the line of runway either in front or side. After releasing, the javelin should fall within the sector lines with the tip first touching the ground. The thrower still remains (leave) the runway only after the javelin lands on the ground.

6. THROWING THE HAMMER

The technique of hammer throwing is determined by the specific nature of the implement and the measurement of the throwing circle, which comply with the international rules. A complete throw consists of two preliminary swings and three turns on the left foot with an active push-off from the right leg at each turn. The following are the parts of hammer throw:

1. The Grip
2. The Initial position
3. The preliminary Arm swings
4. The Transition
5. The turns

Top Layer

Now-a-days all international competitions are being held on synthetic tracks. The thickness and material used for various layers of a synthetic track depend upon the product and preference of the particular firm (construction agency). Although, the material used for top layer by all the firms are synthetic tracks, but of different variations. It is advisable that whenever 8 lane synthetic tracks are being laid, efforts should be made for laying of another 4 lane synthetic track of the same material for training purposes.

Lane

Lane is the space between the two parallel lines.

Kerb

Kerb is the raised border (both inner and outer line) which is fixed permanently through the inner line of the first line and outer line of the last lane. Dimensions of curb is 5 x 5 cm (5 cm height, 5 cm width).

Curb Radius (CR)

Curb radius is the radius which is used to draw the curve. It is otherwise known as Marking Distance Radius (MDR). The curb radius varies according into the nature of the track.

TRACK MARKING

Track must be prepared according to the rules and regulations laid by **International Association Of Athletic Federation** (IAAF). The inner raised border should be 5cm in height and width by using brick, wood or any other suitable material. There shall be a minimum of 8 lanes and width of lane is 1.22mts and width of the line is 5cm. The straight lines are always marked by north to south direction and finishing line must be same for all races.

a) TYPES OF TRACK

The track is classified into two types based on its specifications.

1. Standard Track (with curb)
2. Non- standard Track (without curb)

1. Standard Track

The tracks are made either on plan surface (grass) or with the help of cinder/synthetic material which is skid proof and not too hard. To get maximum benefit from the cinder/right synthetic tracks, it is essential that proper care be taken at the time of the construction so that right materials are mixed in various layers as per required thickness.

6. The Release

7. The Recovery

The Grip

The inside grip of the hammer handle is laid against the pads of the middle phalanges of the left hand fingers. The right hand cuffs the left by putting the four fingers over the back of the middle and basal phalanges of the left hand fingers. The hammer must be held firmly but not tensely.

The initial position

The thrower stands at the rear edge of the circle with his back facing in the direction of the throw his feet are a little more than shoulder width apart and his knees are bent for stability during the arm swings. The thrower now places the hammer head behind his right leg as far to his rear as possible. He then turns to the right until the right shoulder points in the direction of throwing. The hammer wire forms a straight line with the extended left arm.

The preliminary arm swings

The main function of the preliminary swings is to break the inertia of the thrower and hammer and to set a rhythmic pattern of movement by which initial acceleration is transmitted to the hammer. During the preliminary swings, the arms are kept long and relaxed and form and extension

of the hammer wire. They begin with this movement when the hammer is at its lowest point and end it by turning the trunk to the right. The thrower must counteract the increasing centrifugal force.

When the hammer moves backwards, he presses his hips forward. After the first arm swing the thrower keeps the lowest point of his hammer well to the right, at around 290 to 300 degrees, and the highest point somewhere around 120 degrees.

The Release

The delivery phase begins when the right foot touches the ground after the third turn. The landing of the right foot must be fast and firm in order to match the acceleration of the implement, which is racing down to the lowest point with the beginning of the active straightening of the legs. Just before the hammer is released, the left knee straightens. When the implement leaves the hand, the vertical line of projection of the thrower's head should not go beyond the right heel. If the feet are in a stationary position, thus is a clear proof of a correctly executed delivery. The hammer is released at shoulder height. The left shoulder points in throwing direction and back is well arched. The most valuable angle of release in the hammer throw is 42 and 44°.

1st Day Events

1. 100 mts Hurdles
2. High Jump
3. Shot put
4. 200 mts Run

2. Decathlon

Decathlon consist of 10 events which shall be conducted on 2 consecutive days in the following order.

1st Day Events

1. 100 mts Run
2. Discuss throw
3. Pole vault
4. Javelin throw
5. 400 mts Run

2nd Day Events

5. Long Jump
6. Javelin
7. 800 mts Run

2nd Day Events

6. 100 mts Hurdles
7. Long Jump
8. Shot put
9. High Jump
10. 1500 mts Run

Note :

1. Winners will be decided based on the points of all events.
2. There is no heats in the running events and every running events are treated as finals.
3. Three attempts only will be given to field events.
4. Two false start should be permitted.

3. Decathlon

Decathlon consist of 10 events which shall be conducted on two consecutive days in the following order, with minimum 30 minutes interval between two consecutive events and 10 hours interval for last event of first day and first event of second day.

1st Day Events

1. 100 mts Run
2. Long Jump
3. Shot put
4. High Jump
5. 400 mts Run

2nd Day Events

6. 110 mts Hurdles
7. Discus throw
8. Pole vault
9. Javelin throw
10. 1500 mts Run

Combined Events For Women

Combined events for women there are two category mentioned as follows.

1. Heptathlon

2. Decathlon

1. Heptathlon

Heptathlon consist of 7 events which shall be conducted on 2 consecutive days in the following order.

The Recovery or Follow Through

To avoid stepping over to thrower must absorb the impact by reversing the legs and lowering the body's centre of gravity, thus increasing stability.

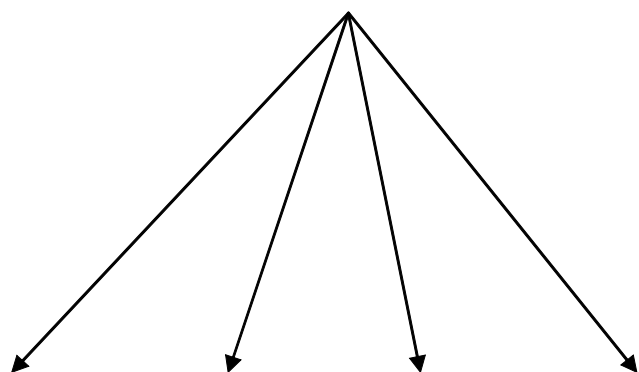
C.COMBINED EVENTS

Multi-discipline events has been included in athletics programmes since eight century B.C. though originally the five events for men included a run, long jump, discus throw, javelin throw and wrestling. The 10 events with we are familiar today were practiced first in Scandinavia, and the event is now developed in importance for the genuine all – rounder, who may not be one event, but who can maintain a high overall standard. Today it is an event for the decathlon or heptathlon specialist who prepares for it and competes in the event as a whole rather than in series of separate competitions. The decathlete or heptathlete needs to be a balanced personality with well –rounded physical development.

The Combined events are an individual events consist of several number of events of different category. For men and women combined events are classified into 4 types according to the level of competitors. The events are held over two days, and they are chose as a true test of skill, stamina and technique. The decathlon combines sprints with middle distance running, throwing, jumping, hurdling and vaulting.

There is a rest period of 30minutes between each event. A competitor is awarded points for his best performance in each event, as calculated by reference to scoring tables produced by the IAAF. The decathlon entered the Olympic programme in 1912.

COMBINED EVENTS



Pentathlon

Heptathlon

Octathlon

Decathlon

They are as follows.

1. Pentathlon - 5 events
2. Heptathlon - 7 events
3. Octathlon - 8 events
4. Decathlon - 10 events

The Combined events such as pentathlon, which shall be conducted on one day, and other combined events such as Heptathlon, Decathlon and Octathlon should be conducted on two consecutive days as in the prescribed order.

Combined Events for Men

1. Pentathlon
2. Octathlon (Youth Boys)
3. Decathlon

1. Pentathlon

The pentathlon is a five-events test of all-round ability. The men's version comprises the long jump, javelin, 200m., discus and 1500 m in that order on one day. Scoring is on the same basis as the decathlon. The pentathlon has long been a most popular women's event, and was introduced into the Olympic schedule in 1964.

2. Octathlon (Youth Boys)

Octathlon consist of 8 events which shall be conducted on consecutive two days in the following order.

1st day Events

1. 100 m Hurdle
2. Long Jump
3. Shot put
4. 400 mts Run

2nd day Events

5. 110mts Hurdles
6. High Jump
7. Javelin
8. 1000 mts Run

i) By seeing their timing in 1/100 of second. If the tie still remains.

ii) Lot shall be used to decide the best loser.

b) Field events

During horizontal or distance events, where there are more than eight competitors, each competitor shall be allocated three trials and the competitors with the best valid performances shall be allowed three additional trials.

In the event of a tie for the last qualifying place it shall be resolved by seeing the second and third best performance among the tied competitors and if the tie still remains, the tied competitors shall also be allowed to perform the three additional trials.

In the event of a tie for any position, it shall be decided first by using the available rules. If the tie still remains it concerns for the first place, the competition shall be re-run to decide the winner which is known as concerns any other place, the result will stand. That means the tied competitors shall be awarded the same place.

Note; Its best performance as achieved during field braking, it shall also be considered.

$$2\pi r = 128 \text{ (Circumference of two curves = } 200 - 72 \text{ (} 2 \times 36 \text{))}$$

$$2 \times 3.14 \times r = 128$$

$$\text{RDR or 'r' = } 128 \times \frac{1}{2} \times \frac{1}{3.14} = 20.37 \text{ m}$$

$$\text{MDR = RDR - 0.20 m}$$

$$\text{MDR = } 20.37 - 0.20 = 20.17 \text{ m}$$

b) TYPES OF RUNNING SURFACE

1. Mud
2. Grass
3. Cinder
4. Synthetic Track

c) NEED FOR A STANDARD TRACK

1. Track must be prepared according to the rules and regulations laid by International Association of Athletic Federation (IAAF).
2. The length of the standard track shall be 400 mts.
3. The track should be laid out from North to South direction.
4. Track shall consist of two parallel straights and two curves of same radius. The length of the curve will be more than the straight.

5. The track should have minimum of 6 lanes and maximum of 8 lanes.
6. The inside and outside of the track shall be bordered by a kerb. That is raised border of maximum 5 x 5 cm.
7. The track should have common finishing point.
8. To conduct all the running events up to 10,000 mts within a track and also the jumping and the throwing events simultaneously with the track events.
9. The track should have proper drainage system.
10. The track should be leveled without any ups and downs.
11. The running direction is such that the athlete's left hand side is towards the centre of the track.
12. The synthetic material will be used as the surface of the track.

STAGGER DISTANCE

1. There will be no stagger for the first lane athlete.
2. As and when the width of the lanes changes, the stagger distance also changes.
3. Staggers are needed only when the athletes are required to run in curves also in their lane.
4. Staggers will not change according to the increase in the length of curves.

6. Angle sector is : 34.92°
7. Wire : Single up broken and straight length of string steel wire 3 mm in diameter
8. Handle : Curved or straight grip with maximum width inside of 130 mm and maximum length inside of 110mm.

BREAKING TIES IN ATHLETICS

Tie breaking in can be steadied separately during preliminary rounds and finals to decide the positions.

1) Preliminary rounds;

a) Track events

Preliminary rounds (heats) shall be held in track events when the number of competitors is more in number to reduce the number of competitors to 6 or 8 to conduct the finals. In all preliminary rounds at least first and second in each heat shall qualify for the next round and it possible at least three in each heat shall qualify. The qualification for the next race shall be decided either according to their placings or according to their times (best losers). During this selection if there is a tie among the best loser, the following steps shall be applied to docile the best loser for the next round.

The Ring

The ring shall be placed to the level of outside ground. It must have a height of 1.4cm to 2.6 cm from the inside floor of the circle and 6mm thickness.

Specification of Hammer

The hammer consist of three parts, a metal head, a wire and a grip. The head shall be of solid iron or other metal not softer than brass. The head should be spherical in shape with smooth surface. A steel wire, with a diameter of 3mm, is attached with the head at one end and with a handle on the other end.

Overall weight of the hammer

1. Men : 7.26 kg to 7.285 kg
2. Women : 4 kg to 4.025 kg

Overall length of the hammer

1. Men : 117.5 cm to 121.5 cm
2. Women : 116 cm to 119.5 cm
3. Diameter for men : 11 cm to 13 cm
4. Diameter for women : 95 cm to 110 cm
5. Head : Solid or other suitable material

5. When staggers are marked, the diagonal excess distance also to be taken into consideration.

Formula

$$\text{Half stagger} = [W (N-1) - \alpha 0.10 \text{ m}] \pi$$

$$\text{Full stagger} = [W (N-1) - \alpha 0.10 \text{ m}] 2\pi$$

$$\text{One and Half stagger} = [W(N-1) - 0.10\text{m}] \times 3\pi$$

Where,

W – Width of the lane,

N – Number of the lane

π – 3.1416 (Standard value)

Stagger distances for Non- standard Track

$$\text{Half stagger} = W (N-1) \times \pi$$

$$\text{Full stagger} = W(N-1) \times 2\pi$$

$$\text{One and Half stagger} = W (N-1) \times 3\pi$$

Diagonal (excess) Distance

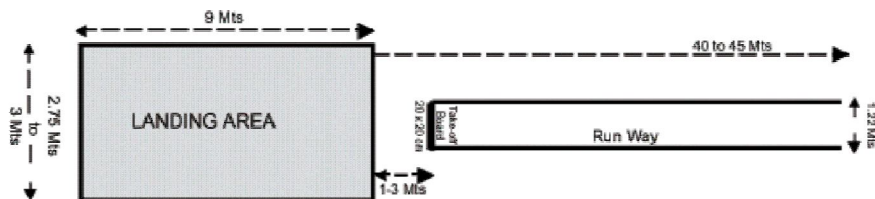
The excessive distance run by the athletes other than the first lane runner for 800mts and 4 x 400mts relay to reach the first lane after the first and three curve respectively is called diagonal excess. This diagonal distance should be calculated for each lane and it should be added with half stagger, and 1½ stagger respectively in the starting point itself.

UNIT - V

FIELD MARKING

Layout of Area for all Field Events with all Specifications

a) LONG JUMP



Specifications

Runway

Approach run - 40-45mts

Width of the lane - 1.22

Width of the line - 5cm

Jumping pit

Length - 9 mts

Width - 2.75 mts to 3 mts

Distance of the take off Board from the nearest edge - 1 – 3 mts of landing area

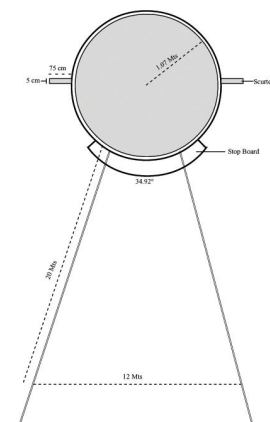
(84)

9. Width of the cord grip : 150 mm to 160 mm for men

10. Width of the cord grip : 140 mm to 150 mm for women

11. Angle of sector is : 29°

h) THROWING THE HAMMER CIRCLE



The hammer is thrown from a circle, shielded on three sides by a netting a cage on a metal frame, and must land within the marked sector. The competitor who achieves the best distance with his throw is declared winner. A total number of five judges watch for infringement within the circle, the other three judges supervise the field. If the hammer breaks while attempting a throw, then the attempt shall not be counted. Under such circumstances, if the competitor loses his balance and commits a foul, it won't go against him.

(93)

The javelin is made of wood or metal shaft with a sharp metal head. There shall be a cord grip around the centre of gravity of javelin. The cord grip should not exceed the diameter of the shaft by more than 8mm. The grip shall be of uniform thickness.

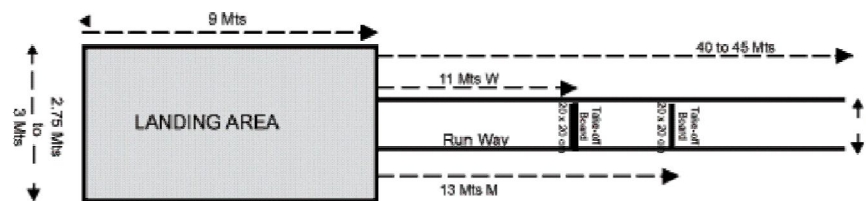
SPECIFICATIONS

1. Length of the runway : 30 to 36.5 mts
2. Width of the runway : Two parallel White lines 5 cm wide and. 4 mts apart
3. Width of the arc : 7 cm extended by 75cm long and 7 cm wide.
4. Weight of the javelin : 800gms to 825 gms for men
5. Weight of the javelin : 600gms to 625gms for women
6. Over all length of the javelin : 2.60 mts to 2.70 mts for men
7. Over all length of the javelin : 2.20 mts to 2.30 mts for women
8. Metal head : 250 mm to 330 mm for men and women

Dimension of the Take- off Board (Wooden Board)

- Length - 1.20 mts to 1.21 mts
 Width - 20 cm
 Depth- 10 cm

b) TRIPLE JUMP



Specifications

Runway

- Approach run - 40-45mts
 Width of the lane - 1.22
 Width of the line - 5cm

Jumping pit

- Length - 9 mts
 Width - 2.75 mts to 3 mts
 Distance of the take off board from the nearest edge of landing area - 11m (w) 13m (m)

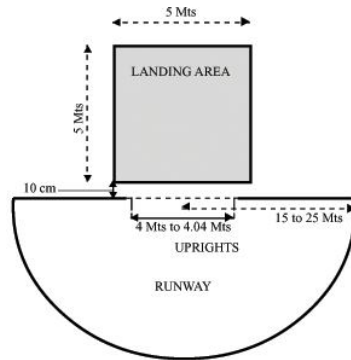
Dimension of the take off board

Length - 1.20 mts to 1.21 mts

Width - 20 cm

Depth- 10 cm

c) HIGH JUMP



Specifications

Runway

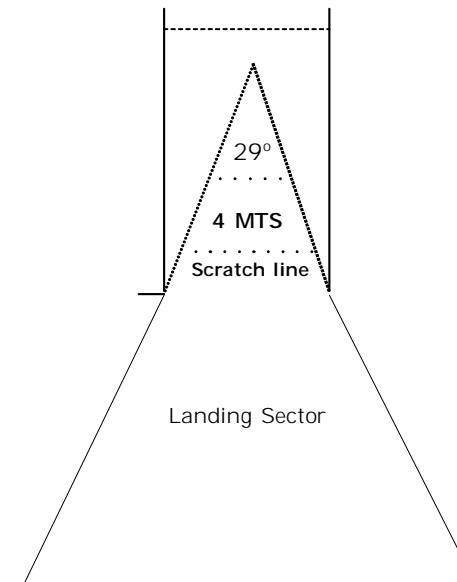
The minimum length of the runway shall be 15 meters. Except in international competitions, where the minimum shall be 20 meters. If conditions permit, the minimum length should be 25 meters.

High Jump Landing Pit

Pit : The pit is made of foam. The length of the pit shall be at least 5m, width 3m and height 60cm.

(86)

Javelin Throw Sector



IMPLEMENTS



Javelin



cord grip

(91)

Specifications

RUNWAY

The minimum length of the runway shall be 15 meters. Except in international competitions where the minimum shall be 20 meters. If conditions permit, the minimum length should be 25 meters.

High Jump Landing Pit

Pit : The pit is made of foam. The length of the pit shall be at least 5m, width 3m and height 60cm.

Uprights

The uprights should be of a rigid or any other suitable material, marked in centimeters. The uprights shall extend at least 10cm above the point up to which the cross bar can be raised. The distance between the uprights shall be between 4.00 - 4.04m.

Cross bar support

The support for the cross bar should be made of rigid or any other suitable material, which can be raised or lowered and can be adjusted up to a height of 2.30m.

Uprights

The uprights should be of a rigid or any other suitable material, marked in centimeters. The uprights shall extend at least 10cm above the point up to which the Cross bar can be raised. The distance between the uprights shall be between 4.00-4.04m.

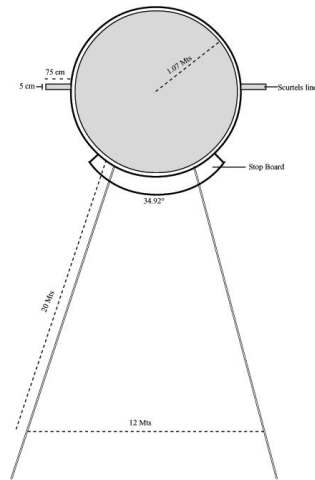
Cross bar support

The support for the cross bar should be made of rigid or any other suitable material, which can be raised or lowered and can be adjusted up to a height of 2.30m.

Cross bar

The cross bar is made of wood, or metal or any other suitable material. The cross bar should be circular with a diameter of 29 mm to 31 mm. The end of the bar shall be of concave or flattened surface of 150-200 mm in length and 29-35 mm in width. The length of the cross bar shall be between 3.98, to 4.02m.

d) SHOT PUT CIRCLE



The Ring

The ring shall be placed to the level of outside ground. It must have a height of 1.4cm to 2.6 cm from the inside floor of the circle and 6mm thickness.

Shot

The shot is made from solid Iron, brass or other hard metal. The men's shot weight is 7.26 kg with a diameter between 110-130mm. The women's shot is of 4kg with a diameter between 95-110mm. The shot should be spherical in shape with smooth surface.

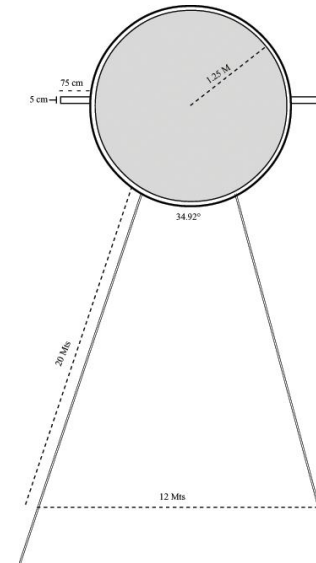
Stop Board

A curved piece of wood 10 cm thick affixed to the front of the shot put circle. When throwing, the shot putter braces his foot against the stop board to avoid falling forwards out of the circle.

(88)

f) DISCUS CIRCLE

Discus



The discus is made of wood, or other suitable material, with a rounded metal rim. The cross section of the edge shall be rounded in a circle of 6mm radius. The thickness of the rim should be at least 12m. The diameter of men's discus shall be between 219-212 mm and its weight should be 2 kg. The diameter of women's discus shall be between 180-182 mm and weight 1kg. The diameter of metal plate or flat centre area should be between 50-57mm.

(89)

a) Track Events

The judges shall decide the order in which the competition finish and if they cannot arrive at a decision shall refer the matter to the Referee, who shall decide.

Dead Heat

If there is a tie for the first place in any track event, the event shall be held after to giving adequate rest. And if it is not possible to conduct event once again due to time factor, the tied competitions shall be awarded first place jointly. This method is known as "dead heat". If tie remains for any other place, the result will stand. Rerace shall not be held to decide the second, third and other place.

Note: If photo finish facilities is available, the positions may be decided, easily.

b) Distance events

When there is a tie for any place, it shall be solved by seeing the second best performance and it necessary third, fourth best, etc. If tie still remains and concerns first place, the tied competitors will complete again in the some order in a new attempt until the tie is result. For remaining places the result will stand. That means same place shall be given to the field competitors.

Height events

When there is a tie for any place in high jump and pole vault it shall be solved by using two rules in order as following

- i) The tie competitor with lowest number of failures at the field height (last cleared height) shall be given higher place.
- ii) If tie still remains; the competitor with lowest total number of failures throughout the competition shall be given higher place.

If the tie still remains and if it concerns the first place, the field competitors shall be given one more jump at the height where the competition is stopped (height which is immediate next to the field height), and if no decision is reached, the bar shall be raised or lowered 2cm for high jump and 5cm for pole vault. The competitors are allowed only one attempt at each height until the tie is decided. The best performance achieved during jump, if any, shall also be considered.

If the tie concerns any other place, the tied competitors shall be awarded the same place in the competition.

Note: If the same place is given to the immediate next competitor, that place shall not be awarded to any other competitor.

competitors shall be placed in the order in which any part of their bodies (i.e. torso, as distinguished from the heads neck, arms, legs, hands or feet) reaches the vertical plane of the nearer edge of the finish line.

B. MIDDLE DISTANCE RUNNING

Distance running can be split into two groups, Middle distance and Long distance. For middle distance running the athlete needs to both speed and stamina. For long distance running, stamina is the most important thing. Stamina means building up our body so that it can be last the race distance, but at race speed.

Middle Distance Events

1. 800 mts
2. 1500 mts
3. 3000 mts

The middle distance runner must apply his effort correctly throughout the race; this can be achieved only by a knowledge of pace and tactics.

The events which fall into the middle distance category range from 800m to 3000m. With the relentless advance in performance in athletics the 800 meter race now attracts athletes who in the past would have been sprinters. His running style is a model of mechanical efficiency, and even

UNIT - I

INTRODUCTION

A. Meaning of Athletics

Athletics comprise of a wide range of skills and can be divided in two broad categories of track and field events. Track events include sprint races, middle distance races, long distance races, relays and hurdles. The field events are those which are being played either inside or outside the track area or outside the stadium, which include throwing events and jumping events.

The track events include races of 100m, 200m, 400m, 800m, 1500m, 5000, 10000m, and relay races of 4x100m, 4x400m in both men and women categories. In all races shorter than 800m the competitors have to run the length in their respective lanes. The competitors of relay races are required to carry a baton and pass over the same to his/her partner within the take over zone. The starting points are arranged in such false a way that distance from start to finish is same for each competitor. In case of two false starts, the athletes declared disqualified. The competitor who jostles, runs across, or obstructs other competitor(s) can also be disqualified. Timings of competitors are recorded by the official time keeper from stop watches or through electronic time keeping equipment. The hurdle events include 110m and 400m for men and 100m and 400m for women. The competitors are required to jump over specified number of hurdles, which are made of metal with

a wooden top bar. The steeplechase hurdle event comprises of 28 hurdle jumps and 7 water jumps spread over a 3000m run-way.

The throwing events include throw of shot-put, javelin, discus and hammer. Each competitor generally gets six trials and the winner is decided on the best distance covered in any one of his six trials. The Jumping events comprise of High Jump, Pole Vault, Long Jump and Triple Jump. In the first two events, athletes are required to jump over a crossbar. In Triple jump the competitors are required to complete a hop, step and Jump sequence. Winner of jumping event is decided based on the distance measured between the take-off line and the nearest break in the landing area lead by the competitor's body part.

A standard international track is 400 mts in circumference. It has 8 lanes and the width of each lane is 1.22 mts. Track and field events include Sprints, Middle distance running, Long distances race, Hurdles, Steeple Chase, Relay races, throwing events and jumping events. Track and field events are conducted by International Association of Athletic Federation (**IAAF**).

Athletics

The term "Athletics" is derived from the Greek word "Athlon" which means a contest. The word "Athlete" denotes a person who takes part in contests which involve physical activity. "Athletics" is the oldest forms of the organized sport contested between individuals and or teams.

3. Run through

A forward dip during the last stride before the finish line is the most commonly used technique.

Photo Finish Camera

It is impossible for the naked eye to be able to determine accurately the finishing sequence of runners for in a blanket finish. The problem has been solved by photo-finish cameras. A photo-finish camera has very narrow slit lens which photograph an area of the finish line not more than 5-10cm across. It uses a continuous strip of film that moves across the lens at a speed proportionate to the speed of athletes and records the arrival of each competitor at the finish line. The space between each athlete shown in the film exhibits the time elapsed between the arrivals of each of them at the finish line. Photo – finish camera also doubles up as an electronic timing device, recording finishing timings of athletes up to one hundredth of a second. The camera gives a developed photograph that gives positions of athletes and time when their torso reached the finish line.

FINISH POSTS

Except where their use may interfere with the photo finish equipment, two white posts may be placed along the prolongation of the finish line at least 0.30 mts from the edge of the track. They should be of rigid construction and approximately 1.40m high, 8 cm wide and 2 cm thick. The

the foot to push against at the start of the race. The foot plates shall be slopped to suit the starting position of the athlete and can be either flat or slightly concave. To monitor the false starts the blocks can be connected with a devise. The blocks can be used up to and including 400 meters (including the first) leg of the 4x200m and 4x400m).

TYPES OF FINISHING

The finish line should be 5cm in width drawn across the track at right angles to the inner edge. Two white posts of rigid material (80mm in width and 20mm in thickness) shall be placed at a 30cm distance from the edge of the track. Competitors are place in the order in which any part of their torso (as distinguished from the head, neck, arms, legs, hands, or feet) reaches the vertical plane of the edge of the finish line nearest to the star.

Technique

There are three finishing technique used particularly during the sprint events. They are as follows.

1. Lunge finish

The torso reached the finish line first, i.e. leaning torso forward.

2. Diagonal finish (or) Shoulder Shrug

At the finish line crossing it by making the shoulder in diagonal, towards midline of the finish line. It is more difficult type.

B. IAAF

The IAAF (International Association of Athletic Federation) is the supreme governing body controlling international athletics throughout the word. It was founded in Stockholm on July 17th, 1912, to draw up and enforce rules and regulations and a common amateur definition, and to recognize world records, The IAAF now promotes its own World Champions in track and field every four years, with annual World Cross- Country Champions for men and women every march.

IAAF- Structure and Functions

In 1912, two days after the Olympic games a congress was held in Stockholm for the formation of an International Association of Athletic Federation. Seventeen countries were attended the historic meeting. The meeting was urged the Athletics to develop and promote international competitions and the Olympic games. The meeting was also urged the importance of having universal code of rules and regulation and a common definition for Amateur and also an athletic register of world and Olympic records.

One year later in 1963 at Berlin the congress once again met and accepted the first constitution and 34 nations figured on the most membership list. J.Sigfrid Edstrom (Sweden) was elected as first president and Kristvan Hailstorm as honorary secretary. The technical rules for International and domestic competition were framed and presented for approval in 1914 at the third congress in France.

In 1946 the IAAF Head Quarters moved from Stockholm to London. Over the years, the IAAF grew into a huge and dynamic organization as the world governing body of track and field athletics, road running, race walking and cross country. The congress decided to move the head quarters once again from London to Morte Carlo in 1993. The Steady growth of the Federation accelerated in the last decades. By 1997 member countries in addition numbered 209. The IAAF council comprising of 27 members from various countries.

AFI (Athletic Federation of India)

Athletics in its present form was born in our country during past decade of 19th century. Nothing much is known of its early stages till first known participation of Norman G.Pitchard in 2nd Olympic games in 1900 at Paris, where he won a Silver medal in 200mts run. The Indian Olympic Association (IOA) was formed in 1926 and its control athletics. But India unofficially participated in the 1920 and 1924 Olympic games under the leadership of H.C.Buck of Y.M.C.A Madras. The official participation of Indian athletes started in the 1928 Olympic games at Amsterdam till 1936 Berlin Olympics. India participated in the Olympics under the IOA BANNER. Then 1940 and 1944 Olympic Games were not conducted because of second World War.

Structure and Functions

Amateur Athletic Federation of India was formed in 1946 at the initiative of Maharaja Yadvindra Singh then

in a natural relaxed position. An angle of about 90° at the front knee and of about 110° to 130° at the rear knee will be appropriate.

(iii) The Long Start (or) Elongated Start

The front starting block is situated 3 foot lengths from the starting line and there is one foot length between the starting blocks. The angle of rear leg about 110°. The long starting position is certainly the most difficult one. It should be applied carefully. Any athlete finds this position rather ineffective. The long start, although still known, is hardly used nowadays.

For good starts a sprinter must,

- a) push back against the blocks
- b) moving the hands and arms as quickly as possible in reaction to the gun.
- c) move the hips quickly from the starting position to running position.
- d) run out of the blocks, do not jump.

STARTING BLOCKS

The starting blocks should be made of rigid material. It should be adjustable, but must be without springs. The blocks are fixed to the track, so that it provide firm base for

'On your marks' – position – his body weight resting comfortably on the legs in the crouch position. The hands are shoulder width apart to touch the ground behind the starting line with fingers and thumb pointing away from each other. The eyes are focused downward and forward.

Set position

The block settings should result, the athletes having a 90° angle at the front knee and 110° to 120° angle in the back of the knee. That gives a set position with the hips just slightly higher than shoulders slightly forward. The hands are placed just slightly wider than shoulder width apart, with the fingers and thumbs in a **"high bridge"** position. The shoulders are above and slightly ahead of the hands, the arms are straight, but not locked. He should feel pressure against rear block in the set position since the center of gravity is located high, the first strides are shorter and less powerful.

(ii) The Middle Start (or) Medium Start.

The front starting block is located two foot lengths (21 inches) from the starting line and the rear starting block is one foot length further. Kneel down with the right knee against the instep or toe of the left foot, and keep the trunk erect. The angle for the rear leg is about 130°. The slope of the body from the hips to the shoulders is not very steep. The body weight is on the legs and arms. The head remains

president of IOA with prof.G.D.Sondhi as its first president. The AAFI got affiliated to IAAF in the year 1946. The AAFI for the first time selected 8 athletes who participated in 1948 Olympic games at London. Indian women competed in the Olympic games for the first time in 1948.

Mr.M.C.Dhawn was elected by secretary of AAFI in 1950 and was the technical secretary in the first Asian games held at New Delhi in 1951. Raja Bhalendra Singh become the president of AAFI in 1952 and continued of guide athletic till 1968 along with Mr.M.C.Dhawn. This team acted a yeoman service to athletics in India and strengthened the AAFI to make it the leading federation. The federation produced by group competitors open national championship, Zonal and Inter Zonal Competition.

Many distinguished personalities are acted as president and secretary of AAFI till 1987 from 1988 to till date Mr.Suresh Kalmadi and Mr.Lalit K.Bhanot formed the new team of president and secretary respectively. The main function of AAFI is to prepare a year long sports calendar at the state and national level. They are sending teams to international level competitions based on merit.

D. AGE GROUPS

Under the Jurisdiction of the IAAF is split into five age groups.

1. Men and women there is no age limit
2. Seniors - 19 Years
3. Juniors - 17 and 18 Years
4. Youths - 15 and 16 Years
5. Boys - 13 and 14 Years

UNIT - II

TRACK EVENTS

Athletics is great fun and people of all ages, can enjoy it. Athletic activities can be traced back of the ancient Greeks, who used to take part in games of running, jumping and throwing. Track events include sprint races, middle distance races, long distance races, relays and hurdles.

The track events include races of 100m, 200m, 400m, 800m, 1500m, 5000, 10000m, and relay races of 4x100m, 4x400m in both men and women categories. In the track events all races are run with the competitor's left hand side of the track and finish in the same position. The competitors are required to wear their numbers on their vests.

A. SPRINT EVENTS

Sprints

"To cover the distance in the shortest time with maximum speed"

A. Sprint Events

1. 100 mts
2. 200 mts
3. 400 mts

1. Bunch start (or) Bullet start
2. Medium start
3. Elongated start

Three types of foot spacing bullet, medium and elongated starts. Each sprinter will have his own particular measurements so the following procedure is suggested to enable him to get into a correct starting position.

Block placement

The three block placement positions are determined by the location of the blocks relative to the starting line.

(i) The Bunch or Bullet Start

Stand with the right toe beside the rear of the left heel. Kneel down with trunk erect and rock forward in the same way. In this starting position the starting blocks are close to the starting line. The front block should be placed one foot length (16 inches) from the starting line, with 11 inches between the blocks results in low velocity and fast block clearance Track events, up to and including 400 meters, run at full speed for the entire race distance. Sprinter press their feet against two blocks, which are spaced apart and connected to a shaft, to improve their initial movement. The main features to look for in the sprinter's highly distinctive running action are the high knee-lift, the long strides, the thrusting arm action and the controlled breathing.

should immediately rise to final starting position retaining the contact of the hands with the ground and of the feet with the foot plates of the blocks.

A competitor shall not touch either the starting line or the ground in front of it with his hands or his feet on his marks. The three starting positions are measured from the starting line to the front leg of the starting block. Starting is the first stages in all the running events, should be conducted either track or road. There are only two types of starting should be followed by the athletes.

1. Crouch start
2. Arc start (Standing start)

CROUCH START

Crouch start can be used by the athletes those who are run up to and including 400mts and even the first runner of 4 x 100mts Relay and 4 x 400mts Relay.

In crouch start the following commands to be used,

1. On your mark
2. Set
3. The gun fire or clapping with clap board

It has three (divisions) method should be used according to the height of the individuals.

Sprinter

There is no ideal shape or size for the sprinter. He must, however, be well built and have good all-round muscular development and a quick reaction time. Regular, even and relaxed arm action must be learned first. The legs follow the arms, and the faster the arms are moved the faster the leg action will become. In the arm action emphasis should be on a forward and upward motion.

Most important factors for sprinting

1. Reaction time
2. Starting position
3. Powerful Muscles
4. Acceleration Technique.
5. Effective stride length
6. Curve running technique (200 mts, and 400 mts).
7. Technique at the finish line.
8. The condition of the Track surface
9. Wind and Weather conditions.

Stride Length

“It is the distance between touchdown of the toe of one foot and the touchdown of the toe of the other foot”. Stride length may and usually will be vary from left to right

or right to left on individual at the same velocity. This variance may be influenced by dominance, weakness, injuries and even leg length. Stride length will be vary with the speed of running and during the various phases of a race.

Stride Cadence or Stride frequency

"It is the number of strides per second". The stride cadence for sprinters is 4.5 to 10 strides per second with little difference found between the strides. The method of determining stride rate is to divide the number of strides in a race by the elapsed time for the race.

STARTING

There are varieties of running events for which the track is used . The finishing line for all races must be the same. But the starting line of all the races cannot be the same. It will vary from race to race. While 100mts race, 100mts hurdles and 110mts, hurdles races have to be run in straight courses, appropriate distance shall be measured backward from the beginning of home stretch and starting lines are marked. The extended lines are broken.

The start and finish of a race shall each be denoted by a white line 5 cm wide. The distance of the race shall be measured from the edge of the starting line farther from the finish, to the edge of the finish line nearer to the start.

All races shall be started by the report of the starter's gun or approved starting apparatus fixed upwards after he has ascertained that competitors are steady and in the correct starting position.

At all international sports competitions meetings, the commands of the starter in his own language shall, in races up to and including 400m be "on your marks", "set", and when all competitors are "set" the gun shall be fired, or approved starting apparatus activated.

In races longer than 400m, the commands shall be, "on your marks" and when all competitors are steady, the gun shall be fired, or approved starting apparatus activated. A competitors shall not touch the ground with his hands.

In all races up to and including 400m, and 4 x 100 mts Relay, 4 x 400mts relay first runner a crouch start and the use of starting blocks are compulsory. In competition held under IAAF, competitors must use starting blocks provided by the organizers of the meet. In other meet on all weather tracks, the organizers may insist that only starting blocks provided by them may be used. After the "on your marks" command, the competitor shall approach the starting line, assume a position completely within his allocated lane and behind the starting line. Both hands and one knee shall be in contact with the ground and both feet, in contact with the starting blocks. At the "set" command, the competitor

decreases. A study of the body movements involved in these activities pinpoints the causes. In normal walking and running the knee of the supporting leg is bent as it passes through the vertical position (i.e. when the centre of mass passes vertically over the foot), but in race walking the knee of this leg is straight in the vertical position. The technique is such a way that race walking does not become a modified run. Briefly, contact with the ground must be maintained at all times, a heel-and-toe action must be used, and the supporting leg must be straight at the knee as it passes through the vertical position.

Judging a fast walk is an extremely difficult skill, since it is almost impossible to see whether a walker has a foot on the ground at all times or that the knee is straight through the vertical for it takes only a fraction of a second to pass through the position. Race walking is not a natural skill as normal walking and running are, because the latter are the locomotion skills learnt from very early childhood.

As in most other athlete events, flexibility is an asset and hip mobility especially is an important factor in stride length in normal walking in which the line through the hip of the forward swinging leg is allowed to twist forward with the leg, the stride length is increased considerably. Stride length is also maximized, if the feet move along a straight line.

in the later stages of a race when fatigue is sapping his strength his skill does not break down.

C.LONG DISTANCE EVENTS

1. 5000 mts
2. 10000 mts
3. Marathon

The three main long distance events are 5,000m 10,000m and the marathon. Stamina is the basic quality needed by a long-distance runner, but speed has also become an essential requirement for would-be world beaters.

However, in the long distance the steady pacer must beware of the fast finisher who sits on his shoulder, until the final run-in. the steady runner without an equivalent fast finish must attempt to put himself far enough ahead of the sprint finishers by either a punishing pace throughout the race or by putting in bursts of speed during several laps from the finish. There is nothing more motivating for the training runner than to see his rival a few strides in front of him, but also nothing more demoralizing than for his rival to be 20 meters or more in front.

D.HURDLES – VARIOUS STAGES

MEANING

Running over the barriers (or) obstacles are known as Hurdles. The Hurdle race should be conducted for men and

women, senior boys and senior girls in various height and distance. Every hurdle race is based on certain conditions laid down in the rules of the International Association of Athletic Federation (IAAF).

The hurdles are made of steel with wooden top bar. The height of hurdles can be adjusted as per the length of the race and sex of the athlete. The hurdles are made in such a way that when force of 3.6-4kg. is being applied to the centre of the top, it should overturn automatically. The height required for, men's 110m race is 106.7 cm. The women's 100m sprint hurdles are 84 cm in height. In 400 m race the men's hurdle is 91.4 cm high and women's is 76.2 cm. The length of the wood used for the top bar should be 1.20m and width at least 7cm. The top bar should be striped in black or white or in some other contrasting colors.

The following are the standard distances, it can be classified into two categories,

- Men - 110 & 400 mts
- Women - 100 & 400 mts

Distance of Hurdles	Category	Height of the Hurdles	Distance Start to first Hurdle	Distance Between the Hurdles	Distance Last Hurdle to Finish
100mts	Women	0.840mts	13mts	8.50mts	10.50mts
110mts	Men	1.067mts	13.72mts	9.14mts	14.02mts
400mts	Men	0.914mts	45mts	35mts	40mts
400mts	Women	0.762mts	45mts	35mts	40mts

Substitution

Once a relay team has participated in a competition only two additional athletes may be used as substitutes in the composition of the team for subsequent rounds. Once an athlete, who has participated in a previous round has been replaced by a substitute, he may not return to the team.

RELAY BATON

The relay baton is made of a rigid material. It should be a single piece of smooth, circular and hollow tube of 280-300 mm length. The minimum weight required for baton is 50 grams and its circumference should be between 120-130mm. The batons should be colored so that it can be easily visible during the race.

Specification

- Weight of the baton : not less than 50 gm
- Length of the baton : 28 to 30 cm
- Circumference of the baton : 10 cm
- Color of the baton : Visible color
- Minimum baton required : 6 Nos.
- Maximum baton required : 8 Nos.

D. WALKING

Race walking may appear to be the natural link between ordinary walking and running, and in some respects this is true-with increase in speed, the force-time

runner only. The baton should not be exchanged within the acceleration zone(Advance Zone).

During the exchange the baton must be delivered firmly and safely into the hands of the receiving runner. When the incoming runner has approached his partner within 2 to 3 mts he indicated to him by a signal when to extend his receiving arm backwards. The signal comes too early or too late, or the runner receiving the baton moves his arm up, down or to the side, the results in an unsteady baton pass and consequently in a loss of time. The baton should be put firmly into the grasping hand between the spread thumb and the four locked fingers.

2. 4 x 400 mts Relay

The runners use a visual pass. The incoming runner carries the baton in the right hand and passes to the outgoing runner's left hand. The primary responsibility for the pass rests on the outgoing runner due to fatigue on the part of the passer. Once the baton has been taken, the athlete immediately transfer it to the other hand.

The four athletes shall run 400mts each to cover 1600mts distance by means exchanging a baton. The first leg of the 4x 400 mts relay run in lanes and so is the first curve of the second leg; only after crossing the line making the exit from the first curve, runners free to move to the inside of the track.

110mts Hurdles

There shall be Ten flights of hurdles in each lane, set out in accordance with the below table.

Starting line to First Hurdle	:	=13.72mts
" "	Second Hurdle	: 13.72+9.14 =22.86mts
" "	Third Hurdle	: 22.86+9.14 =32.00mts
" "	Fourth Hurdle	: 32.00+9.14 =41.14mts
" "	Fifth Hurdle	: 41.14+9.14 =50.28mts
" "	Sixth Hurdle	: 50.28+9.14 =59.42mts
" "	Seventh Hurdle	: 59.42+9.14 =68.56mts
" "	Eight Hurdle	: 68.56+9.14 =77.70mts
" "	Ninth Hurdle	: 77.50+9.14 =86.84mts
" "	Tenth Hurdle	: 86.84+9.14 =95.98mts
" "	Finishing line	: 95.98+9.14=110mts

VARIOUS STAGES

110mts Hurdles the Hurdling Technique is classified into the following:

1. Starting
2. Approach to the First Hurdle
3. Hurdle Clearance (Departure)

4. Running between the hurdles
5. The finish

1.Starting

Hurdling is basically a sprinting event, the mechanics of the starting do not vary much from that of the sprint start. In order to get eight (8) strides to the first hurdle to take – off foot should be placed in the first block. If the hurdler wants seven (7) strides to the first hurdle, take – off foot should be placed in the rear block.

2. Approach to the First Hurdle

The distance from the starting line to the first hurdle is 13.72 mts. The first three strides out of the blocks are the same as in a sprinter’s start. On the fourth stride, the hurdler begins to concentrate on the first hurdle. In perfecting the approach to the first hurdle make any adjustments on the 4th, 5th and 6th strides. The first three and last two should be kept constant. The last stride is slightly shorter to permit to get his centre of gravity slightly ahead of the take-off foot. This approach sets the pattern for the entire race.

3. Hurdle clearance

The take – off distance from the hurdle depends on four factors. The height of the athlete, speed of the approach length of the lead leg speed of the lead leg action. Each

The baton must be carried by hand throughout the race, if dropped, it must be recovered by the athlete who dropped it. He may leave his own lane to retrieve the baton provided this procedure is adopted and no other athlete is impeded, dropping the baton shall not result in disqualification.

Stages of Relay Running

The start

The starting of the 4 x 100 mts Relay is basically same as for the 400 mts. The starting blocks are placed close to the outer line of the track. The baton lies between the forefinger and the thumb is enclosed by the other fingers. After a successful start the runner quickly passes to the inside of his lane.

Checkmarks

The second, third and fourth runners place a checkmarks on their lanes just behind their starting positions. This is a check mark for the out going runner. The distance between the checkmark and the starting position depends on the speed of the incoming runner and on the acceleration of the outgoing runner.

The Baton exchange

The relay baton should be exchanged from one to another competitor with in the take over zone. The exchange is completed when the baton is in the hand of the receiving

when hearing the signal from the incoming runner moves the appropriate arm backwards in a positive and slightly angled manner to a level not higher than the shoulder line. The upper arm is straight at the elbow, the back of the hand is facing down wards the thumb and index fingers are widely spaced forming obtuse angle. The baton is received into such a palm from the incoming runner with an outstretched arm. In the final phase of the change over the elbow joint locks quickly and the baton is passed in a down sweep action.

The best result in both techniques the change over should occur when both runners are traveling at maximum speed and the actual change over should be as quick as possible. The majority of experts consider that the speediest change over occurs when the baton is actually changed over a distance of 2 to 4 mts from the end of the exchange zone.

Acceleration Zone

The acceleration zone lets the outgoing runner accelerate properly and allows the athletes more time to reach top speed at the exchange.

Exchange Zone or Take over Zone

The incoming runner can signals the exchange with verbal commands at a specific point when the incoming runner ready to pass the baton. The incoming runners can also use nonverbal signals. The outgoing runner can count the incoming runner's stride from the check mark to the exchange point.

hurdler must be cleared quickly and safely. The first prerequisite of movements much as in the ordinary running stride. For this action the lead leg is slightly flexed at the knee joint, and leading foot to track beyond the hurdle.

The average take-off distance from the hurdle in men's hurdles will be 1.90 mts to 2.20 mts to allow the leading leg to sweep forward and upward in a straight line. Too short a distance for the take-off results in a "jump" over the hurdle. The hurdle clearance are having the following factors.

Action of the Leading leg

The complete action consists of a quick forward and upward thrust of the leading leg in the direction of the leading of introduces the sequences.

Once the take-off foot leaves the track it becomes the trail leg. The heel of the trail leg moves actively toward the buttocks as the knee moves in a exaggerated motion upward and to the side to avoid hitting the hurdle. For the clearance of the hurdle, the trailing leg must be stretched away from the body when clearing the hurdle. This movement requires good mobility of the hip. The sequence of the athlete's movements should be as follows: after a rigorous push from the ground follows a phase of relaxation for the take-off leg. An action forward movement of the high should begin only when the foot of the leading leg has reached the edge of the hurdle.

Action of the Arms

The usual movements during running are also executed during hurdle clearance. With the sole difference that in the hurdle stride the arms perform additional functions. The arms contribute in a greater degree to maintaining body balance. When the trailing leg comes forward, the trailing arm swings backward to counter balance this movement. It is either almost stretched or flexed at the elbow.

4. Running between the hurdles (The three-step Rhythm)

In the 110 mts hurdle run the distance between the hurdles is 9.14 mts. If we reduce from the length of the hurdle stride, there remains for three strides between the hurdles or three-step rhythm a distance of about 5.065 meters. So that is 1.88 mts for each step. But practice shows clearly that the three steps are not of equal length. The first stride after the landing which is of about 1.55 to 1.60 mts follows a wide second stride measuring 2.00 to 2.20 meters and this is the longest between the hurdles. The last stride before the hurdle is always slightly shorter than the previous one.

5. Finish

The athlete has to use any one technique similar to sprint to finish the race.

Baton Exchange

There are two methods of baton (Exchange) passing

1. Up sweep method
2. Down sweep method

1. The up sweep method

In this method the passing of the baton occurs in an upward movement by a straight arm. At the same time the baton is received by an arm which is pointing backward and locked at the elbow. The outgoing runner upon hearing the agreed signal from the incoming runner, quickly extends his arm backwards locking it at the elbow, the thumb and fingers are separated and pointing downwards forming an obtuse angle. The time that he receives the baton the outgoing runner tries to keep his arm as still as possible. This outstretched arm the incoming runner quickly moves his straight arm upwards and in such a way that the outgoing runner can grasp the baton as near to the incoming runner's palm as is possible. In the upsweep method the baton is passed from the right hand to the left hand and then the left hand passing it to the right.

2. Down sweep method

In the down sweep method the baton – exchange takes place over a distance of 2 to 3 mts. The out-going runner

2. The baton must be passed inside a short distance to be covered by some three to four strides and without unnecessary loss of time.
3. The baton must be exchanged by non – visual method.

Visual Method

The visual method of baton exchange is used only in 4x400 mts relay. When the out going runner receive the baton, he must see the incoming runner while receiving the baton. The incoming runner gripping the baton at its base, then passes the baton into the receiver hand with a forward down sweep motion. The outgoing runner reaches arm straight back, palm facing upward and takes the baton, gripping the upper portion.

Non Visual Method

The non-visual method of baton exchange is used only in 4x400 mts relay. When the out going runner receive the baton, he doesn't to see the incoming runner while receiving the baton. The incoming runner gripping the baton at its base, incoming alerts the receiver, then passes the baton into his or her hand with a forward pushing, down sweep motion. The outgoing runner reaches arm back, palm facing upward and takes the baton, gripping the upper portion. then rotates the receiving arm down, under and forward, to ready the baton for the next exchange.

400 mts Hurdles

Hurdling is a sprinting, rhythmic event. In this race a full circuit of the track is run with 10 hurdles, 91.4 cm high, placed 35 mts apart. The distance from the starting to the first hurdle is 45 mts, while the last hurdle to the finish line measures 40 mts. There are ten flights of hurdles in each lane, set out in accordance with the below table.

Placement of Hurdles in 100mts Hurdle race

Starting line to First Hurdle	:	=13.00mts
" "	Second Hurdle	: 13+8.50 =21.50mts
" "	Third Hurdle	: 21.5+8.50=30.00mts
" "	Fourth Hurdle	: 30+8.50 =38.50mts
" "	Fifth Hurdle	: 38.5+8.50=47.00mts
" "	Sixth Hurdle	: 47+8.50 =55.50mts
" "	Seventh Hurdle	: 55.5+8.50 =64.00mts
" "	Eight Hurdle	: 64 +8.50 =72.50mts
" "	Ninth Hurdle	: 72.5+8.50=81.00mts
" "	Tenth Hurdle	: 81+8.50 =89.50mts
" "	Finishing line	: 89.5+10.5=100mts

Placement of 400mts Hurdles in Standard Track

(Men and Women)

Starting line to First Hurdle	:	=45.00mts
" "	Second Hurdle	: 45+35 =80mts
" "	Third Hurdle	: 80+35=115mts

"	"	Fourth Hurdle :115+35=150mts
"	"	Fifth Hurdle : 50+35=185mts
"	"	Sixth Hurdle : 185+35=220mts
"	"	Seventh Hurdle : 220+35=255mts
"	"	Eight Hurdle : 255 +35=290mts
"	"	Ninth Hurdle : 290+35=325mts
"	"	Tenth Hurdle : 325 +35=360mts
"	"	Finishing line: 360+40=400mts

E. RELAY

There are two relay events comprising of 4x100m for men and women, and 4x400m for men and women. All the four members of a team are required to run one stage of the race along with the relay baton in their hands throughout the race. The baton must be picked up by the athlete who dropped it. He/She may leave the lane in order to retrieve the baton, provided no other player is impeded.

4x100m relay races are run entirely in respective lanes with staggered starts. In 4x400m relay races the first lap and the same part, of the track, of the second lap shall be run in lanes. The position of the teams at the start shall be retained at each take- over zone, except in case of races where lanes are not used. The waiting runners can move to inside zone, after handing over the baton, until the course is clear to avoid obstruction to other competitors.

Relay races are a popular and exciting feature of track and field. It is a team event in an individual oriented sport. They give the opportunity for team work and cooperation is not available in the other events. The key to good relay racing is the baton exchange. Commonly the relay events are as mentioned below,

1. 4 x 100 mts
2. 4 x 400 mts

1. 4 x 100 mts Relay

The 4 x 100 relay is undoubtedly the most beautiful and one of the most difficult events of the athletics spectrum. This relay uses four sprinters running a complete lap of the track, passing on a baton which has to arrive at the finish line with the runner of the last leg.

The main objective in the baton pass is to keep the baton moving at top speed throughout the relay. The baton must be passed only within a 20 meters take – over zone (exchange zone). This zone begins 10 mts before the scratch line (100 mts marking) and ends 10 mts after it. A good baton – exchange needs to satisfy the following three conditions.

1. The baton – exchange must take place after some 12 to 16 mts running, measured from the beginning of the take – over zone.

forward and upward. Then he goes upward the body position is in vertical (or) hanging and elbows are flexed.

5. Clearing the bar

When the body is in hanging position lift and swings upward both the legs, at the same time the pole straightened, turn the upside down. Then pushing the pole down by hands the legs are throw over the cross bar. After clearing the cross bar push the pole away from the pit with the wrist action to avoid foul or touching the bar.

6. Landing

Safe landing is required on the landing area.

B.THROWING EVENTS

General conditions

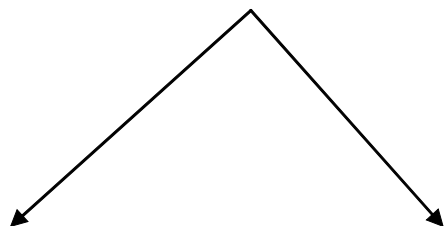
The person who has more body weight and mass of the muscles can choose throwing events. The following qualities are essential for throwers.

1. Body weight
2. Height
3. Leg power
4. Shoulder strength
5. Flexibility
6. Co-ordination
7. Speed

Race walking, of course, involves a rapid leg cadence and if the arms too are no maintain their synchronous swings they have to be bent at the elbows to reduce their moments of inertia, as in running. However, more emphasis is placed on the arm and shoulder action in race walking than in running, because of the need to counterbalancing the exaggerated eccentric thrust of the legs and movements of the hips. But in addition to counterbalancing the leg action, they also aid the forward drive with their swinging the strong upward swing of both arms evokes extra forces from the ground through the driving leg.

UNIT- III

FIELD EVENTS



DISTANCE EVENTS

1. Long Jump
2. Triple Jump
3. Shot Put
4. Discus
5. Javelin
6. Hammer

HEIGHT EVENTS

1. High Jump
2. Pole Vault

A. JUMPING EVENTS

1. LONG JUMP

The following techniques should involve while doing long jump.

1. Approach run
2. Penultimate stride
3. Take – off

1. Grip

Athletes who take off with the left foot, the pole must be carried on the right hand side, the left arm, half bent, supports the pole with the palm of the same hand turned downwards, while the right arm grips about 60-70cm higher with the hand lightly turned out. Keep the pole straight near the cross bar on the uprights. Hold the pole slightly lower than the height of the cross bar. Keep the pole parallel to the ground pointing to the pit or above the right hand palm facing upward and with left hand palm facing down ward.

2. Carry the Pole

The pole should be raised at 50° or 45° to the ground and keep right side. The left hand should be kept flexed at chest level and the right hand at the back. While carrying the pole, the body balance is very important.

3. Approach run

20 to 30 mts away from the vaulting box to start the running with the pole steadily and high knee action. When you reach the check mark, plant the pole in the vaulting box and kick the floor to go up.

4. Planting the pole

When the competitor reaches the check mark he should plant the pole into the box. Join the left hand with the right hand, push the right shoulder and both the hands

(iii) Supports for the cross bar

The cross bar shall rest on pegs pointing in the direction towards the landing area. The supports shall extend not more than 5.5 cm and not more than 1.3 cm in diameter, which should extend 35 – 40 mm above the pegs.

The distance between supports is minimum of 4.30 meters and maximum of 4.37 meters.

(iv) End Pieces of Cross Bar

It shall have 30 mm to 35 mm in diameter, square the length of the end piece is between 15 cm to 20 cm and should be semi circular.

(v) Landing (Pit) Area

The minimum dimensions of the landing area is 5 x 5 meters, for international competitions the length, width and height of the landing area will be 7 x 6 meters. The front pieces must be 2 m long.

VARIOUS STAGES

1. Grip
2. Carry the pole
3. Approach run
4. Planting
5. Crossing the bar
6. Landing

4. Flight in the air
5. Landing

1. Approach run

The length of the un-up is determined by the height of the jumper and his ability to accelerate in the run. According to analyzes carried out at recent Olympic Games, the best athletes use a run-up from 37-50m in length (incase for women 33-40). The athlete should mark the starting check mark 14 to 16 strides from the take – off board. If the athlete who is taking off with left leg, he should start running with right leg. Then he starts the approach run steadily and gradually increase the speed towards the take – off board.

2. Penultimate stride

The last two strides before the take off is called penultimate stride. In this time, the athlete shrugs his body little downward and the length of the stride decreases. That is easy way to fly in the air.

3. Take – off

The length of the jump depends not only on horizontal speed but also on the speed and power of the take-off. After completion of Approach run (penultimate stride), step on the take off board with the stronger foot and jump up in the air by pushing the take off board. After take off (or) jumping in the air the hands should be vertically raised. The Non-

take off leg should be raised high. The last step is executed more quickly and the whole foot is placed on the board, ahead of the projection of the center of gravity.

Plasticine Indicator (No Jump indicator)

Plasticine indicator is called no jump indicator, it is placed at the inner edge of the Take-off board. The judge at the take-off board must watch the competitors does not overstep the scratch line. If a no jump indicator is not available the judge should build one moist sand which will clearly show if it is touched by toe or spike. It is a foul only if contact is made with the ground or the no jump indicator.

4. Flight

Jumping styles vary according to the development of the athlete and his muscular characteristics and the bone structure. The most common techniques are,

1. The Sail (common among beginners)
2. The Hitch kick (1-2-3 strides and a half in the air)
3. Hang (extended jump or glide)

(i) Hitch Kick

After jumping in the air from the take-off board the athlete swings (or) rotates their legs like pedaling in cycle in the air into 2 or 3 pedaling styles, and the legs are closed together before landing. When legs are pedaling the arms alternatively with leg movement.

4. POLE VAULT

Runway

The minimum length of the runway shall be 40 meters, when the conditions permit it is 45 meters.

1. The width of the runway is 1.22 meters.
2. The runway should be marked by white lines with 5cm as width.

Implements

(i) Upright

Any style of uprights or posts may be used provided they are rigid.

(ii) Cross Bar

It is made up of Fiber glass, Metal or other suitable material.

1. The length of the cross bar is 4.48 mts to 4.52 mts.
2. The maximum weight of the cross bar is 2.25 kg.
3. The circular shape of the cross bar is 30 mm diameter.
4. It should have the gap of maximum 3 mm

3.Fosbury Flop

The Fosbury flop was introduced by Dick Fosbury, who won the high jump at the Mexico Olympics in 1968. His technique for clearing the bar, his run up was also very notable because it was in the form of a semi- circle, and he took off with his foot at an angle of about 20 degree relative to the plane of the uprights. At the point of take – off Dick Fosbury with a vigorous bending action and driving up of the free leg, supported by an alternated movement of the upper limbs, rose completing a rotation on the longitudinal axis of the body and then prepared for flight with his back to the cross-bar.

Next he performed his rotation on the transverse axis of the body and at the extreme point of the parabola, he arched himself and continued his trajectory on this position until, so as not to knock down the cross - bar, he straightened his leg and landed on his back bowing his head on to his trunk so that the impact was taken by the top part of the back, avoiding unpleasant injuries to the cervical part of the spinal column.

4. Landing

Safe landing is required on the landing area.

(ii) Hang style

After the take off the athlete do the back arch the arms should be vertically raised above the head, the legs are straighten back, and before landing brings the legs and arms to extend forward, and the legs are closed together before landing.

5. LANDING

After completion of his style in the air, before landing, the athletes should extend both the legs forward / straightened. While landing both the heels should be landed first on the pit. There are three landing techniques should be used to come out of the landing area. They are as follows.

1. Collapsed landing
2. Swing out landing
3. Scoop landing

1. Collapsed landing

While landing both the heels should be touched first on the pit and then toe, the whole body should brought forward and place the knees on the pit, at the same time the buttocks should be kept back on both the heels.

2. Swing out landing

After landing in the pit the athletes should turn his body 45° either right or left in forward and fall down on the ground with shoulder, first then buttocks and so on.

3. Scoop landing

Landing by heels on the pit and push forcefully the sand and makes a dig and place the buttocks on the dig by extending the legs straight.

The competitor commits fouls if he;

1. Take off beyond the take off line.
2. Delaying more than 60 seconds.
3. After landing walking back towards the run way.
4. Performing acrobatics during the jump.
5. Uses illegal style of jump.

Rules

1. The order in which the competitors make their attempts must be decided by drawing lots.
2. Each competitor will be placed according to his best jump.
3. When there are more than eight competitors, each one is given 3 attempts and the 8 competitors with the best jumps are given further three jumps.
4. In case of a tie for the eight position, each competitor involved in the tie has three additional attempts.
5. When there are eight or less competitors, each one is allowed six trials.

3. Clearing the bar

1.The scissors

Towards the end of the 19th century, an American named Mike Sweeny proposed the scissors jump as an alternative to the frontal clearance. The scissors involved passing one leg over after the other at the same time bending the trunk towards the knees when clearing the bar. It consisted of the following movement:

1. While the forward leg was the cross – bar the other one kicked upwards, causing the chest to rotate towards the direction of jumping and a landing on the feet.
2. With the use of this style the world record began to rise this style, the world high-jumpers introduced minor adjustments to the technique according to their physical characteristics and talents.

2.The Straddle

Towards the middle of the 1930s another American Dave Albritton, proposed a radical new technique for clearing the bar, involving the body being parallel to the bar, but with the stomach downwards rather than with the body sideways. Thus the straddle was born, which was clearly demonstrated by the Soviet trainer Vladimir Mihailovic Dyachkov and put to good effect by Valeri Brumel, who took the world record to 2.28m in 1963.

1. Scissors
2. Straddle Roll (or) Belly Roll
3. Fosbury Flop

Various stages

1. Approach run
2. Take – off
3. Crossing the bar/ clearing the bar
4. Landing

1. Approach run

The jumper can approach either from the left side or right side of the cross bar with 25 mts long and medium speed. The angle of approach run and the number of steps vary according to the level of the athlete.

2. Take off

Jumper can stand either right or left one arm away from the cross bar. Then down vertically draw the line that may be considered as take off line. When the jumper start to approach towards crossbar, used his power leg on the take off line for make a jump.

6. Once the competition is under way, competitors are not allowed to use the runway for trail attempts.
7. All jumps must be measured from the nearest mark in the landing area made by any part of the body or limbs of the athlete to the take-off line or its extension and at right angles with the take-off line.
8. If a competitor takes off before the board or the line this does not constitute a foul.

2. TRIPLE JUMP

The triple jump shall consist of a Hop, step and jump in that order. This is the English definition of the jump. The hop must be executed on the same leg which was used for the take off (right-right or left-left). In the step the support is transferred to the other leg. The final jump is a proper long jump.

1. It shall not be considered a failure if the competitor, while jumping, touches the ground, with the “sleeping” leg.
2. There are six stages when taking Triple jump. They are as follows
 - (1) Approach run
 - (2) Take – off
 - (3) Hop

(4) Step

(5) Flight

(6) Landing

1. Approach run

The length of the run-up is determined by the height of the jumper and his ability to accelerate in the run. According to analyzes carried out at recent Olympic Games, the best athletes use a run-up from 37-50m in length (incase for women 33-40). The athlete should mark the starting check mark 14 to 16 strides from the take – off board. If the athlete who are taking off with left leg, he should start running with right leg. Then he start the approach run steadily and gradually increase the speed towards the take – off board.

2. Take – off

The length of the jump depends not only on horizontal speed but also on the speed and power of the take-off. After completion of Approach run (penultimate stride), step on the take off board with the stronger foot and jump up in the air by pushing the take off board. After take off (or) jumping in the air the hands should be vertically raised. The Non-take off leg should raised highly. The last step is executed more quickly and the whole foot is placed on the board, ahead of the projection of the center of gravity.

3. Hopping

The athlete should be used to land on the ground which he was used to take off. For example: The athlete has take off for his left leg means he should land or hop in the same leg. During hopping the non take off leg (or) rear leg has no movement, that's why it is called sleeping leg.

4. Step

After completion of hopping the athlete used to take one more step with his non take – off, foot before landing is called step. Here the athlete does the bounding action to do the step.

5. **Flight** and

6. **Landing** procedures are similar to long jump.

3. HIGH JUMP

The high jump as we know it today first became popular in the 19th century. Subsequent perfecting of the jumping technique took place in the development stages, but it has depended particularly on modification of the rules for the event and on the elimination of some restrictive conditions.

Various techniques should be used by the jumper to cross the bar. Depends upon their ability they used any one of the following techniques.

c) High carry

High carry method is associated with those throwers who tend to use a direct over the shoulder type withdrawal which ends with a turning back of the shoulders at the arm and javelin is reaching near full backward extension (To held on above the head).

A thrower must develop his carry position to suit his technique of withdrawal of the javelin in preparation for the delivery stride.

2. Approach run

During approach run the thrower has to mark the point of starting and the point of check mark with javelin. While running the javelin should move front and back, and slowly increase the running speed still you reach you the check mark.

The Run-up : The run – up has two parts. They are

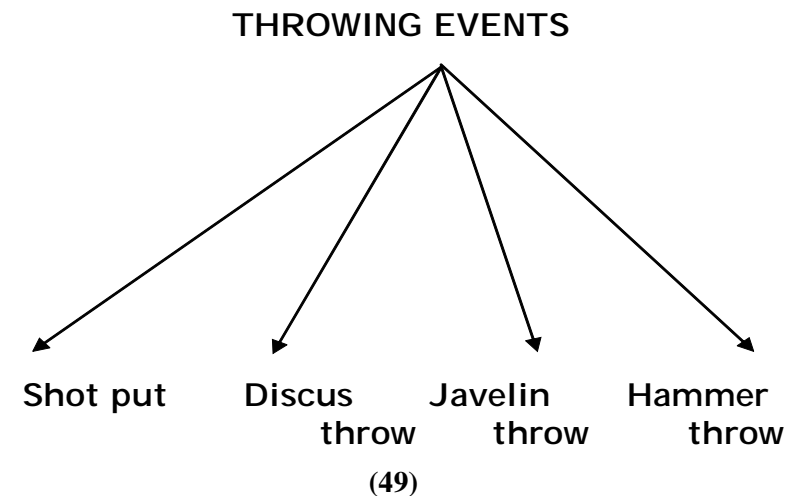
- (i) The cyclic part
- (ii) The acyclic part

The cyclic part speed is built up sufficiently so as to allow for a further increase over the last strides. The run-up should be easy and relaxed, heading the thrower to a powerful explosive all-out release.

- 8. Arm length
- 9. Balance
- 10. Endurance

The competitors are allowed three to six trails and three to eight of the best competitors are allowed three more trails. Incase of a tie for the final place, the competitor shall be allowed three additional trails. The conditions of the competition must be explained to the competitors before its commencement. The best throw of the competition out of all trails taken by the competitors shall be credited in resolving a first place tie. No markers or marks are allowed to be put in the throwing sector.

Competitors may use an adhesive substance on their hands for better grip, and can also wear a belt of leather or some other material to protect the spine from injury. However, taping of the fingers or use of any other devise on their hand which might assist in throwing is not allowed.



1. THROWING THE SHOT PUT

The competitor must begin the throw from a stationary position within the circle. The shot shall be put from the shoulder with one hand only and, shall touch or be in close contact with the chin. The hand shall not be dropped below this position during the act of putting.

Practice trials are not allowed after the commencement of the competition. Competitors are not allowed to put on gloves nor are they allowed to spray or spread any substance either on the surface of the throwing circle or on their shoes.

Basic Principles

1. Forces must be applied along a straight line.
2. Newton's 3rd law – Action and Reaction are equal and opposite.

Specifications

1. Weight of the shot for men - 7.260 Kg
2. Weight of the shot for women - 4.00 Kg
3. Diameter of the shot put circle- 2.135 m
4. Angle of the shot put sector - 34.92
5. Dimension of the sector - 20 x 12 m

a) Normal grip

The above thumb and middle finger is behind the edge of the grip cord and the index finger is partly curled around and behind on the javelin's shaft.

b) Middle and Thumb grip

The index finger and thumb is behind the edge of the cord binder and the rest of the fingers around the cord itself.

c) 'V' grip (or) Glow grip

The Javelin is held between the index and the middle fingers at the edge of the cord binder and rest of the fingers around the cord itself.

Carry

The javelin is carried above the shoulder of the throwing arm. Three commonly used methods of carrying the javelin during the approach run's cyclic phase.

a) Low carry

The low carry is generally associated with a circular type arm action in the 'withdrawal' (To held on waist level).

b) Medium carry

The medium carry is generally favored expansion in the withdrawal. (To held on eye level).

1. A head
2. A shaft and
3. A cord grip

The javelin throw comprises the following technical elements.

1. The grip and carry
2. The Approach run
3. The withdrawal
4. The impulse stride
5. The throwing stride
6. The release
7. The recovery

1. Grip

When executing their throws, javelin throwers may hold the javelin only by the whipcord grip. They may hold the javelin at the end of the cord grip with one or more fingers and the thumb touching the javelin shaft. Javelin throwers have some leeway in how they grip the javelin. It has three types how they can hold the javelin. The javelin is held behind the cord binder the rear edge of which offers a slightly raise border for gripping the javelin.

Stages / Method

1. Holding of the shot
2. Tucking (or) Placement of the shot
3. Stance
4. Glide
5. Release

1. Holding the shot

- a. The shot rest on the root of the fingers, and should not touch the palm.
- b. All the fingers are carry the shot except the little finger which is only support.

2. Placing (Tucking) the shot

1. The shot must be placed between chin and clavicle.
2. The shot does not go beyond the shoulder line.
3. The hand should be parallel to the ground.

3. Stance

The stance varied according to the using the style of Athletes.

Techniques (Style Of Putting)

The thrower can be used 3 style when putting the shot

1. Standing throw
2. 'O' Brien technique (or) Gliding
3. Rotation (or) Disco put

1. The 'O' Brien Technique

The distance a shot travels depends upon its height of release, velocity at the moment of release and the Angle of projection. The optimum angle of projection will vary depending on the height of the release, and the distance of the put, it will be approximately 34.95. The correct technique is the one that will result in the greatest velocity at release. The motion of a projected object is influenced by the exact point of application of the propelling force.

Holding the shot

The procedure for gripping the shot is to hold it in the left hand and lay the right hand loosely on top with the fingers spread slightly. The putter holds the shot in his right hand. Where it rests on the "base" of the fingers. The three middle fingers are only slightly splayed while the thumb and the little finger give the shot lateral support, securing a safe position of the shot.

The Reverse

The reversal is to serve as a follow through after the thrust and to retain balance in order to avoid fouling. After the discus has left the hand the thrower will have to reverse the feet rapidly and lower the body weight to maintain balance. The right leg must be brought forward quickly and planted firmly close to the rim of the circle, mean time the left leg swings back the body is bent at hips and right knee flexes to drop the centre of gravity into a stable position.

3. THROWING THE JAVELIN

The javelin throw distinguishes itself from other throwing events of shot-put, discus throw and hammer throw. These throwing events must be from a circle, the javelin must be thrown from behind the arc of a sector drawn with a radius of 8 mts. Due to the aerodynamic nature of the implement and its relative weight, the event does not require great strength. The event does require few less technique in order to achieve high level results.

Javelin consists of three parts namely the head, shaft and grip. The shaft is made up of either Aluminium or fiber. At the tip of the shaft a sharp head is fixed. At the center a grip made of thread is fixed. The Javelin is round and broad at the center. The circumference is small in the front and rear. It has three main parts

athlete drives off the left foot. The effective throwing position is one of "muscular wind" the hips displaced from the feet, shoulders from the hips and discus from the shoulders.

The run across the circle is initiated by the driving action of the left leg. Synchronized with the swing of the right leg. This drive carries the thrower halfway across the circle. The right foot landing approximately on the centre line with the leg well bent and the shoulder and body weight back. His left leg is pointing toward the direction of the throw, his right shoulder is facing the rear, his throwing arm is well behind the shoulder his left arm is curled and the discus is flat.

The Release

The throw begins with a forward and upward drive from the right foot. The shoulder should now come in slightly after the hip and the arm strikes from the low point, the thrower reaching out as far as possible to give as much distance from axis of rotation as he can. The left leg should now straighten, as the arm strikes. The discus will leave the hand in line with the right shoulder and should be squeezed out of fingers, each digit applying its force in turn and spinning of the first fingers last. The discus is spun clockwise. A good thrower will release the discus at a 35°-40° angle. The release must be smooth and rhythmic using the force generated from the lower body.

The stance

He should stand facing the rear of the ring with his back in the direction that he is going to throw. The shot should be held in right hand, supported by thumb and fingers. The hand holding the shot will be placed into the hollow of the collar bone in such a manner that it does not rest on such a manner that it does not rest on the shoulder but against the right side of the neck and the jaw. The elbow of the right arm is slightly raised and pressed forward. The upper arm points forward and downward. The head remains in its normal position. The eyes should be focused on a point to the rear of the ring and about five to ten yards away. He should stand erect in a telexed attitude, the left arm is held either out in front of the face or relaxed above the head the left front behind the right about one foot with just the toes touching for balance.

The glide or drive

The purpose of the glide is to gain momentum while moving across the ring and to lead into the correct position for the delivery. The initial movement is to lower the trunk and raise the left leg causing the body to form a "T" shape with all weight carried on the right leg. The head, shoulders and hip remain square to the rear of the circle, and the right leg flexes in preparation for the drive across the ring proper balance at this point is extremely important.

2. The Rotation or Disco-put Technique

The Starting Position

The putter stands at the rear of the circle facing 180° away from the throwing direction. The left foot is along the centre line of the circle and the right foot is placed laterally to the right of the centre line about shoulder width apart or just this point in most cases. The grounding of the left foot at the stop board denotes the arrival of the thrower into the delivery stance.

Preliminary Movements

To start the turn, the putter begins by swinging the shoulders, trunk and left arm along with the left and then to the right, as the body weight shifts correspondingly from leg to leg in coordination with the rhythm of the shoulders, trunk and left arm. Both knees are semi – flexed while this side to side swaying movement is taking place to break the inertia and set the pattern of movement to follow.

Turn

The double support phase of the turn begins at the end of the preliminary movements. The thrower is completely over his right leg with the trunk and shoulders well twisted to the right. From this position the thrower begins unwinding his upper body in the direction of turning with a wide

throwing arm bang to the right side along the thrower's thigh with the head and eyes focused to a point about 5 meters behind the circle. There are generally three positions that a thrower may adopt in relation to the line of direction. The experience, technical skill and comfort of the thrower must decide which of the three starting positions suit their ability.

The left foot is generally placed a few centimeters back from the rim of the circle, in order to avoid fouling by bursting the sole of the foot on the top edge of the rim of the circle as the pivot is executed.

The preliminary swings

The thrower should position himself at the rear edge of the circle with his back to the generally facing the direction of throw and his feet slightly wider than hips. The discus should be flat and facing downwards on the arm swung at shoulder height so that the arm and discus go well behind the right shoulder. The free arm rests comfortably across the chest. The thrower's weight should move easily from one foot to the other. On the final preliminary swing, the arm is swung back as far as possible so that the body weight is over a straight right leg.

Coming across the circle

The initial movement is begun the hips are turned and a pivot is made on the ball of the right foot as the

Specification of discus

1. Weight of the discus for men : 2 kg to 2.025 kg
2. Weight of the discus for women : 1 kg to 1.025 kg
3. Diameter of the discus for men : 21.9 cm to 22.1 cm
4. Diameter of the discus for women: 18 cm to 18.2 cm
5. Angle of sector is : 34.92°

Various Stages

Hold

The hand is placed flat against the discus surface, the upper joints of the fingers grasp the rim of the discus. Its center of gravity lies between the index and middle finger. Due to a slight bending at the wrist the upper face of the discus touches the arm, because it prevents the discus from falling out of the hand in the subsequent movements.

Starting position

The starting position at the rear of the circle is with the thrower facing 180 degrees away from the throwing direction. The two feet are usually placed about shoulder width apart or slightly more in the case of very tall throwers. The toes point naturally outwards with the weight of the body evenly distributed over both feet. The discus and

sweeping left arm action parallel to the ground, a slight forward tilt to trunk in a semi sitting position. The single support phase of the initial part of the turn is followed by a brief non support phase when both feet are off the ground and the whole body is turning on its vertical axis, and continues turning after the right foot lands around about the center of the circle.

Follow through (or) Reverse

When the right leg has driven really well and effectively and the action has been timed correctly the athlete will be well over the left foot as the arm strikes. Immediately after the shot has left the hand, he will find himself falling over the stop – board. In order to prevent himself fouling, the left foot is rapidly withdrawn and the right leg brought forward, the toe of the right foot striking the inside edge of the stop – board. At the same time the body weight is lowered in order to be more on balance by lowering the centre of gravity.

Valid Trial

For a valid trial, the shot shall fall completely within the inner edges of the landing sector.

Fouls

1. Throwing the shot from behind the shoulder
2. Touching outside the circle or the top of the stop Board

3. Shot landing on the sector line or outside the sector line
4. Delaying more than 60 seconds to throw.

Rules

1. The use of gloves is not allowed
2. At the competition area, each competitor may have a maximum of two practice trials which should be made in draw order, under the supervision of the judges.
3. Once the competition has begun, competitors are not permitted to use implements for practice purposes or to use the runway or ground within the sector for practice trials, with or without implements.
4. No device of any kind – i.e., taping of two or more fingers together, which in anyway assists a competitor when making a throw, shall be allowed. The use of tape on the hand shall not be allowed except in the case of the need to cover an open cut or wound.
5. A better grip, competitors are permitted to use a suitable substance on their hands only.
6. To protect the spine from injury, a competitor may wear a belt of feather or other suitable material.

7. For a valid trail, the tip of the javelin shall fall completely within the inner edges of the landing sector.
8. If the implements breaks during a throw or while in the air, and if the competitor thereby loses his balance and contravenes, it shall not count as a foul throw, provided one attempt was made in accordance with the Rule.
9. Implements shall be carried back to the starting line and never thrown back.
10. The competitor shall not leave the runway until the implement has touched the ground.

2. THROWING THE DISCUS

The object of the spin in the discus throw is to generate power and speed within the circle to apply to the discus itself, and the more power that is applied to the discus, then further it will go the angle to release of discus, the position of the discus during its flight are important factors. It has three types,

1. Half rotation
2. Full rotation
3. One and half rotation

6. 5000m Run – Arc start **or** Group start
7. 10000m Run – Arc start **or** Group start
8. 400mts Hurdles - Full stagger distance
9. 4 x 100m Relay – Full stagger distance
10. 4 x 400m Relay – One and Half stagger distance with diagonal distance.

2.Non- Standard Track

The track which is not satisfying the conditions of standard track is called as Non-standard track and the 400mts track without curb (raised border) is also treated as Non-standard track. Usually 200mts track is called as Non – standard track.

Some of the disadvantages of Non-standard track:

- a) Sprinters very difficult to show their real capacity.
- b) Very difficult to run more than 6 competitors at a time.
- c) Very difficult to conduct Hurdles and Relay races.
- d) Very difficult to conduct both track and field events simultaneously.

Method of finding Running Distance Radius for 200 mts track if 36 mts as straight.

3. Five – stride – Rhythm

The three known stride Rhythms – the three stride rhythm. The five stride Rhythm and seven stride rhythm. It is five stride – Rhythm which is the most widely accepted, which comprises the following phases:

- (i) The withdrawal of the javelin
- (ii) The impulse stride
- (iii) The throwing position
- (iv) The release
- (v) The recovery

(i) Withdrawal of the javelin

The withdrawal starts at the second stride of the five-stride rhythm and ends at the third stride. The throwing arm is drawn back in alignment with the shoulder axis. The palm of the hand is turned upward and extend the forearm, when the withdrawal is completed, the athlete's body has a marked backward lean.

(II) Impulse stride /Cross step / Three step (or) Five step Rhythm

When an athlete reaches the check mark with the left leg the action of throwing should be starts. The right hand is stretched backward with the javelin and left hand is brought in forward in front of chest. That is otherwise called "with drawl of the javelin".

The toe of the right foot must be deviate more than 30° from the run up direction. The left leg presses the body down low into the fourth stride, preventing the body's centre of gravity from lifting at the landing of the right leg, which must be allowed to bend when it receives the body weight.

(iii) Throwing Position

The throwing position starts at the moment when the athletes right foot makes contact with the ground after the impulse stride. The right leg can start to extend and doing s introduce the release, the full extension of the forearm by the hand is important under no circumstances must the arm be flexed at the wrist.

(iv) The Release

The release is initiated by a forward and upward stretching of the right leg at the knee and ankle joints, driving the right hip forward. The shoulder and the hip axes now run parallel and almost at right angles to the direction of the throw. The throwing arm is not yet stretched while the right leg is extended, the heel is raised, allowing the pressure of the ball of the foot to act longer on the body. The throwing arm now comes into its sphere of action. When the throwing arm begins to strike, the elbows are raised until it is level with the heed and pointing in the throwing direction.

Method of Finding Running Distance Radius for 400 mts if 80 mts as straight.

$$2pr = 240 \text{ (Circumference of two curves)}$$

$$r = 240/2 \pi$$

$$240/2 \times 3.1416 = \frac{240}{2 \times 3.1416} = \frac{240}{6.2832}$$

$$= 38.20 \text{ mts}$$

For Standard Track (With Kerb)

Marking Distance Radius (MDR or CR) = RDR – 0.30 m

$$\text{MDR} = 38.20 - 0.30 = 37.90\text{m}$$

For Non-standard Track (without kerb)

$$\text{MDR} = \text{RDR} - 0.20 \text{ m} = 38.20 - 0.20 \text{ m} = 38.00\text{m}$$

Starting points in 400 mts Track

1. 100m Run Men & Women
100m Hurdles for Women - Parallel Method
110m Hurdles for Men
2. 200m Run – Half stagger distance
3. 400m Run – Full stagger distance
4. 800m Run – Half stagger with diagonal excess **Or** Arc start / group start
5. 1500m Run – Arc start **or** Group start

Running Distance Radius (RDR)

RDR is the path in which an athlete has to run in the curve to cover the exact distance. The chart below shows that RDR, CDR and area required to lay 400mts raised bordered track when the straights length varies.

Straight length in mts	Rdr in mts	Cdr in mts
79MTS	38.50	38.20
80MTS	38.18	37.88
84.39mts	36.80	36.50

The chart below shows that RDR, CDR and area required to lay 200mts Non raised bordered track when the straights length varies.

Straight length in mts	Rdr in mts	Cdr in mts
37.50MTS	19.89	19.67
40.00MTS	19.09	18.89

During the release the left side of the body must be in a flexed position. This is achieved by a sudden arrest of the backward movement of the left arm just when the right side of the body overtakes the left side the angle of release is between 30 and 36 degrees.

(v) The recovery

A distance of at least two meters from the arc will be required merely checks the forward speed of the body. Thus preventing from fouling. After the release, the right leg is forward in a springing movement. The reverse takes places to avoid stepping over the right foot must be planted transversely to the throwing direction, the upper body must be lean forward, the left leg is raised and brought back into the direction of the run-up. Javelin consists of three parts namely the head, shaft and grip. The shaft is made up of either Aluminium or fiber. At the tip of the shaft a sharp head is fixed. At the center a grip made of thread is fixed. The Javelin is round and broad at the center. The circumference is small in the front and rear.

Follow throw

After releasing the javelin the thrower to avoid his forward momentum (or) foul, then he placed his rear leg to brought forward for his rear leg and placed nearer to the board and to do hopping twice or threes. Then he come back behind the runway should not make foul.

Correct throw

The javelin should be caught in the grip. The javelin must be thrown forward from behind the shoulders. While throwing thrower should not cross the line of runway either in front or side. After releasing, the javelin should fall within the sector lines with the tip first touching the ground. The thrower still remains (leave) the runway only after the javelin lands on the ground.

6. THROWING THE HAMMER

The technique of hammer throwing is determined by the specific nature of the implement and the measurement of the throwing circle, which comply with the international rules. A complete throw consists of two preliminary swings and three turns on the left foot with an active push-off from the right leg at each turn. The following are the parts of hammer throw:

1. The Grip
2. The Initial position
3. The preliminary Arm swings
4. The Transition
5. The turns

Top Layer

Now-a-days all international competitions are being held on synthetic tracks. The thickness and material used for various layers of a synthetic track depend upon the product and preference of the particular firm (construction agency). Although, the material used for top layer by all the firms are synthetic tracks, but of different variations. It is advisable that whenever 8 lane synthetic tracks are being laid, efforts should be made for laying of another 4 lane synthetic track of the same material for training purposes.

Lane

Lane is the space between the two parallel lines.

Kerb

Kerb is the raised border (both inner and outer line) which is fixed permanently through the inner line of the first line and outer line of the last lane. Dimensions of curb is 5 x 5 cm (5 cm height, 5 cm width).

Curb Radius (CR)

Curb radius is the radius which is used to draw the curve. It is otherwise known as Marking Distance Radius (MDR). The curb radius varies according into the nature of the track.

TRACK MARKING

Track must be prepared according to the rules and regulations laid by **International Association Of Athletic Federation** (IAAF). The inner raised border should be 5cm in height and width by using brick, wood or any other suitable material. There shall be a minimum of 8 lanes and width of lane is 1.22mts and width of the line is 5cm. The straight lines are always marked by north to south direction and finishing line must be same for all races.

a) TYPES OF TRACK

The track is classified into two types based on its specifications.

1. Standard Track (with curb)
2. Non- standard Track (without curb)

1. Standard Track

The tracks are made either on plan surface (grass) or with the help of cinder/synthetic material which is skid proof and not too hard. To get maximum benefit from the cinder/right synthetic tracks, it is essential that proper care be taken at the time of the construction so that right materials are mixed in various layers as per required thickness.

6. The Release

7. The Recovery

The Grip

The inside grip of the hammer handle is laid against the pads of the middle phalanges of the left hand fingers. The right hand cuffs the left by putting the four fingers over the back of the middle and basal phalanges of the left hand fingers. The hammer must be held firmly but not tensely.

The initial position

The thrower stands at the rear edge of the circle with his back facing in the direction of the throw his feet are a little more than shoulder width apart and his knees are bent for stability during the arm swings. The thrower now places the hammer head behind his right leg as far to his rear as possible. He then turns to the right until the right shoulder points in the direction of throwing. The hammer wire forms a straight line with the extended left arm.

The preliminary arm swings

The main function of the preliminary swings is to break the inertia of the thrower and hammer and to set a rhythmic pattern of movement by which initial acceleration is transmitted to the hammer. During the preliminary swings, the arms are kept long and relaxed and form and extension

of the hammer wire. They begin with this movement when the hammer is at its lowest point and end it by turning the trunk to the right. The thrower must counteract the increasing centrifugal force.

When the hammer moves backwards, he presses his hips forward. After the first arm swing the thrower keeps the lowest point of his hammer well to the right, at around 290 to 300 degrees, and the highest point somewhere around 120 degrees.

The Release

The delivery phase begins when the right foot touches the ground after the third turn. The landing of the right foot must be fast and firm in order to match the acceleration of the implement, which is racing down to the lowest point with the beginning of the active straightening of the legs. Just before the hammer is released, the left knee straightens. When the implement leaves the hand, the vertical line of projection of the thrower's head should not go beyond the right heel. If the feet are in a stationary position, thus is a clear proof of a correctly executed delivery. The hammer is released at shoulder height. The left shoulder points in throwing direction and back is well arched. The most valuable angle of release in the hammer throw is 42 and 44°.

1st Day Events

1. 100 mts Hurdles
2. High Jump
3. Shot put
4. 200 mts Run

2. Decathlon

Decathlon consist of 10 events which shall be conducted on 2 consecutive days in the following order.

1st Day Events

1. 100 mts Run
2. Discuss throw
3. Pole vault
4. Javelin throw
5. 400 mts Run

2nd Day Events

5. Long Jump
6. Javelin
7. 800 mts Run

2nd Day Events

6. 100 mts Hurdles
7. Long Jump
8. Shot put
9. High Jump
10. 1500 mts Run

Note :

1. Winners will be decided based on the points of all events.
2. There is no heats in the running events and every running events are treated as finals.
3. Three attempts only will be given to field events.
4. Two false start should be permitted.

3. Decathlon

Decathlon consist of 10 events which shall be conducted on two consecutive days in the following order, with minimum 30 minutes interval between two consecutive events and 10 hours interval for last event of first day and first event of second day.

1st Day Events

1. 100 mts Run
2. Long Jump
3. Shot put
4. High Jump
5. 400 mts Run

2nd Day Events

6. 110 mts Hurdles
7. Discus throw
8. Pole vault
9. Javelin throw
10. 1500 mts Run

Combined Events For Women

Combined events for women there are two category mentioned as follows.

1. Heptathlon

2. Decathlon

1. Heptathlon

Heptathlon consist of 7 events which shall be conducted on 2 consecutive days in the following order.

The Recovery or Follow Through

To avoid stepping over to thrower must absorb the impact by reversing the legs and lowering the body's centre of gravity, thus increasing stability.

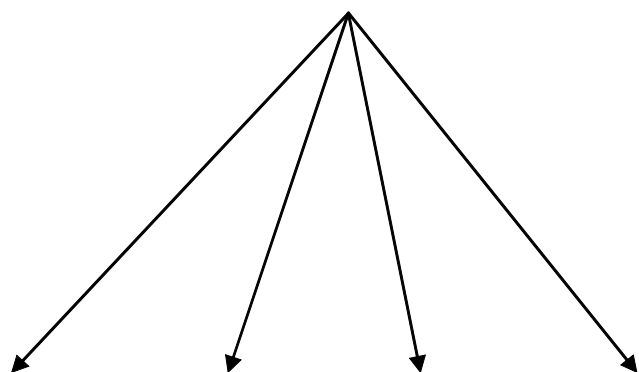
C.COMBINED EVENTS

Multi-discipline events has been included in athletics programmes since eight century B.C. though originally the five events for men included a run, long jump, discus throw, javelin throw and wrestling. The 10 events with we are familiar today were practiced first in Scandinavia, and the event is now developed in importance for the genuine all – rounder, who may not be one event, but who can maintain a high overall standard. Today it is an event for the decathlon or heptathlon specialist who prepares for it and competes in the event as a whole rather than in series of separate competitions. The decathlete or heptathlete needs to be a balanced personality with well –rounded physical development.

The Combined events are an individual events consist of several number of events of different category. For men and women combined events are classified into 4 types according to the level of competitors. The events are held over two days, and they are chose as a true test of skill, stamina and technique. The decathlon combines sprints with middle distance running, throwing, jumping, hurdling and vaulting.

There is a rest period of 30minutes between each event. A competitor is awarded points for his best performance in each event, as calculated by reference to scoring tables produced by the IAAF. The decathlon entered the Olympic programme in 1912.

COMBINED EVENTS



Pentathlon

Heptathlon

Octathlon

Decathlon

They are as follows.

1. Pentathlon - 5 events
2. Heptathlon - 7 events
3. Octathlon - 8 events
4. Decathlon - 10 events

The Combined events such as pentathlon, which shall be conducted on one day, and other combined events such as Heptathlon, Decathlon and Octathlon should be conducted on two consecutive days as in the prescribed order.

Combined Events for Men

1. Pentathlon
2. Octathlon (Youth Boys)
3. Decathlon

1. Pentathlon

The pentathlon is a five-events test of all-round ability. The men's version comprises the long jump, javelin, 200m., discus and 1500 m in that order on one day. Scoring is on the same basis as the decathlon. The pentathlon has long been a most popular women's event, and was introduced into the Olympic schedule in 1964.

2. Octathlon (Youth Boys)

Octathlon consist of 8 events which shall be conducted on consecutive two days in the following order.

1st day Events

1. 100 m Hurdle
2. Long Jump
3. Shot put
4. 400 mts Run

2nd day Events

5. 110mts Hurdles
6. High Jump
7. Javelin
8. 1000 mts Run

i) By seeing their timing in 1/100 of second. If the tie still remains.

ii) Lot shall be used to decide the best loser.

b) Field events

During horizontal or distance events, where there are more than eight competitors, each competitor shall be allocated three trials and the competitors with the best valid performances shall be allowed three additional trials.

In the event of a tie for the last qualifying place it shall be resolved by seeing the second and third best performance among the tied competitors and if tie still remains, the tied competitors shall also be allowed to perform the three additional trials.

In the event of a tie for any position, it shall be decided first by using the available rules. If the tie still remains it concerns for the first place, the competition shall be re-run to decide the winner which is known as concerns any other place, the result will stand. That means the tied competitors shall be awarded the same place.

Note; Its best performance as achieved during field marking, it shall also be considered.

$$2\pi r = 128 \text{ (Circumference of two curves = } 200 - 72 \text{ (} 2 \times 36 \text{))}$$

$$2 \times 3.14 \times r = 128$$

$$\text{RDR or 'r' = } 128 \times \frac{1}{2} \times \frac{1}{3.14} = 20.37 \text{ m}$$

$$\text{MDR = RDR - 0.20 m}$$

$$\text{MDR = } 20.37 - 0.20 = 20.17 \text{ m}$$

b) TYPES OF RUNNING SURFACE

1. Mud
2. Grass
3. Cinder
4. Synthetic Track

c) NEED FOR A STANDARD TRACK

1. Track must be prepared according to the rules and regulations laid by International Association of Athletic Federation (IAAF).
2. The length of the standard track shall be 400 mts.
3. The track should be laid out from North to South direction.
4. Track shall consist of two parallel straights and two curves of same radius. The length of the curve will be more than the straight.

5. The track should have minimum of 6 lanes and maximum of 8 lanes.
6. The inside and outside of the track shall be bordered by a kerb. That is raised border of maximum 5 x 5 cm.
7. The track should have common finishing point.
8. To conduct all the running events up to 10,000 mts within a track and also the jumping and the throwing events simultaneously with the track events.
9. The track should have proper drainage system.
10. The track should be leveled without any ups and downs.
11. The running direction is such that the athlete's left hand side is towards the centre of the track.
12. The synthetic material will be used as the surface of the track.

STAGGER DISTANCE

1. There will be no stagger for the first lane athlete.
2. As and when the width of the lanes changes, the stagger distance also changes.
3. Staggers are needed only when the athletes are required to run in curves also in their lane.
4. Staggers will not change according to the increase in the length of curves.

6. Angle sector is : 34.92°
7. Wire : Single up broken and straight length of string steel wire 3 mm in diameter
8. Handle : Curved or straight grip with maximum width inside of 130 mm and maximum length inside of 110mm.

BREAKING TIES IN ATHLETICS

Tie breaking in can be steadied separately during preliminary rounds and finals to decide the positions.

1) Preliminary rounds;

a) Track events

Preliminary rounds (heats) shall be held in track events when the number of competitors is more in number to reduce the number of competitors to 6 or 8 to conduct the finals. In all preliminary rounds at least first and second in each heat shall qualify for the next round and it possible at least three in each heat shall qualify. The qualification for the next race shall be decided either according to their placings or according to their times (best losers). During this selection if there is a tie among the best loser, the following steps shall be applied to docile the best loser for the next round.

The Ring

The ring shall be placed to the level of outside ground. It must have a height of 1.4cm to 2.6 cm from the inside floor of the circle and 6mm thickness.

Specification of Hammer

The hammer consist of three parts, a metal head, a wire and a grip. The head shall be of solid iron or other metal not softer than brass. The head should be spherical in shape with smooth surface. A steel wire, with a diameter of 3mm, is attached with the head at one end and with a handle on the other end.

Overall weight of the hammer

1. Men : 7.26 kg to 7.285 kg
2. Women : 4 kg to 4.025 kg

Overall length of the hammer

1. Men : 117.5 cm to 121.5 cm
2. Women : 116 cm to 119.5 cm
3. Diameter for men : 11 cm to 13 cm
4. Diameter for women : 95 cm to 110 cm
5. Head : Solid or other suitable material

5. When staggers are marked, the diagonal excess distance also to be taken into consideration.

Formula

$$\text{Half stagger} = [W (N-1) - \alpha 0.10 \text{ m}] \pi$$

$$\text{Full stagger} = [W (N-1) - \alpha 0.10 \text{ m}] 2\pi$$

$$\text{One and Half stagger} = [W(N-1) - 0.10\text{m}] \times 3\pi$$

Where,

W – Width of the lane,

N – Number of the lane

π – 3.1416 (Standard value)

Stagger distances for Non- standard Track

$$\text{Half stagger} = W (N-1) \times \pi$$

$$\text{Full stagger} = W(N-1) \times 2\pi$$

$$\text{One and Half stagger} = W (N-1) \times 3\pi$$

Diagonal (excess) Distance

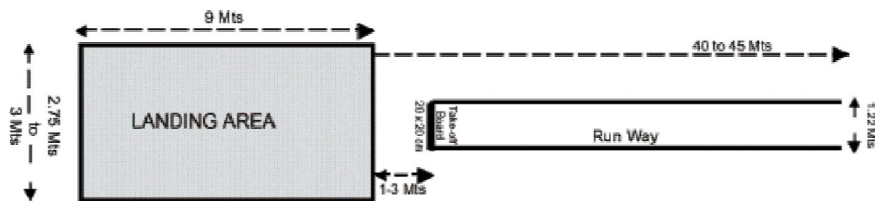
The excessive distance run by the athletes other than the first lane runner for 800mts and 4 x 400mts relay to reach the first lane after the first and three curve respectively is called diagonal excess. This diagonal distance should be calculated for each lane and it should be added with half stagger, and 1½ stagger respectively in the starting point itself.

UNIT - V

FIELD MARKING

Layout of Area for all Field Events with all Specifications

a) LONG JUMP



Specifications

Runway

- Approach run - 40-45mts
- Width of the lane - 1.22
- Width of the line - 5cm

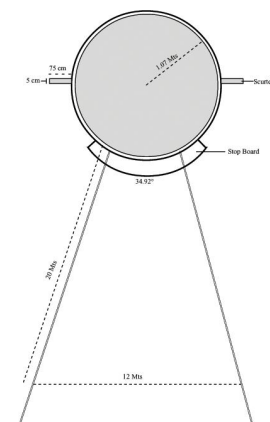
Jumping pit

- Length - 9 mts
- Width - 2.75 mts to 3 mts
- Distance of the take off Board from the nearest edge - 1 – 3 mts of landing area

(84)

- 9. Width of the cord grip : 150 mm to 160 mm for men
- 10. Width of the cord grip : 140 mm to 150 mm for women
- 11. Angle of sector is : 29°

h) THROWING THE HAMMER CIRCLE



The hammer is thrown from a circle, shielded on three sides by a netting a cage on a metal frame, and must land within the marked sector. The competitor who achieves the best distance with his throw is declared winner. A total number of five judges watch for infringement within the circle, the other three judges supervise the field. If the hammer breaks while attempting a throw, then the attempt shall not be counted. Under such circumstances, if the competitor loses his balance and commits a foul, it won't go against him.

(93)

The javelin is made of wood or metal shaft with a sharp metal head. There shall be a cord grip around the centre of gravity of javelin. The cord grip should not exceed the diameter of the shaft by more than 8mm. The grip shall be of uniform thickness.

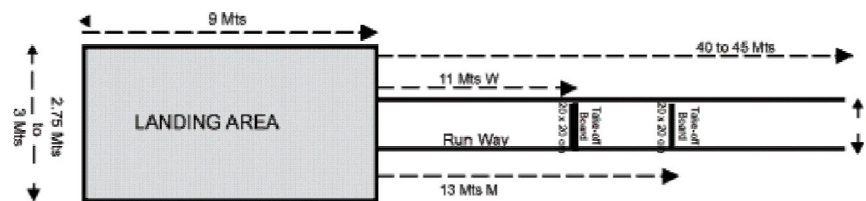
SPECIFICATIONS

1. Length of the runway : 30 to 36.5 mts
2. Width of the runway : Two parallel White lines 5 cm wide and. 4 mts apart
3. Width of the arc : 7 cm extended by 75cm long and 7 cm wide.
4. Weight of the javelin : 800gms to 825 gms for men
5. Weight of the javelin : 600gms to 625gms for women
6. Over all length of the javelin : 2.60 mts to 2.70 mts for men
7. Over all length of the javelin : 2.20 mts to 2.30 mts for women
8. Metal head : 250 mm to 330 mm for men and women

Dimension of the Take- off Board (Wooden Board)

- Length - 1.20 mts to 1.21 mts
 Width - 20 cm
 Depth- 10 cm

b) TRIPLE JUMP



Specifications

Runway

- Approach run - 40-45mts
 Width of the lane - 1.22
 Width of the line - 5cm

Jumping pit

- Length - 9 mts
 Width - 2.75 mts to 3 mts
 Distance of the take off board from the nearest edge of landing area - 11m (w) 13m (m)

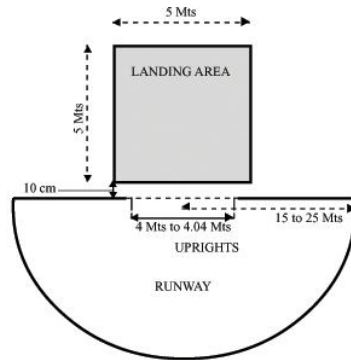
Dimension of the take off board

Length - 1.20 mts to 1.21 mts

Width - 20 cm

Depth- 10 cm

c) HIGH JUMP



Specifications

Runway

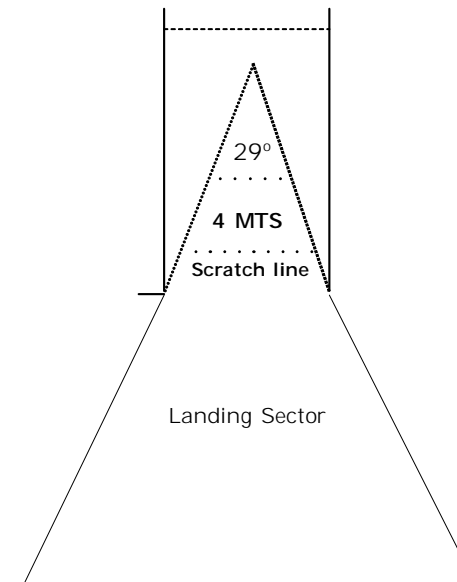
The minimum length of the runway shall be 15 meters. Except in international competitions, where the minimum shall be 20 meters. If conditions permit, the minimum length should be 25 meters.

High Jump Landing Pit

Pit : The pit is made of foam. The length of the pit shall be at least 5m, width 3m and height 60cm.

(86)

Javelin Throw Sector



IMPLEMENTS



Javelin



cord grip

(91)

Specifications

RUNWAY

The minimum length of the runway shall be 15 meters. Except in international competitions where the minimum shall be 20 meters. If conditions permit, the minimum length should be 25 meters.

High Jump Landing Pit

Pit : The pit is made of foam. The length of the pit shall be at least 5m, width 3m and height 60cm.

Uprights

The uprights should be of a rigid or any other suitable material, marked in centimeters. The uprights shall extend at least 10cm above the point up to which the cross bar can be raised. The distance between the uprights shall be between 4.00 - 4.04m.

Cross bar support

The support for the cross bar should be made of rigid or any other suitable material, which can be raised or lowered and can be adjusted up to a height of 2.30m.

Uprights

The uprights should be of a rigid or any other suitable material, marked in centimeters. The uprights shall extend at least 10cm above the point up to which the Cross bar can be raised. The distance between the uprights shall be between 4.00-4.04m.

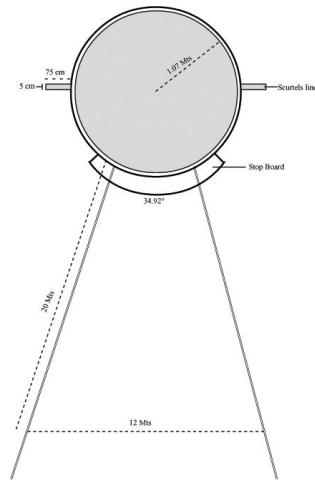
Cross bar support

The support for the cross bar should be made of rigid or any other suitable material, which can be raised or lowered and can be adjusted up to a height of 2.30m.

Cross bar

The cross bar is made of wood, or metal or any other suitable material. The cross bar should be circular with a diameter of 29 mm to 31 mm. The end of the bar shall be of concave or flattened surface of 150-200 mm in length and 29-35 mm in width. The length of the cross bar shall be between 3.98, to 4.02m.

d) SHOT PUT CIRCLE



The Ring

The ring shall be placed to the level of outside ground. It must have a height of 1.4cm to 2.6 cm from the inside floor of the circle and 6mm thickness.

Shot

The shot is made from solid Iron, brass or other hard metal. The men's shot weight is 7.26 kg with a diameter between 110-130mm. The women's shot is of 4kg with a diameter between 95-110mm. The shot should be spherical in shape with smooth surface.

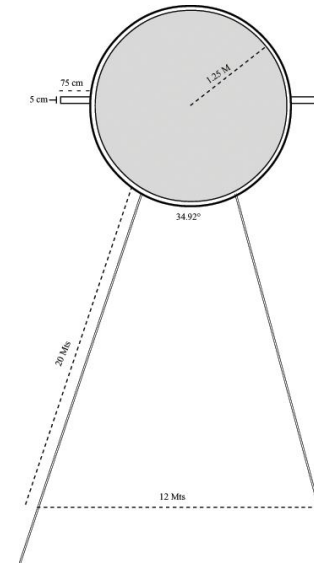
Stop Board

A curved piece of wood 10 cm thick affixed to the front of the shot put circle. When throwing, the shot putter braces his foot against the stop board to avoid falling forwards out of the circle.

(88)

f) DISCUS CIRCLE

Discus



The discus is made of wood, or other suitable material, with a rounded metal rim. The cross section of the edge shall be rounded in a circle of 6mm radius. The thickness of the rim should be at least 12m. The diameter of men's discus shall be between 219-212 mm and its weight should be 2 kg. The diameter of women's discus shall be between 180-182 mm and weight 1kg. The diameter of metal plate or flat centre area should be between 50-57mm.

(89)

a) Track Events

The judges shall decide the order in which the competition finish and if they cannot arrive at a decision shall refer the matter to the Referee, who shall decide.

Dead Heat

If there is a tie for the first place in any track event, the event shall be held after to giving adequate rest. And if it is not possible to conduct event once again due to time factor, the tied competitions shall be awarded first place jointly. This method is known as "dead heat". If tie remains for any other place, the result will stand. Rerace shall not be held to decide the second, third and other place.

Note: If photo finish facilities is available, the positions may be decided, easily.

b) Distance events

When there is a tie for any place, it shall be solved by seeing the second best performance and it necessary third, fourth best, etc. If tie still remains and concerns first place, the tied competitors will complete again in the some order in a new attempt until the tie is result. For remaining places the result will stand. That means same place shall be given to the field competitors.

Height events

When there is a tie for any place in high jump and pole vault it shall be solved by using two rules in order as following

- i) The tie competitor with lowest number of failures at the field height (last cleared height) shall be given higher place.
- ii) If tie shall remain; the competitor with lowest total number of failures throughout the competition shall be given higher place.

If the tie still remains and if it concerns the first place, the field competitors shall be given one more jump at the height where the competition is stopped (height which is immediate next to the field height), and if no decision is reached, the bar shall be raised or lowered 2cm for high jump and 5cm for pole vault. The competitors are allowed only one attempt at each height until the tie is decided. The best performance achieved during jump, if any, shall also be considered.

If the tie concerns any other place, the tied competitors shall be awarded the same place in the competition.

Note: If the same place is given, the immediate next place shall not be awarded to any competitors.

competitors shall be placed in the order in which any part of their bodies (i.e. torso, as distinguished from the heads neck, arms, legs, hands or feet) reaches the vertical plane of the nearer edge of the finish line.

B. MIDDLE DISTANCE RUNNING

Distance running can be split into two groups, Middle distance and Long distance. For middle distance running the athlete needs to both speed and stamina. For long distance running, stamina is the most important thing. Stamina means building up our body so that it can be last the race distance, but at race speed.

Middle Distance Events

1. 800 mts
2. 1500 mts
3. 3000 mts

The middle distance runner must apply his effort correctly throughout the race; this can be achieved only by a knowledge of pace and tactics.

The events which fall into the middle distance category range from 800m to 3000m. With the relentless advance in performance in athletics the 800 meter race now attracts athletes who in the past would have been sprinters. His running style is a model of mechanical efficiency, and even

UNIT - I

INTRODUCTION

A. Meaning of Athletics

Athletics comprise of a wide range of skills and can be divided in two broad categories of track and field events. Track events include sprint races, middle distance races, long distance races, relays and hurdles. The field events are those which are being played either inside or outside the track area or outside the stadium, which include throwing events and jumping events.

The track events include races of 100m, 200m, 400m, 800m, 1500m, 5000, 10000m, and relay races of 4x100m, 4x400m in both men and women categories. In all races shorter than 800m the competitors have to run the length in their respective lanes. The competitors of relay races are required to carry a baton and pass over the same to his/her partner within the take over zone. The starting points are arranged in such false a way that distance from start to finish is same for each competitor. In case of two false starts, the athletes declared disqualified. The competitor who jostles, runs across, or obstructs other competitor(s) can also be disqualified. Timings of competitors are recorded by the official time keeper from stop watches or through electronic time keeping equipment. The hurdle events include 110m and 400m for men and 100m and 400m for women. The competitors are required to jump over specified number of hurdles, which are made of metal with

a wooden top bar. The steeplechase hurdle event comprises of 28 hurdle jumps and 7 water jumps spread over a 3000m run-way.

The throwing events include throw of shot-put, javelin, discus and hammer. Each competitor generally gets six trials and the winner is decided on the best distance covered in any one of his six trials. The Jumping events comprise of High Jump, Pole Vault, Long Jump and Triple Jump. In the first two events, athletes are required to jump over a crossbar. In Triple jump the competitors are required to complete a hop, step and Jump sequence. Winner of jumping event is decided based on the distance measured between the take-off line and the nearest break in the landing area lead by the competitor's body part.

A standard international track is 400 mts in circumference. It has 8 lanes and the width of each lane is 1.22 mts. Track and field events include Sprints, Middle distance running, Long distances race, Hurdles, Steeple Chase, Relay races, throwing events and jumping events. Track and field events are conducted by International Association of Athletic Federation (**IAAF**).

Athletics

The term "Athletics" is derived from the Greek word "Athlon" which means a contest. The word "Athlete" denotes a person who takes part in contests which involve physical activity. "Athletics" is the oldest forms of the organized sport contested between individuals and or teams.

3. Run through

A forward dip during the last stride before the finish line is the most commonly used technique.

Photo Finish Camera

It is impossible for the naked eye to be able to determine accurately the finishing sequence of runners for in a blanket finish. The problem has been solved by photo-finish cameras. A photo-finish camera has very narrow slit lens which photograph an area of the finish line not more than 5-10cm across. It uses a continuous strip of film that moves across the lens at a speed proportionate to the speed of athletes and records the arrival of each competitor at the finish line. The space between each athlete shown in the film exhibits the time elapsed between the arrivals of each of them at the finish line. Photo – finish camera also doubles up as an electronic timing device, recording finishing timings of athletes up to one hundredth of a second. The camera gives a developed photograph that gives positions of athletes and time when their torso reached the finish line.

FINISH POSTS

Except where their use may interfere with the photo finish equipment, two white posts may be placed along the prolongation of the finish line at least 0.30 mts from the edge of the track. They should be of rigid construction and approximately 1.40m high, 8 cm wide and 2 cm thick. The

the foot to push against at the start of the race. The foot plates shall be slopped to suit the starting position of the athlete and can be either flat or slightly concave. To monitor the false starts the blocks can be connected with a devise. The blocks can be used up to and including 400 meters (including the first) leg of the 4x200m and 4x400m).

TYPES OF FINISHING

The finish line should be 5cm in width drawn across the track at right angles to the inner edge. Two white posts of rigid material (80mm in width and 20mm in thickness) shall be placed at a 30cm distance from the edge of the track. Competitors are place in the order in which any part of their torso (as distinguished from the head, neck, arms, legs, hands, or feet) reaches the vertical plane of the edge of the finish line nearest to the star.

Technique

There are three finishing technique used particularly during the sprint events. They are as follows.

1. Lunge finish

The torso reached the finish line first, i.e. leaning torso forward.

2. Diagonal finish (or) Shoulder Shrug

At the finish line crossing it by making the shoulder in diagonal, towards midline of the finish line. It is more difficult type.

B. IAAF

The IAAF (International Association of Athletic Federation) is the supreme governing body controlling international athletics throughout the word. It was founded in Stockholm on July 17th, 1912, to draw up and enforce rules and regulations and a common amateur definition, and to recognize world records, The IAAF now promotes its own World Champions in track and field every four years, with annual World Cross- Country Champions for men and women every march.

IAAF- Structure and Functions

In 1912, two days after the Olympic games a congress was held in Stockholm for the formation of an International Association of Athletic Federation. Seventeen countries were attended the historic meeting. The meeting was urged the Athletics to develop and promote international competitions and the Olympic games. The meeting was also urged the importance of having universal code of rules and regulation and a common definition for Amateur and also an athletic register of world and Olympic records.

One year later in 1963 at Berlin the congress once again met and accepted the first constitution and 34 nations figured on the most membership list. J.Sigfrid Edstrom (Sweden) was elected as first president and Kristvan Hailstorm as honorary secretary. The technical rules for International and domestic competition were framed and presented for approval in 1914 at the third congress in France.

In 1946 the IAAF Head Quarters moved from Stockholm to London. Over the years, the IAAF grew into a huge and dynamic organization as the world governing body of track and field athletics, road running, race walking and cross country. The congress decided to move the head quarters once again from London to Morte Carlo in 1993. The Steady growth of the Federation accelerated in the last decades. By 1997 member countries in addition numbered 209. The IAAF council comprising of 27 members from various countries.

AFI (Athletic Federation of India)

Athletics in its present form was born in our country during past decade of 19th century. Nothing much is known of its early stages till first known participation of Norman G.Pitchard in 2nd Olympic games in 1900 at Paris, where he won a Silver medal in 200mts run. The Indian Olympic Association (IOA) was formed in 1926 and its control athletics. But India unofficially participated in the 1920 and 1924 Olympic games under the leadership of H.C.Buck of Y.M.C.A Madras. The official participation of Indian athletes started in the 1928 Olympic games at Amsterdam till 1936 Berlin Olympics. India participated in the Olympics under the IOA BANNER. Then 1940 and 1944 Olympic Games were not conducted because of second World War.

Structure and Functions

Amateur Athletic Federation of India was formed in 1946 at the initiative of Maharaja Yadvindra Singh then

in a natural relaxed position. An angle of about 90° at the front knee and of about 110° to 130° at the rear knee will be appropriate.

(iii) The Long Start (or) Elongated Start

The front starting block is situated 3 foot lengths from the starting line and there is one foot length between the starting blocks. The angle of rear leg about 110°. The long starting position is certainly the most difficult one. It should be applied carefully. Any athlete finds this position rather ineffective. The long start, although still known, is hardly used nowadays.

For good starts a sprinter must,

- a) push back against the blocks
- b) moving the hands and arms as quickly as possible in reaction to the gun.
- c) move the hips quickly from the starting position to running position.
- d) run out of the blocks, do not jump.

STARTING BLOCKS

The starting blocks should be made of rigid material. It should be adjustable, but must be without springs. The blocks are fixed to the track, so that it provide firm base for

'On your marks' – position – his body weight resting comfortably on the legs in the crouch position. The hands are shoulder width apart to touch the ground behind the starting line with fingers and thumb pointing away from each other. The eyes are focused downward and forward.

Set position

The block settings should result, the athletes having a 90° angle at the front knee and 110° to 120° angle in the back of the knee. That gives a set position with the hips just slightly higher than shoulders slightly forward. The hands are placed just slightly wider than shoulder width apart, with the fingers and thumbs in a **"high bridge"** position. The shoulders are above and slightly ahead of the hands, the arms are straight, but not locked. He should feel pressure against rear block in the set position since the center of gravity is located high, the first strides are shorter and less powerful.

(ii) The Middle Start (or) Medium Start.

The front starting block is located two foot lengths (21 inches) from the starting line and the rear starting block is one foot length further. Kneel down with the right knee against the instep or toe of the left foot, and keep the trunk erect. The angle for the rear leg is about 130°. The slope of the body from the hips to the shoulders is not very steep. The body weight is on the legs and arms. The head remains

president of IOA with prof.G.D.Sondhi as its first president. The AAFI got affiliated to IAAF in the year 1946. The AAFI for the first time selected 8 athletes who participated in 1948 Olympic games at London. Indian women competed in the Olympic games for the first time in 1948.

Mr.M.C.Dhawn was elected by secretary of AAFI in 1950 and was the technical secretary in the first Asian games held at New Delhi in 1951. Raja Bhalendra Singh become the president of AAFI in 1952 and continued of guide athletic till 1968 along with Mr.M.C.Dhawn. This team acted a yeoman service to athletics in India and strengthened the AAFI to make it the leading federation. The federation produced by group competitors open national championship, Zonal and Inter Zonal Competition.

Many distinguished personalities are acted as president and secretary of AAFI till 1987 from 1988 to till date Mr.Suresh Kalmadi and Mr.Lalit K.Bhanot formed the new team of president and secretary respectively. The main function of AAFI is to prepare a year long sports calendar at the state and national level. They are sending teams to international level competitions based on merit.

D. AGE GROUPS

Under the Jurisdiction of the IAAF is split into five age groups.

1. Men and women there is no age limit
2. Seniors - 19 Years
3. Juniors - 17 and 18 Years
4. Youths - 15 and 16 Years
5. Boys - 13 and 14 Years

UNIT - II

TRACK EVENTS

Athletics is great fun and people of all ages, can enjoy it. Athletic activities can be traced back of the ancient Greeks, who used to take part in games of running, jumping and throwing. Track events include sprint races, middle distance races, long distance races, relays and hurdles.

The track events include races of 100m, 200m, 400m, 800m, 1500m, 5000, 10000m, and relay races of 4x100m, 4x400m in both men and women categories. In the track events all races are run with the competitor's left hand side of the track and finish in the same position. The competitors are required to wear their numbers on their vests.

A. SPRINT EVENTS

Sprints

"To cover the distance in the shortest time with maximum speed"

A. Sprint Events

1. 100 mts
2. 200 mts
3. 400 mts

1. Bunch start (or) Bullet start
2. Medium start
3. Elongated start

Three types of foot spacing bullet, medium and elongated starts. Each sprinter will have his own particular measurements so the following procedure is suggested to enable him to get into a correct starting position.

Block placement

The three block placement positions are determined by the location of the blocks relative to the starting line.

(i) The Bunch or Bullet Start

Stand with the right toe beside the rear of the left heel. Kneel down with trunk erect and rock forward in the same way. In this starting position the starting blocks are close to the starting line. The front block should be placed one foot length (16 inches) from the starting line, with 11 inches between the blocks results in low velocity and fast block clearance Track events, up to and including 400 meters, run at full speed for the entire race distance. Sprinter press their feet against two blocks, which are spaced apart and connected to a shaft, to improve their initial movement. The main features to look for in the sprinter's highly distinctive running action are the high knee-lift, the long strides, the thrusting arm action and the controlled breathing.

should immediately rise to final starting position retaining the contact of the hands with the ground and of the feet with the foot plates of the blocks.

A competitor shall not touch either the starting line or the ground in front of it with his hands or his feet on his marks. The three starting positions are measured from the starting line to the front leg of the starting block. Starting is the first stages in all the running events, should be conducted either track or road. There are only two types of starting should be followed by the athletes.

1. Crouch start
2. Arc start (Standing start)

CROUCH START

Crouch start can be used by the athletes those who are run up to and including 400mts and even the first runner of 4 x 100mts Relay and 4 x 400mts Relay.

In crouch start the following commands to be used,

1. On your mark
2. Set
3. The gun fire or clapping with clap board

It has three (divisions) method should be used according to the height of the individuals.

Sprinter

There is no ideal shape or size for the sprinter. He must, however, be well built and have good all-round muscular development and a quick reaction time. Regular, even and relaxed arm action must be learned first. The legs follow the arms, and the faster the arms are moved the faster the leg action will become. In the arm action emphasis should be on a forward and upward motion.

Most important factors for sprinting

1. Reaction time
2. Starting position
3. Powerful Muscles
4. Acceleration Technique.
5. Effective stride length
6. Curve running technique (200 mts, and 400 mts).
7. Technique at the finish line.
8. The condition of the Track surface
9. Wind and Weather conditions.

Stride Length

“It is the distance between touchdown of the toe of one foot and the touchdown of the toe of the other foot”. Stride length may and usually will be vary from left to right

or right to left on individual at the same velocity. This variance may be influenced by dominance, weakness, injuries and even leg length. Stride length will be vary with the speed of running and during the various phases of a race.

Stride Cadence or Stride frequency

"It is the number of strides per second". The stride cadence for sprinters is 4.5 to 10 strides per second with little difference found between the strides. The method of determining stride rate is to divide the number of strides in a race by the elapsed time for the race.

STARTING

There are varieties of running events for which the track is used . The finishing line for all races must be the same. But the starting line of all the races cannot be the same. It will vary from race to race. While 100mts race, 100mts hurdles and 110mts, hurdles races have to be run in straight courses, appropriate distance shall be measured backward from the beginning of home stretch and starting lines are marked. The extended lines are broken.

The start and finish of a race shall each be denoted by a white line 5 cm wide. The distance of the race shall be measured from the edge of the starting line farther from the finish, to the edge of the finish line nearer to the start.

All races shall be started by the report of the starter's gun or approved starting apparatus fixed upwards after he has ascertained that competitors are steady and in the correct starting position.

At all international sports competitions meetings, the commands of the starter in his own language shall, in races up to and including 400m be "on your marks", "set", and when all competitors are "set" the gun shall be fired, or approved starting apparatus activated.

In races longer than 400m, the commands shall be, "on your marks" and when all competitors are steady, the gun shall be fired, or approved starting apparatus activated. A competitors shall not touch the ground with his hands.

In all races up to and including 400m, and 4 x 100 mts Relay, 4 x 400mts relay first runner a crouch start and the use of starting blocks are compulsory. In competition held under IAAF, competitors must use starting blocks provided by the organizers of the meet. In other meet on all weather tracks, the organizers may insist that only starting blocks provided by them may be used. After the "on your marks" command, the competitor shall approach the starting line, assume a position completely within his allocated lane and behind the starting line. Both hands and one knee shall be in contact with the ground and both feet, in contact with the starting blocks. At the "set" command, the competitor

decreases. A study of the body movements involved in these activities pinpoints the causes. In normal walking and running the knee of the supporting leg is bent as it passes through the vertical position (i.e. when the centre of mass passes vertically over the foot), but in race walking the knee of this leg is straight in the vertical position. The technique is such a way that race walking does not become a modified run. Briefly, contact with the ground must be maintained at all times, a heel-and-toe action must be used, and the supporting leg must be straight at the knee as it passes through the vertical position.

Judging a fast walk is an extremely difficult skill, since it is almost impossible to see whether a walker has a foot on the ground at all times or that the knee is straight through the vertical for it takes only a fraction of a second to pass through the position. Race walking is not a natural skill as normal walking and running are, because the latter are the locomotion skills learnt from very early childhood.

As in most other athlete events, flexibility is an asset and hip mobility especially is an important factor in stride length in normal walking in which the line through the hip of the forward swinging leg is allowed to twist forward with the leg, the stride length is increased considerably. Stride length is also maximized, if the feet move along a straight line.

in the later stages of a race when fatigue is sapping his strength his skill does not break down.

C.LONG DISTANCE EVENTS

1. 5000 mts
2. 10000 mts
3. Marathon

The three main long distance events are 5,000m 10,000m and the marathon. Stamina is the basic quality needed by a long-distance runner, but speed has also become an essential requirement for would-be world beaters.

However, in the long distance the steady pacer must beware of the fast finisher who sits on his shoulder, until the final run-in. the steady runner without an equivalent fast finish must attempt to put himself far enough ahead of the sprint finishers by either a punishing pace throughout the race or by putting in bursts of speed during several laps from the finish. There is nothing more motivating for the training runner than to see his rival a few strides in front of him, but also nothing more demoralizing than for his rival to be 20 meters or more in front.

D.HURDLES – VARIOUS STAGES

MEANING

Running over the barriers (or) obstacles are known as Hurdles. The Hurdle race should be conducted for men and

women, senior boys and senior girls in various height and distance. Every hurdle race is based on certain conditions laid down in the rules of the International Association of Athletic Federation (IAAF).

The hurdles are made of steel with wooden top bar. The height of hurdles can be adjusted as per the length of the race and sex of the athlete. The hurdles are made in such a way that when force of 3.6-4kg. is being applied to the centre of the top, it should overturn automatically. The height required for, men's 110m race is 106.7 cm. The women's 100m sprint hurdles are 84 cm in height. In 400 m race the men's hurdle is 91.4 cm high and women's is 76.2 cm. The length of the wood used for the top bar should be 1.20m and width at least 7cm. The top bar should be striped in black or white or in some other contrasting colors.

The following are the standard distances, it can be classified into two categories,

- Men - 110 & 400 mts
- Women - 100 & 400 mts

Distance of Hurdles	Category	Height of the Hurdles	Distance Start to first Hurdle	Distance Between the Hurdles	Distance Last Hurdle to Finish
100mts	Women	0.840mts	13mts	8.50mts	10.50mts
110mts	Men	1.067mts	13.72mts	9.14mts	14.02mts
400mts	Men	0.914mts	45mts	35mts	40mts
400mts	Women	0.762mts	45mts	35mts	40mts

Substitution

Once a relay team has participated in a competition only two additional athletes may be used as substitutes in the composition of the team for subsequent rounds. Once an athlete, who has participated in a previous round has been replaced by a substitute, he may not return to the team.

RELAY BATON

The relay baton is made of a rigid material. It should be a single piece of smooth, circular and hollow tube of 280-300 mm length. The minimum weight required for baton is 50 grams and its circumference should be between 120-130mm. The batons should be colored so that it can be easily visible during the race.

Specification

- Weight of the baton : not less than 50 gm
- Length of the baton : 28 to 30 cm
- Circumference of the baton : 10 cm
- Color of the baton : Visible color
- Minimum baton required : 6 Nos.
- Maximum baton required : 8 Nos.

D. WALKING

Race walking may appear to be the natural link between ordinary walking and running, and in some respects this is true-with increase in speed, the force-time

runner only. The baton should not be exchanged within the acceleration zone(Advance Zone).

During the exchange the baton must be delivered firmly and safely into the hands of the receiving runner. When the incoming runner has approached his partner within 2 to 3 mts he indicated to him by a signal when to extend his receiving arm backwards. The signal comes too early or too late, or the runner receiving the baton moves his arm up, down or to the side, the results in an unsteady baton pass and consequently in a loss of time. The baton should be put firmly into the grasping hand between the spread thumb and the four locked fingers.

2. 4 x 400 mts Relay

The runners use a visual pass. The incoming runner carries the baton in the right hand and passes to the outgoing runner's left hand. The primary responsibility for the pass rests on the outgoing runner due to fatigue on the part of the passer. Once the baton has been taken, the athlete immediately transfer it to the other hand.

The four athletes shall run 400mts each to cover 1600mts distance by means exchanging a baton. The first leg of the 4x 400 mts relay run in lanes and so is the first curve of the second leg; only after crossing the line making the exit from the first curve, runners free to move to the inside of the track.

110mts Hurdles

There shall be Ten flights of hurdles in each lane, set out in accordance with the below table.

Starting line to First Hurdle	:	=13.72mts
" "	Second Hurdle	: 13.72+9.14 =22.86mts
" "	Third Hurdle	: 22.86+9.14 =32.00mts
" "	Fourth Hurdle	: 32.00+9.14 =41.14mts
" "	Fifth Hurdle	: 41.14+9.14 =50.28mts
" "	Sixth Hurdle	: 50.28+9.14 =59.42mts
" "	Seventh Hurdle	: 59.42+9.14 =68.56mts
" "	Eight Hurdle	: 68.56+9.14 =77.70mts
" "	Ninth Hurdle	: 77.50+9.14 =86.84mts
" "	Tenth Hurdle	: 86.84+9.14 =95.98mts
" "	Finishing line	: 95.98+9.14=110mts

VARIOUS STAGES

110mts Hurdles the Hurdling Technique is classified into the following:

1. Starting
2. Approach to the First Hurdle
3. Hurdle Clearance (Departure)

4. Running between the hurdles
5. The finish

1.Starting

Hurdling is basically a sprinting event, the mechanics of the starting do not vary much from that of the sprint start. In order to get eight (8) strides to the first hurdle to take – off foot should be placed in the first block. If the hurdler wants seven (7) strides to the first hurdle, take – off foot should be placed in the rear block.

2. Approach to the First Hurdle

The distance from the starting line to the first hurdle is 13.72 mts. The first three strides out of the blocks are the same as in a sprinter’s start. On the fourth stride, the hurdler begins to concentrate on the first hurdle. In perfecting the approach to the first hurdle make any adjustments on the 4th, 5th and 6th strides. The first three and last two should be kept constant. The last stride is slightly shorter to permit to get his centre of gravity slightly ahead of the take-off foot. This approach sets the pattern for the entire race.

3. Hurdle clearance

The take – off distance from the hurdle depends on four factors. The height of the athlete, speed of the approach length of the lead leg speed of the lead leg action. Each

The baton must be carried by hand throughout the race, if dropped, it must be recovered by the athlete who dropped it. He may leave his own lane to retrieve the baton provided this procedure is adopted and no other athlete is impeded, dropping the baton shall not result in disqualification.

Stages of Relay Running

The start

The starting of the 4 x 100 mts Relay is basically same as for the 400 mts. The starting blocks are placed close to the outer line of the track. The baton lies between the forefinger and the thumb is enclosed by the other fingers. After a successful start the runner quickly passes to the inside of his lane.

Checkmarks

The second, third and fourth runners place a checkmarks on their lanes just behind their starting positions. This is a check mark for the out going runner. The distance between the checkmark and the starting position depends on the speed of the incoming runner and on the acceleration of the outgoing runner.

The Baton exchange

The relay baton should be exchanged from one to another competitor with in the take over zone. The exchange is completed when the baton is in the hand of the receiving

when hearing the signal from the incoming runner moves the appropriate arm backwards in a positive and slightly angled manner to a level not higher than the shoulder line. The upper arm is straight at the elbow, the back of the hand is facing down wards the thumb and index fingers are widely spaced forming obtuse angle. The baton is received into such a palm from the incoming runner with an outstretched arm. In the final phase of the change over the elbow joint locks quickly and the baton is passed in a down sweep action.

The best result in both techniques the change over should occur when both runners are traveling at maximum speed and the actual change over should be as quick as possible. The majority of experts consider that the speediest change over occurs when the baton is actually changed over a distance of 2 to 4 mts from the end of the exchange zone.

Acceleration Zone

The acceleration zone lets the outgoing runner accelerate properly and allows the athletes more time to reach top speed at the exchange.

Exchange Zone or Take over Zone

The incoming runner can signals the exchange with verbal commands at a specific point when the incoming runner ready to pass the baton. The incoming runners can also use nonverbal signals. The outgoing runner can count the incoming runner's stride from the check mark to the exchange point.

hurdler must be cleared quickly and safely. The first prerequisite of movements much as in the ordinary running stride. For this action the lead leg is slightly flexed at the knee joint, and leading foot to track beyond the hurdle.

The average take-off distance from the hurdle in men's hurdles will be 1.90 mts to 2.20 mts to allow the leading leg to sweep forward and upward in a straight line. Too short a distance for the take-off results in a "jump" over the hurdle. The hurdle clearance are having the following factors.

Action of the Leading leg

The complete action consists of a quick forward and upward thrust of the leading leg in the direction of the leading of introduces the sequences.

Once the take-off foot leaves the track it becomes the trail leg. The heel of the trail leg moves actively toward the buttocks as the knee moves in a exaggerated motion upward and to the side to avoid hitting the hurdle. For the clearance of the hurdle, the trailing leg must be stretched away from the body when clearing the hurdle. This movement requires good mobility of the hip. The sequence of the athlete's movements should be as follows: after a rigorous push from the ground follows a phase of relaxation for the take-off leg. An action forward movement of the high should begin only when the foot of the leading leg has reached the edge of the hurdle.

Action of the Arms

The usual movements during running are also executed during hurdle clearance. With the sole difference that in the hurdle stride the arms perform additional functions. The arms contribute in a greater degree to maintaining body balance. When the trailing leg comes forward, the trailing arm swings backward to counter balance this movement. It is either almost stretched or flexed at the elbow.

4. Running between the hurdles (The three-step Rhythm)

In the 110 mts hurdle run the distance between the hurdles is 9.14 mts. If we reduce from the length of the hurdle stride, there remains for three strides between the hurdles or three-step rhythm a distance of about 5.065 meters. So that is 1.88 mts for each step. But practice shows clearly that the three steps are not of equal length. The first stride after the landing which is of about 1.55 to 1.60 mts follows a wide second stride measuring 2.00 to 2.20 meters and this is the longest between the hurdles. The last stride before the hurdle is always slightly shorter than the previous one.

5. Finish

The athlete has to use any one technique similar to sprint to finish the race.

Baton Exchange

There are two methods of baton (Exchange) passing

1. Up sweep method
2. Down sweep method

1. The up sweep method

In this method the passing of the baton occurs in an upward movement by a straight arm. At the same time the baton is received by an arm which is pointing backward and locked at the elbow. The outgoing runner upon hearing the agreed signal from the incoming runner, quickly extends his arm backwards locking it at the elbow, the thumb and fingers are separated and pointing downwards forming an obtuse angle. The time that he receives the baton the outgoing runner tries to keep his arm as still as possible. This outstretched arm the incoming runner quickly moves his straight arm upwards and in such a way that the outgoing runner can grasp the baton as near to the incoming runner's palm as is possible. In the upsweep method the baton is passed from the right hand to the left hand and then the left hand passing it to the right.

2. Down sweep method

In the down sweep method the baton – exchange takes place over a distance of 2 to 3 mts. The out-going runner

2. The baton must be passed inside a short distance to be covered by some three to four strides and without unnecessary loss of time.
3. The baton must be exchanged by non – visual method.

Visual Method

The visual method of baton exchange is used only in 4x400 mts relay. When the out going runner receive the baton, he must see the incoming runner while receiving the baton. The incoming runner gripping the baton at its base, then passes the baton into the receiver hand with a forward down sweep motion. The outgoing runner reaches arm straight back, palm facing upward and takes the baton, gripping the upper portion.

Non Visual Method

The non-visual method of baton exchange is used only in 4x400 mts relay. When the out going runner receive the baton, he doesn't to see the incoming runner while receiving the baton. The incoming runner gripping the baton at its base, incoming alerts the receiver, then passes the baton into his or her hand with a forward pushing, down sweep motion. The outgoing runner reaches arm back, palm facing upward and takes the baton, gripping the upper portion. then rotates the receiving arm down, under and forward, to ready the baton for the next exchange.

400 mts Hurdles

Hurdling is a sprinting, rhythmic event. In this race a full circuit of the track is run with 10 hurdles, 91.4 cm high, placed 35 mts apart. The distance from the starting to the first hurdle is 45 mts, while the last hurdle to the finish line measures 40 mts. There are ten flights of hurdles in each lane, set out in accordance with the below table.

Placement of Hurdles in 100mts Hurdle race

Starting line to First Hurdle	:	=13.00mts
" "	Second Hurdle	: 13+8.50 =21.50mts
" "	Third Hurdle	: 21.5+8.50=30.00mts
" "	Fourth Hurdle	: 30+8.50 =38.50mts
" "	Fifth Hurdle	: 38.5+8.50=47.00mts
" "	Sixth Hurdle	: 47+8.50 =55.50mts
" "	Seventh Hurdle	: 55.5+8.50 =64.00mts
" "	Eight Hurdle	: 64 +8.50 =72.50mts
" "	Ninth Hurdle	: 72.5+8.50=81.00mts
" "	Tenth Hurdle	: 81+8.50 =89.50mts
" "	Finishing line	: 89.5+10.5=100mts

Placement of 400mts Hurdles in Standard Track

(Men and Women)

Starting line to First Hurdle	:	=45.00mts
" "	Second Hurdle	: 45+35 =80mts
" "	Third Hurdle	: 80+35=115mts

"	"	Fourth Hurdle :115+35=150mts
"	"	Fifth Hurdle : 50+35=185mts
"	"	Sixth Hurdle : 185+35=220mts
"	"	Seventh Hurdle : 220+35=255mts
"	"	Eight Hurdle : 255 +35=290mts
"	"	Ninth Hurdle : 290+35=325mts
"	"	Tenth Hurdle : 325 +35=360mts
"	"	Finishing line: 360+40=400mts

E. RELAY

There are two relay events comprising of 4x100m for men and women, and 4x400m for men and women. All the four members of a team are required to run one stage of the race along with the relay baton in their hands throughout the race. The baton must be picked up by the athlete who dropped it. He/She may leave the lane in order to retrieve the baton, provided no other player is impeded.

4x100m relay races are run entirely in respective lanes with staggered starts. In 4x400m relay races the first lap and the same part, of the track, of the second lap shall be run in lanes. The position of the teams at the start shall be retained at each take- over zone, except in case of races where lanes are not used. The waiting runners can move to inside zone, after handing over the baton, until the course is clear to avoid obstruction to other competitors.

Relay races are a popular and exciting feature of track and field. It is a team event in an individual oriented sport. They give the opportunity for team work and cooperation is not available in the other events. The key to good relay racing is the baton exchange. Commonly the relay events are as mentioned below,

1. 4 x 100 mts
2. 4 x 400 mts

1. 4 x 100 mts Relay

The 4 x 100 relay is undoubtedly the most beautiful and one of the most difficult events of the athletics spectrum. This relay uses four sprinters running a complete lap of the track, passing on a baton which has to arrive at the finish line with the runner of the last leg.

The main objective in the baton pass is to keep the baton moving at top speed throughout the relay. The baton must be passed only within a 20 meters take – over zone (exchange zone). This zone begins 10 mts before the scratch line (100 mts marking) and ends 10 mts after it. A good baton – exchange needs to satisfy the following three conditions.

1. The baton – exchange must take place after some 12 to 16 mts running, measured from the beginning of the take – over zone.

forward and upward. Then he goes upward the body position is in vertical (or) hanging and elbows are flexed.

5. Clearing the bar

When the body is in hanging position lift and swings upward both the legs, at the same time the pole straightened, turn the upside down. Then pushing the pole down by hands the legs are throw over the cross bar. After clearing the cross bar push the pole away from the pit with the wrist action to avoid foul or touching the bar.

6. Landing

Safe landing is required on the landing area.

B.THROWING EVENTS

General conditions

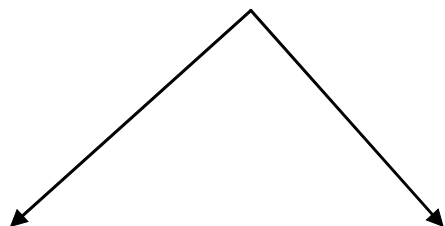
The person who has more body weight and mass of the muscles can choose throwing events. The following qualities are essential for throwers.

1. Body weight
2. Height
3. Leg power
4. Shoulder strength
5. Flexibility
6. Co-ordination
7. Speed

Race walking, of course, involves a rapid leg cadence and if the arms too are no maintain their synchronous swings they have to be bent at the elbows to reduce their moments of inertia, as in running. However, more emphasis is placed on the arm and shoulder action in race walking than in running, because of the need to counterbalancing the exaggerated eccentric thrust of the legs and movements of the hips. But in addition to counterbalancing the leg action, they also aid the forward drive with their swinging the strong upward swing of both arms evokes extra forces from the ground through the driving leg.

UNIT- III

FIELD EVENTS



DISTANCE EVENTS

1. Long Jump
2. Triple Jump
3. Shot Put
4. Discus
5. Javelin
6. Hammer

HEIGHT EVENTS

1. High Jump
2. Pole Vault

A. JUMPING EVENTS

1. LONG JUMP

The following techniques should involve while doing long jump.

1. Approach run
2. Penultimate stride
3. Take – off

(34)

1. Grip

Athletes who take off with the left foot, the pole must be carried on the right hand side, the left arm, half bent, supports the pole with the palm of the same hand turned downwards, while the right arm grips about 60-70cm higher with the hand lightly turned out. Keep the pole straight near the cross bar on the uprights. Hold the pole slightly lower than the height of the cross bar. Keep the pole parallel to the ground pointing to the pit or above the right hand palm facing upward and with left hand palm facing down ward.

2. Carry the Pole

The pole should be raised at 50° or 45° to the ground and keep right side. The left hand should be kept flexed at chest level and the right hand at the back. While carrying the pole, the body balance is very important.

3. Approach run

20 to 30 mts away from the vaulting box to start the running with the pole steadily and high knee action. When you reach the check mark, plant the pole in the vaulting box and kick the floor to go up.

4. Planting the pole

When the competitor reaches the check mark he should plant the pole into the box. Join the left hand with the right hand, push the right shoulder and both the hands

(47)

(iii) Supports for the cross bar

The cross bar shall rest on pegs pointing in the direction towards the landing area. The supports shall extend not more than 5.5 cm and not more than 1.3 cm in diameter, which should extend 35 – 40 mm above the pegs.

The distance between supports is minimum of 4.30 meters and maximum of 4.37 meters.

(iv) End Pieces of Cross Bar

It shall have 30 mm to 35 mm in diameter, square the length of the end piece is between 15 cm to 20 cm and should be semi circular.

(v) Landing (Pit) Area

The minimum dimensions of the landing area is 5 x 5 meters, for international competitions the length, width and height of the landing area will be 7 x 6 meters. The front pieces must be 2 m long.

VARIOUS STAGES

1. Grip
2. Carry the pole
3. Approach run
4. Planting
5. Crossing the bar
6. Landing

4. Flight in the air
5. Landing

1. Approach run

The length of the un-up is determined by the height of the jumper and his ability to accelerate in the run. According to analyzes carried out at recent Olympic Games, the best athletes use a run-up from 37-50m in length (incase for women 33-40). The athlete should mark the starting check mark 14 to 16 strides from the take – off board. If the athlete who is taking off with left leg, he should start running with right leg. Then he starts the approach run steadily and gradually increase the speed towards the take – off board.

2. Penultimate stride

The last two strides before the take off is called penultimate stride. In this time, the athlete shrugs his body little downward and the length of the stride decreases. That is easy way to fly in the air.

3. Take – off

The length of the jump depends not only on horizontal speed but also on the speed and power of the take-off. After completion of Approach run (penultimate stride), step on the take off board with the stronger foot and jump up in the air by pushing the take off board. After take off (or) jumping in the air the hands should be vertically raised. The Non-

take off leg should be raised high. The last step is executed more quickly and the whole foot is placed on the board, ahead of the projection of the center of gravity.

Plasticine Indicator (No Jump indicator)

Plasticine indicator is called no jump indicator, it is placed at the inner edge of the Take-off board. The judge at the take off board must watch the competitors does not overstep the scratch line. If a no jump indicator is not available the judge should build one moist sand which will clearly show if it is touched by toe or spike. It is a foul only if contact is made with the ground or the no jump indicator.

4. Flight

Jumping styles vary according to the development of the athlete and his muscular characteristics and the bone structure. The most common techniques are,

1. The Sail (common among beginners)
2. The Hitch kick (1-2-3 strides and a half in the air)
3. Hang (extended jump or glide)

(i) Hitch Kick

After jumping in the air from the take off board the athlete swing (or) rotate their legs like pedaling in cycle in the air into 2 or 3 pedaling style, and the legs are closed together before landing. When legs are pedaling the arms alternatively with legs movement.

4. POLE VAULT

Runway

The minimum length of the runway shall be 40 meters, when the conditions permit it is 45 meters.

1. The width of the runway is 1.22 meters.
2. The runway should be marked by white lines with 5cm as width.

Implements

(i) Upright

Any style of uprights or posts may be used provided they are rigid.

(ii) Cross Bar

It is made up of Fiber glass, Metal or other suitable material.

1. The length of the cross bar is 4.48 mts to 4.52 mts.
2. The maximum weight of the cross bar is 2.25 kg.
3. The circular shape of the cross bar is 30 mm diameter.
4. It should have the gap of maximum 3 mm

3.Fosbury Flop

The Fosbury flop was introduced by Dick Fosbury, who won the high jump at the Mexico Olympics in 1968. His technique for clearing the bar, his run up was also very notable because it was in the form of a semi- circle, and he took off with his foot at an angle of about 20 degree relative to the plane of the uprights. At the point of take – off Dick Fosbury with a vigorous bending action and driving up of the free leg, supported by an alternated movement of the upper limbs, rose completing a rotation on the longitudinal axis of the body and then prepared for flight with his back to the cross-bar.

Next he performed his rotation on the transverse axis of the body and at the extreme point of the parabola, he arched himself and continued his trajectory on this position until, so as not to knock down the cross - bar, he straightened his leg and landed on his back bowing his head on to his trunk so that the impact was taken by the top part of the back, avoiding unpleasant injuries to the cervical part of the spinal column.

4. Landing

Safe landing is required on the landing area.

(ii) Hang style

After the take off the athlete do the back arch the arms should be vertically raised above the head, the legs are straighten back, and before landing brings the legs and arms to extend forward, and the legs are closed together before landing.

5. LANDING

After completion of his style in the air, before landing, the athletes should extend both the legs forward / straightened. While landing both the heels should be landed first on the pit. There are three landing techniques should be used to come out of the landing area. They are as follows.

1. Collapsed landing
2. Swing out landing
3. Scoop landing

1. Collapsed landing

While landing both the heels should be touched first on the pit and then toe, the whole body should brought forward and place the knees on the pit, at the same time the buttocks should be kept back on both the heels.

2. Swing out landing

After landing in the pit the athletes should turn his body 45° either right or left in forward and fall down on the ground with shoulder, first then buttocks and so on.

3. Scoop landing

Landing by heels on the pit and push forcefully the sand and makes a dig and place the buttocks on the dig by extending the legs straight.

The competitor commits fouls if he;

1. Take off beyond the take off line.
2. Delaying more than 60 seconds.
3. After landing walking back towards the run way.
4. Performing acrobatics during the jump.
5. Uses illegal style of jump.

Rules

1. The order in which the competitors make their attempts must be decided by drawing lots.
2. Each competitor will be placed according to his best jump.
3. When there are more than eight competitors, each one is given 3 attempts and the 8 competitors with the best jumps are given further three jumps.
4. In case of a tie for the eight position, each competitor involved in the tie has three additional attempts.
5. When there are eight or less competitors, each one is allowed six trials.

3. Clearing the bar

1.The scissors

Towards the end of the 19th century, an American named Mike Sweeny proposed the scissors jump as an alternative to the frontal clearance. The scissors involved passing one leg over after the other at the same time bending the trunk towards the knees when clearing the bar. It consisted of the following movement:

1. While the forward leg was the cross – bar the other one kicked upwards, causing the chest to rotate towards the direction of jumping and a landing on the feet.
2. With the use of this style the world record began to rise this style, the world high-jumpers introduced minor adjustments to the technique according to their physical characteristics and talents.

2.The Straddle

Towards the middle of the 1930s another American Dave Albritton, proposed a radical new technique for clearing the bar, involving the body being parallel to the bar, but with the stomach downwards rather than with the body sideways. Thus the straddle was born, which was clearly demonstrated by the Soviet trainer Vladimir Mihailovic Dyachkov and put to good effect by Valeri Brumel, who took the world record to 2.28m in 1963.

1. Scissors
2. Straddle Roll (or) Belly Roll
3. Fosbury Flop

Various stages

1. Approach run
2. Take – off
3. Crossing the bar/ clearing the bar
4. Landing

1. Approach run

The jumper can approach either from the left side or right side of the cross bar with 25 mts long and medium speed. The angle of approach run and the number of steps vary according to the level of the athlete.

2. Take off

Jumper can stand either right or left one arm away from the cross bar. Then down vertically draw the line that may be considered as take off line. When the jumper start to approach towards crossbar, used his power leg on the take off line for make a jump.

6. Once the competition is under way, competitors are not allowed to use the runway for trail attempts.
7. All jumps must be measured from the nearest mark in the landing area made by any part of the body or limbs of the athlete to the take-off line or its extension and at right angles with the take-off line.
8. If a competitor takes off before the board or the line this does not constitute a foul.

2. TRIPLE JUMP

The triple jump shall consist of a Hop, step and jump in that order. This is the English definition of the jump. The hop must be executed on the same leg which was used for the take off (right-right or left-left). In the step the support is transferred to the other leg. The final jump is a proper long jump.

1. It shall not be considered a failure if the competitor, while jumping, touches the ground, with the “sleeping” leg.
2. There are six stages when taking Triple jump. They are as follows
 - (1) Approach run
 - (2) Take – off
 - (3) Hop

(4) Step

(5) Flight

(6) Landing

1. Approach run

The length of the run-up is determined by the height of the jumper and his ability to accelerate in the run. According to analyzes carried out at recent Olympic Games, the best athletes use a run-up from 37-50m in length (incase for women 33-40). The athlete should mark the starting check mark 14 to 16 strides from the take – off board. If the athlete who are taking off with left leg, he should start running with right leg. Then he start the approach run steadily and gradually increase the speed towards the take – off board.

2. Take – off

The length of the jump depends not only on horizontal speed but also on the speed and power of the take-off. After completion of Approach run (penultimate stride), step on the take off board with the stronger foot and jump up in the air by pushing the take off board. After take off (or) jumping in the air the hands should be vertically raised. The Non-take off leg should raised highly. The last step is executed more quickly and the whole foot is placed on the board, ahead of the projection of the center of gravity.

3. Hopping

The athlete should be used to land on the ground which he was used to take off. For example: The athlete has take off for his left leg means he should land or hop in the same leg. During hopping the non take off leg (or) rear leg has no movement, that's why it is called sleeping leg.

4. Step

After completion of hopping the athlete used to take one more step with his non take – off, foot before landing is called step. Here the athlete does the bounding action to do the step.

5. **Flight** and

6. **Landing** procedures are similar to long jump.

3. HIGH JUMP

The high jump as we know it today first became popular in the 19th century. Subsequent perfecting of the jumping technique took place in the development stages, but it has depended particularly on modification of the rules for the event and on the elimination of some restrictive conditions.

Various techniques should be used by the jumper to cross the bar. Depends upon their ability they used any one of the following techniques.

c) High carry

High carry method is associated with those throwers who tend to use a direct over the shoulder type withdrawal which ends with a turning back of the shoulders at the arm and javelin is reaching near full backward extension (To held on above the head).

A thrower must develop his carry position to suit his technique of withdrawal of the javelin in preparation for the delivery stride.

2. Approach run

During approach run the thrower has to mark the point of starting and the point of check mark with javelin. While running the javelin should move front and back, and slowly increase the running speed still you reach you the check mark.

The Run-up : The run – up has two parts. They are

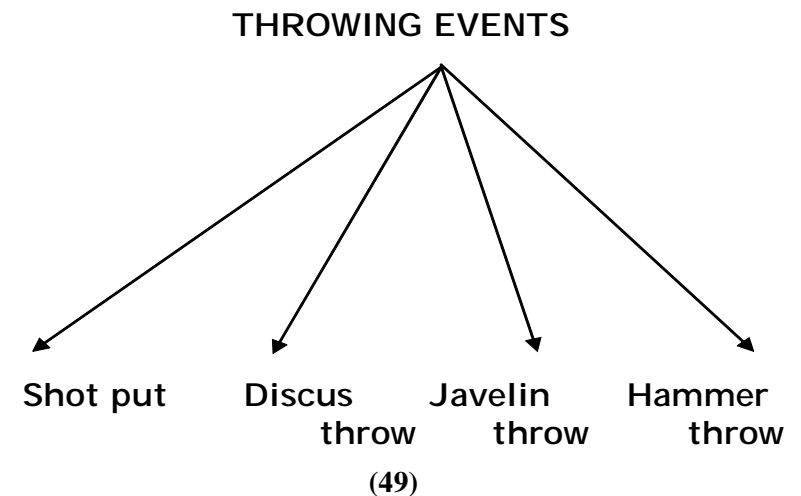
- (i) The cyclic part
- (ii) The acyclic part

The cyclic part speed is built up sufficiently so as to allow for a further increase over the last strides. The run-up should be easy and relaxed, heading the thrower to a powerful explosive all-out release.

- 8. Arm length
- 9. Balance
- 10. Endurance

The competitors are allowed three to six trails and three to eight of the best competitors are allowed three more trails. In case of a tie for the final place, the competitor shall be allowed three additional trails. The conditions of the competition must be explained to the competitors before its commencement. The best throw of the competition out of all trails taken by the competitors shall be credited in resolving a first place tie. No markers or marks are allowed to be put in the throwing sector.

Competitors may use an adhesive substance on their hands for better grip, and can also wear a belt of leather or some other material to protect the spine from injury. However, taping of the fingers or use of any other device on their hand which might assist in throwing is not allowed.



1. THROWING THE SHOT PUT

The competitor must begin the throw from a stationary position within the circle. The shot shall be put from the shoulder with one hand only and, shall touch or be in close contact with the chin. The hand shall not be dropped below this position during the act of putting.

Practice trials are not allowed after the commencement of the competition. Competitors are not allowed to put on gloves nor are they allowed to spray or spread any substance either on the surface of the throwing circle or on their shoes.

Basic Principles

1. Forces must be applied along a straight line.
2. Newton's 3rd law – Action and Reaction are equal and opposite.

Specifications

1. Weight of the shot for men - 7.260 Kg
2. Weight of the shot for women - 4.00 Kg
3. Diameter of the shot put circle- 2.135 m
4. Angle of the shot put sector - 34.92
5. Dimension of the sector - 20 x 12 m

a) Normal grip

The above thumb and middle finger is behind the edge of the grip cord and the index finger is partly curled around and behind on the javelin's shaft.

b) Middle and Thumb grip

The index finger and thumb is behind the edge of the cord binder and the rest of the fingers around the cord itself.

c) 'V' grip (or) Glow grip

The Javelin is held between the index and the middle fingers at the edge of the cord binder and rest of the fingers around the cord itself.

Carry

The javelin is carried above the shoulder of the throwing arm. Three commonly used methods of carrying the javelin during the approach run's cyclic phase.

a) Low carry

The low carry is generally associated with a circular type arm action in the 'withdrawal' (To held on waist level).

b) Medium carry

The medium carry is generally favored expansion in the withdrawal. (To held on eye level).

1. A head
2. A shaft and
3. A cord grip

The javelin throw comprises the following technical elements.

1. The grip and carry
2. The Approach run
3. The withdrawal
4. The impulse stride
5. The throwing stride
6. The release
7. The recovery

1. Grip

When executing their throws, javelin throwers may hold the javelin only by the whipcord grip. They may hold the javelin at the end of the cord grip with one or more fingers and the thumb touching the javelin shaft. Javelin throwers have some leeway in how they grip the javelin. It has three types how they can hold the javelin. The javelin is held behind the cord binder the rear edge of which offers a slightly raise border for gripping the javelin.

Stages / Method

1. Holding of the shot
2. Tucking (or) Placement of the shot
3. Stance
4. Glide
5. Release

1. Holding the shot

- a. The shot rest on the root of the fingers, and should not touch the palm.
- b. All the fingers are carry the shot except the little finger which is only support.

2. Placing (Tucking) the shot

1. The shot must be placed between chin and clavicle.
2. The shot does not go beyond the shoulder line.
3. The hand should be parallel to the ground.

3. Stance

The stance varied according to the using the style of Athletes.

Techniques (Style Of Putting)

The thrower can be used 3 style when putting the shot

1. Standing throw
2. 'O' Brien technique (or) Gliding
3. Rotation (or) Disco put

1. The 'O' Brien Technique

The distance a shot travels depends upon its height of release, velocity at the moment of release and the Angle of projection. The optimum angle of projection will vary depending on the height of the release, and the distance of the put, it will be approximately 34.95. The correct technique is the one that will result in the greatest velocity at release. The motion of a projected object is influenced by the exact point of application of the propelling force.

Holding the shot

The procedure for gripping the shot is to hold it in the left hand and lay the right hand loosely on top with the fingers spread slightly. The putter holds the shot in his right hand. Where it rests on the "base" of the fingers. The three middle fingers are only slightly splayed while the thumb and the little finger give the shot lateral support, securing a safe position of the shot.

The Reverse

The reversal is to serve as a follow through after the thrust and to retain balance in order to avoid fouling. After the discus has left the hand the thrower will have to reverse the feet rapidly and lower the body weight to maintain balance. The right leg must be brought forward quickly and planted firmly close to the rim of the circle, mean time the left leg swings back the body is bent at hips and right knee flexes to drop the centre of gravity into a stable position.

3. THROWING THE JAVELIN

The javelin throw distinguishes itself from other throwing events of shot-put, discus throw and hammer throw. These throwing events must be from a circle, the javelin must be thrown from behind the arc of a sector drawn with a radius of 8 mts. Due to the aerodynamic nature of the implement and its relative weight, the event does not require great strength. The event does require few less technique in order to achieve high level results.

Javelin consists of three parts namely the head, shaft and grip. The shaft is made up of either Aluminium or fiber. At the tip of the shaft a sharp head is fixed. At the center a grip made of thread is fixed. The Javelin is round and broad at the center. The circumference is small in the front and rear. It has three main parts

athlete drives off the left foot. The effective throwing position is one of "muscular wind" the hips displaced from the feet, shoulders from the hips and discus from the shoulders.

The run across the circle is initiated by the driving action of the left leg. Synchronized with the swing of the right leg. This drive carries the thrower halfway across the circle. The right foot landing approximately on the centre line with the leg well bent and the shoulder and body weight back. His left leg is pointing toward the direction of the throw, his right shoulder is facing the rear, his throwing arm is well behind the shoulder his left arm is curled and the discus is flat.

The Release

The throw begins with a forward and upward drive from the right foot. The shoulder should now come in slightly after the hip and the arm strikes from the low point, the thrower reaching out as far as possible to give as much distance from axis of rotation as he can. The left leg should now straighten, as the arm strikes. The discus will leave the hand in line with the right shoulder and should be squeezed out of fingers, each digit applying its force in turn and spinning of the first fingers last. The discus is spun clockwise. A good thrower will release the discus at a 35°-40° angle. The release must be smooth and rhythmic using the force generated from the lower body.

The stance

He should stand facing the rear of the ring with his back in the direction that he is going to throw. The shot should be held in right hand, supported by thumb and fingers. The hand holding the shot will be placed into the hollow of the collar bone in such a manner that it does not rest on such a manner that it does not rest on the shoulder but against the right side of the neck and the jaw. The elbow of the right arm is slightly raised and pressed forward. The upper arm points forward and downward. The head remains in its normal position. The eyes should be focused on a point to the rear of the ring and about five to ten yards away. He should stand erect in a telexed attitude, the left arm is held either out in front of the face or relaxed above the head the left front behind the right about one foot with just the toes touching for balance.

The glide or drive

The purpose of the glide is to gain momentum while moving across the ring and to lead into the correct position for the delivery. The initial movement is to lower the trunk and raise the left leg causing the body to form a "T" shape with all weight carried on the right leg. The head, shoulders and hip remain square to the rear of the circle, and the right leg flexes in preparation for the drive across the ring proper balance at this point is extremely important.

2. The Rotation or Disco-put Technique

The Starting Position

The putter stands at the rear of the circle facing 180° away from the throwing direction. The left foot is along the centre line of the circle and the right foot is placed laterally to the right of the centre line about shoulder width apart or just this point in most cases. The grounding of the left foot at the stop board denotes the arrival of the thrower into the delivery stance.

Preliminary Movements

To start the turn, the putter begins by swinging the shoulders, trunk and left arm along with the left and then to the right, as the body weight shifts correspondingly from leg to leg in coordination with the rhythm of the shoulders, trunk and left arm. Both knees are semi – flexed while this side to side swaying movement is taking place to break the inertia and set the pattern of movement to follow.

Turn

The double support phase of the turn begins at the end of the preliminary movements. The thrower is completely over his right leg with the trunk and shoulders well twisted to the right. From this position the thrower begins unwinding his upper body in the direction of turning with a wide

throwing arm bang to the right side along the thrower's thigh with the head and eyes focused to a point about 5 meters behind the circle. There are generally three positions that a thrower may adopt in relation to the line of direction. The experience, technical skill and comfort of the thrower must decide which of the three starting positions suit their ability.

The left foot is generally placed a few centimeters back from the rim of the circle, in order to avoid fouling by bursting the sole of the foot on the top edge of the rim of the circle as the pivot is executed.

The preliminary swings

The thrower should position himself at the rear edge of the circle with his back to the generally facing the direction of throw and his feet slightly wider than hips. The discus should be flat and facing downwards on the arm swung at shoulder height so that the arm and discus go well behind the right shoulder. The free arm rests comfortably across the chest. The thrower's weight should move easily from one foot to the other. On the final preliminary swing, the arm is swung back as far as possible so that the body weight is over a straight right leg.

Coming across the circle

The initial movement is begun the hips are turned and a pivot is made on the ball of the right foot as the

Specification of discus

1. Weight of the discus for men : 2 kg to 2.025 kg
2. Weight of the discus for women : 1 kg to 1.025 kg
3. Diameter of the discus for men : 21.9 cm to 22.1 cm
4. Diameter of the discus for women: 18 cm to 18.2 cm
5. Angle of sector is : 34.92°

Various Stages

Hold

The hand is placed flat against the discus surface, the upper joints of the fingers grasp the rim of the discus. Its center of gravity lies between the index and middle finger. Due to a slight bending at the wrist the upper face of the discus touches the arm, because it prevents the discus from falling out of the hand in the subsequent movements.

Starting position

The starting position at the rear of the circle is with the thrower facing 180 degrees away from the throwing direction. The two feet are usually placed about shoulder width apart or slightly more in the case of very tall throwers. The toes point naturally outwards with the weight of the body evenly distributed over both feet. The discus and

sweeping left arm action parallel to the ground, a slight forward tilt to trunk in a semi sitting position. The single support phase of the initial part of the turn is followed by a brief non support phase when both feet are off the ground and the whole body is turning on its vertical axis, and continues turning after the right foot lands around about the center of the circle.

Follow through (or) Reverse

When the right leg has driven really well and effectively and the action has been timed correctly the athlete will be well over the left foot as the arm strikes. Immediately after the shot has left the hand, he will find himself falling over the stop – board. In order to prevent himself fouling, the left foot is rapidly withdrawn and the right leg brought forward, the toe of the right foot striking the inside edge of the stop – board. At the same time the body weight is lowered in order to be more on balance by lowering the centre of gravity.

Valid Trial

For a valid trial, the shot shall fall completely within the inner edges of the landing sector.

Fouls

1. Throwing the shot from behind the shoulder
2. Touching outside the circle or the top of the stop Board

3. Shot landing on the sector line or outside the sector line
4. Delaying more than 60 seconds to throw.

Rules

1. The use of gloves is not allowed
2. At the competition area, each competitor may have a maximum of two practice trials which should be made in draw order, under the supervision of the judges.
3. Once the competition has begun, competitors are not permitted to use implements for practice purposes or to use the runway or ground within the sector for practice trials, with or without implements.
4. No device of any kind – i.e., taping of two or more fingers together, which in anyway assists a competitor when making a throw, shall be allowed. The use of tape on the hand shall not be allowed except in the case of the need to cover an open cut or wound.
5. A better grip, competitors are permitted to use a suitable substance on their hands only.
6. To protect the spine from injury, a competitor may wear a belt of feather or other suitable material.

7. For a valid trail, the tip of the javelin shall fall completely within the inner edges of the landing sector.
8. If the implements breaks during a throw or while in the air, and if the competitor thereby loses his balance and contravenes, it shall not count as a foul throw, provided one attempt was made in accordance with the Rule.
9. Implements shall be carried back to the starting line and never thrown back.
10. The competitor shall not leave the runway until the implement has touched the ground.

2. THROWING THE DISCUS

The object of the spin in the discus throw is to generate power and speed within the circle to apply to the discus itself, and the more power that is applied to the discus, then further it will go the angle to release of discus, the position of the discus during its flight are important factors. It has three types,

1. Half rotation
2. Full rotation
3. One and half rotation

6. 5000m Run – Arc start **or** Group start
7. 10000m Run – Arc start **or** Group start
8. 400mts Hurdles - Full stagger distance
9. 4 x 100m Relay – Full stagger distance
10. 4 x 400m Relay – One and Half stagger distance with diagonal distance.

2.Non- Standard Track

The track which is not satisfying the conditions of standard track is called as Non-standard track and the 400mts track without curb (raised border) is also treated as Non-standard track. Usually 200mts track is called as Non – standard track.

Some of the disadvantages of Non-standard track:

- a) Sprinters very difficult to show their real capacity.
- b) Very difficult to run more than 6 competitors at a time.
- c) Very difficult to conduct Hurdles and Relay races.
- d) Very difficult to conduct both track and field events simultaneously.

Method of finding Running Distance Radius for 200 mts track if 36 mts as straight.

3. Five – stride – Rhythm

The three known stride Rhythms – the three stride rhythm. The five stride Rhythm and seven stride rhythm. It is five stride – Rhythm which is the most widely accepted, which comprises the following phases:

- (i) The withdrawal of the javelin
- (ii) The impulse stride
- (iii) The throwing position
- (iv) The release
- (v) The recovery

(i) Withdrawal of the javelin

The withdrawal starts at the second stride of the five-stride rhythm and ends at the third stride. The throwing arm is drawn back in alignment with the shoulder axis. The palm of the hand is turned upward and extend the forearm, when the withdrawal is completed, the athlete's body has a marked backward lean.

(II) Impulse stride /Cross step / Three step (or) Five step Rhythm

When an athlete reaches the check mark with the left leg the action of throwing should be starts. The right hand is stretched backward with the javelin and left hand is brought in forward in front of chest. That is otherwise called "with drawl of the javelin".

The toe of the right foot must be deviate more than 30° from the run up direction. The left leg presses the body down low into the fourth stride, preventing the body's centre of gravity from lifting at the landing of the right leg, which must be allowed to bend when it receives the body weight.

(iii) Throwing Position

The throwing position starts at the moment when the athletes right foot makes contact with the ground after the impulse stride. The right leg can start to extend and doing s introduce the release, the full extension of the forearm by the hand is important under no circumstances must the arm be flexed at the wrist.

(iv) The Release

The release is initiated by a forward and upward stretching of the right leg at the knee and ankle joints, driving the right hip forward. The shoulder and the hip axes now run parallel and almost at right angles to the direction of the throw. The throwing arm is not yet stretched while the right leg is extended, the heel is raised, allowing the pressure of the ball of the foot to act longer on the body. The throwing arm now comes into its sphere of action. When the throwing arm begins to strike, the elbows are raised until it is level with the heed and pointing in the throwing direction.

Method of Finding Running Distance Radius for 400 mts if 80 mts as straight.

$$2pr = 240 \text{ (Circumference of two curves)}$$

$$r = 240/2 \pi$$

$$240/2 \times 3.1416 = \frac{240}{2 \times 3.1416} = \frac{240}{6.2832}$$

$$= 38.20 \text{ mts}$$

For Standard Track (With Kerb)

Marking Distance Radius (MDR or CR) = RDR – 0.30 m

MDR = 38.20 – 0.30 = 37.90m

For Non-standard Track (without kerb)

MDR = RDR – 0.20 m = 38.20 – 0.20 m = 38.00m

Starting points in 400 mts Track

1. 100m Run Men & Women
100m Hurdles for Women - Parallel Method
110m Hurdles for Men
2. 200m Run – Half stagger distance
3. 400m Run – Full stagger distance
4. 800m Run – Half stagger with diagonal excess **Or** Arc start / group start
5. 1500m Run – Arc start **or** Group start

Running Distance Radius (RDR)

RDR is the path in which an athlete has to run in the curve to cover the exact distance. The chart below shows that RDR, CDR and area required to lay 400mts raised bordered track when the straights length varies.

Straight length in mts	Rdr in mts	Cdr in mts
79MTS	38.50	38.20
80MTS	38.18	37.88
84.39mts	36.80	36.50

The chart below shows that RDR, CDR and area required to lay 200mts Non raised bordered track when the straights length varies.

Straight length in mts	Rdr in mts	Cdr in mts
37.50MTS	19.89	19.67
40.00MTS	19.09	18.89

During the release the left side of the body must be in a flexed position. This is achieved by a sudden arrest of the backward movement of the left arm just when the right side of the body overtakes the left side the angle of release is between 30 and 36 degrees.

(v) The recovery

A distance of at least two meters from the arc will be required merely checks the forward speed of the body. Thus preventing from fouling. After the release, the right leg is forward in a springing movement. The reverse takes places to avoid stepping over the right foot must be planted transversely to the throwing direction, the upper body must be lean forward, the left leg is raised and brought back into the direction of the run-up. Javelin consists of three parts namely the head, shaft and grip. The shaft is made up of either Aluminium or fiber. At the tip of the shaft a sharp head is fixed. At the center a grip made of thread is fixed. The Javelin is round and broad at the center. The circumference is small in the front and rear.

Follow throw

After releasing the javelin the thrower to avoid his forward momentum (or) foul, then he placed his rear leg to brought forward for his rear leg and placed nearer to the board and to do hopping twice or threes. Then he come back behind the runway should not make foul.

Correct throw

The javelin should be caught in the grip. The javelin must be thrown forward from behind the shoulders. While throwing thrower should not cross the line of runway either in front or side. After releasing, the javelin should fall within the sector lines with the tip first touching the ground. The thrower still remains (leave) the runway only after the javelin lands on the ground.

6. THROWING THE HAMMER

The technique of hammer throwing is determined by the specific nature of the implement and the measurement of the throwing circle, which comply with the international rules. A complete throw consists of two preliminary swings and three turns on the left foot with an active push-off from the right leg at each turn. The following are the parts of hammer throw:

1. The Grip
2. The Initial position
3. The preliminary Arm swings
4. The Transition
5. The turns

Top Layer

Now-a-days all international competitions are being held on synthetic tracks. The thickness and material used for various layers of a synthetic track depend upon the product and preference of the particular firm (construction agency). Although, the material used for top layer by all the firms are synthetic tracks, but of different variations. It is advisable that whenever 8 lane synthetic tracks are being laid, efforts should be made for laying of another 4 lane synthetic track of the same material for training purposes.

Lane

Lane is the space between the two parallel lines.

Kerb

Kerb is the raised border (both inner and outer line) which is fixed permanently through the inner line of the first line and outer line of the last lane. Dimensions of curb is 5 x 5 cm (5 cm height, 5 cm width).

Curb Radius (CR)

Curb radius is the radius which is used to draw the curve. It is otherwise known as Marking Distance Radius (MDR). The curb radius varies according into the nature of the track.

TRACK MARKING

Track must be prepared according to the rules and regulations laid by **International Association Of Athletic Federation** (IAAF). The inner raised border should be 5cm in height and width by using brick, wood or any other suitable material. There shall be a minimum of 8 lanes and width of lane is 1.22mts and width of the line is 5cm. The straight lines are always marked by north to south direction and finishing line must be same for all races.

a) TYPES OF TRACK

The track is classified into two types based on its specifications.

1. Standard Track (with curb)
2. Non- standard Track (without curb)

1. Standard Track

The tracks are made either on plan surface (grass) or with the help of cinder/synthetic material which is skid proof and not too hard. To get maximum benefit from the cinder/right synthetic tracks, it is essential that proper care be taken at the time of the construction so that right materials are mixed in various layers as per required thickness.

6. The Release

7. The Recovery

The Grip

The inside grip of the hammer handle is laid against the pads of the middle phalanges of the left hand fingers. The right hand cuffs the left by putting the four fingers over the back of the middle and basal phalanges of the left hand fingers. The hammer must be held firmly but not tensely.

The initial position

The thrower stands at the rear edge of the circle with his back facing in the direction of the throw his feet are a little more than shoulder width apart and his knees are bent for stability during the arm swings. The thrower now places the hammer head behind his right leg as far to his rear as possible. He then turns to the right until the right shoulder points in the direction of throwing. The hammer wire forms a straight line with the extended left arm.

The preliminary arm swings

The main function of the preliminary swings is to break the inertia of the thrower and hammer and to set a rhythmic pattern of movement by which initial acceleration is transmitted to the hammer. During the preliminary swings, the arms are kept long and relaxed and form and extension

of the hammer wire. They begin with this movement when the hammer is at its lowest point and end it by turning the trunk to the right. The thrower must counteract the increasing centrifugal force.

When the hammer moves backwards, he presses his hips forward. After the first arm swing the thrower keeps the lowest point of his hammer well to the right, at around 290 to 300 degrees, and the highest point somewhere around 120 degrees.

The Release

The delivery phase begins when the right foot touches the ground after the third turn. The landing of the right foot must be fast and firm in order to match the acceleration of the implement, which is racing down to the lowest point with the beginning of the active straightening of the legs. Just before the hammer is released, the left knee straightens. When the implement leaves the hand, the vertical line of projection of the thrower's head should not go beyond the right heel. If the feet are in a stationary position, thus is a clear proof of a correctly executed delivery. The hammer is released at shoulder height. The left shoulder points in throwing direction and back is well arched. The most valuable angle of release in the hammer throw is 42 and 44°.

1st Day Events

1. 100 mts Hurdles
2. High Jump
3. Shot put
4. 200 mts Run

2. Decathlon

Decathlon consist of 10 events which shall be conducted on 2 consecutive days in the following order.

1st Day Events

1. 100 mts Run
2. Discuss throw
3. Pole vault
4. Javelin throw
5. 400 mts Run

2nd Day Events

5. Long Jump
6. Javelin
7. 800 mts Run

2nd Day Events

6. 100 mts Hurdles
7. Long Jump
8. Shot put
9. High Jump
10. 1500 mts Run

Note :

1. Winners will be decided based on the points of all events.
2. There is no heats in the running events and every running events are treated as finals.
3. Three attempts only will be given to field events.
4. Two false start should be permitted.

3. Decathlon

Decathlon consist of 10 events which shall be conducted on two consecutive days in the following order, with minimum 30 minutes interval between two consecutive events and 10 hours interval for last event of first day and first event of second day.

1st Day Events

1. 100 mts Run
2. Long Jump
3. Shot put
4. High Jump
5. 400 mts Run

2nd Day Events

6. 110 mts Hurdles
7. Discus throw
8. Pole vault
9. Javelin throw
10. 1500 mts Run

Combined Events For Women

Combined events for women there are two category mentioned as follows.

1. Heptathlon
2. Decathlon

1. Heptathlon

Heptathlon consist of 7 events which shall be conducted on 2 consecutive days in the following order.

The Recovery or Follow Through

To avoid stepping over to thrower must absorb the impact by reversing the legs and lowering the body's centre of gravity, thus increasing stability.

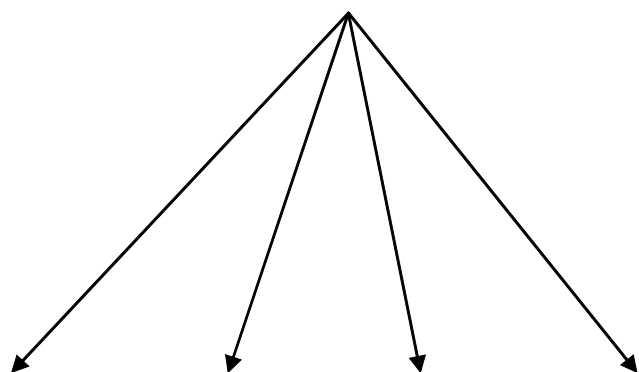
C.COMBINED EVENTS

Multi-discipline events has been included in athletics programmes since eight century B.C. though originally the five events for men included a run, long jump, discus throw, javelin throw and wrestling. The 10 events with we are familiar today were practiced first in Scandinavia, and the event is now developed in importance for the genuine all – rounder, who may not be one event, but who can maintain a high overall standard. Today it is an event for the decathlon or heptathlon specialist who prepares for it and competes in the event as a whole rather than in series of separate competitions. The decathlete or heptathlete needs to be a balanced personality with well –rounded physical development.

The Combined events are an individual events consist of several number of events of different category. For men and women combined events are classified into 4 types according to the level of competitors. The events are held over two days, and they are chose as a true test of skill, stamina and technique. The decathlon combines sprints with middle distance running, throwing, jumping, hurdling and vaulting.

There is a rest period of 30minutes between each event. A competitor is awarded points for his best performance in each event, as calculated by reference to scoring tables produced by the IAAF. The decathlon entered the Olympic programme in 1912.

COMBINED EVENTS



Pentathlon

Heptathlon

Octathlon

Decathlon

They are as follows.

1. Pentathlon - 5 events
2. Heptathlon - 7 events
3. Octathlon - 8 events
4. Decathlon - 10 events

The Combined events such as pentathlon, which shall be conducted on one day, and other combined events such as Heptathlon, Decathlon and Octathlon should be conducted on two consecutive days as in the prescribed order.

Combined Events for Men

1. Pentathlon
2. Octathlon (Youth Boys)
3. Decathlon

1. Pentathlon

The pentathlon is a five-events test of all-round ability. The men's version comprises the long jump, javelin, 200m., discus and 1500 m in that order on one day. Scoring is on the same basis as the decathlon. The pentathlon has long been a most popular women's event, and was introduced into the Olympic schedule in 1964.

2. Octathlon (Youth Boys)

Octathlon consist of 8 events which shall be conducted on consecutive two days in the following order.

1st day Events

1. 100 m Hurdle
2. Long Jump
3. Shot put
4. 400 mts Run

2nd day Events

5. 110mts Hurdles
6. High Jump
7. Javelin
8. 1000 mts Run

i) By seeing their timing in 1/100 of second. If the tie still remains.

ii) Lot shall be used to decide the best loser.

b) Field events

During horizontal or distance events, where there are more than eight competitors, each competitor shall be allocated three trials and the competitors with the best valid performances shall be allowed three additional trials.

In the event of a tie for the last qualifying place it shall be resolved by seeing the second and third best performance among the tied competitors and if tie still remains, the tied competitors shall also be allowed to perform the three additional trials.

In the event of a tie for any position, it shall be decided first by using the available rules. If the tie still remains it concerns for the first place, the competition shall be re-run to decide the winner which is known as concerns any other place, the result will stand. That means the tied competitors shall be awarded the same place.

Note; Its best performance as achieved during field braking, it shall also be considered.

$$2\pi r = 128 \text{ (Circumference of two curves = } 200 - 72 \text{ (} 2 \times 36 \text{))}$$

$$2 \times 3.14 \times r = 128$$

$$\text{RDR or 'r' = } 128 \times \frac{1}{2} \times \frac{1}{3.14} = 20.37 \text{ m}$$

$$\text{MDR = RDR - 0.20 m}$$

$$\text{MDR = } 20.37 - 0.20 = 20.17 \text{ m}$$

b) TYPES OF RUNNING SURFACE

1. Mud
2. Grass
3. Cinder
4. Synthetic Track

c) NEED FOR A STANDARD TRACK

1. Track must be prepared according to the rules and regulations laid by International Association of Athletic Federation (IAAF).
2. The length of the standard track shall be 400 mts.
3. The track should be laid out from North to South direction.
4. Track shall consist of two parallel straights and two curves of same radius. The length of the curve will be more than the straight.

5. The track should have minimum of 6 lanes and maximum of 8 lanes.
6. The inside and outside of the track shall be bordered by a kerb. That is raised border of maximum 5 x 5 cm.
7. The track should have common finishing point.
8. To conduct all the running events up to 10,000 mts within a track and also the jumping and the throwing events simultaneously with the track events.
9. The track should have proper drainage system.
10. The track should be leveled without any ups and downs.
11. The running direction is such that the athlete's left hand side is towards the centre of the track.
12. The synthetic material will be used as the surface of the track.

STAGGER DISTANCE

1. There will be no stagger for the first lane athlete.
2. As and when the width of the lanes changes, the stagger distance also changes.
3. Staggers are needed only when the athletes are required to run in curves also in their lane.
4. Staggers will not change according to the increase in the length of curves.

6. Angle sector is : 34.92°
7. Wire : Single up broken and straight length of string steel wire 3 mm in diameter
8. Handle : Curved or straight grip with maximum width inside of 130 mm and maximum length inside of 110mm.

BREAKING TIES IN ATHLETICS

Tie breaking in can be steadied separately during preliminary rounds and finals to decide the positions.

1) Preliminary rounds;

a) Track events

Preliminary rounds (heats) shall be held in track events when the number of competitors is more in number to reduce the number of competitors to 6 or 8 to conduct the finals. In all preliminary rounds at least first and second in each heat shall qualify for the next round and it possible at least three in each heat shall qualify. The qualification for the next race shall be decided either according to their placings or according to their times (best losers). During this selection if there is a tie among the best loser, the following steps shall be applied to docile the best loser for the next round.

The Ring

The ring shall be placed to the level of outside ground. It must have a height of 1.4cm to 2.6 cm from the inside floor of the circle and 6mm thickness.

Specification of Hammer

The hammer consist of three parts, a metal head, a wire and a grip. The head shall be of solid iron or other metal not softer than brass. The head should be spherical in shape with smooth surface. A steel wire, with a diameter of 3mm, is attached with the head at one end and with a handle on the other end.

Overall weight of the hammer

1. Men : 7.26 kg to 7.285 kg
2. Women : 4 kg to 4.025 kg

Overall length of the hammer

1. Men : 117.5 cm to 121.5 cm
2. Women : 116 cm to 119.5 cm
3. Diameter for men : 11 cm to 13 cm
4. Diameter for women : 95 cm to 110 cm
5. Head : Solid or other suitable material

5. When staggers are marked, the diagonal excess distance also to be taken into consideration.

Formula

$$\text{Half stagger} = [W (N-1) - \alpha 0.10 \text{ m}] \pi$$

$$\text{Full stagger} = [W (N-1) - \alpha 0.10 \text{ m}] 2\pi$$

$$\text{One and Half stagger} = [W(N-1) - 0.10\text{m}] \times 3\pi$$

Where,

W – Width of the lane,

N – Number of the lane

π – 3.1416 (Standard value)

Stagger distances for Non- standard Track

$$\text{Half stagger} = W (N-1) \times \pi$$

$$\text{Full stagger} = W(N-1) \times 2\pi$$

$$\text{One and Half stagger} = W (N-1) \times 3\pi$$

Diagonal (excess) Distance

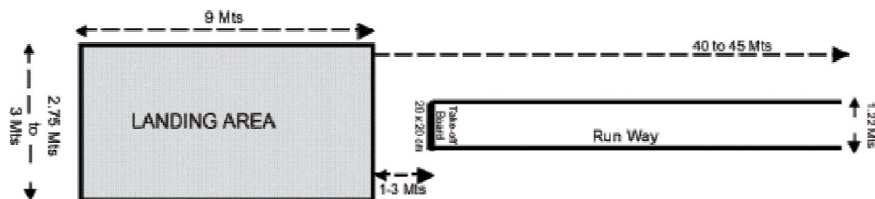
The excessive distance run by the athletes other than the first lane runner for 800mts and 4 x 400mts relay to reach the first lane after the first and three curve respectively is called diagonal excess. This diagonal distance should be calculated for each lane and it should be added with half stagger, and 1½ stagger respectively in the starting point itself.

UNIT - V

FIELD MARKING

Layout of Area for all Field Events with all Specifications

a) LONG JUMP



Specifications

Runway

Approach run - 40-45mts

Width of the lane - 1.22

Width of the line - 5cm

Jumping pit

Length - 9 mts

Width - 2.75 mts to 3 mts

Distance of the take off Board from the nearest edge - 1 – 3 mts of landing area

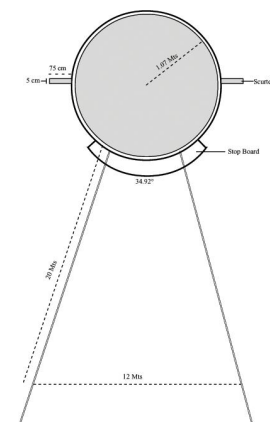
(84)

9. Width of the cord grip : 150 mm to 160 mm for men

10. Width of the cord grip : 140 mm to 150 mm for women

11. Angle of sector is : 29°

h) THROWING THE HAMMER CIRCLE



The hammer is thrown from a circle, shielded on three sides by a netting a cage on a metal frame, and must land within the marked sector. The competitor who achieves the best distance with his throw is declared winner. A total number of five judges watch for infringement within the circle, the other three judges supervise the field. If the hammer breaks while attempting a throw, then the attempt shall not be counted. Under such circumstances, if the competitor loses his balance and commits a foul, it won't go against him.

(93)

The javelin is made of wood or metal shaft with a sharp metal head. There shall be a cord grip around the centre of gravity of javelin. The cord grip should not exceed the diameter of the shaft by more than 8mm. The grip shall be of uniform thickness.

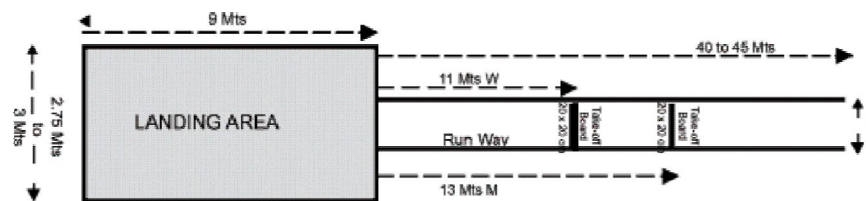
SPECIFICATIONS

1. Length of the runway : 30 to 36.5 mts
2. Width of the runway : Two parallel White lines 5 cm wide and. 4 mts apart
3. Width of the arc : 7 cm extended by 75cm long and 7 cm wide.
4. Weight of the javelin : 800gms to 825 gms for men
5. Weight of the javelin : 600gms to 625gms for women
6. Over all length of the javelin : 2.60 mts to 2.70 mts for men
7. Over all length of the javelin : 2.20 mts to 2.30 mts for women
8. Metal head : 250 mm to 330 mm for men and women

Dimension of the Take- off Board (Wooden Board)

- Length - 1.20 mts to 1.21 mts
 Width - 20 cm
 Depth- 10 cm

b) TRIPLE JUMP



Specifications

Runway

- Approach run - 40-45mts
 Width of the lane - 1.22
 Width of the line - 5cm

Jumping pit

- Length - 9 mts
 Width - 2.75 mts to 3 mts
 Distance of the take off board from the nearest edge of landing area - 11m (w) 13m (m)

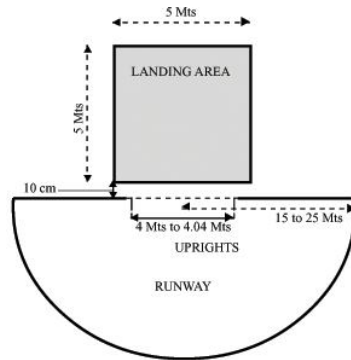
Dimension of the take off board

Length - 1.20 mts to 1.21 mts

Width - 20 cm

Depth- 10 cm

c) HIGH JUMP



Specifications

Runway

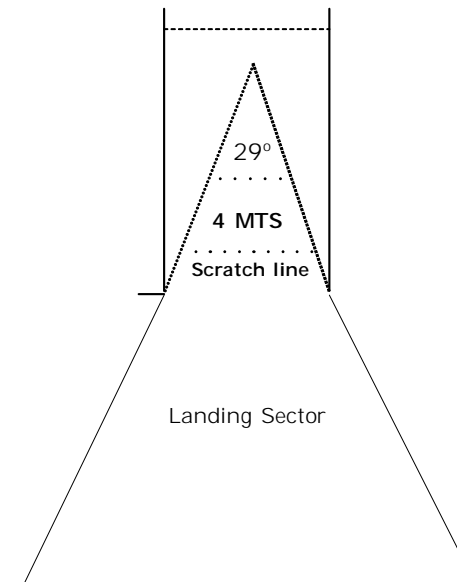
The minimum length of the runway shall be 15 meters. Except in international competitions, where the minimum shall be 20 meters. If conditions permit, the minimum length should be 25 meters.

High Jump Landing Pit

Pit : The pit is made of foam. The length of the pit shall be at least 5m, width 3m and height 60cm.

(86)

Javelin Throw Sector



IMPLEMENTS



Javelin



cord grip

(91)

Specifications

RUNWAY

The minimum length of the runway shall be 15 meters. Except in international competitions where the minimum shall be 20 meters. If conditions permit, the minimum length should be 25 meters.

High Jump Landing Pit

Pit : The pit is made of foam. The length of the pit shall be at least 5m, width 3m and height 60cm.

Uprights

The uprights should be of a rigid or any other suitable material, marked in centimeters. The uprights shall extend at least 10cm above the point up to which the cross bar can be raised. The distance between the uprights shall be between 4.00 - 4.04m.

Cross bar support

The support for the cross bar should be made of rigid or any other suitable material, which can be raised or lowered and can be adjusted up to a height of 2.30m.

Uprights

The uprights should be of a rigid or any other suitable material, marked in centimeters. The uprights shall extend at least 10cm above the point up to which the Cross bar can be raised. The distance between the uprights shall be between 4.00-4.04m.

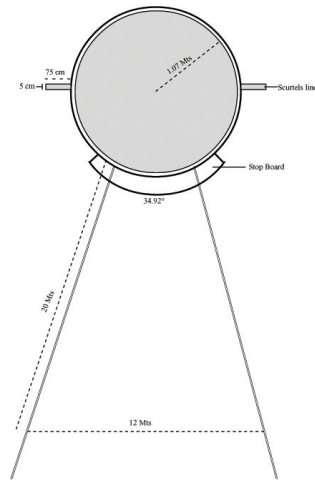
Cross bar support

The support for the cross bar should be made of rigid or any other suitable material, which can be raised or lowered and can be adjusted up to a height of 2.30m.

Cross bar

The cross bar is made of wood, or metal or any other suitable material. The cross bar should be circular with a diameter of 29 mm to 31 mm. The end of the bar shall be of concave or flattened surface of 150-200 mm in length and 29-35 mm in width. The length of the cross bar shall be between 3.98, to 4.02m.

d) SHOT PUT CIRCLE



The Ring

The ring shall be placed to the level of outside ground. It must have a height of 1.4cm to 2.6 cm from the inside floor of the circle and 6mm thickness.

Shot

The shot is made from solid Iron, brass or other hard metal. The men's shot weight is 7.26 kg with a diameter between 110-130mm. The women's shot is of 4kg with a diameter between 95-110mm. The shot should be spherical in shape with smooth surface.

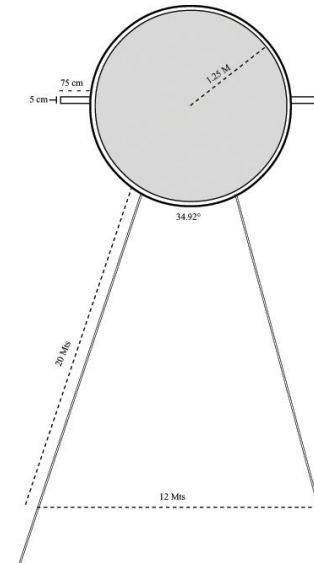
Stop Board

A curved piece of wood 10 cm thick affixed to the front of the shot put circle. When throwing, the shot putter braces his foot against the stop board to avoid falling forwards out of the circle.

(88)

f) DISCUS CIRCLE

Discus



The discus is made of wood, or other suitable material, with a rounded metal rim. The cross section of the edge shall be rounded in a circle of 6mm radius. The thickness of the rim should be at least 12m. The diameter of men's discus shall be between 219-212 mm and its weight should be 2 kg. The diameter of women's discus shall be between 180-182 mm and weight 1kg. The diameter of metal plate or flat centre area should be between 50-57mm.

(89)

a) Track Events

The judges shall decide the order in which the competition finish and if they cannot arrive at a decision shall refer the matter to the Referee, who shall decide.

Dead Heat

If there is a tie for the first place in any track event, the event shall be held after to giving adequate rest. And if it is not possible to conduct event once again due to time factor, the tied competitions shall be awarded first place jointly. This method is known as "dead heat". If tie remains for any other place, the result will stand. Rerace shall not be held to decide the second, third and other place.

Note: If photo finish facilities is available, the positions may be decided, easily.

b) Distance events

When there is a tie for any place, it shall be solved by seeing the second best performance and it necessary third, fourth best, etc. If tie still remains and concerns first place, the tied competitors will complete again in the some order in a new attempt until the tie is result. For remaining places the result will stand. That means same place shall be given to the field competitors.

Height events

When there is a tie for any place in high jump and pole vault it shall be solved by using two rules in order as following

- i) The tie competitor with lowest number of failures at the field height (last cleared height) shall be given higher place.
- ii) If tie shall remain; the competitor with lowest total number of failures throughout the competition shall be given higher place.

If the tie still remains and if it concerns the first place, the field competitors shall be given one more jump at the height where the competition is stopped (height which is immediate next to the field height), and if no decision is reached, the bar shall be raised or lowered 2cm for high jump and 5cm for pole vault. The competitors are allowed only one attempt at each height until the tie is decided. The best performance achieved during jump, if any, shall also be considered.

If the tie concerns any other place, the tied competitors shall be awarded the same place in the competition.

Note: If the same place is given, the immediate next place shall not be awarded to any competitors.