

# STEP TEST

## MCARDLE STEP TEST

THE MCARDLE STEP TEST IS ANOTHER FIELD TEST USED TO MEASURE cardiorespiratory endurance. Unlike the YMCA submaximal step test that evaluates recovery HR, this test measures exercising HR from which  $\dot{V}O_2\text{max}$  can be estimated. This is a useful test for clients with higher levels of aerobic fitness, but individuals who are short in stature may struggle with this test given that the step height is 16.25 inches (41.3 cm).

### Equipment:

- 16.25-inch (41.3 cm) step (This is the common height of a bleacher; no configuration of the Reebok step will achieve this height.)
- Stopwatch
- Metronome
- Stethoscope (optional)



Three-minute step test—stepping cycle



### Contraindications

Due to the nature of step testing, this assessment may not be appropriate for:

- Individuals who are extremely overweight
- Individuals with balance concerns
- Individuals with orthopedic problems (e.g., knee, low-back)
- Individuals who are extremely deconditioned, as the intensity of the test may require near-maximal effort
- Individuals who are short in stature, as they may have trouble with the step height, especially during the McArdle step test

### Pre-test procedure, test protocol, and administration:

- The pre-test procedures, test protocol, and administration are very similar to the YMCA submaximal step test, with the following changes:
  - ✓ Women step at a cadence of 88 steps per minute (22 step cycles), while men will step at the same 96 steps-per-minute cadence used in the YMCA test (“up,” “up,” “down,” “down”).
  - ✓ The post-exercise HR is counted for 15 seconds while the client remains standing (instead of the one-minute sitting count used in the YMCA test). Multiply the 15-second count by four to use in the appropriate formula.

- The client’s 15-second post-exercise HR is recorded on the testing form.
- Encourage a three- to five-minute cool-down followed by stretching of the lower extremities. If there are concerns with post-exercise dizziness or other signs of distress from an abrupt cessation of exercise, allow the client to march in place during the HR measurement to prevent pooling of blood in the lower extremity.

- Use the following formulas to determine  $\dot{V}O_2\text{max}$ :

- ✓ Women:  $\dot{V}O_2\text{max} = 65.81 - (0.1847 \times \text{HR})$

- ✓ Men:  $\dot{V}O_2\text{max} = 111.33 - (0.42 \times \text{HR})$

- *Example:* Pete completes this three-minute step with a 15-second HR count of 35 beats.
  - ✓ 15-second count at 35 beats = 140 bpm
  - ✓  $\dot{V}O_2\text{max}$  (mL/kg/min) =  $111.33 - (0.42 \times \text{HR}) = 111.33 - (0.42 \times 140) = 111.33 - 58.8 = 52.53$  mL/kg/min

- Have the client cool down for three to five minutes and continue to observe the client, as negative symptoms can arise post-exercise.
- Classify the client’s score using Table 8-12 of the *ACE Personal Trainer Manual* (5th Edition) and record the values on the testing form.