

# 7 Test and Measurement in Sports

Read this new topic before Article 7.1 on page 139 of the main book.

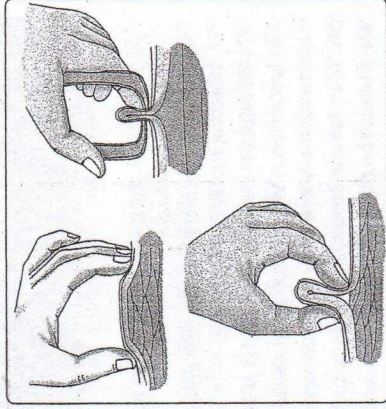
## 7.0 COMPUTATION OF FAT PERCENTAGE

Fat percentage of children, i.e., boys and girls can be easily calculated with the help of *Slaughter-Lohman children skinfold formula* that is given below.

- A. **Triceps and calf skinfold (Males 6 to 17 years)**  
Body fat percentage =  $(0.735 \times \text{sum of skinfold}) + 1.0$
- B. **Triceps and calf skinfold (Females 6 to 17 years)**  
Body fat percentage =  $(0.610 \times \text{sum of skinfold}) + 5.0$

Before using the formula it is essential to take the measurements of triceps and calf with the help of skinfold calipers. The following procedure is applied for measurements.

1. **Triceps Skinfold:** First of all ensure that the adult's or child's right arm is hanging loosely. Stand behind the subject and pull a vertical skinfold about half an inch about the already marked site, with the thumb and index finger pointing downward centering the mark. Keep the skinfold caliper perpendicular to the length of the fold, centering the mark. Then release the caliper and note the reading on the dial after approximately four seconds. Record the measurement to the nearest millimetres.
2. **Calf Skinfold:** The calf skinfold is measured on the inside of the right leg at the level of maximal calf girth. The right foot is placed flat on the elevated surface with the knee flexed at a 90° angle. The vertical skinfold should be grasped just above the level of maximal girth and the measurement is made below the grasp. The measurements are taken in millimetres.



Procedure for using skinfold calipers for measurements

Now, the measurements of triceps and calf can be computed to calculate the fat percentage.  
For example:

Suppose the measurements of triceps and calf of a male are 12 mm and 9 mm, respectively. Calculate his body fat percentage by using *Slaughter-Lohman children skinfold formula*.

$$\begin{aligned} \text{Body fat percentage} &= (0.735 \times 10 \text{ mm} + 9 \text{ m}) + 1 \\ &= (0.735 \times 19) + 1.0 \\ &= 13.965 + 1.0 \\ &= 14.965\% \end{aligned}$$

Read this new topic before Article 7.3 on page 145 of the main book.

### 7.2 A GENERAL MOTOR FITNESS

#### Barrow Three-item General Motor Ability Test

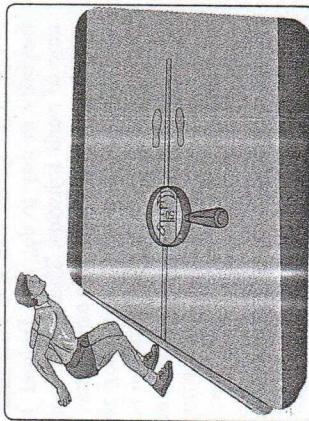
Motor abilities play a very vital role in achieving apex position in games and sports. Motor fitness involves speed, agility, power, coordination, strength and so on. These components of fitness are necessary for competing at top levels.

For measuring general motor fitness, the three-item test battery of Barrow is used. In this test, battery of three items such as standing broad jump, zig-zag run and medicine ball are used to measure the general motor ability of an individual. The details of administration of these tests are described below:

#### 1. Standing Broad Jump (for measuring leg strength)

**Equipment and material:** A mat of 5 x 12 feet and a measuring tape, if the mat is unmarked.

**Procedure:** A take-off line is marked on the ground. Subject stands just behind the take-off line with the feet several inches apart. The subject swings the arms and bends the knees to take a jump in the long jump pit. Three trials are given to the subject. The distance is measured from the take-off line to the heel or other part of body that touches the ground nearest to the take-off line. All jumps are measured and the best one is recorded.



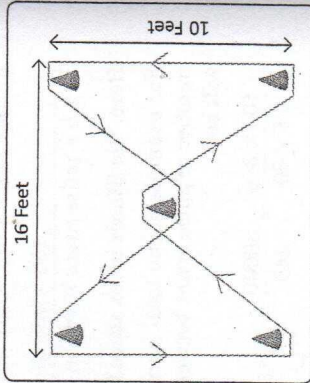
Standing broad jump

#### 2. Zig-Zag Run (for measuring agility and speed)

**Equipment and material:** Stopwatch, five obstacles and space enough to accommodate the 16 x 10 feet course.

**Procedure:** The subject begins from a standing start on the command to run. The subject runs the prescribed pattern stated to him as quickly as he can without gasping. Three

complete circuits are run. The stopwatch is started when the command to run is given and stopped immediately when the subject crosses the finish line. The time is recorded to the nearest tenth of a second. Before running the zig-zag run, the subject should warm up properly. The subject should wear proper fitting shoes with good traction to avoid blisters and slipping. Demonstration of the pattern of the course should be given by the administrator before the beginning of the run.

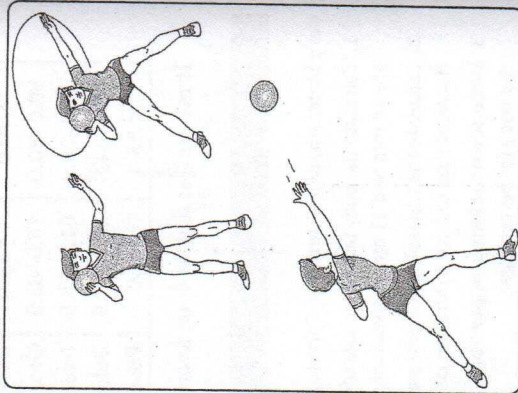


Zig-Zag run

#### 3. Medicine Ball Put (for measuring arm and shoulder strength)

**Equipment and material:** A medicine ball and measuring tape.

**Procedure:** The subject stands between two restraining lines which are 16 feet apart. In case of girls, a medicine ball of 1 kg is provided, whereas in case of boys a medicine ball of 3 kg is provided to be put. After that he/she attempts to put the medicine ball out as far as possible without crossing the restraining line. He/she should hold the medicine ball at the junction of the neck and shoulder then the ball should be put straight down the course. Three trials are given to him/her. The best of three trials is recorded. The distance is computed to the nearest foot. A put in which the subject commits a foul is not scored. However, if all the trials are fouls, subject he/she should try until he/she make a fair put.



Medicine ball put

Read this new topic before Article 7.4 on page 148 of the main book.

### 7.3 A COMPUTATION OF FITNESS INDEX

#### Calculation of the Fitness Index Score

The athlete's fitness index score is calculated with the help of two formulae.

$$1. \text{ Fitness index score (Long term)} = \frac{100 \times \text{test duration in seconds}}{2 \times \text{sum of heartbeats in recovery period}}$$

2. Fitness index score (short term)

$$= \frac{100 \times \text{test duration in seconds}}{5.5 \times \text{pulse count between 1 to 1.5 minutes after exercise}}$$

Here, the fitness index score is calculated with short term formula.

For example, if the total number of test duration of a girl was 300 seconds and the number of pulse count between 1 to 1.5 minutes was 80 then her fitness index score will be:

$$= \frac{100 \times 300}{5.5 \times 80} = \frac{30000}{440} = 68.18$$

Fitness Index Score		Rating
Male	Female	
> 90.0	> 86.0	Excellent
80.0–90.0	76.0–85.9	Good/above average
65.0–79.9	61.0–75.9	Average
55.0–64.9	50.0–60.9	Below average
< 55	< 50	Poor

It means her fitness is on average.

## Exercises

### Very Short Answer Questions Carrying 1 Mark (20 to 30 words)

1. Calculate the body fat percentage of a 15 year old boy whose triceps and calf skinfold measurements are 14 mm and 11 mm respectively by using Slaughter–Lohman children skinfold formula.
2. Calculate the fitness index score using short term formula for a 13 year old boy having completed Harward step test for a duration of 180 seconds and his pulse count is 64 for 1 to 1.5 minutes.
3. Write down the formulae given by Slaughter/Lohman children skinfold for girls and boys to calculate the body fat percentage.
4. How will you calculate the fitness index score using the short term formula.

### Short Answer Question Carrying 3 Marks (80 to 90 words)

1. Discuss the zig-zag run for measuring agility and speed in detail.

### Long Answer Question Carrying 5 Marks (150 to 200 words)

1. Elucidate the three item test battery for general motor fitness propounded by Barrow in detail.