



Fitness Tests

Ensuring validity in tests



Fitness Tests

Ensuring validity in tests

The aims of this presentation:

- Identify the appropriate fitness tests for a component of fitness
- Know how to ensure validity in fitness tests
- Identify how to set up and administer fitness tests
- Re-cap definitions of fitness components and apply practical examples to them

**There are YouTube videos for you to view for each fitness test*

How to ensure validity (applicable to all tests)

How can we make tests more reliable and valid?

- Use competent and well-trained testers
 - Equipment should be standardised
 - Each test should measure only one factor
- Care should be taken to make sure the athlete understands exactly what is required of them
- The test procedure should be standardised in terms of administration, organisation and environmental conditions
- The test should be designed so that it can easily be repeated by another trained tester
- The test should be fully documented so that it can be administered in the same way the next time it is conducted
 - Encouragement must be standardised
 - The warm up should be replicated exactly
 - Weather can effect results if conducted outside
 - Level of motivation may invalidate results

How to ensure validity (applicable to all tests)

The following things must remain consistent for each test and for each participant to ensure validity:

- Timer / starter person / starter gun / line judge (jumps) / stop watch / measurer / distance markers

A very important point to consider:

There are some components of fitness where two fitness tests can be used. In this instance, you must ensure you know both tests.

E.g., to measure cardiovascular endurance, you can use the bleep test or the cooper run.

CV Endurance - The ability to continuously exercise without tiring

Objective of test: monitor the development of the athlete's aerobic endurance and to obtain an estimate of their VO_2 max.

Sporting examples:
Marathon running, cross country skiing, long distance swimming

Test 1: 12 Minute Cooper run

Required Resources

- 400-metre track
- Stopwatch
- Whistle

How to conduct the test

- This test requires the athlete to run as far as possible in 12 minutes.
- The athlete warms up for 10 minutes
- The assistant gives the command "GO", starts the stopwatch and the athlete commences the test.
- The assistant keeps the athlete informed of the remaining time at the end of each lap (400m)
- The assistant blows the whistle when the 12 minutes have elapsed and records the distance the athlete covered to the nearest 10 meters.

12 minute cooper run

Female Athletes

Age	Excellent	Above Average	Average	Below Average	Poor
13-14	>2000m	1900-2000m	1600-1899m	1500-1599m	<1500m
15-16	>2100m	2000-2100m	1700-1999m	1600-1699m	<1600m
17-20	>2300m	2100-2300m	1800-2099m	1700-1799m	<1700m
20-29	>2700m	2200-2700m	1800-2199m	1500-1799m	<1500m
30-39	>2500m	2000-2500m	1700-1999m	1400-1699m	<1400m
40-49	>2300m	1900-2300m	1500-1899m	1200-1499m	<1200m
>50	>2200m	1700-2200m	1400-1699m	1100-1399m	<1100m

Male Athletes

Age	Excellent	Above Average	Average	Below Average	Poor
13-14	>2700m	2400-2700m	2200-2399m	2100-2199m	<2100m
15-16	>2800m	2500-2800m	2300-2499m	2200-2299m	<2200m
17-19	>3000m	2700-3000m	2500-2699m	2300-2499m	<2300m
20-29	>2800m	2400-2800m	2200-2399m	1600-2199m	<1600m
30-39	>2700m	2300-2700m	1900-2299m	1500-1999m	<1500m
40-49	>2500m	2100-2500m	1700-2099m	1400-1699m	<1400m
>50	>2400m	2000-2400m	1600-1999m	1300-1599m	<1300m

CV Endurance - The ability to continuously exercise without tiring

Objective of test: monitor the development of the athlete's aerobic endurance and to obtain an estimate of their VO_2 max.

Sporting examples: Marathon running, cross country skiing, long distance swimming

Test 2: Multistage Fitness test ('the bleep test')

Required Resources

- Flat non-slip surface
- 30-metre tape measure
- Marking Cones
- The Multi-Stage Fitness Test audiotape or CD
- A tape recorder or CD Player
- Recording sheets

How to conduct the test

- This test requires the athlete to run 20m in time with a beep from a CD recording. The athlete must place one foot on or beyond the 20m marker at the end of each shuttle.
- The athlete warms up for 10 minutes
- The assistant measures out a 20-metre section and marks each end with marker cones
- The assistant starts the CD and the athlete commences the test
- If the athlete arrives at the end of a shuttle before the beep, the athlete must wait for the beep and then resume running
- If the athlete fails to reach the end of the shuttle before the beep they should be allowed 2 or 3 further shuttles to attempt to regain the required pace before being withdrawn
- The assistant records the level and number of shuttles completed at that level by the athlete when they are withdrawn

Multistage fitness test/ The bleep test

Male athletes

Age	Excellent	Above Average	Average	Below Average	Poor
14 - 16	L12 S7	L11 S2	L8 S9	L7 S1	< L6 S6
17 - 20	L12 S12	L11 S6	L9 S2	L7 S6	< L7 S3
21 - 30	L12 S12	L11 S7	L9 S3	L7 S8	< L7 S5
31 - 40	L11 S7	L10 S4	L6 S10	L6 S7	< L6 S4
41 - 50	L10 S4	L9 S4	L6 S9	L5 S9	< L5 S2

Female athletes

Age	Excellent	Above Average	Average	Below Average	Poor
14 - 16	L10 S9	L9 S1	L6 S7	L5 S1	< L4 S7
17 - 20	L10 S11	L9 S3	L6 S8	L5 S2	< L4 S9
21 - 30	L10 S8	L9 S2	L6 S6	L5 S1	< L4 S9
31 - 40	L10 S4	L8 S7	L6 S3	L4 S6	< L4 S5
41 - 50	L9 S9	L7 S2	L5 S7	L4 S2	< L4 S1

Muscular Endurance: The ability of the muscle or group of muscles in the body to repeatedly contract or keep going without rest

Objective of test: monitor the development of the athlete's upper body endurance

Sporting examples:
Rugby, football,
swimming, cycling

Test 1: Press Up Test

Resources Required:

Non-slip surface

Assistant to count reps and monitor form

How to conduct the test:

- The athlete warms up for 10 minutes
- The athlete lies on the ground, places their hands by the shoulders and straightens the arms
- The athlete lowers the body until the elbows reach 90° and then extends the arms to return to the start position
- The athlete continuous this press-up action, with no rest, until they are unable to continue
- The assistant counts and records the number of correctly completed press-ups

Press Up Test

Male athletes

Age	Excellent	Good	Above Average	Average	Below Average	Poor
17 - 19	>56	47-56	35-46	19-34	11-18	<11
20 - 29	>47	39-47	30-38	17-29	10-16	<10
30 - 39	>41	34-41	25-33	13-24	8-12	<8
40 - 49	>34	28-34	21-27	11-20	6-10	<6
50 - 59	>31	25-31	18-24	9-17	5-8	<5
60 - 65	>30	24-30	17-23	6-16	3-5	<3

Female athletes

Age	Excellent	Good	Above Average	Average	Below Average	Poor
17 - 19	>35	27-35	21-26	11-20	6-10	<6
20 - 29	>36	30-36	23-29	12-22	7-11	<7
30 - 39	>37	30-37	22-29	10-21	5-9	<5
40 - 49	>31	25-31	18-24	8-17	4-7	<4
50 - 59	>25	21-25	15-20	7-14	3-6	<3
60 - 65	>23	19-23	13-18	5-12	2-4	<2

Muscular Endurance: The ability of the muscle or group of muscles in the body to repeatedly contract or keep going without rest

Objective of test: monitor the development of the athlete's abdominal endurance

Sporting examples:
Rugby, football,
swimming, cycling

Test 2: Sit Up Test

Resources Required:

Non-slip surface
Exercise Mat
Sit up bleep app
Assistant

How to conduct the test:

- The athlete warms up for 10 minutes
- The athlete lies on the mat with the knees bent, feet flat on the floor and their hands on their ears where they must stay throughout the test
- The assistant holds the athlete's feet on the ground
- The assistant starts the app
- The athlete tries to keep to the bleep for as long as possible
- The assistant records the score for the athlete

Sit Up Test

Stage	Number of sit-ups Cumulative	Standard Male	Standard Female
1	20	Poor	Poor
2	42	Poor	Fair
3	64	Fair	Fair
4	89	Fair	Good
5	116	Good	Good
6	146	Good	Very Good
7	180	Very Good	Excellent
8	217	Excellent	Excellent

Speed: This is the ability of the body to move quickly

Objective of test: monitor the development of the athlete's ability to effectively and efficiently build up acceleration, from a standing start or from starting blocks, to maximum speed.

Sporting examples:
Swimming, 100 sprint, squash, basketball

Test: 30-metre sprint test

Resources Required:

Flat non-slip surface
Stopwatch
An assistant

How to conduct the test:

- The athlete warms up for 10 minutes
- The assistant marks out a 30-metre straight section with cones
- The athlete starts in their own time and sprints as fast as possible over the 30 metres
- The assistant starts the stopwatch on the athlete's 1st-foot strike after starting and stopping the stopwatch as the athlete's torso crosses the finishing line
- The test is conducted 3 times
- The assistant uses the fastest recorded time to assess the athlete's performance



30-Metre Speed Test

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Gender	Excellent	Above Average	Average	Below Average	Poor
Male	<4.0 secs	4.0 - 4.2 secs	4.3 - 4.4 secs	4.5 - 4.6 secs	>4.6 secs
Female	<4.5 secs	4.5 - 4.6 secs	4.7 - 4.8 secs	4.9 - 5.0 secs	>5.0 secs



Muscular Strength:

Ability of a muscle to exert force over a short period of time

Objective of test: To measure the strength of the handgrip. It is generally accepted that there is a strong correlation between handgrip strength and overall strength.

Sporting examples:
Rugby, weightlifting,
rowing

Test 1: Grip Strength Dynamometer Test

Resources Required:

Dynamometer

Assistant



How to conduct the test:

- The athlete using their dominant hand applies as much grip pressure as possible on the dynamometer
- The assistant records the maximum reading (kg)
- The athlete repeats the test 3 times
- The assistant uses the highest recorded value to assess the athlete's performance



The Grip Strength Dynamometer Test

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Gender	Excellent	Good	Average	Fair	Poor
Male	>56	51-56	45-50	39-44	<39
Female	>36	31-36	25-30	19-24	<19

Muscular Strength:

Ability of a muscle to exert force over a short period of time

Objective of test: To measure upper body strength using the bench press test

Sporting examples:
Rugby, weightlifting,
rowing

Test 2: One repetition maximum test (1RM) (Bench Press)

Resources Required:

Barbell and weights

Weighing Scales

Bench

Assistant

How to conduct the test:

- Athlete performs 10 reps warm up with a light weight
- Two more sets of 2 to 5 reps of slightly heavier weight
- Two minute rest and then participant completes one rep of heaviest weight
- If the lift is successful, another two minutes rest and the load is increased by 10%.
- If the lift is unsuccessful, the load is decreased by 5% and then attempted again until a maximum weight is performed

A good 1RM for the bench press is $1.25 \times$ "Body Weight" for men and $0.8 \times$ "Body Weight" for women.



1 Rep Max Bench Press Table for adults
(weight lifted per bodyweight)

Rating	Score (per body weight)
Excellent	> 1.60
Good	1.30 - 1.60
Average	1.15 - 1.29
Below Average	1.00 - 1.14
Poor	0.91 - 0.99
Very Poor	< 0.90

Power: The combination of speed and strength

Objective of test: To monitor the development of athlete's leg strength

Sporting examples:
Triple jump, shot put, javelin, sprinting

Test 1: Standing Jump Test

Resources Required:

Long Jump Pit/Mat

30-metre tape measure

Assistant

How to conduct the test:

- The athlete warms up for 10 minutes
- The athlete places their feet over the edge of the sandpit or mat, crouches down and using the arms and legs jumps horizontally as far as possible landing with both feet into the sandpit
- The assistant measures and records the distance from the edge of the sandpit to the nearest impression made by the athlete in the sandpit or mat
- The athlete repeats the test 3 times
- The assistant uses the longest recorded distance to assess the athlete's leg strength

The Standing Long Jump Test

Male athletes

Age	Excellent	Above average	Average	Below average	Poor
14	> 2.11m	2.11 - 1.96m	1.95 - 1.85m	1.84 - 1.68m	<1.68m
15	>2.26m	1.26 - 2.11m	2.10 - 1.98m	1.97 - 1.85m	<1.85m
16	>2.36m	2.36 - 2.21m	2.20 - 2.11m	2.10 - 1.98m	<1.98m
>16	>2.44m	2.44 - 2.29m	2.28 - 2.16m	2.15 - 1.98m	<1.98m

Female athletes

Age	Excellent	Above average	Average	Below average	Poor
14	>1.91m	1.91 - 1.73m	1.72 - 1.60m	1.59 - 1.47m	<1.47m
15	>1.85m	1.84 - 1.73m	1.72 - 1.60m	1.59 - 1.50m	<1.50m
16	>1.83m	1.83 - 1.68m	1.67 - 1.58m	1.57 - 1.45m	<1.45m
>16	>1.91m	1.91 - 1.78m	1.77 - 1.63m	1.62 - 1.50m	<1.50m

Power: The combination of speed and strength

Objective of test: To monitor the development of athlete's leg strength

Sporting examples:
Triple jump, shot put, javelin, sprinting

Test 2: Vertical Jump Test

Resources Required:

Wall

Tape measure

Step Ladder

Chalk

Assistant

How to conduct the test:

The athlete warms up for 10 minutes.

- The athlete chucks the end of his/her fingertips.
- The athlete stands side onto the wall, keeping both feet remaining on the ground, reaches up as high as possible with one hand and marks the wall with the tips of the fingers (M1).
- The athlete from a static position jumps as high as possible and marks the wall with the chalk on his fingers (M2).
- The assistant measures and records the distance between M1 and M2.
- The athlete repeats the test 3 times
- The assistant calculates the average of the recorded distances and uses this value to assess the athlete's performance



The Vertical Jump Test

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Male athletes

Age	Excellent	Above average	Average	Below average	Poor
14	> 2.11m	2.11 - 1.96m	1.95 - 1.85m	1.84 - 1.68m	<1.68m
15	>2.26m	1.26 - 2.11m	2.10 - 1.98m	1.97 - 1.85m	<1.85m
16	>2.36m	2.36 - 2.21m	2.20 - 2.11m	2.10 - 1.98m	<1.98m
>16	>2.44m	2.44 - 2.29m	2.28 - 2.16m	2.15 - 1.98m	<1.98m

Female athletes

Age	Excellent	Above average	Average	Below average	Poor
14	>1.91m	1.91 - 1.73m	1.72 - 1.60m	1.59 - 1.47m	<1.47m
15	>1.85m	1.84 - 1.73m	1.72 - 1.60m	1.59 - 1.50m	<1.50m
16	>1.83m	1.83 - 1.68m	1.67 - 1.58m	1.57 - 1.45m	<1.45m
>16	>1.91m	1.91 - 1.78m	1.77 - 1.63m	1.62 - 1.50m	<1.50m

Flexibility: This is the range of movement around a joint

Objective of test: to monitor the development of the athlete's lower back and hamstring flexibility

Sporting examples:
Gymnastics, dance,
tennis, table tennis

Test : Sit and Reach Test

Resources Required:

Box
Metre Ruler
Tape
Assistant

How to conduct the test:

- The athlete warms up for 10 minutes and then removes their shoes
- The assistant secures the ruler to the box top with the tape so that the front edge of the box lines up with the 15cm (6 inches) mark on the ruler and the zero end of the ruler points towards the athlete
- The athlete sits on the floor with their legs fully extended with the bottom of their bare feet against the box
- The athlete places one hand on top of the other, slowly bends forward and reaches along the top of the ruler as far as possible holding the stretch for two seconds
- The assistant records the distance reached by the athlete's fingertips (cm)
- The athlete performs the test three times
- The assistant calculates and records the average of the three distances and uses this value to assess the athlete's performance



Sit and Reach Test

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Gender	Excellent	Above average	Average	Below average	Poor
Male	>14	14.0 - 11.0	10.9 - 7.0	6.9 - 4.0	<4
Female	>15	15.0 - 12.0	11.9 - 7.0	6.9 - 4.0	<4



Agility: How can you change direction while maintaining speed, balance and power

Objective of test: is to monitor the development of the athlete's agility.

Sporting examples:
Football, basketball,
trampolining,
gymnastics

Test: The Illinois Agility Test

Resources Required:

Flat non-slip surface

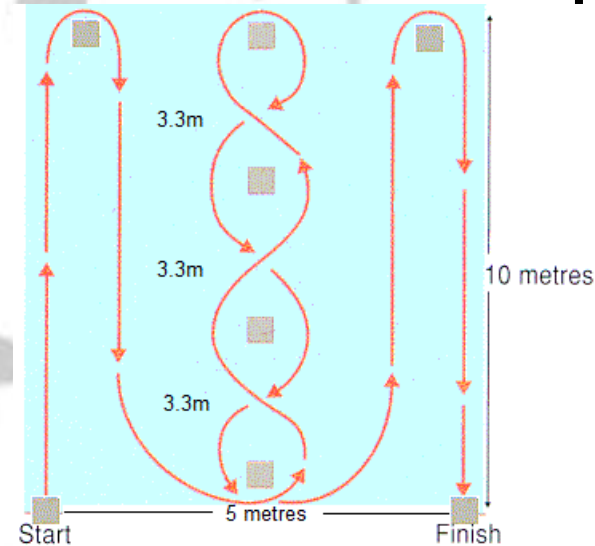
8 cones

Stopwatch

Assistant

How to conduct the test:

- The athlete warms up for 10 minutes
- The assistance sets up the course as detailed in the diagram
- The athlete lies face down on the floor at the "Start" cone
- The assistant gives the command "GO" and starts the stopwatch.
- The athlete jumps to his/her feet and negotiates the course around the cones following the red line route as shown in the diagram to the finish
- The assistant stops the stopwatch and records the time when the athlete passes the "Finish" cone





The Illinois Agility Test

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Gender	Excellent	Above Average	Average	Below Average	Poor
Male	<15.2 secs	15.2 - 16.1 secs	16.2 - 18.1 secs	18.2 - 19.3 secs	>19.3 secs
Female	<17.0 secs	17.0 - 17.9 secs	18.0 - 21.7 secs	21.8 - 23.0 secs	>23.0 secs



Balance: The ability to keep your body mass or centre of mass over a base of support

Objective of test: To monitor the development of the athlete's ability to maintain a state of equilibrium (balance) in a static position.

Sporting examples:
Gymnastics, netball,
dance

Test: Stork stand test

Resources Required:

Warm dry location - gym

Stopwatch

Assistant

How to conduct the test:

The athlete warms up for 10 minutes

The athlete stands comfortably on both feet with their hands on their hips

The athlete lifts the right leg and places the sole of the right foot against the side of the left kneecap

The assistant gives the command "GO", starts the stopwatch and the athlete raises the heel of the left foot to stand on their toes

The athlete is to hold this position for as long as possible

The assistant stops the stopwatch when the athlete's left heel touches the ground, or the right foot moves away from the left knee

The assistance records the time



Stork Stand Test

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	Excellent	Above Average	Average	Below Average	Poor
Males	>50	41-50	31-40	20-30	<20
Females	>30	23-30	16-22	10-15	<10



Coordination: The ability to move different limbs at different times or to do more than one task at a time effectively

Objective of test: to monitor the ability of the athlete's vision system to coordinate the information received through the eyes to control, guide, and direct the hands in the accomplishment of catching a ball (hand-eye coordination).

Sporting examples:
Dance, tennis, table tennis, badminton, gymnastics

Test: Wall Throw Test

Resources Required:

Tennis Ball
Stopwatch
Smooth Wall
Assistant

How to conduct the test:

- The athlete warms up for 10 minutes
- The athlete stands two metres away from a smooth wall
- The assistant gives the command "GO" and starts the stopwatch
- The athlete throws a tennis ball with their right hand against the wall and catches it with the left hand, throws the ball with the left hand and catches it with the right hand. This cycle of throwing and catching is repeated for 30 seconds
- The assistant counts the number of catches and stops the test after 30 seconds
- The assistant records the number of catches



Wall Throw Test

ISAAC NEWTON
ACADEMY



Age	Excellent	Above Average	Average	Below Average	Poor
15-16 years	>35	30 - 35	25 - 29	20 - 24	<20



Reaction Time: Time between the onset of the stimulus and initiation of the response

Objective of test: to monitor the athlete's reaction time

Sporting examples:
Sprint start in athletics,
receiving a serve in
table tennis

Test: Ruler Drop Test

Resources Required:

Metre ruler

Assistant

How to conduct the test:

- The ruler is held by the assistant between the outstretched index finger and thumb of the athlete's dominant hand so that the top of the athlete's thumb is level with the zero-centimetre line on the ruler
- The assistant instructs the athlete to catch the ruler as soon as possible after it has been released
- The assistant releases the ruler and the athlete catches the ruler between their index finger and thumb as quickly as possible
- The assistant is to record the distance between the bottom of the ruler and the top of the athlete's thumb where the ruler has been caught.
- The test is repeated 2 more times and the average value used in the assessment



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Ruler Drop Test



Excellent	Above Average	Average	Below Average	Poor
<7.5cm	7.5 - 15.9cm	15.9 - 20.4cm	20.4 - 28cm	>28cm

