FOR SCHOOLS

The first of our two articles in this issue, Long Jumping for Beginners, comes from the former German Democratic Republic. It stresses the learning of the stride long jump technique right from the start in a simple, easy to follow, approach. In the second article Russian authors present a study to clarify the problems of overtraining among advanced young distance runners.

LONG JUMPING FOR BEGINNERS

By Dr. Wolfgang Lohmann

The following article, looking into the mechanics of the stride long jump technique and presenting a series of conditioning exercises for beginners, has been extracted from the long jump chapter of the author's book Lauf, Sprung, Wurf (Running, Jumping, Throwing), published by Sportverlag, Berlin)

There are several flight techniques in the long jump. Before answering the question which of these is the most efficient, it must be stressed that movements in the flight have little influence on the jumping distance achieved. The action in the air serves to keep balance and to prepare for the landing.

Obviously the crouched position in the ...l technique is not suited for the tasks in ...e flight and most top-class long jumpers employ the hitch-kick techniques. Those reaching distances around the 8.00m mark often perform 3½ strides in the air before landing. Others, who jump less, execute only 2½ strides. However, even 2½ strides require a distance close to 5.00m to finish the flight action.

Youngsters, before they reach reasonable distances, are therefore recommended to perform only one stride in the flight before landing. As this is not really running in the air, we have named it the "stride" long jump technique. The stride technique is simple, allows for the body to be straightened in the flight and provides for an efficient landing. It is superior to the sail technique. (Fig. 1).

THE STRIDE TECHNIQUE

How long a body remains in flight depends on the velocity at the take-off. The faster the jumper is at the take-off the longer he or she will stay in the air. How far or how high the jumper jumps depends on the take-off angle. A smaller angle is more suited for distance, a larger angle for height.

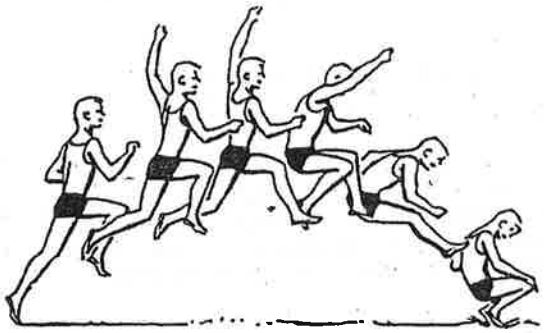


FIG. 1: THE STRIDE LONG JUMP

The resultant velocity Vo in the long jump is determined by horizontal (Vh) and vertical (Vv) velocities. This means that the flight curve becomes steeper or flatter according to the components of horizontal and vertical velocity (Vh and Vv). In the long jump the horizontal component (Vh) should be three times larger than the vertical component (Vv). The horizontal component depends mainly on the run-up speed, the vertical component can be increased only by an efficient take-off (Fig. 2).

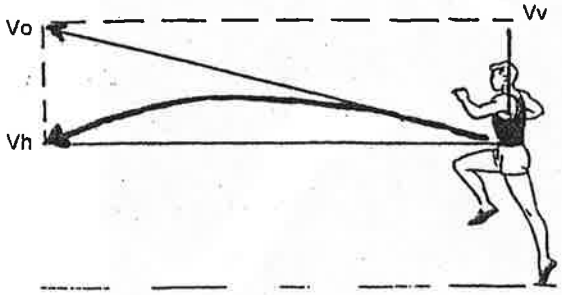


FIG. 2.

THE RUN-UP

* Youngsters should use a 12 to 16-stride run-up.
* The run-up should always be started with the same foot. The first strides must be the same length in order to hit the take-off board accurately. A marker must therefore be used.
* It is essential to reach speed as soon as possible. The run-up speed must reach its maximum at the take-off board.
* The upper body should be upright shortly before the board is reached to get into a correct take-off position.
* Relaxation is important during the run-up. The athlete should concentrate on developing speed in the beginning of the approach, not on the take-off.
* The main fault in the final stages of the run-up is the lengthening or cutting of the strides in order to hit the board. Both actions will reduce horizontal speed and ruin the jump.

THE TAKE-OFF

* The take-off stride is much faster than all previous run-up strides. Concentration is on an explosive placement of the take-off foot on the board.
* The heel touches the board only shortly before the foot rolls forward at the take-off. The athlete should have a "feel" of gripping the board lightning fast with the take-off foot before pushing off backwards.
* The following energetic stretching action, starting from the ankle, knee and hip joints, extends the whole body. At the same time, the lead leg, well bent in the knee, is brought up with the thigh reaching a nearly horizontal position.
* During the take-off action the trunk remains upright, the eyes look straight forward and the opposite arm to the lead leg assists the action (Fig. 3).
* The main and most frequent fault at the take-off is the failure to extend the take-off leg fast. This is essential to avoid power losses that occur at a high run-up speed. Other common faults are:

FIG. 3

- Looking up, hollow back.
- Backwards lean.
- Forwards lean, usually combined with poor lead leg lift.

THE FLIGHT

* The athlete should remain in the take-off position during the first phase of the flight. The upper body remains upright or, better still, has a slight backward lean.
* At this stage the body gets into a jack-knife position with the upper body leaning over the knees, both legs stretched out and at the same height.
* Provided the arms have been dropped back-ward-downward, the above described position makes best use of the jumper's flight curve.
* The most frequent faults in the flight are:
  - Too much forward lean with the lead leg dropped after the take-off.
  - Legs dropped too low for an efficient landing.
  - The body held in the outdated crouch position of the sail technique (Fig 4).

THE LANDING

* Legs are brought forward for the landing fast and kept virtually straight, although not stiff.
* The knee joints flex immediately after the heels break the sand in the landing pit. At this stage the upper body straightens a little to allow the hips to move forward.
* As the hips move forward to shift the body weight over the supporting leg, the seat is kept high to avoid touching the sand (Fig. 5).
* Both feet land at the same level. The arms, trailing at the start of the landing, are swung forward fast to avoid falling back.
* The most frequent faults in the landing are:
  - Both feet not landing at the same level, resulting in a loss of valuable centimetres.
  - Stiff knee joints, usually causing the jumper to fall back.
  - Touching the sand with the seat, or falling back, because the feet are placed too far forward.
  - Diving forward after the landing because feet are dropped in the pit too early.

TRAINING

The three most important aspects in the long jump are speed, accuracy of the run-up and jumping power. Speed can be developed by sprint training, keeping in mind that in the long jump run-up speed alone is not sufficient. The run-up must allow a take-off from the board to avoid fouling or losing valuable distance. The development of an

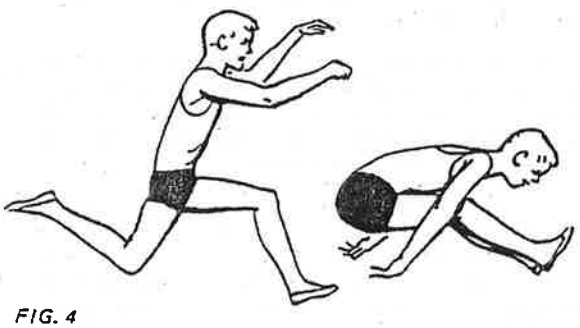


FIG. 4

FIG. 5

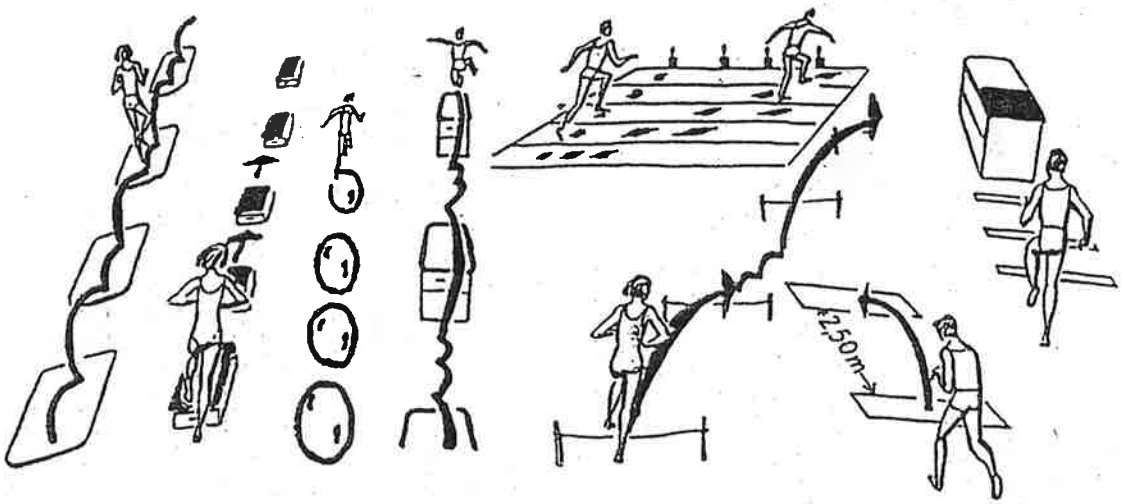


FIG. 6. BOUNDING AND JUMPING EXERCISES

accurate run-up must therefore be included in the young jumper's training program right from the beginning. It is done by adjusting sprinting exercises over a distance of approximately 20m and checking where the take-off foot lands after each acceleration.

Jumping power is developed by employing general leg strengthening exercises and specific exercises designed to improve the take-off action. In general, the following procedures are recommended:

1. Perform the exercises in short series, following a pre-described training load.
2. Stop training as soon as it becomes obvious that the jumps lack explosiveness.
3. Combine all specific exercises with a fast run-up.
4. Aim to reach maximum distances in all jumps.

Bounding Exercises

1. Multiple jumps from a five-stride run-up (6 to 8 repetitions). The take-off is marked so that the last landing occurs in the landing pit.

2. Stair jumping (6 to 8 repetitions) up stairs or a series of gymnastic boxes. Use a short run-up and increase distances between the boxes.

3. Pattern bouncing (4 to 6 repetitions) over a series of lines about 1.80 to 2.00m apart. The athletes are allowed to touch the ground only once between the lines. The aim is to increase the distance by gradually bounding across the lines diagonally.

4. Bounding over low obstacles (6 to 8 repetitions). Use rubber strings, balls, wooden blocks etc. Increase the distance between the obstacles.

5. Gymnastic mat jumping (6 to 8 repetitions). Take-offs from one mat to the next form a fast run-up. The mats are placed so that only one stride is performed on each mat.

6. Low box jumping (6 to 8 repetitions). Take-offs as in the first exercises onto the top of a series of gymnastic boxes.

7. Zone jumping (12 to 15 repetitions). Take-offs over two non-parallel marked lines, to allow for increased distances.

Jumping Over Obstacles

8. Jumping over low rubber strings (6 to 8 repetitions). The obstacles are 25 to 30cm high and at least 1.80 to 2.00m apart. Only two accelerating strides are allowed between each take-off.

9. Jumping onto gymnastic boxes (8 to 10 repetitions). Using a longer run-up, athletes jump from about 1.00m distance on top of half height boxes. The take-off line is gradually moved further back.

10. Zone jumping (10 to 15 repetitions). Using a longer run-up, athletes jump from a 40 to 50cm wide take-off zone onto a marked landing area. The distance is increased gradually and should allow for clearing only from a fast run-up.

LONG JUMP

CONSISTS OF FOUR PHASES:

(1) RUN UP - MUST BE FAST, ACCURATE AND ALLOW THE ATHLETE TO PERFORM AN EXPLOSIVE AND WELL COORDINATED TAKE-OFF

(2) TAKE-OFF - MUST BE POWERFULLY EXECUTED WITH EMPHASIS ON ATTAINING THE BEST VERTICAL VELOCITY WITHOUT DRASTIC REDUCTIONS IN VITAL HORIZONTAL SPEED

(3) FLIGHT - THE MAIN AIM IS TO ESTABLISH CONDITIONS FOR AN EFFICIENT LANDING AND TO COUNTERACT THE ROTATION DEVELOPED AT TAKE-OFF

(4) LANDING - TO ACHIEVE A POSITION WITH THE FEET AS FAR FORWARD OF THE JUMPER'S CENTRE OF GRAVITY AS POSSIBLE WITHOUT FALLING BACK

RUN UP - KEY FEATURES

(1) MUST BE OF SUFFICIENT LENGTH TO ALLOW THE JUMPER TO ARRIVE AT THE BOARD WITH AS MUCH SPEED AS CAN BE HANDLED EFFECTIVELY DURING TAKE-OFF
(2) MUST BE ACCURATE AND CONSISTENT AND ALLOW THE JUMPER TO DEVELOP RHYTHM OF THE RUN UP
(3) THE RUNNING TECHNIQUE MUST BE EFFICIENT. THE ATHLETE "RUNS TALL" WITH HIGH KNEE LIFT AND POWERFUL BUT RELAXED ARM DRIVE
(4) INCREASE LEG SPEED IN THE FINAL STAGES (CADENCE). ACCELERATION MUST BE SMOOTH.
(5) THE LAST STRIDE IS MADE FAST WITH THE TAKE-OFF FOOT PLANTED ACTIVELY SLIGHTLY AHEAD OF THE BODY
(6) NO VELOCITY LOSSES BECAUSE OF OVER EMPHASIS IN PREPARING FOR TAKE-OFF

TAKE-OFF - KEY FEATURES

(1) A FLAT, ACTIVE PLACEMENT OF THE TAKE-OFF FOOT ON THE BOARD
(2) VERTICAL ALIGNMENT OF THE HEAD, UPPER BODY AND HIPS
(3) VIGOROUS DRIVE OF FREE KNEE TO HIP LEVEL AND OPPOSITE ARM DRIVE - "SWINGING MOVEMENTS" - VERY FAST MOVEMENT
(4) LIFT OF SHOULDERS
(5) FULL EXTENSION OF TAKE-OFF LEG AT HIP, KNEE AND ANGLE JOINTS. FAILURE TO DO THIS CAUSES INCOMPLETE DRIVE AND AN INEFFECTIVE AND "RUSHED" TAKE-OFF.

FLIGHT - KEY FEATURES

(1) MAINTAIN LONG THIN SHAPE IN AIR - HIPS FORWARD - NO SIDEWAYS MOVEMENT
(2) CORRECT ARM AND LEG MOVEMENTS IN SINGLE STRIDE TECHNIQUE
(3) GOOD LEG EXTENSION FOR LANDING (JACKNIFE POSITION)

LANDING - KEY FEATURES

(1) LANDING IS MADE WITH FEET TOGETHER AHEAD OF THE BODY
(2) PREMATURE DROPPING OF THE LEGS CAUSES LOSS OF DISTANCE IN THE OVERALL JUMP
(3) EFFICIENT ROTATION OVER EXTENDED LEGS ON LANDING.

Long Jump

The long jump is a speed event which comprises of four phases:

- approach run
- take off
- flight through the air
- landing.

To achieve maximum distance in the long jump the athlete will have to balance three components - speed, technique and strength.

The approach run

The objective of the approach run is for the athlete to achieve the ideal speed. Rhythm in the approach run is important to ensure the ideal speed is achieved at take off and also accuracy in hitting the take off board. It is important the athlete develops a good running rhythm before accuracy is addressed. The length of the run will depend on the athlete's age and speed. When first determining the number of strides in the approach run start by matching the number of stride with the athlete's age;

Age	Strides
Under 11	11
Under 13	13
Under 15	15

The start of the approach run should be marked and the athlete should commence the start from a standing start. Some athletes use a 'walk on start' or 'run on start' which will provide more initial speed but if not consistent will impact the accuracy of the approach run onto the take off board. The athlete begins the run with a marked forward lean to develop speed but before they reach the take off board they should be upright. The athlete should be on the balls of the feet as in sprinting with a natural head position, the eyes focused beyond the pit and not at the take off board.

Accuracy of the approach run onto the take off board is established by:

- Determine the take off foot
- Stand with your back to the jumping pit and the heel of your non take off foot on the take off board scratch line
- Run up the runway the required number of strides, say 13, and place a marker where the 13th stride falls.
- Place the non take off foot on the marker and run back towards the board and take off.

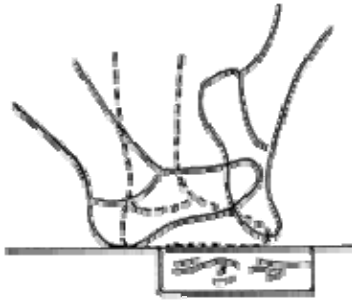
- Repeat the run up and marker adjustment 4 or 5 times to establish a consistent approach run onto the take off board
- Once achieved measure the distance accurately and record it for future use
- It is important to bear in mind that a head or tail wind will effect the run up. A head wind may mean moving the marker slightly forward

The take off

The preparation for the long jump take-off begins in the later phases of the approach run. The long jumper prepares for take off by sinking the hips and then raising the hips into the take off phase. This usually results in the next to last stride being longer than normal and the final stride being up to 25 centimetres shorter than a normal running stride. It must be emphasised that the hip sink and stride adjustment all happen in response to the athlete's postural adjustments in preparation for the take off. At take off ensure the hips are forward.

When the take off foot is placed on the board, it is well ahead of the body's centre of gravity and should strike the board on the mid line.

The heel of the take off foot will strike first allowing a rolling action onto to the ball and then the toes of the foot to give maximum vertical lift. This vertical impulse is further assisted by the upward acceleration of the "free" limbs, the arms and the non take off leg, against the braced take- off leg.

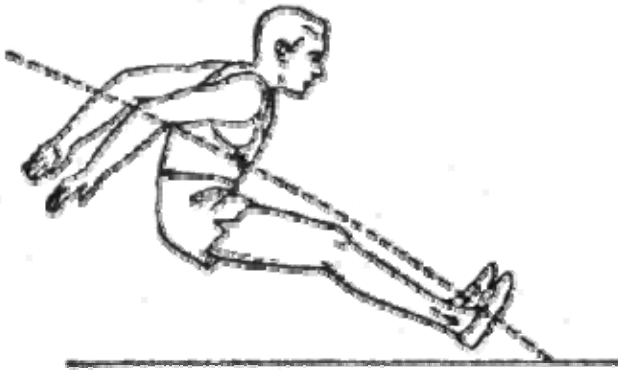


The flight through the air

Speed and lift generated on the runway and through take off can result in a good distance. After a take off the athlete tends to have forward rotation which, if not corrected, will result in the feet hitting the sand early and a loss of distance in the jump. The cyclic forward movement of the legs and arms, as seen in the hitch-kick for example, will correct this forward rotation.

The landing

During the landing the athlete is aiming to get the heels as far away from the take off board as is possible. The ideal landing position is shown in the diagram opposite where the dotted line represents the projected flight path of the body's centre of gravity. The heels will need to land just before the projected flight path to ensure the athlete does not fall back into the sand.



Optimum take off angle

The take off speed of a male elite long jumper is about 10.5 metres/second in a "run through" (take off angle of zero degrees) and 3.5 metres/second for a vertical jump (take off angle of 90 degrees). This decrease in speed means that the optimum angle of take off is well below 45 degrees. For the elite long jumper the optimum take off angle is between 18 and 25 degrees (Linthorne et al, 2001)

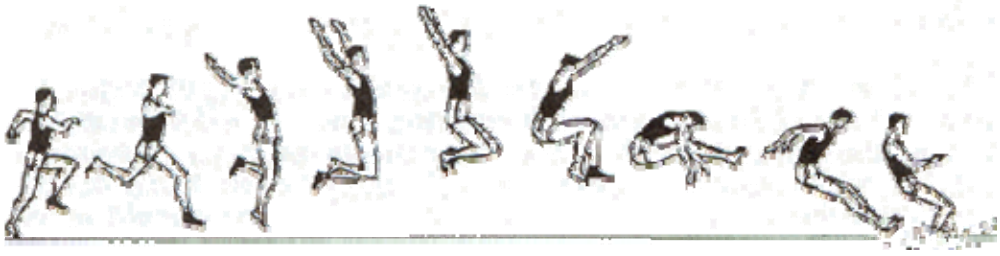
Long Jump Styles

The Stride Jump

In the stride jump style the athlete maintains the take off position for as long as possible and only as the athlete comes into land does the take off leg join the free leg for a good landing position.

The Hang Style

On take off the athlete drops the free leg to the vertical which is then joined by the take off leg. The arms go overhead to slow down the rotation about the athlete's centre of gravity. The legs are then lifted upwards and forwards whilst lower the trunk. The arms swing past the legs during the landing phase to ensure a good leg shoot.



The Hitch-Kick

Following take off the free leg is straightened and swung back and down as the take off leg folds up beneath the hips and comes forward bent. The take off leg then continues forward, straightening for landing. The free leg completes its backward swing behind the hip and then folds up and comes forwards bent, to join the take off leg ready for landing.

LONG JUMP

When long jumping: -

- You need a fast and accurate run up of no more that 11-15 steps
- Take off from one foot
- Drive your free knee and arms high into the air
- Keep your body tall; eyes up or to the front
- Land with your feet close together; bend at your hips and knees







JUMPS

LONG JUMP

This event is basically a short sprint followed by a jump into the air and a landing into a sandpit. It is one of the most natural events to perform and is easily taught.

Each athlete is allowed three turns in which to **run up, take off** and **land** so that they travel (unaided) the furthest distance through the air and land in the pit.

The take off is from a mat 1.00m square (usually made of heavy rubber). This mat has a 200mm wide white line (board) painted across the mat on one side. This is located 300mm from the end and it is for U13 - U15 athletes.

The reverse side of the mat is used by the U6 - U12 athletes. This side has one half painted yellow. This is the foul zone for the U7 - U12 athletes. U6's can use the whole mate for their take-off.

Rules

- A foul will be recorded if any part of the Athlete's foot protrudes over the front of the mat or board or outside the side lines of the mat or board.

- A foul will be recorded if the athlete leaves the pit closer to the take off point than the marks made on landing.

- For the U6 - U12 athletes the mat is to be placed 0.5m back from the edge (width of the yellow section).

- For the U13 - U15 athletes the Foul Line is set at one, two or three metres from the inside edge of the pit. This distance must be agreeable to all competing athletes and must remain fixed for the duration of the competition.
- No form of somersaulting is permitted.
- Once competition has begun, athletes are not allowed to re-measure their run-ups.
- Markers are not permitted on the runway. They may be placed alongside the runway and can be adjusted if the need arises.
- Athletes are permitted but should not be encouraged to take off from both feet.
- An athlete is allowed to take off from behind the mat or board.

Safety

- Ensure that the sandpit is clear of debris and dangerous objects.
- Ensure that the sandpit is raked level with the runway.
- Ensure that the runway is dry and clear.
- Ensure that the sand pit is completely clear before allowing an athlete to jump into it.

Warm Up

This should involve some short sprints and mobility exercises. This warm up is similar to the one for Sprints.

Run Up

- This should be an odd number of strides (preferably of a maximum of 15 strides) back from the mat or board.
- The run should start with both feet together. The first stride should be onto the take off foot.
- Start slowly and build up speed so as to reach maximum velocity at the take off point.
- Run tall with a high knee lift.

Take Off

- The trunk should be upright and the knee of the lead leg should be brought up high quickly. At the same time the opposite arm should be driven up, aiming for height.
- The head should be kept up and straight.

Landing

- Aim at getting the feet as far ahead of the body as possible.
- As the heels break the sand, the knees should flex with the body coming through in a forward movement. This avoids falling back into the pit.

THE SINGLE STRIDE TECHNIQUE
Notice the upright trunk and high knee lift at the take-off

Drills and Games

- **Hopping.**
- **Standing Jumps** :- First off two feet but also off the take off foot.
- **Jump the River** :- Two lines are drawn across the pit approximately 1m apart. This simulates a river full of crocodiles with the athletes must jump or be gobbled up. This distance can be widened for each round with points being allocated for each successful jump.
- **Measured Standing Jumps** :- Mark off three standards (1, 2, 3). Give each athlete performance points. This could also be a team event. Combine scores or distances.
- **Poison Ball** :- One team forms a circle (approximately 20m) around the other team. A ball is rolled along the ground trying to hit those in the middle below the knees. Athletes must jump to avoid being hit. When everyone is out, swap teams. this game can be run as a time trial. N.B. Hits above the knee do not count! ! !.
- **Circle Number Hop Chase** :- Athletes form a 10m circle and are numbered off 1-3. On the call of their number they hop in a clockwise direction trying to tag the athlete in front of them.
- **Stepping Stones** :- Ten carpet squares are set out across an area. The object of this game is to get across the area without touching the ground. This can be done by hopping, stepping or jumping onto the carpet squares.
  These squares may be moved further apart when everyone has been successful.
  Obstacles could be placed in the way to increase the difficulty e.g. can supported on blocks.

Measuring (Long Jump and Triple Jump)

- The jump is measured from the mark in the sand made by the athlete which is nearest to the take off point.
- Fouls are not measured.
- Measurements are made to the nearest centimetre below the distance travelled.
- The zero end of the tape is held at the mark in the sand, held horizontally and pulled taut to the take off point.
- The take off point for athletes using the mat is the toe imprint on the mat. (or the edge furthest from the pit if the take off occurs before the mat.) U6 - U12's use the 1/2 metre mat.
- The take off point for athletes using the board (U13 - U15's) is the edge of the board nearest the pit and is measured at right angles to the board from the nearest mark in the sand.

TRIPLE JUMP

Once upon a time this event was called the "Hop, Step and Jump". The Triple Jump is made up of a run up, a take off with a landing on the same foot (i.e. the Hop), a second take off with a landing on the opposite foot (i.e. the Step) and a third take off with a landing this time on both feet in a sandpit (i.e. the Jump).

Rules

- This event is only available for the U10 to U15 age groups.
- All rules of Long Jump apply except for those concerned with the take off mat or board.
- The foul line of the take off mat or board is set at various whole metre distances from the inside edge of the pit. It is moved to these intervals as necessary during the competition. All athletes should know their take off distance and let the Triple Jump Official know this before competition starts.
- The Jump must land in the pit. Landing on the runway is a foul.

Safety

- The run up and landing area for the hop and step should preferably be on grass. It should be dry and safe.
- The safety conditions which apply to Long Jump also apply here. Refer back to Long Jump - Safety.

Warm Up

This should involve some short sprints and mobility exercises. This warm up is similar to the one for Sprints.

Run Up

This is also the same as for the Long Jump except that it need not necessarily be as fast. Balance and an upright position in the last few strides is very important.

Take Off

This is different from the Long Jump as the athlete runs off the mat or board rather than jumps off it. Forward drive is emphasised rather than upward drive as in the Long Jump.

The athlete should aim at even distance for each of the three jumps. Novices at this event invariably perform a short step and jump because of the effort put in gaining distance in the hop. This should be avoided.

The Hop

Often the hop is too high which causes jarring on landing and lost distance. To correct this, aim for a low take off angle and stress a forward floating action.

The Step

- Arms should be driven forwards and upwards to aid drive.
- The trunk should be kept upright. Any forward lean means a loss of height and distance.

The Jump

- The leading knee must drive vigorously forward and upward.
- Both arms must be swung high.
- The knees are brought together as late as possible with the arms simultaneously swinging down.

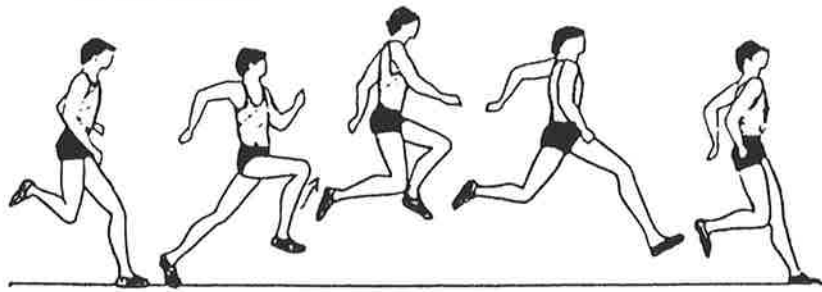
This is probably the hardest part as the athlete has lost speed from the hop and step. The athlete would also be taking off on the non preferred foot.

TRIPLE JUMP TECHNIQUE

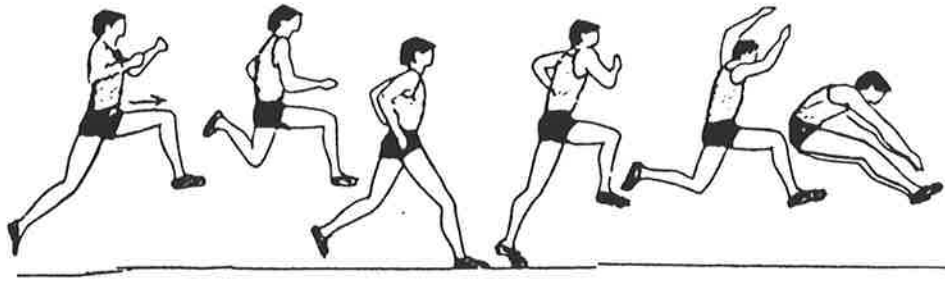
For an athlete who takes off his/her left foot (as in the diagram below) the landing sequence would be as follows:

Left	Left	Right	Both
Take-off	Hop	Step	Jump

The Triple Jump Action



1. Left foot take off 2. 3. 4. 5. Lands on left foot



6. 7. 8. 9. 10. 11.

1-5	The Hop:	Left foot take off Left foot landing
6-8	The Step:	Left foot take off Right foot landing
9-11	The Jump:	Right foot take off Landing on both feet in sand pit

Landing

This is the same as for the Long Jump.

Drills (Hops)

- Repetition Hops :- Emphasise flatness. Aim for distance and speed.
- Hops over low hurdles / obstacles.
- 5 hops and a jump into the pit.

Drills (Step)

- Repetition Steps :- Stress knee drive.
- Steps over small obstacles.
- 2 hops and three steps.

Games The games suggested in the Long Jump section can be used here as well.