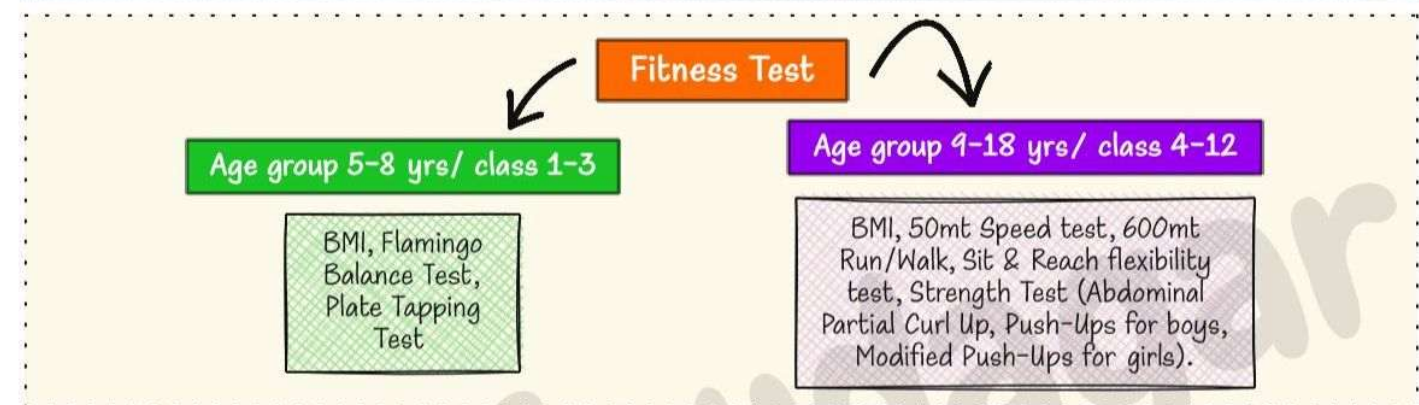


Unit 6 | Test & Measurements in Sports

Fitness Test — SAI Khelo India Fitness Test in school:

Fitness defines the ability to perform physical activity and encompasses a wide range of abilities. Each activity and sports requires a specific set of skills, and so being fit for an activity or a sport does not necessarily make a person fit for another. Fitness is generally divided into specific fitness categories or components, and each can be tested and trained individually.



BMI

Body Composition refers primarily to the distribution of muscle and fat in the body. Body size such as height, lengths and girths are also grouped under this component. The test performed is Body Mass Index (BMI), which is calculated from body Weight (W) and Height (H) such as:

$$\text{BMI} = \frac{\text{weight in kg}}{(\text{height in m})^2}$$

Where: W = body weight in kg & H = height in m. The higher the score usually indicating higher levels of body fat.

Equipments Required:

Flat, Clean surface, Weighing Machine, Stadiometer/Measuring Tape pasted on a wall

Plate Tapping

Purpose: It measures speed & coordination of limb movement of children.

Equipment: Table (adjustable height), 2 yellow discs (20cm diameter), Rectangle (30 x 20 cm), Stopwatch

Procedure: If possible, the table height should be adjusted so that the subject is standing comfortably in front of the discs. The two yellow discs are placed with their centers 60 cm apart on the table. The rectangle is placed equidistant between both discs. The non-preferred hand is placed on the rectangle. The subject moves the preferred hand back & forth between the discs over the hand in the middle as quickly as possible. This action is repeated for 25 full cycles (50 taps).



Plate Tapping Method



Flamingo Balance Test

Flamingo Balance

Purpose It measures the ability to balance successfully on a single leg. This single-leg balance test assesses the strength of the leg, pelvic, and trunk muscles as well as static balance.

Equipment Required: Non-Slippery even surface, Stopwatch, can be done just standing on the beam

Procedure: Stand on the beam. Keep balance by holding the instructor's hand (if required to start).

While balancing on the preferred leg, the free leg is flexed at the knee and the foot of this leg is held close to the buttocks. Start the watch as the instructor lets go of the participant/subject. Pause the stopwatch each time the subject loses balance (either by falling off the beam or letting go of the foot being held). Resume over, again timing until they lose balance. Count the number of falls in 60 seconds of balancing. If there are more than 15 falls in the first 30 seconds, the test is terminated.

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50m Standing Test

Purpose - to determine the speed.

Equipment- measuring tape or Marked track , Stopwatch

Procedure - The test involves running a single maximum sprint over 50 meters, with the time recorded. A thorough warm up should be given, including some practice starts and accelerations. Start from a stationary standing position (hands cannot touch the ground), with one foot in front of the other.

Abdominal Curl Test

Purpose - To test the strength and endurance of abdominal muscles

Equipment - a flat clean and cushioned surface, recording sheet

Procedure - The starting position is lying on the back with the knees flexed and feet 12 inches from the buttocks. The feet cannot be held or rest against an object. The arms are extended and are rested on the thighs. The head is in a neutral position. The subject curls up with a slow controlled movement, until the student's shoulders come off the mat two inches, then back down again. One complete curl-up is completed every three seconds (1.5 seconds up and 1.5 seconds down, with no hesitation), and are continued until exhaustion (e.g. the subject cannot maintain the rhythm). There is no pause in the up or down position, the curl-ups should be continuous with the abdominal muscles engaged throughout

Pushup Test-Boys

Purpose - To measure upper body strength & endurance

Equipment - floor mat record sheet

Procedure - A standard push-up begins with the hands and toes touching the floor, the body and legs in a straight line, feet slightly apart, the arms at shoulder-width apart, extended and at a right angle to the body. Keeping the back and knees straight, the subject lowers the body to a predetermined point, to touch the ground or some other object, or until there is a 90-degree angle at the elbows, then returns back to the starting position with the arms extended. This action is repeated without rest, and the test continues until exhaustion, or until they can do no more in rhythm or have reached the target number of push-ups.

600m Run Test

Purpose - To measure endurance

Equipment - 600 metre track and stopwatch

Procedure - the subject clicks the position of standing right behind the starting line. At the signal of 'GO' the subject starts running 600 yard distance. Time is recorded in minute and seconds

Sit and Reach

Purpose - to measure the flexibility of hip region including back and hamstring

Equipment - Sit and reach box

Procedure - This test involves sitting on the floor with legs stretched out straight ahead. Shoes should be removed. The soles of the feet are placed flat against the box. Both knees should be locked and pressed flat to the floor, the tester may assist by holding them down. With the palms facing downwards, and the hands on top of each other or side by side, the subject reaches forward along the measuring line as far as possible. Ensure that the hands remain at the same level, not one reaching further forward than the other. After some practice reaches, the subject reaches out and holds that position for at one-two seconds while the distance is recorded. Make sure there are no jerky movements.

Pushup Test-Girls

Purpose - to measure the upper body strength & endurance

Equipment - set and reach box

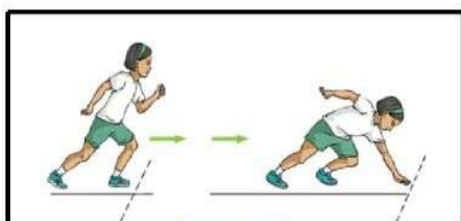
Procedure : Begin in a kneeling position on a mat with hands below shoulders and knees behind hips so back is angled and long. Tuck toes under, tighten abdominals, & bend elbows to lower chest toward the floor. Keep your gaze in front of your fingertips so neck stays long. Press chest back up to start position. Repeat for desired number of repetitions.



Abdominal Curl Test



Sit & Reach Test



50m or 600m Test



Push-Up Test



Modified Push-Up Test

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Measurement of Cardio-Vascular Fitness

Cardiovascular fitness refers to the ability of our heart, lungs & organs to consume, transport and utilize oxygen. The maximum volume of oxygen our body can consume and use is our $\dot{V}O_{2\text{Max}}$. When we exercise regularly, we can increase our cardiovascular fitness as our heart becomes more efficient at pumping blood and oxygen to the body, & the body becomes more efficient at using that oxygen.

Harvard Step Test

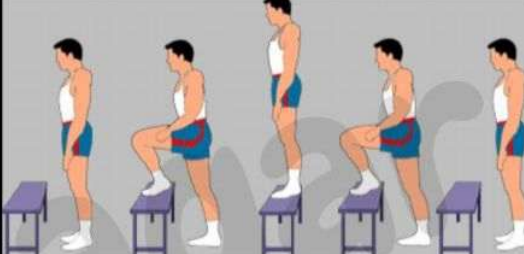
The purpose of this test is to predict a client's aerobic fitness using a simple test with minimal equipment.

Equipment required: Step or platform 50.8 cm high, stopwatch, metronome or cadence tape.

Procedure: The client steps up onto, & back down from the step at a rate of 30 completed steps per minute (one second up, one second down) for 5 minutes or until exhaustion. Exhaustion is defined as when the client cannot maintain the stepping rate for 15 continuous seconds. The client immediately sits down on completion of the test, and the total number of their heart beats are counted from 1 to 1½ minutes after finishing and from 2 to 2½ minutes after finishing and finally from 3 to 3½ minutes after finishing. The client's heart beats are counted through feeling the client's pulse at their wrist.

Scoring: the client's fitness index score is then determined by the following equations.

Fitness Index = $(100 \times \text{test duration in seconds}) \div (2 \times \text{sum of heart beats in the recovery periods})$



Rating	Fitness Index
Excellent	>90
Good	80-89
High average	65-79
Low average	55-64
Poor	<55

Basal Metabolic Rate (BMR)

Basal Metabolic Rate (BMR) is the number of calories our body needs to accomplish its most basic (basal) life-sustaining functions such as breathing, circulation, nutrient processing and cell production. Around 60–75% of our daily calories are burned during these processes.

It is the rate of one's metabolism when waking up in the morning after fasting during sleep.

The BMR is enough energy for the brain and central nervous system, heart, kidneys, liver, lungs, muscles, sex organs, and skin to function properly.

In fact, their BMR is usually faster to accommodate for extra fat and for their body to work harder to perform normal body functions. Building lean muscle mass can increase BMR, but there is a limit for both men and women as to how much lean muscle mass can be built. Some supplements may increase BMR, but also only to a limit, and they may have serious side effects.

- For men:** $\text{BMR} = 88.362 + (13.397 \times \text{weight in kilograms}) + (4.799 \times \text{height in centimetres}) - (5.677 \times \text{age in years})$
- For women:** $\text{BMR} = 447.593 + (9.247 \times \text{weight in kilograms}) + (3.098 \times \text{height in centimetres}) - (4.330 \times \text{age in years})$

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Rikli and Jones test [For Senior Citizen]

The Rikli & Jones Senior Fitness Test is a standardised assessment tool used to evaluate the physical fitness of older adults aged 60 years and older. The test includes physical performance measures, including strength, flexibility, balance, endurance and coordination. The results can be used to identify areas of physical fitness that need improvement and to develop personalised exercise programs to help seniors maintain or improve physical health.

Chair Stand Test



Purpose - To measure the lower body strength

Equipment - chair with the straight back and seat of at least 44 cm & stopwatch

Procedure : The person stands up from the chair and sits down again as many times as possible in a given time frame, usually 30 seconds. The movements should be smooth and controlled, without using the arms to push off the chair or to balance. The feet should always stay in contact with the floor. Repeat the test 2 times on each leg.

Arm Curl Test



Purpose - To measure the upper body strength and endurance

Equipment - 5 pound weight for women and 8 pound weight for men, chair without arms and stopwatch

Procedure : The arm must be fully bent and then fully straightened at the elbow. The protocol for the AAHPERD test describes the administrator's hand being placed on the biceps, and the lower arm must touch the tester's hand for a full bicep curl to be counted. Repeat this action as many times as possible within 30 seconds.

Chair Sit & Reach



Purpose - To measure the flexibility of lower body

Equipment - A sturdy chair without arms, a ruler or measuring tape & a flat surface are required for the test.

Procedure: The person reaches forward along the ruler or measuring tape with both hands, keeping the legs straight and the feet flat on the floor. The person should reach as far as possible without bending the knees and hold the position for at least 2 seconds. The distance reached is recorded in centimetres or inches.

Back Scratch Test

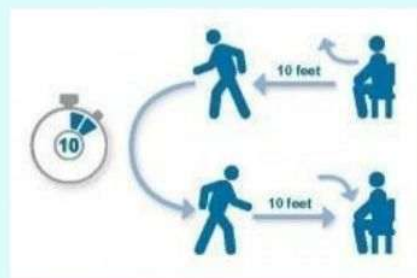


Purpose - To measure the flexibility of shoulder or upper body

Equipment - ruler back stretch test

Procedure : This test is done in the standing position. Place one hand behind the head and back over the shoulder, and reach as far as possible down the middle of your back, your palm touching your body and the fingers directed downwards.

Eight foot up & go Test



Purpose: This test measures speed, agility and balance while moving.

Equipment required: stopwatch, straight back or folding chair (about 17 inches), cone marker, measuring tape, area clear of obstacles.

Procedure: The person stands up from the chair, walks forward three metres, turns around and walks back to the chair. The time taken is recorded using a timer. The movements should be smooth and controlled, without excessive speed or hurry.

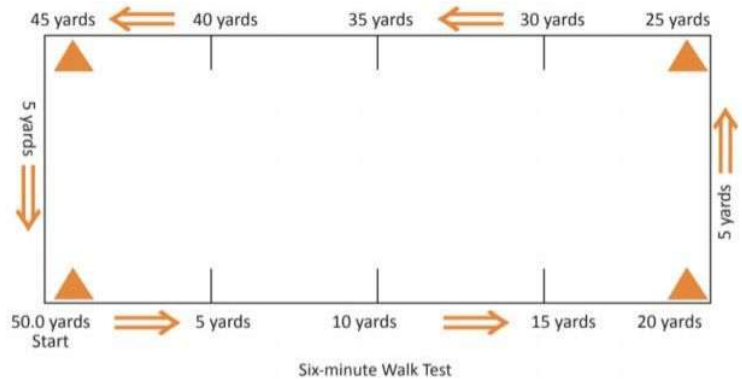
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6 min Walk Test

Purpose: This test helps to assess the aerobic fitness or aerobic endurance of a person which is an essential component for walking distances, stair climbing, shopping, sightseeing, etc.

Equipment Required: A measuring tape, a stopwatch.

Procedure: The walking distance or course is marked i.e., 45.72 m or 50 yards in a rectangular area (20 × 5 yards) of 5 yards with cones placed at regular intervals to indicate the distance covered. Efforts are made to walk maximum distance as quickly as possible in six minutes. A practice trial is given to the participant. He may stop any time if he desires so.



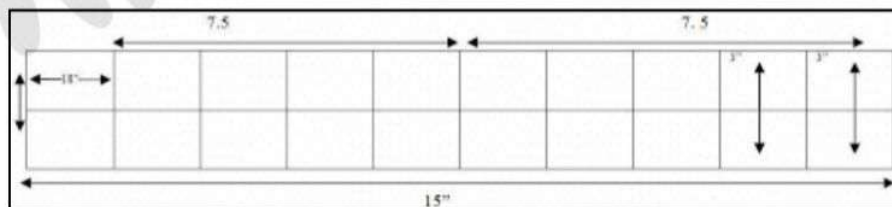
Johnsen-Methney test of Motor Educability

Purpose: The Metheny-Johnson test is actually a test used to evaluate the physical abilities of athletes, & it measures factors such as strength, agility, and speed. It may indirectly assess some aspects of neuromuscular function.

This Test consist of four motor stunts are given below:

1. Front Roll
2. Back Roll
3. Jumping Half-Turns
4. Jumping Full-Turns

TEST AREA: Mat area length is 15 feet and it is 2 feet wide
And the 15 feet length divided into 10 sections.



Front Roll: Ignoring the long middle dividing line, the subject is asked to start outside the marked area and perform two front rolls, one upto 7.5' i.e. 3" wide centre line and the other in the second half of 7.5. The subject is to perform the rolls without touching the limits or over reaching the zones mentioned above.

Scoring: Each correct roll gets 5 points, hence maximum of 10 points. Two points are deducted for over reaching side line, right or left for each roll; one point is deducted for over reaching the end limit on each roll and full five points are deducted when the subject fails to perform a true front roll.

Back Roll: The test is similar to front roll both in performing and scoring. The subject is to start outside the marked chart area and is to 'perform two back rolls in the 2 feet lane area, one upto first half' and the second back roll in the second half

Jumping Half Turns: The subject is asked to start with feet on first 3 inch line, jump with both feet to second 3 inch wide line, executing a half turn. either right or left; jump to third 3 inch line executing half turn in opposite direction to first half-turn and then to 4th and 5th 3" wide lines executing half turns, right or left alternatively.

Scoring: Perfect execution of four jumps is worth ten points. Only 2 points are deducted for each wrong jump when the subject either does not land with both feet on the 3 inch line or turns the wrong way or both.

Jumping Full Turns: The subject is asked to start with the feet outside the marked area at about the centre of the lane. He/She is required to jump with feet together to second rectangular space, executing a full turn with the body either right or left; continue jumping to alternate rectangular spaces across the marked mat executing full turns, rotating body in the same direction, landing on both feet every time.

Scoring: Perfect execution of five jumps is worth ten points. Two points are deducted, if the subject fails to keep balance on landing on both feet, turns too far or oversteps the squares.