Fitness Testing – Muscular and Aerobic Endurance

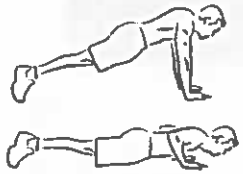
Muscular endurance and aerobic endurance are two components of physical fitness. Many sports and activities including marathon running, and team sports such as hockey, require both and, therefore, it is important that athletes are able to assess these components. The following tests can be used to measure an athlete's training progress.

Muscular Endurance

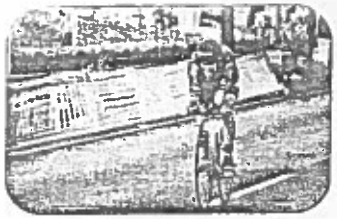
The one-minute press-up test measures the muscular endurance of the muscles in the upper body such as the chest and triceps, while the one-minute sit-up test measures the muscular endurance of the abdominal muscles. Females may often perform modified press-ups as opposed to conventional full body press-ups due to their reduced upper body strength compared to males.

One minute sit-up/press-up test

1. Both the one-minute sit-up and press-up tests measure muscular endurance.
2. The tests involve performing as many sit-ups or press-ups as possible in a period of one minute.
3. The results of these tests are usually measured as the number of repetitions (reps) performed in the one-minute period.



One-minute press-up test



Long-distance cyclists require muscular endurance

Average Sit-up Test Results (reps)

Rating	Males	Females
Excellent	>30	>25
Good	26–30	21–25
Average	20–25	15–20
Fair	17–19	9–14
Poor	<17	<9

Average Full Body Press-up Test Results (reps)

Rating	Males	Females
Excellent	>56	>35
Good	47–56	27–35
Above Average	35–46	21–26
Average	19–34	11–20
Below Average	11–18	6–10
Poor	<11	<6

Source. Davis et al. 2000

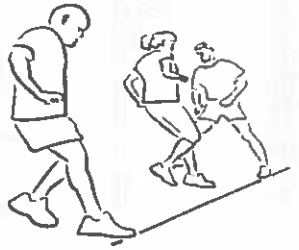
Advantages ✓	Disadvantages ✗
• They are reliable and valid ways to assess muscular endurance • The only equipment required is a stopwatch	• They may require assistance to administer. • Only measure endurance of specific muscles that may not be specific to a sport

Aerobic Endurance

1) **Forestry Step Test:** This test is used to measure aerobic endurance and involves stepping on and off a step box for five minutes in time with a metronome set at 90 bpm (22.5 steps per minute). Pulse rate is then calculated 15 seconds after completing the five minutes of exercise. Pulse rate is then used to calculate **maximal oxygen consumption (VO_2 max)** based upon pre-established aerobic fitness values and the weight of the athlete. The units of measurements used for VO_2 max are ml/kg/min.

Advantages ✓	Disadvantages ✗
• It is an accurate and valid way to test aerobic endurance • It requires minimal equipment	• It requires athletes to be fit enough to keep up with the stepping rate • Requires coordination

2) **Multi-stage Fitness Test:** This test is used to measure aerobic endurance and involves a participant running between cones 20 m apart in time with the bleeping noises that set the pace of running. The athlete must make sure they arrive at each cone in time with the bleep, which becomes increasingly hard as the levels of the test increase and the time in which the athlete has to run between the cones decreases. The level of the test that the athlete reaches then corresponds to their **maximal oxygen consumption (VO_2 max)** measured in ml/kg/min.



Advantages ✓	Disadvantages ✗
• It is an accurate and valid way to test aerobic endurance • Can assess multiple people at a time	• It requires a CD and CD player • Assistance is required to ensure each level is completed appropriately

Long-distance swimming requires aerobic endurance

Maximal Oxygen Consumption (VO_2 Max)

This is a measure of aerobic endurance and describes an athlete's maximum amount of oxygen uptake. It is measured in ml of oxygen per kg of body mass per minute (ml/kg/min).