

Upper-Body Muscular Endurance

Equipment

- Bench press with appropriate free weights
- Floor mats (for push-up stations)
- Metronome
- Individual data sheet
- Group data sheet
- Microsoft Excel or equivalent spreadsheet program

Warm-Up

Regardless of which method is used to assess muscular endurance, each subject should perform a structured warm-up to prepare for the tests that will be performed. The warm-up should contain a 5 min general warm-up and a 5 min dynamic stretching warm-up (8). Sample general warm-up exercises include light jogging, cycling, and jumping rope. Dynamic stretching activities might include arm circles and swings, as well as other activities targeting the upper body. After completing the warm-up protocol, the subject can begin the testing process.

YMCA Bench Press Test

This test requires a station with a bench press, barbell (with appropriate weights), and metronome. Men use an 80 lb (36.3 kg) barbell, and women use a 35 lb (15.9 kg) barbell. During the test, a metronome counts 60 beats $\cdot$ min⁻¹ to establish a rate of 30 reps $\cdot$ min⁻¹. If the subject cannot maintain this rate, the test is ended.

- Step 1:** Set up the testing area with the appropriate weight, as well as a bench and a metronome.
- Step 2:** Set the metronome to 60 beats $\cdot$ min⁻¹ to establish the necessary cadence (30 reps $\cdot$ min⁻¹).
- Step 3:** Gather basic data (e.g., age, height, weight) for the individual data sheet as described in laboratory activity 1.1.
- Step 4:** Assume a spotting position while directing the subject to lie on his or her back on the bench. Explain that the subject must maintain all five points of contact (e.g., head, shoulders, buttocks, right and left feet) during the test (figure 12.6a).
- Step 5:** Once the subject is positioned on the bench, lift the bar off the rack using an alternated grip (figure 12.6b) while the subject holds the bar using a pronated grip with the hands slightly farther than shoulder-width apart. Throughout the test, spot the subject with an alternated grip in order to assist when muscular failure is reached.
- Step 6:** Have the subject lower the bar to the starting position with the bar resting on the chest and the elbows in a flexed position (figure 12.6c).
- Step 7:** Instruct the subject to press the bar up to a position in which the arms are fully extended (figure 12.6d) and then return bar to the chest at a

cadence of $30 \text{ reps} \cdot \text{min}^{-1}$. The up-and-down movement will continue as long as the subject can maintain the prescribed cadence. During each repetition, ensure that a full range of motion (ROM) is performed. Count each successful repetition.

- Step 8:** When the subject can no longer maintain the $30 \text{ reps} \cdot \text{min}^{-1}$ cadence, help return the barbell to the rack (figure 12.6e).
- Step 9:** Record the total number of repetitions completed and determine the subject's percent ranking by comparing the results with the data presented in table 12.8. Record the results in the appropriate locations on the individual data sheet.
- Step 10:** Using the equations presented on page 264, estimate the subject's 1RM bench press. Transfer this value to the individual and group data sheets.

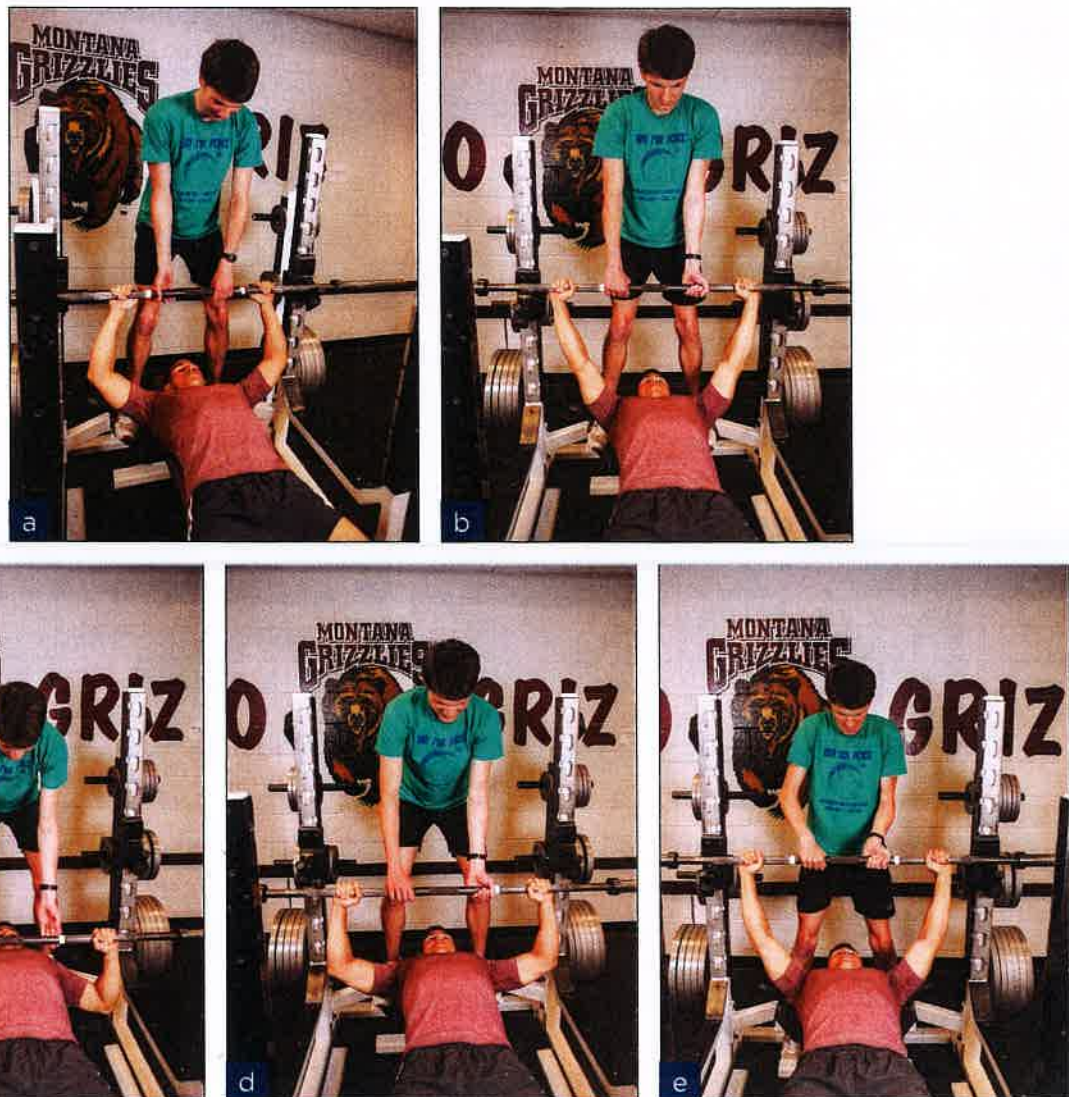


Figure 12.6 Bench press series: (a) liftoff, (b) starting position, (c) downward position, (d) upward movement, and (e) racking the bar.

Push-Up Test

The push-up test is recommended by the ACSM for evaluating upper-body muscular endurance (2, 3). It is an ideal field test because it requires no special equipment. When conducting the push-up test, make sure the subject maintains a flat back at all times. For men, the subject takes the standard push-up position in which the hands are about shoulder-width apart, the back is straight, the head is up, and the toes are used as a pivot point (figure 12.7a). Women use a modified knee push-up position in which the legs are held together, the lower leg is in contact with a mat or the floor with the ankles plantar-flexed, the back is straight, the head is up, and the hands are approximately shoulder-width apart (figure 12.8a).

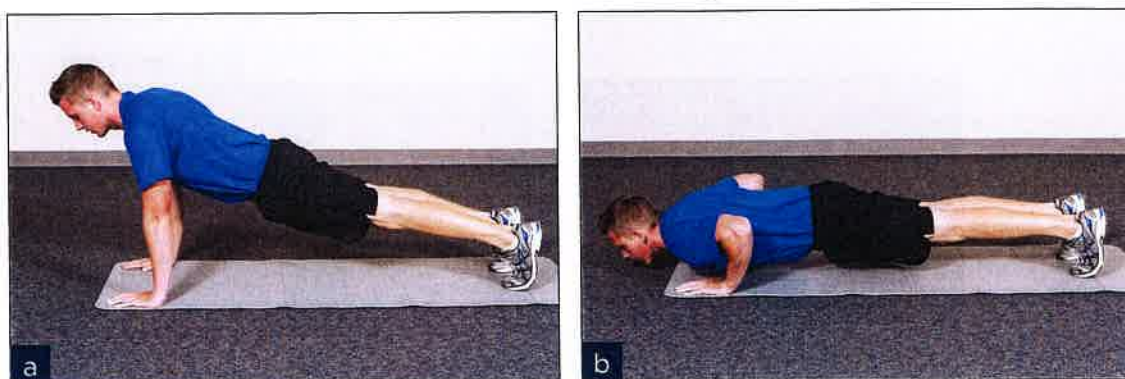


Figure 12.7 Push-up test: (a) standard start position and (b) standard lowered position.

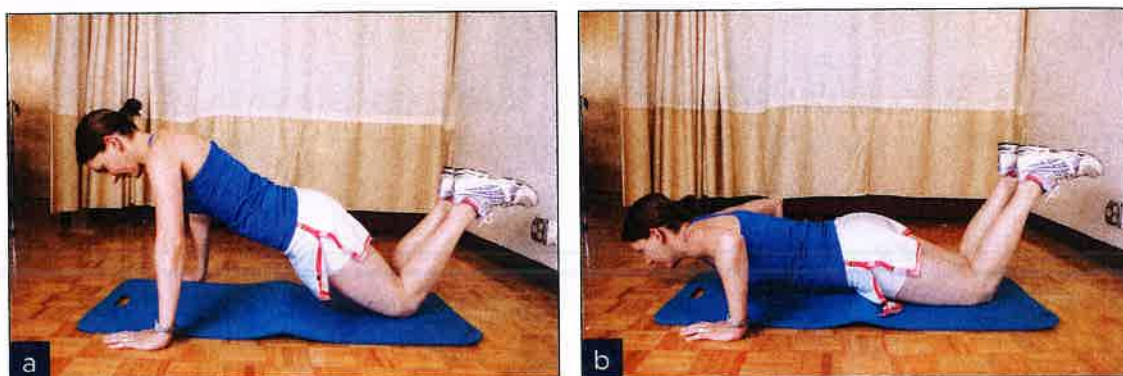


Figure 12.8 Push-up test: (a) modified start position and (b) modified lowered position.

- Step 1:** Set up the testing area and explain the basics of the test to the subject.
- Step 2:** Gather basic data (e.g., age, height, weight) for the individual data sheet as described in laboratory activity 1.1. Have the subject put his or her shoes back on and move to the test area.
- Step 3:** Lead the subject through a 10 min warm-up that includes both a general warm-up and a dynamic stretching routine targeting the musculature of the upper body.

- Step 4:** Instruct the subject to assume the proper starting position (for men, use the standard position in figure 12.7a; for women, use the modified position in figure 12.8a).
- Step 5:** Have the subject lower the body while maintaining a straight back until the chin touches the mat (figures 12.7b and 12.8b). The stomach should not touch the mat at any time during the assessment.
- Step 6:** Once the chin touches the mat, the subject should push up by extending the arms until achieving a straight-arm position. Record each successful push-up as it is performed.
- Step 7:** Without resting, the subject should repeat steps 5 and 6 until no longer able to maintain a straight-back position or complete any more push-ups.
- Step 8:** Record the total number of push-ups completed in the appropriate location on the individual and group data sheets. Compare the subject's results with the data presented in table 12.9 and record the appropriate classification.

Question Set 12.4

1. What were your individual upper-body muscular endurance ratings for the YMCA bench press test and the push-up test? How did these compare with the results for the class and with the values presented in the norm tables?
2. Did the men and women in the class differ in upper-body muscular endurance? Did you expect this result? Why or why not?
3. How did your push-up test results compare with the normative values? Was the muscular endurance rating similar to the YMCA bench press test results?
4. Using Excel or an equivalent spreadsheet program, perform a correlation analysis between the number of push-ups performed and the number of repetitions performed in the YMCA bench press test. Are these related? If so, how might they be related?
5. Using Excel or an equivalent spreadsheet program, perform a correlation analysis between the number of push-ups performed and the estimated maximal weight determined. Are these related? If so, how might they be related?

LABORATORY ACTIVITY 12.4

INDIVIDUAL DATA SHEET

Name or ID number: _____ Date: _____

Tester: _____ Time: _____

Sex: M / F (circle one) Age: _____ y Height: _____ in. _____ m

Weight: _____ lb _____ kg Temperature: _____ °F _____ °C

Barometric pressure: _____ mmHg Relative humidity: _____ %

YMCA bench press test		Comments
Number of repetitions		
Percent ranking		
1RM prediction	Men	
	Women	

Push-up test		Comments
Number of repetitions		
Classification		