

2) Number of Repetitions: While planning a strength training programme the number of repetitions executed to produce fatigue is an important consideration. Maximum strength gains appear to result from working with 4-6 RM. If this number increases to 12-20 RM which leads to increase in muscle endurance and mass (volume). Example of a typical strength training programme is one set of 8-12 RM performed 3 days a week. Of course load schedule will be depends upon level of athlete, nature of activity and strength demand of the specific activity, sex, age etc.

For heavy weight training programme a recovery of 3-5 minutes between sets may be given and minimum recovery time be taken to develop strength endurance.

3) Frequency of Training: Recovery time plays an important role for strength training. As a rule of thumb 48 hours should be recovery phase between sessions. If athlete feels difficulty to lift the same amount of load, then load can be varied (low, medium, high volume session) each week.

2) DEVELOPMENT OF EXPLOSIVE STRENGTH / PLYOMETRICS.

Perhaps we know that speed and strength are integral components physical fitness in different proportion in respect to all athletic / sporting movements. It is the combination of speed and strength to produce power. Generally jumping, bounding and hopping exercises have been used in various ways to enhance athletic performance. In recent years this training method to develop power or explosiveness has been named as PLYOMETRIC.

SOME OF THE PLYOMETRIC EXERCISES FOR DEVELOPMENT OF EXPLOSIVE STRENGTH :-

1. Leg plyometric (Bounds)
2. Hurdle Hopping
3. Single Leg Hopping
4. Box Jumps.
5. Depth Jumps
6. Tuck Jumps
7. Two Legged Hops or Bunny Hops.
8. Chest pass with Medicine ball.
9. Power drop with medicine ball.
10. Incline chest Pass with Medicine ball
11. Vertical Toss with Medicine ball

Warmup: Complete warm up is at most important prior to plyometric training. Warm up programme should include Jogging, stretch (static & ballistic), striding and flexibility exercises for joints and muscles. After this training cooling down session must be followed. Administration of the exercise and load/dose presented in pictorial form.



Fig. 4. Bounds

How to perform the drill

- Jog into the start of the exercise
- Push off with your left foot and bring the leg forward, with the knee bent and the thigh parallel to the ground
- At the same time, reach forward with your right arm. As the left leg comes through, the right leg extends back and remains extended for the duration of the push-off
- Hold this extended stride for a brief time, then land on your left foot
- The right leg then drives through to a forward bent position, the left arm reaches forward, and the left leg extends backward
- Make each stride long, and try to cover as much distance as possible
- You should land on the sole of the foot (flat footed), allowing energy to be stored by the elastic components of the leg muscles, and immediately take off again
- Keep the foot touch down time to the shortest time possible

How much

- One to three sets over 30 to 40 metres
- Allow a full recovery between each set
- Quality of bounding is far more important than quantity.

Hurdle Hopping

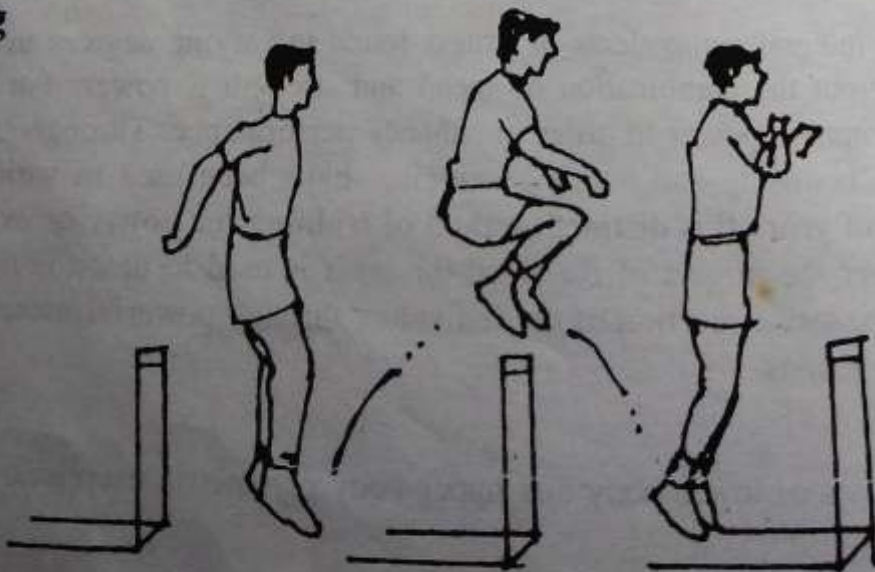


Fig. 5. Hurdle Hopping

How to perform the drill

- Jump forward over the barriers with your feet together
- The movement should come from your hips and knees
- Keep your body vertical and straight, and do not let your knees move apart or to either side
- Tuck both knees to your chest
- Use a double arm swing to maintain balance and gain height
- You should land on the balls of the feet, allowing energy to be stored by the elastic components of the leg muscles, and immediately take off again
- Keep the feet touch down time between hurdles to the shortest time possible

How much

- One to three sets using 6 to 8 hurdles
- Allow a full recovery between each set
- Hurdles should set up in a row, spaced according to ability
- The height of the hurdles should be in the region of 12 and 36 inches high
- Quality of hurdle hopping is far more important than quantity

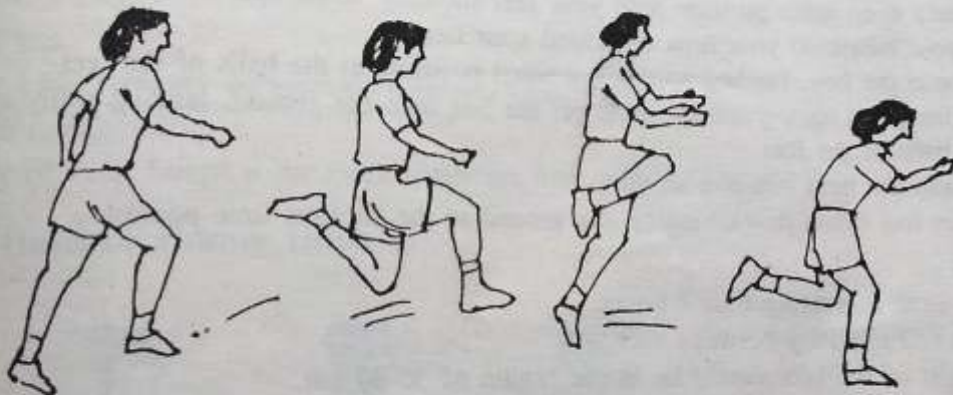
Single Leg Hopping

Fig. 6. Single Leg Hopping

How to perform the drill

- Stand on one leg
- Push off with the leg you are standing on and jump forward, landing on the same leg
- Use a forceful swing of the opposite leg to increase the length of the jump but aim primarily for height off each jump
- You should land on the ball of the foot, allowing energy to be stored by the elastic components of the leg muscles, and immediately take off again
- Keep the foot touch down time to the shortest time possible
- Try to keep your body vertical and straight
- Perform this drill on both legs
- Beginners will use a straighter leg action where as advanced athletes should try to pull the heel toward the buttocks during the jump

How much

- One to three sets over 30 to 40 metres

- Allow a full recovery between each set
- Quality of bounding is far more important than quantity

Box Jumps

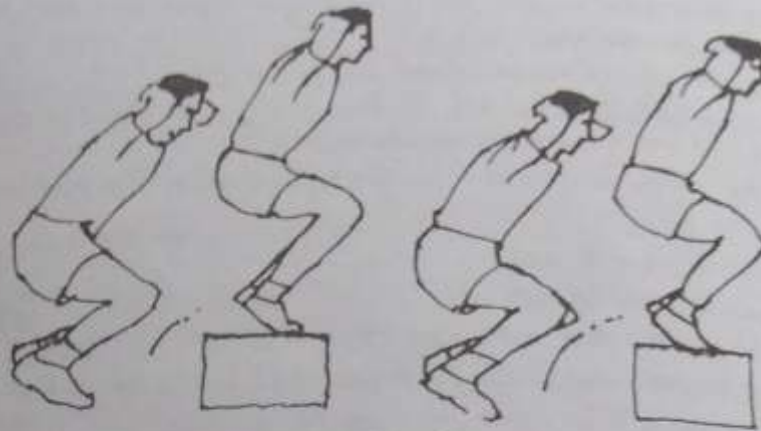


Fig. 7. Box Jumps

How to perform the drill

- Assume a deep squat position with your feet shoulder width apart at the end of the row of boxes
- Keep your hands on your hips or behind your head
- Jump onto the box, landing softly in a squat position on the balls of the feet
- Maintaining the squat position, jump off the box onto the ground, landing softly in a squat position on the balls of the feet
- Jump onto the next box and so on
- Keep the feet touch down time on the ground to the shortest time possible

How much

- One to three sets using 6 to 8 boxes.
- Allow a full recovery between each set
- The height of the box should be in the region of 30-80 cm.
- Quality of box jumping is far more important than quantity.

Depth Jumps

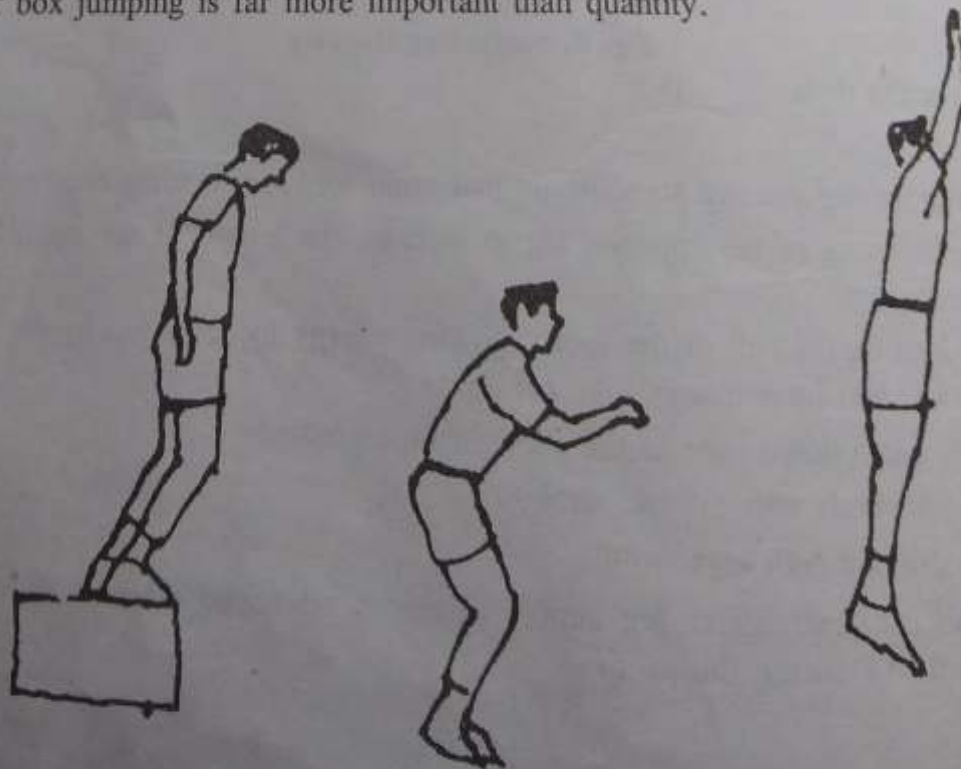


Fig. 8. Depth Jumps

How to perform the drill

- Stand on the box with your toes close to the front edge
- Step from the box and drop to land on then balls of both feet
- Try to anticipate the landing and spring up as quickly as you can
- Keep the feet touch down time on the ground to the shortest time possible

How much

- One to three sets using 6 to 8 boxes
- Allow a full recovery between each set
- The height of the box should be in the region of 30-80 cm.
- Quality of depth jumping is far more important than quantity.

Tuck Jumps

How to perform the drill

- Begin in a standing position
- Jump up, grabbing both knees as they come up your chest
- Return to the starting position landing on the balls of the feet
- Try to anticipate the landing and spring up as quickly as you can
- Keep the feet touch down time on the ground to the shortest time possible

How much

- 1 to 3 sets
- Allow a full recovery between each set
- 5 to 10 repetitions/set
- Quality of Tuck Jumps is far more important than quantity

Two legged Hops or Bunny Hops

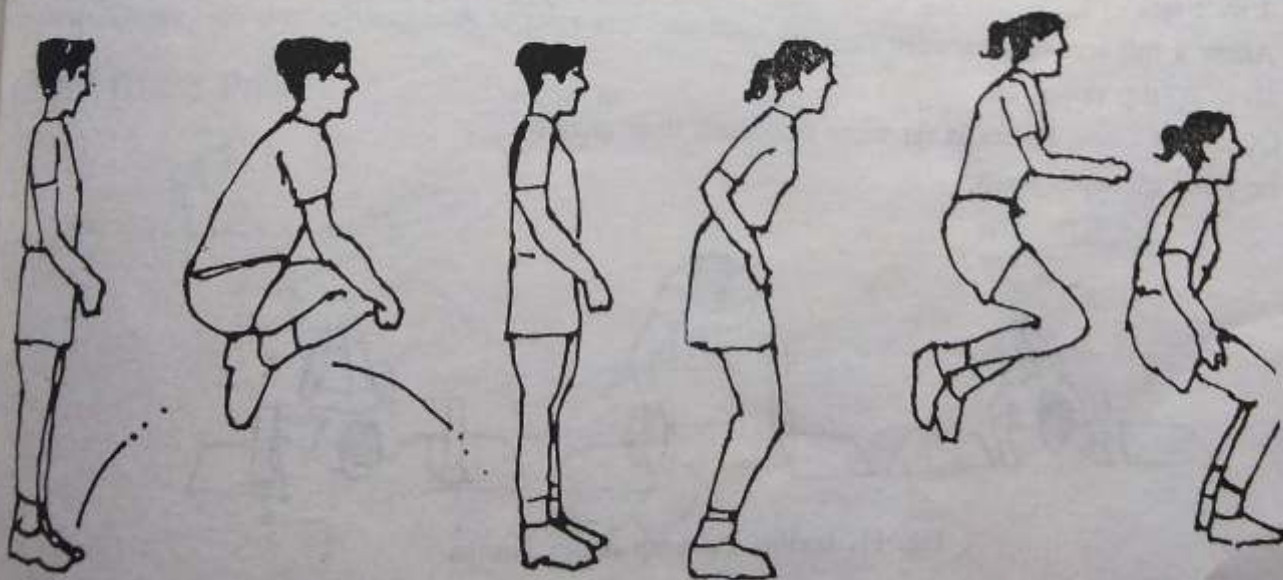


Fig. 9. (a) Tuck Jumps, (b) Two legged Hops or Bunny Hops

How to perform the drill

- Stand with your feet shoulder-width apart.
- Lower into a squat position and jump as far forward as possible.
- Land on then balls of both feet

- Try to keep your body vertical and straight, and do not let your knees move apart or to either side
- Try to anticipate the landing and spring up as quickly as you can,
- Keep the feet touch down time on the ground to the shortest time possible
- Use quick double-arm swings and keep landings short.

How much

- 1 to 3 sets
- Allow a full recovery between each set
- 5 to 10 repetitions/set
- Quality of Bunny Hops is far more important than quantity

Arm Plyometrics**Chest Pass****How to perform the drill**

- This drill requires a partner
- Stand facing each other with your feet shoulder width apart and your knees slightly bent
- Begin by holding the medicine ball with both hands at chest level, elbows pointing out
- Pass the ball to your partner, pushing it off your chest and ending with your arms straight.
- Your partner catches the ball, allows the ball to come to the chest before passing it back to you
- Try to anticipate the catch and return the ball as quickly as you can
- Keep the catch time to the shortest time possible

How much

- 1 to 3 sets
- Allow a full recovery between each set
- 10 to 20 repetitions/set
- Quality of Chest Passes is far more important than quantity

Incline Push up depth jump

Fig. 11. Incline Push up depth Jumps

How to perform the drill

- Two mats, three to four inches high, placed shoulder width apart
- A box high enough to elevate your feet above your shoulders when in a push-up position
- Face the floor as if you were going to do a push-up, with your feet on the box and your hands between the mats
- Push off from the ground with your hands and land with one hand on each mat

BASIC PRINCIPLES FOLLOWED FOR WEIGHT TRAINING

1. Maintain concentration and mental awareness while doing exercise with weights.
2. Proper rhythm of exercise must be maintained during exercise (2 seconds for the lift and 4 seconds for getting back to initial position)
3. Never extend knee and elbow joints fully to avoid injury.
4. While lifting weight exhale and inhale during lowering weight to initial position.
5. Start with smaller weight and gradually increase weight.
6. Use big muscles first and then go for smaller muscle during weight training exercise.
7. Give rest for 30 to 60 seconds between two sets.
8. For muscle recovery give 48 hours between two sessions of weight training programme.
9. Do weight training under guidance of the expert and follow a specific schedule for weight training.
10. Warming up and cooling down session must be there in weight training programme. ~~Thorough~~ Thorough warm up with stretching of muscles required before starting weight training and similarly cooling down is required to settle down the normal condition of the body.

3) STRENGTH ENDURANCE DEVELOPMENT:

Strength endurance is used to develop the athlete's capacity to carry out the quality of their muscles' contractile force under fatigue condition. Strength endurance can be developed with weight training, circuit training, fartlek, hill running etc. It has been discussed about circuit training method and weight training method in detail for development of strength and endurance through earlier paragraphs. Following paragraphs will give the idea of fartlek training and hill running methods.

Fartlek Training Method: - Fartlek is a Swedish term which means 'Speed Play' and useful for long distance runners. Fartlek may be done by Road running or Cross-Country manner in which athlete usually changes the pace significantly (as required) during the workout. This training programme is suitable for experienced athlete, as it is considered to be an advance training.

Fartlek is similar to Interval Training in that short fast runs followed with slow running or jogging recovery intervals. Here the athlete plan/set her/his own interval lengths and paces in response to their own feeling of pressure. This training helps an athlete to judge load pressure on his/her systems thereby develop self-awareness towards training. They are free to set any pace for any distance and for any purpose of course by considering their level of fitness, nature of activity and level of experience.

It is primarily a technique for advanced runners because it demands 'HONESTY' to put in a demanding workload, and 'Maturity' to not overdo the pace or length of the intervals.

For games players, the session should not just use running, but also jogging and walking to fit with the demands of the sport. Example, no Kho-Kho player actually runs for the whole 9 minutes of an inning. For varied. Similarly the running direction, the pace