

UNIT- VI

TEST AND MEASUREMENT IN SPORTS



CONTENT:

TEST AND MEASUREMENT IN SPORTS

- i. Fitness Test – SAI Khelo India Fitness Test in school
- ii. Measurement of Cardio-Vascular Fitness – HARVARD Step Test
- iii. Computing Basal Metabolic Rate (BMR)
- iv. Rikli & Jones - Senior Citizen Fitness Test
- v. Johnsen – Methney Test of Motor Educability

LEARNING OBJECTIVES

- Understand the concept and importance of test and measurement in sports and physical education.
- Gain the ability to design and conduct fitness assessments based on scientific protocols.
- Learn to collect, analyze, and interpret data for athlete performance enhancement.
- Develop skills to evaluate different fitness components such as strength, endurance, flexibility, and agility.
- Apply test results to plan and improve training programs effectively.
- Explore career opportunities in sports science and allied health fields.
- Enhance knowledge of performance tracking techniques using standard testing procedures.

LEARNING OUTCOMES

- Ability to assess fitness using standard protocols.
- Evaluate and interpret physical performance data accurately.
- Identify strengths and weaknesses of athletes.
- Use test outcomes to improve athletic training.
- Explore professional opportunities in sports science and education.

Test and measurement in sports help assess an individual's physical fitness, strengths, and weaknesses. It includes different types of tests like flexibility, strength, endurance, and agility tests, including the HARVARD Step Test and Senior Citizen Fitness Test. BMR (Basal Metabolic Rate) helps in understanding energy needs and planning one's diet for weight management. Data collected from tests is used to improve training and performance. This knowledge also supports careers like fitness trainer, sports scientist, and analyst.

UNIT - 6

MIND MAP

WEIGHTAGE MARKS
(08)

TEST & MEASUREMENT IN SPORTS

Test and measurement in sports involve evaluating physical abilities, tracking progress, and optimizing athletic performance. It helps coaches and athletes understand strengths, weaknesses, and overall fitness levels.

01

FITNESS TEST – SAI Khelo India Fitness Test in school:
Age group 5-8 years/ class 1-3:

- **Body Composition** (BMI)
- **Coordination** (Plate Tapping)
- **Balance** (Flamingo Balance)

Age group 9 18yrs/ class 4-12:

- **Body Composition** (BMI)
- **Strength:**
 - a. *Abdominal* (Partial Curl-up)
 - b. *Muscular Endurance* (Push Ups for Boys, Modified Push Ups for Girls)
- **Flexibility** (Sit and Reach Test)
- **Cardiovascular Endurance** (600 Meter Run/Walk)
- **Speed** (50 mt. Dash)

02

MEASUREMENT OF CARDIO VASCULAR FITNESS –

Harvard Step Test – Duration of the Exercise in Seconds $\times 100/5.5 \times$ Pulse count of 1-1.5 Min after Exercise.

- *To make students to determine Physical Fitness Index (PFI) through*

03

JOHNSEN – METHNEY TEST - Motor Educability

- **Front Roll**
- **Back Roll**
- **Jumping Half-Turns**
- **Jumping Full-Turns**

05

RIKLI & JONES - Senior Citizen Fitness Test

- **Chair Stand** : Test for lower body strength
- **Arm Curl** : Test for upper body strength
- **Chair Sit & Reach** : Test for lower body flexibility
- **Back Scratch** : Test for upper body flexibility
- **Eight Foot Up & Go** : Test for agility
- **Six-Minute Walk** : Test for Aerobic Endurance

04

COMPUTING BASAL METABOLIC RATE (BMR) -

- To make students to calculate Basal Metabolic Rate (BMR)

FITNESS TEST – SAI KHELO INDIA FITNESS TEST IN SCHOOL

Launched by the **Sports Authority of India (SAI) under the Khelo India Programme in 2018**, this test promotes fitness awareness in school children. It measures strength, speed, flexibility, endurance, and BMI. Includes 50m sprint, bent arm hang, and agility tests. It helps track student fitness progress nationally.

AGE GROUP 5-8 YRS./ CLASS 1-3:

- BMI : To assess Body Composition
- Flamingo Balance Test: To assess Balancing ability
- Plate Tapping Test : To assess neuro muscular Coordination

BODY COMPOSITION: BODY MASS INDEX (BMI)

Definition: BMI is a method used to assess whether a person has a healthy body weight for their height.

Equipment Required: Flat, Clean surface, Weighing Machine, Stadiometer/Measuring Tape pasted on a wall Procedure:

Measuring Height: The measurement need to be taken while the participant stands with head, shoulders, buttocks, and heels touching the flat surface.

Measuring Weight: The participants are asked to remove shoes and heavy clothing, such as sweaters. Then they are asked to stand with both feet in the centre of the scale and to look straight.

Formula:

$$\text{BMI} = \frac{\text{Weight (kg)}}{\text{Height (m)}^2}$$

Example:

A student weighs **60 kg** and is **1.65 meters** tall.

$$\text{BMI} = \frac{60}{1.65^2} = \frac{60}{2.7225} \approx 22.04$$

→ This student has a **normal BMI**.

FLAMINGO BALANCE TEST



Equipment Required: Non-slippery even surface, Stopwatch, can be done while standing on beam.

Purpose: To assess static balance, which is the ability to maintain the body in a fixed position without swaying or falling.

Procedure:

1. The student stands on the beam on one leg (e.g., right leg), bending the free leg at the knee and holding the foot close to the buttocks with the same-side hand.
2. The student starts balancing as soon as the stopwatch starts.
3. Every time the student loses balance (touches the floor, lets go of foot, or falls off the beam), it counts as one fault.
4. The total number of faults in 30 seconds is recorded.
5. The test can be repeated twice, and the best score is taken.



Scoring:

- The total number of falls or loss of balance in 60 seconds of balancing is recorded. If there are more than 15 falls in the first 30 seconds, the test is terminated.
- **Lower number of faults = better balance**
- For example:
3 faults in 30 seconds → Good balance
10 faults → Poor balance

PLATE TAPPING TEST

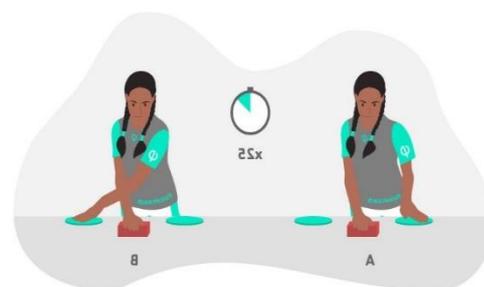
Purpose: To measure upper body reaction time, speed, and coordination of hand movement.

Equipment Needed:

- A table
- Two plastic plates (or discs) – placed 60 cm apart
- A rectangle (20 cm × 10 cm) marked in the center between the plates
- Stopwatch

Procedure:

1. The student stands in front of the table.
2. Place the non-dominant hand (left hand for right-handed person) on the rectangle and keep it there.
3. When told to start, the student uses the dominant hand (right hand) to touch each plate alternately as fast as possible.
4. The student must tap each plate 25 times (making 50 taps total).
5. The stopwatch is started at the first tap and stopped after the 50th tap.



Scoring:

- The total time taken to complete 50 taps is recorded in seconds.

- Less time = better coordination and speed

AGE GROUP 9- 18YRS/ CLASS 4-12:

BMI

(Same as described in the test of Age group 5-8 yrs./ Class 1-3)

50M SPEED TEST

Purpose: To assess the component of Speed

Procedure & Scoring: The individual runs a distance of 50 m with full speed and the time to cover this distance is recorded in seconds and milliseconds.

600MT RUN/WALK

Purpose: To assess Cardio-vascular endurance

Procedure & Scoring: The individual runs/walk a distance of 600 m and the time to cover this distance is recorded in minutes and seconds.

SIT & REACH FLEXIBILITY TEST

Purpose: To assess Flexibility

Procedure & Scoring: The individual sits in flat surface with the feet touching flat to the sit and reach box. He/she needs to extend the arm and bend forward to touch the measuring scale in the upper surface of the box, while keeping the knees straight. The distance is recorded in centimeters

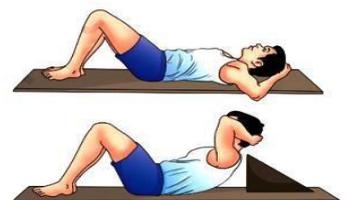


ABDOMINAL PARTIAL CURL UP

Purpose: To assess Muscular Endurance

Procedure & Scoring: The individual lie on a flat surface with palm touching downward by the side of the body.

He/she then raise body and slide the hand forward to the distance of 6" and moves back. Number of correct repetitions is recorded for 30 sec.



PUSH-UPS (FOR BOYS)

Purpose: To assess Muscular Strength

Procedure & Scoring: The individual lie on proline position with arm extended with palm by the side of the shoulder and the ankle, hip and shoulder in the same line. He/ She flexes the arm



to move down and comes back to the initial position. The number of correct repetitions in 1 minute is recorded.

MODIFIED PUSH-UPS (FOR GIRLS)

Purpose: To assess Muscular Strength

Procedure & Scoring: Same as push up with knees touching the ground.



MEASUREMENT OF CARDIO-VASCULAR FITNESS – HARVARD STEP TEST

Developed by Belgian-American physiologist Lucien Brouha and his associates in 1943 at the HARVARD Fatigue Laboratories during World War II.

Objective: To measure cardio vascular efficiency, Aerobic Fitness and Recovery rate.

Equipment: Stopwatch, a platform 20 inches high (men), 18 inches for women.

Procedure: The participant is asked to step-up on the platform and down again at a rate of 30 steps/minute for 5 minutes continuously or until he gets exhausted.

Scoring: As soon as the participant completes the cycle, he is asked to sit-down and the total number of heartbeats are counted between 1 to 1.5 minutes, 2 to 2.5 minutes and 3 to 3.5 minutes. The score is based on following formula:

LONG FORM:

Procedure:

1. The subject steps up and down on a bench or platform (height: 20 inches for men, 16 inches for women) at a rate of **30 steps per minute**.
2. The stepping continues for a **maximum of 5 minutes (or 150 steps)** or until exhaustion.
3. After stopping, the subject sits down, and **pulse is recorded** at:
 - 1 to 1.5 minutes after exercise (Pulse1)
 - 2 to 2.5 minutes (Pulse2)
 - 3 to 3.5 minutes (Pulse3)

Scoring Formula:

Fitness Index (FI) = Duration of Exercise in Seconds \times 100 \div (Pulse1+Pulse2+Pulse3) \times 2

Interpretation of Score:

- Above 90 = Excellent
- 80–89 = Good
- 65–79 = Average
- Below 65 = Poor

SHORT FORM

Test Name: Harvard Step Test

Purpose: To assess cardiovascular fitness

Duration: 5 minutes or until exhaustion

Step Height: 20 inches (men), 16 inches (women)

Step Rate: 30 steps per minute

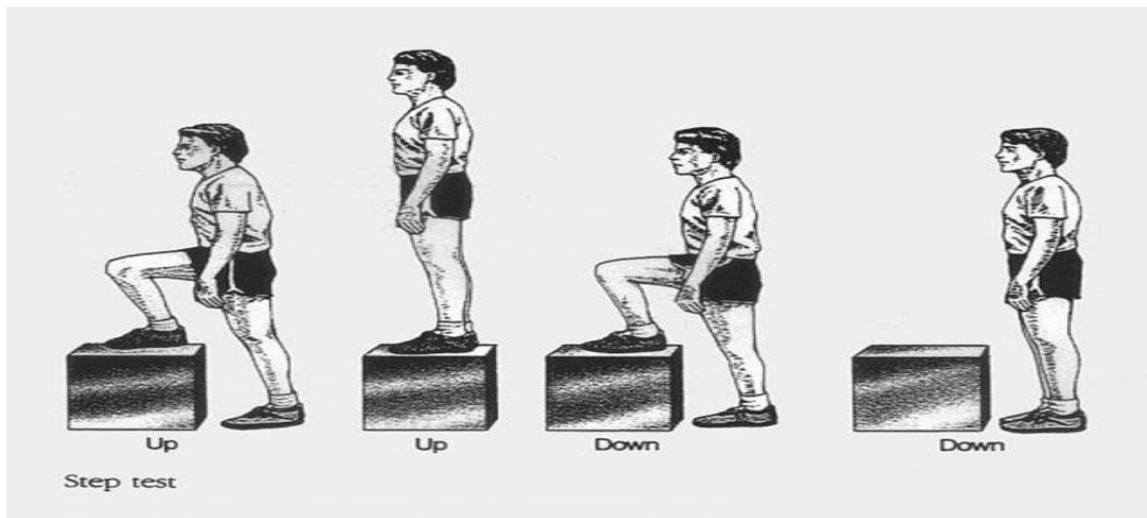
Pulse Taken: 3 times after test (1-1.5 min, 2-2.5 min, 3-3.5 min)

Score Formula:

$(\text{Exercise Duration in Seconds}) \times 100 \div (\text{Sum of 3 pulse readings}) \times 2$

Fitness Levels:

- 90 Excellent,
- 80–89 Good,
- 65–79 Average,
- <65 Poor



COMPUTING BASAL METABOLIC RATE (BMR)

Basal metabolic rate (BMR) estimates the minimum number of calories a person needs to burn to sustain their basic life functions during a 24-hour period of rest.

Equipment: Stadiometer, Weight machine, Pen and paper

Procedure: Measure Height and Weight and put the values in the equations below



Formula used: The Mifflin-St Jeor BMR Equation

Male: $(10 * \text{weight (kg.)}) + (6.25 * \text{height (cm)}) - (5 * \text{age}) + 5$

Female: $(10 * \text{body weight (kg.)}) + (6.25 * \text{height (cm)}) - (5 * \text{age}) - 161$

IMPORTANCE OF BMR:-

1. Helps in Weight Management

– Understanding BMR helps determine how many calories you need daily to maintain, gain, or lose weight.

2. Personalized Diet Planning

– BMR allows nutritionists and dieticians to create customized meal plans based on your energy needs.

3. Guides Exercise and Fitness Goals

– Knowing BMR helps set realistic fitness goals by estimating total daily energy expenditure (TDEE).

4. Monitors Metabolic Health

– Abnormally low or high BMR can indicate hormonal or metabolic disorders like hypothyroidism or hyperthyroidism.

5. Improves Athletic Performance

– Athletes use BMR to ensure they are fueling their bodies with adequate energy for performance and recovery.

RIKLI & JONES - SENIOR CITIZEN FITNESS TEST

The assessments was designed by **Rikli and Jones in 2001** at California State University, Fullerton. The test items of Rikli & Jones Senior Citizen Fitness Test are:

ARM CURL TEST

Objective: To assesses upper-body strength.

Procedure: On the command “Go” the individual flexes the elbow or curls the arm with full range of motion then returns back to its initial position. (Dumbbell for men- 8 pounds (3.6kgs) and women- 5 pounds (2.3kgs)

Scoring: Maximum number of correct arm curls in 30 second



SCRATCH TEST OF THE BACK

Objective: To assess upper body flexibility.

Procedure: In standing position participant will place one hand over the shoulder and one hand middle of the back and try to touch or overlap each other.

Scoring: Measurement will be taken by measuring the distance between the tips of the middle fingers. If the fingertips touch, then the score is zero. If they do not touch, measure the distance between the finger tips (a negative score), if they overlap, measure by how much (a positive score).



CHAIR STAND TEST

Objective: To assess lower body strength.

Procedure: On the command “Go” the individual will stand up completely, then return back to the initial position.

Scoring: Maximum number of complete stands in 30 seconds.

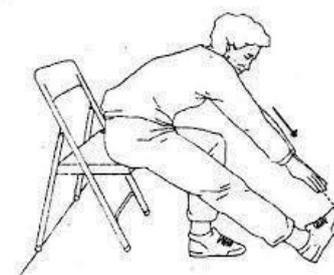


CHAIR SIT & REACH TEST

Objective: To assess lower body flexibility.

Procedure: Participant sits on the chair with one foot flat on the floor and the other leg extended forward with the knee straight, heel on the floor, and ankle bent at 90°. The participant, then, tries to touch the toe of that foot by bending at the hip and sliding her/his hands towards the toes.

Scoring: Measurement will be taken between extended long finger and tip of the toe and minimum to .5 inches will be recorded as score



EIGHT-FOOT UP AND GO TEST

Objective: To assess speed and agility.

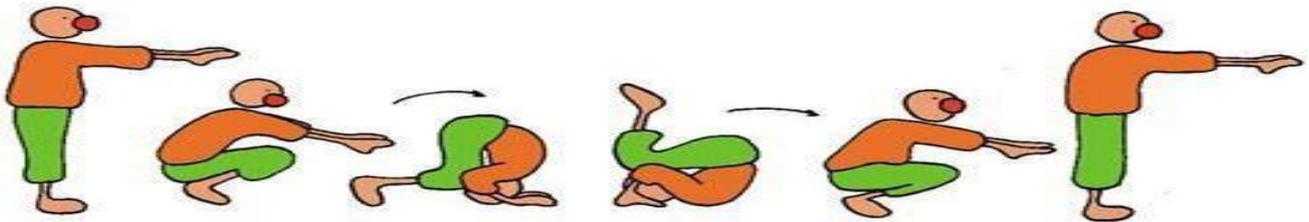
Procedure: The participant sits in the chair, hands on thighs, feet flat on the floor.

- On the command “Go!”, the stopwatch starts.
- The participant:
 1. **Stands up** from the chair
 2. **Walks** (as quickly and safely as possible) to the marker **8 feet away**
 3. **Turns around** the marker



FRONT ROLL

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

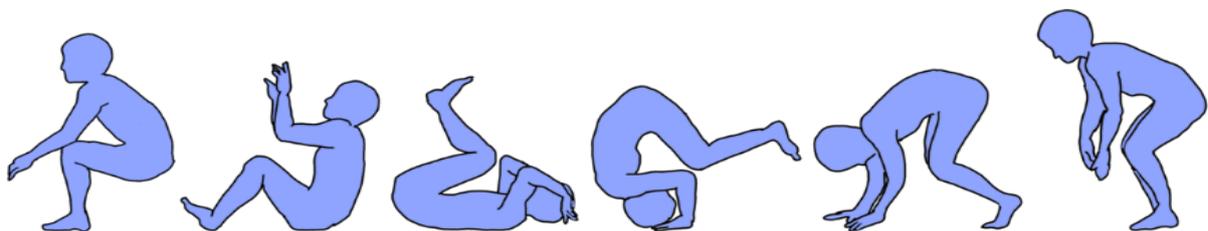


Scoring: Each correct roll gets 5 points, hence maximum of 10 points. Two points are deducted for over-reaching side line, right or left for each roll; one point is deducted for over reaching the end limit on each roll and full five points are deducted when the subject fails to perform a true front roll

BACK ROLL

Procedure: The subject is to start outside the marked chart area and is to 'perform two back rolls in the 2 feet lane area, one up to first half and the second back roll in the second half.

Scoring: Similar as Front Roll Test.



JUMPING HALF TURNS

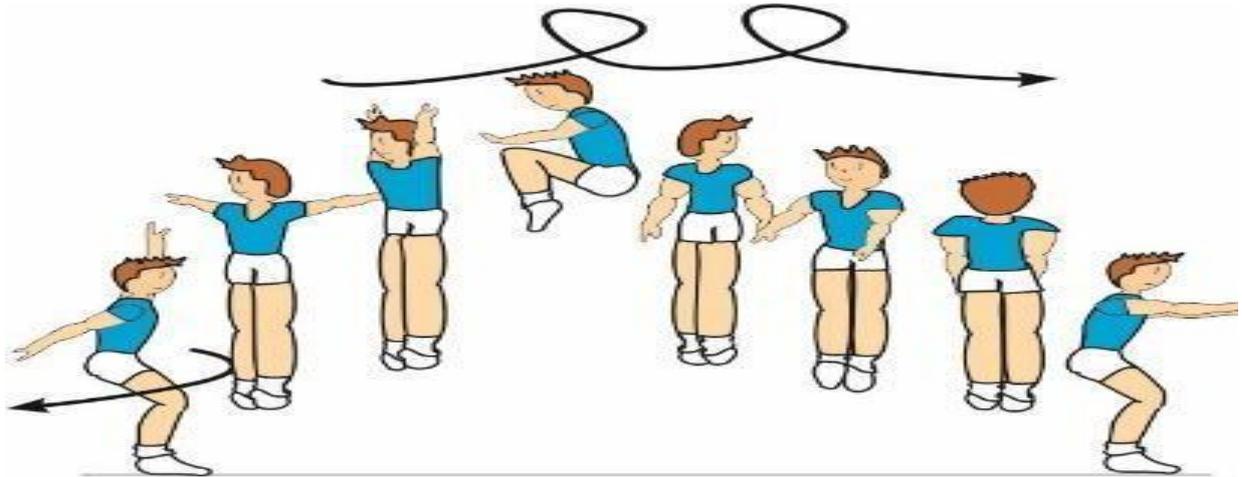
Procedure: The subject is asked to start with feet on first 3" line, jump with both feet to second 3" wide line, executing a half turn either right or left; jump to third 3" line executing half turn in opposite direction to first half-turn and then to 4th and 5th 3" wide lines executing half turns, right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



JUMPING FULL TURN

Procedure: 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.

MULTIPLE CHOICE QUESTIONS:

01Marks

1. Which of the following is used to measure cardiovascular endurance?

- A. Sit and Reach Test
- B. 50 Meter Dash
- C. HARVARD Step Test
- D. Standing Broad Jump

Answer: C. HARVARD Step Test

2. The 'Sit and Reach Test' is primarily used to assess:

- A. Muscular strength
- B. Flexibility
- C. Agility
- D. Endurance

Answer: B. Flexibility

3. Which test is used to measure abdominal strength?

- A. Pull-Up Test
- B. 600 Meter Run
- C. Sit-Up Test
- D. Shuttle Run

Answer: C. Sit-Up Test

4. Which test is suitable for assessing agility in school children?

- A. 50 Meter Sprint
- B. Shuttle Run

- C. Vertical Jump
- D. Skinfold Measurement

Answer: B. Shuttle Run

5. What is the primary purpose of measurement in physical education?

- A. To compete with others
- B. To evaluate physical fitness and performance
- C. To assess academic performance
- D. To determine grades in other subjects

Answer: B. To evaluate physical fitness and performance

6. Which of the following is a test for upper body strength?

- A. Push-Up Test
- B. Sit and Reach Test
- C. 600 Meter Run
- D. Shuttle Run

Answer: A. Push-Up Test

7. The purpose of the Standing Broad Jump test is to measure:

- A. Agility
- B. Flexibility
- C. Explosive leg power
- D. Reaction time

Answer: C. Explosive leg power

8. Which of the following is used to assess speed?

- A. 50 Meter Dash
- B. Sit-Up Test
- C. Sit and Reach Test
- D. HARVARD Step Test

Answer: A. 50 Meter Dash

9. Which is component of fitness tested by the "Arm Curl Test"?

- A. Endurance
- B. Strength
- C. Agility
- D. Balance

Answer: B. Strength

10. The term 'test' in physical education refers to:

- A. A final exam
- B. A tool to evaluate skill and fitness levels
- C. A written questionnaire
- D. A set of sports rules

Answer: B. A tool to evaluate skill and fitness levels

11. Back scratch test is used to test fitness of:

- A. Lower body part
- B. Shoulder only
- C. Upper body part
- D. Elbows only

Answer: B. Shoulder only

12. The test used to measure fitness of senior citizens is

- A. Borrow motor fitness test
- B. HARVARD step test
- C. Rikli and Jones fitness test
- D. General motor fitness test

Answer: C. Rikli and Jones fitness test

13. What should be the height of chair required in chair sit and reach test?

- A. 40 cm
- B. 44 cm
- C. 42 cm
- D. None of the above

Answer: B. 44 cm

14. Which of the following are part of In the SAI Khelo India Fitness test for age group 5-8?

- A. BMI
- B. Flamingo Balance Test
- C. Plate tapping test
- D. All of the above

Answer: D. All of the above

15. Which of the following tests is used to measure cardiovascular endurance?

- A) Sit and Reach Test
- B) 50-Metre Sprint Test
- C) Harvard Step Test
- D) Push-Up Test

Answer:

C) Harvard Step Test

16. Which one of the following is NOT linked accurately?

- A. Arm Curl Test-A test to measure the upper body strength
- B. Chair sit and reach test-A test to assess the upper body flexibility
- C. Chair stand test -A test to measure the lower body strength
- D. Eight foot up and go test-A test to evaluate speed and agility

17. In the back scratch test if the finger tips touch each other, then the score will be:

- A. Negative
- B. Zero
- C. Positive
- D. None of the above

18. Eight foot up and go test is conducted to check the Coordination and agility in

- A. Children
- B. Adolescent
- C. Aged people
- D. Youth

19. Which of the following test is part of Johnson- Metheny Test battery for Motor educability.

- A. Front Roll
- B. Back Roll
- C. Jumping half-turn
- D. All of the above

20. $(10 * \text{body weight (kg.)}) + (6.25 * \text{height (cm)}) - (5 * \text{age}) - \dots\dots\dots$ Complete the formula for calculating the BMR for females.

- A. 141
- B. 151
- C. 161
- D. 171

VERY SHORT ANSWER QUESTIONS

2 MARKS

Q1. What do you understand by the term 'test' in physical education?

Answer: A test is a tool designed to assess specific physical skills or fitness levels.

Q2. How is 'measurement' defined in the context of sports?

Answer: Measurement refers to the process of collecting data using standard tools and techniques to evaluate performance.

Q3. Mention one key objective of conducting tests and measurements in sports.

Answer: One main objective is to determine the fitness level of a person.

Q4. Which test helps in evaluating heart and lung endurance?

Answer: The HARVARD Step Test is used to assess cardiovascular endurance.

Q5. State a test that measures the flexibility of an individual.

Answer: Flexibility can be checked using the Sit and Reach Test.

Q6. Name a test that helps assess lower body strength.

Answer: The Standing Broad Jump is used to evaluate leg power.

Q7. Give one application of anthropometric measurements in physical education.

Answer: They are used to study and analyze body composition.

Q8. Which physical ability is evaluated by performing a 50-meter sprint?

Answer: Speed is assessed through the 50-meter dash.

Q9. What is meant by 'evaluation' in the field of physical education?

Answer: Evaluation involves interpreting test results to make decisions or judgments.

Q10. Can you name a test that is used to check a person's agility?

Answer: The Shuttle Run Test is used to measure agility.

Q 11: Identify the test shown in the picture. What does it measure?



Answer: The test is the HARVARD Step Test. It measures cardiovascular endurance.

Q12: Name the test shown. Which fitness component does it assess?



Answer: The test is the Sit and Reach Test. It assesses flexibility, especially of the lower back and hamstrings

Q11. What is body composition and how can it be measured?

Q12. Your grandmother feels she has reduced her upper body flexibility and therefore she wants to test herself. Which test would you suggest to her?

Q13. What is motor educability test and how can it be measured?

Q14. What is the purpose of conducting motor fitness tests in schools?

Q15. Name any one test used for assessing muscular endurance and explain how it is performed.

SHORT ANSEER QUESTION

3 MARKS

Q1. Define the term 'test' and explain its importance in physical education.

Answer:

A test is a tool or instrument used to measure a specific skill, fitness component, or performance ability. It is important in physical education because it helps in assessing the effectiveness of training programs, identifying strengths and weaknesses, and guiding future training needs.

Q2. What is the difference between 'measurement' and 'evaluation' in sports?

Answer:

Measurement is the process of collecting data through tests using standard tools and techniques.

Evaluation involves interpreting the results of measurements to make informed decisions or judgments regarding performance or fitness.

Q3. Write any three objectives of test and measurement in physical education.

Answer:

1. To assess the fitness levels of individuals.
2. To evaluate the effectiveness of training programs.
3. To identify talent and potential in sports.

Q4. Explain the procedure of the Sit and Reach Test.

Answer:

The participant sits on the floor with legs extended straight ahead and feet flat against a box or board.

They slowly reach forward as far as possible without bending the knees.

The distance reached by the fingertips is measured in centimeters to assess flexibility, especially of the lower back and hamstrings.

Q5. What is the HARVARD Step Test and what does it measure?

Answer:

The HARVARD Step Test is a cardiovascular endurance test. It involves stepping up and down a platform (around 18 inches) at a set pace for 5 minutes. Heart rate is recorded after the exercise, and recovery rate is used to determine cardiovascular fitness.

Q6. Define BMR and explain its role in fitness assessment.

Answer:

Basal Metabolic Rate (BMR) is the amount of energy expended while at complete rest to maintain vital body functions. It is essential in fitness assessments as it helps in determining caloric needs, planning diet and weight management, and understanding how individual metabolism affects overall physical performance.

Q7. Explain any three standard fitness tests used in sports.

Q8. State any three career options related to test and measurement in sports.

Q9. What is the importance of test and measurement in sports?

CASE STUDY BASED QUESTIONS

4 MARKS

1. Case:

Riya, a class 7 student, took part in the Khelo India School Fitness Test. She was evaluated in various components like BMI, 50m sprint, sit and reach test, and endurance run/walk. Her PE teacher recorded her performance to assess her overall fitness level.

Q1. Which component of fitness is assessed through the 50m sprint?

- a) Flexibility
- b) Cardiovascular endurance
- c) Speed
- d) Agility

Answer: c) Speed

Q2. The Sit and Reach test measures:

- a) Speed
- b) Flexibility
- c) Strength
- d) Balance

Answer: b) Flexibility

Q3. Which of the following is part of the Khelo India fitness assessment?

- a) BMR Calculation
- b) Harvard Step Test
- c) BMI Measurement
- d) Skinfold Testing

Answer: c) BMI Measurement

Q4. What age group is primarily targeted under the Khelo India School Fitness Test?

- a) Under 5
- b) School-going children
- c) College athletes
- d) Senior citizens

Answer: b) School-going children

2. Case:

Rohan, a 17-year-old football player, is asked to perform the Harvard Step Test to measure his cardiovascular endurance. He steps up and down a bench for 5 minutes at a set rhythm, and his recovery pulse is recorded.

Q1. The Harvard Step Test evaluates:

- a) Strength
- b) Flexibility
- c) Cardiovascular endurance
- d) Speed

Answer: c) Cardiovascular endurance

Q2. For how long should the subject perform the stepping exercise in Harvard Step Test?

- a) 2 minutes b) 3 minutes c) 5 minutes d) 10 minutes

Answer: c) 5 minutes

Q3. What is primarily recorded in the Harvard Step Test to compute fitness index?

- a) Jump height b) Body weight
c) Recovery heart rate d) Body fat

Answer: c) Recovery heart rate

Q4. A low fitness index in the Harvard Step Test indicates:

- a) Excellent cardiovascular fitness b) Average strength
c) Poor cardiovascular fitness d) High flexibility

Answer: c) Poor cardiovascular fitness

3. Case:

Sneha wants to manage her weight effectively. Her fitness trainer calculates her Basal Metabolic Rate (BMR) to determine the minimum calories her body needs at rest to maintain basic functions like breathing and circulation.

Q1. BMR refers to:

- a) The calories burned during exercise b) The rate of digestion
c) The energy used at rest d) The calories stored as fat

Answer: c) The energy used at rest

Q2. Which factor does *not* affect BMR?

- a) Age b) Gender c) Skin color d) Muscle mass

Answer: c) Skin color

Q3. Which tool/formula is commonly used to calculate BMR?

- a) BMI Scale b) Skinfold Caliper c) Harris-Benedict Equation d) Cooper's Formula

Answer: c) Harris-Benedict Equation

Q4. If BMR is high, what does it indicate?

- a) The person burns fewer calories b) The person needs less food
c) The person burns more calories at rest d) The person is malnourished

Answer: c) The person burns more calories at rest

4. Case:

Mrs. Sharma, a 70-year-old woman, visits a wellness center for a fitness evaluation. The trainer uses the Rikli & Jones test to assess her functional fitness needed for daily activities, such as arm curl test and chair stand test.

Q1. The Rikli & Jones test is designed for:

- a) School children b) Young athletes c) Senior citizens d) Bodybuilders

Answer: c) Senior citizens

Q2. Which component is tested through the 30-second chair stand test?

- a) Upper body strength b) Lower body strength
c) Cardiovascular endurance d) Flexibility

Answer: b) Lower body strength

Q3. The "Arm Curl" test in Rikli & Jones is used to assess:

- a) Reaction time b) Arm endurance

- c) Upper body strength d) Speed

Answer: c) Upper body strength

Q4. The "8-foot up-and-go" test is a part of:

- a) Harvard Step Test b) SAI Khelo India
c) Rikli & Jones Test d) Johnsen – Methney Test

Answer: c) Rikli & Jones Test

5. Case:

A school PE teacher uses the Johnsen – Methney test to assess class 6 students' basic motor skills such as jumping, running, and catching. This helps to understand their potential to learn motor movements.

Q1. The Johnsen – Methney Test is used to measure:

- a) Endurance b) Flexibility c) Motor educability d) Intelligence

Q2. Which of the following is usually included in the Johnsen – Methney Test?

- a) Shuttle run b) Height and weight c) Throwing and catching d) Skinfold measurements

Q3. Who is the target group for the Johnsen – Methney Test?

- a) Senior citizens b) Infants c) School-age children d) Professional athletes

Q4. The term "motor educability" refers to:

- a) Endurance for long races b) Learning and performing motor tasks
c) Muscular strength d) Nutritional knowledge

6. Case:

A fitness trainer is designing a plan for a school. He wants to assess students' cardio fitness, flexibility, speed, and motor skills. He plans to use multiple tests such as Khelo India Fitness Test, Harvard Step Test, and Johnsen – Methney Test.

Q1. To assess speed, which test should be included?

- a) Sit and Reach b) 50-meter sprint
c) Chair stand test d) Harvard Step Test

Q2. Which test among the following is best suited for measuring cardiovascular endurance?

- a) Harvard Step Test b) BMI
c) Push-ups d) Sit-ups

Q3. For evaluating motor learning ability, which test is appropriate?

- a) BMR Calculation b) Rikli & Jones
c) Johnsen – Methney d) Skinfold Test

Q4. If a PE teacher wants to assess flexibility, which test is ideal?

- a) Arm curl b) Sit and reach c) Step test d) BMI

LONG ANSWER QUESTION

5 MARKS

Q1. Explain SAI Khelo India Fitness test for age group 9-18 yrs age group.

Answer:

SAI Khelo India Fitness Test is a fitness assessment program designed by the Sports Authority of India (SAI) and the Ministry of Youth Affairs and Sports for school students across India.

BMI (Body Mass Index): BMI is a simple and widely used method to assess if a person has a healthy body weight in proportion to their height. It is calculated by dividing a person's weight in kilograms by the square of their height in meters.

50-Meter Sprint Test: The 50-meter sprint test measures how quickly a student can run over a short distance. This test assesses the student's anaerobic power and speed.

600-Meter Run/Walk Test : The 600-meter run/walk test measures cardiovascular endurance. Students are required to run/walk the distance as quickly as possible, and their time is recorded.

Sit and Reach Flexibility Test : The sit and reach test measures the flexibility of the student's lower back and hamstring muscles. The student sits on the floor with their legs straight, and then reaches forward as far as possible while keeping their legs straight.

Partial curl up: Abdominal partial curl-up is a test of abdominal muscle endurance. The participant lies on their back with knees bent and feet on the floor. They cross their arms over their chest and curl up to touch their knees with their elbows. They repeat this movement as many times as possible within a specified time.

Push Ups: Push-ups are a test of upper body strength. For boys, they perform push-ups with their toes and hands on the ground, and they lower their body to touch the ground and then push themselves back up. For girls, they perform modified push-ups with their knees on the ground instead of their toes.

Q2. Explain in detail the HARVARD Step Test. Mention its purpose, procedure, advantages, and limitations.

Answer:

The HARVARD Step Test is a widely used cardiovascular endurance test designed to measure the efficiency of the heart and lungs during recovery after physical activity.

Purpose:

The primary aim of this test is to assess cardiovascular fitness and the body's recovery rate after exercise. A faster recovery indicates better endurance and heart efficiency.

Procedure:

1. A bench or platform around 18 inches high is used.
2. The subject steps up and down the platform at a rate of 30 steps per minute for 5 minutes (150 steps total).
3. After completion, the subject sits down, and their pulse is measured three times: at 1 minute, 2 minutes, and 3 minutes post-exercise.
4. The fitness index is calculated using the formula:

FI = (Duration of exercise in seconds × 100) / (2 × sum of heartbeats at 1, 2, and 3 minutes).

Advantages:

- Simple and low-cost.
- Requires minimal equipment.
- Can be conducted on a large group with ease.
- Suitable for all age groups.

Limitations:

- Not suitable for individuals with joint or knee issues.
- Results can be influenced by body weight or leg length.
- It requires a consistent pace which may be difficult without a metronome.

This test is useful in schools, gyms, and sports training to check the aerobic fitness level of students and athletes.

Q3. Write a detailed note on the importance and objectives of test and measurement in physical education and sports.

Test and measurement play an integral role in scientific training and performance evaluation in the field of physical education and sports. They are used to collect accurate data, monitor progress, and make informed decisions regarding training and participation.

Importance:

1. **Assessment of Fitness Levels:** Tests help identify the current level of an individual's physical fitness. This includes strength, flexibility, endurance, and speed.
2. **Monitoring Progress:** By repeating the same tests periodically, trainers and teachers can track improvements or declines in performance.
3. **Selection and Classification:** Tests help in selecting individuals for specific sports based on their skills, fitness, and body structure.
4. **Talent Identification:** Through regular measurement, students with specific physical advantages can be guided into appropriate sports disciplines.
5. **Scientific Training Planning:** Data from tests allows for creating personalized training programs that are suited to an individual's needs and goals.

Objectives:

1. **Diagnose Strengths and Weaknesses:** It helps in understanding which areas need more focus and improvement.
2. **Evaluate the Effectiveness of a Program:** Helps to see if a training routine is delivering the expected results.
3. **Motivate Students and Athletes:** Visible progress through test results encourages continued effort and discipline.
4. **Establish Norms and Standards:** Benchmarking results help in setting standards and grading performance levels.

In summary, test and measurement ensure that training becomes scientific, objective, and individualized, enhancing both participation and performance in sports.

Q4. Write a detailed note on the importance and objectives of test and measurement in physical education and sports.