

Administration, Scoring, and Interpretation of Selected Tests



Measuring Parameters of Athletic Performance

- **Maximum Muscular Strength (Low-Speed Strength)**
 - Related to the force a muscle or muscle group can exert in one maximal effort
- **Anaerobic or Maximum Muscular Power (High-Speed Strength)**
 - Related to the ability of muscle tissue to exert high force while contracting at a high speed (also called maximal anaerobic muscular power or anaerobic power)

- Most maximal muscular strength tests use relatively slow movement speeds and therefore reflect low-speed strength. Conversely, assessment of high-speed muscular strength can involve measuring the 1RM of explosive resistance training exercises, the height of a vertical jump, or the time to sprint up a staircase. ATP is the primary energy source for both low-speed and high-speed muscular strength tests.

Measuring Parameters of Athletic Performance

- **Anaerobic Capacity**
 - Maximal rate of energy production by the combined phosphagen and lactic acid energy systems for moderate-duration activities

Measuring Parameters of Athletic Performance

- **Local Muscular Endurance**
 - Ability of certain muscles or muscle groups to perform repeated contractions against a submaximal resistance
- **Aerobic Capacity**
 - Maximum rate at which an athlete can produce energy through oxidation of energy resources (carbohydrates, fats, and proteins)
 - Usually expressed as a volume of oxygen consumed per kilogram of body weight per minute (i.e., $\text{ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$); also called aerobic power

Measuring Parameters of Athletic Performance

- **Agility**
 - Ability to stop, start, and change the direction of the body or body parts rapidly and in a controlled manner
- **Speed**
 - Movement distance per unit time, typically quantified as the time taken to cover a fixed distance
- **Flexibility**
 - Range of motion about a body joint

Measuring Parameters of Athletic Performance

- **Body Composition**
 - Relative proportions by weight of fat and lean tissue
- **Anthropometry**
 - The science of measurement applied to the human body
 - Generally includes measurements of height, weight, and selected body girths

Testing Conditions

- To maximize the reliability of tests, conditions should be as similar as possible for all athletes tested and from test to retest of the same athlete.
- Temperature and humidity, surface, and type of equipment should be consistent.
- Athletes should not be tested when fatigued, or when glycogen depleted or overly full from a meal. They should arrive for testing normally hydrated.
- Warm-up for the tests should be standardized.

Vertical Jump

- Wall and Chalk
- Commercial Vertec Device
 - Best of 3 trials is recorded to the nearest 0.5 inch

Margaria-Kalamen Test

- The athlete sprints toward the stairs from a standing start 20 feet (6 m) from the base of the stairs and then up the staircase three steps at a time.
- Power in watts is calculated as the athlete's weight (w) in newtons times height (h) in meters from the third step to the ninth step divided by the measured time interval (t) in seconds; P (watts) = $(w \times h) / t$.

300-Yard Shuttle

- Pair off athletes of similar ability.
- The athletes sprint to the line 25 yards (22.86 m) away, then immediately sprint back to the first line. Six such round trips are made as fast as possible without stopping.
- The average of two trials is recorded to the nearest 1.0 second.

Curl-Up

- Set a metronome to 40 beats per minute and have the individual do slow, controlled curl-ups to lift the shoulder blades off the mat in time with the metronome. The upper back must touch the floor before each curl-up.
- The athlete performs as many curl-ups as possible without pausing, to a maximum of 75.

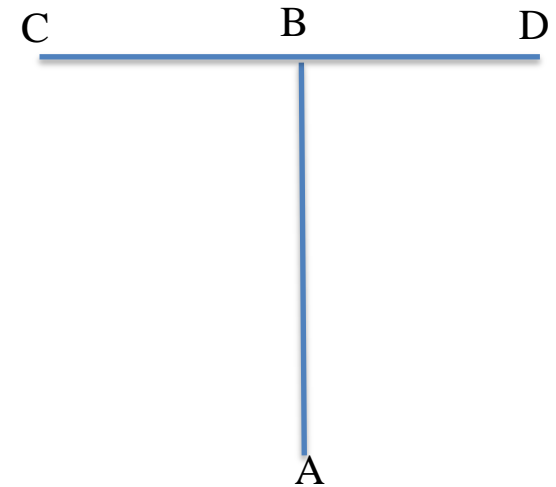
Army Push-Up

- Beginning position – Knees off ground
 - For the Army standard, as many repetitions as possible are done within a timed 2-minute period.

ACSM Push-UP for Females

- Beginning position – Knees on ground, legs crossed
 - For the ACSM standard, as many repetitions as possible are done continuously until failure.

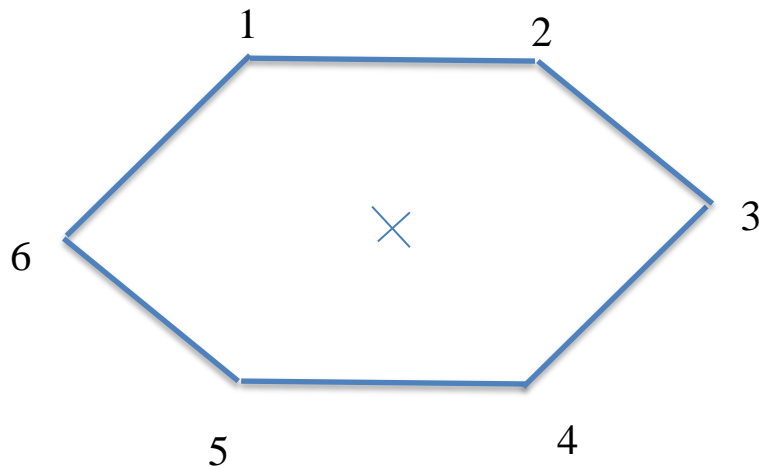
T-Test



- Layout: A to B (10 Yds)
- C is 5 Yds to the left of B
- D is 5 Yds to the right of B
- The test begins with the athlete standing at point A. The athlete:
 - Sprints to point B and touches the base of the cone with the right hand.
 - Shuffles left and touches the base of cone C with the left hand.
 - Shuffles right and touches the base of cone D with the right hand.
 - Shuffles left and touches the base of cone B with the left hand.
 - Runs backward past point A.

Hexagon Test

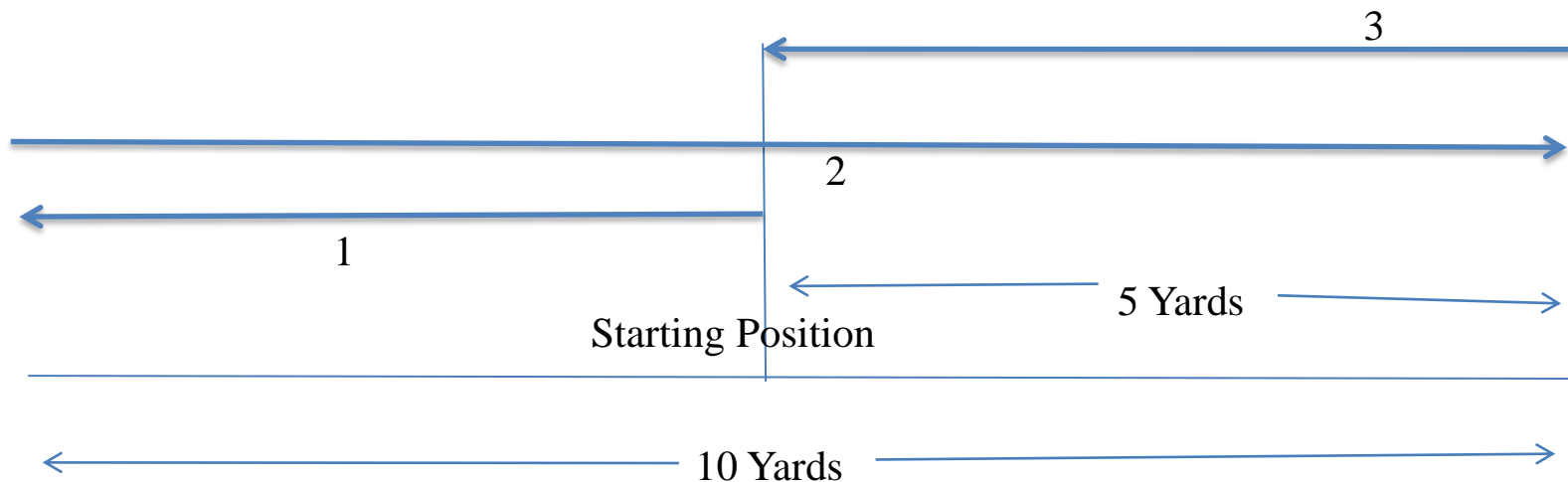
- The athlete double-leg hops from the center of the hexagon over each side and back to the center, starting with the side directly in front of the athlete, in a continuous clockwise sequence until all six sides are covered three times (for a total of 18 jumps).



Length of Side is
24 inches

Pro Agility Test

- The athlete sprints 5 yards (4.6 m) to the left, then changes direction and sprints 10 yards (9.1 m) to the right, then again changes direction and sprints 5 yards (4.6 m) to the where they started.



Sit-and-Reach Test

- Tape yardstick or tape measure to floor
- Place a piece of tape about 24 inches long across the yardstick at a right angle to it at the 15 inch mark.
- Shoeless athlete sits with yardstick between legs, zero end toward the body, feet 12 inches apart, toes pointed up, heels touching edge of taped line at 15 inch mark.
- Athlete slowly reaches forward as with both hands as far as possible on the yardstick, hold position momentarily, athlete should exhale and drop head between arms when reaching
- Record best of 3 trials to the nearest 0.25 inch

Skinfold Measurements

- Common sites for skinfold measurements
 - Chest: a diagonal fold one half the distance between the anterior axillary line and the nipple for men
 - Thigh: a vertical fold on the anterior aspect of the thigh, midway between the hip and knee
 - Abdomen: a vertical fold 1 inch to the right of the umbilicus
 - Triceps: a vertical fold on the posterior midline of the upper arm, halfway between the acromion and olecranon process
 - Suprailium: a diagonal fold above the crest of the ilium
 - Midaxilla: a vertical fold on the midaxillary line at the level of the xiphoid process
 - Subscapula: a diagonal fold that extends from the vertebral border to a point 1 inch from the inferior angle of scapula
 - Calf: a vertical fold along the medial side of the calf

Skinfold Measurements Procedure

- Should be made on dry skin, prior to exercise
- Grasp the skin firmly with thumb and index finger
- Place the calipers perpendicular to the fold
- Release the caliper grip so tension is exerted on the fold
- Read the dial between 1-2 s after the grip has been released
record to nearest 0.5 mm
- Obtain 1 measurement from each test site than repeat all for a second trial.
- If the two measurements do not differ by more than 10% take average of two measurements.

Statistical Evaluation of Test Data

- Descriptive Statistics
 - Central Tendency
 - Mean: The average of the scores.
 - Median: The middlemost score when a set of scores is arranged in order of magnitude.
 - Mode: The score that occurs with the greatest frequency.

Statistical Evaluation of Test Data

- Descriptive Statistics

- Variability

- Range: The interval from the lowest to the highest score.
 - Standard deviation: A measure of the variability of a set of scores about the mean.

- Percentile Rank

- The percentage of test takers scoring below an individual

Statistical Evaluation of Test Data

- Inferential Statistics
 - Allows one to draw general conclusions about a population from information collected in a population sample.
 - Population sample must be representative.
 - Normal Bell Curve



Developing an Athletic Profile

- Select tests that will measure the specific parameters most closely related to the characteristics of the sport or sports in question.
- Choose valid and reliable tests to measure these parameters, and arrange the testing battery in an appropriate order with sufficient rest between tests to promote test reliability.
- Administer the test battery to as many athletes as possible.
- Calculate percentile ranks to present a visual profile.
- Evaluate the athlete based on percentile rank within the group and against the individual's best performances over previous years, if possible.