

Bench Press 1RM Prediction Test

When performing an RM test as a tool for predicting the 1RM, use a load that allows fewer than 10 repetitions to be performed (29). This repetition range is selected because it has been established that using heavier loads in the prediction process results in greater accuracy in predicting the 1RM (1). In this lab, you will use the 1RM to calculate a load that is 87% of 1RM, which is chosen as the target intensity because it corresponds to previously established 5RM loads for most people (9, 52). Once the target load has been established, initiate the testing process with the following steps.

- Step 1:** Set up the bench press area with the appropriate weights.
- Step 2:** Gather basic data (e.g., age, height, weight) for the individual data sheet as described in laboratory activity 1.1. Instruct the subject to put on his or her shoes and move to the test area.
- Step 3:** Explain the test to the subject. Then begin a 10 min warm-up that contains a 5 min general warm-up (e.g., cycling, jogging, rope jumping) followed by 5 min of dynamic stretching activities targeting the upper body.
- Step 4:** Use the subject's 1RM to determine the test set load. This will be considered the repetition weight (kg) used for the test (RepWt).
- Step 5:** Load the barbell with 50% of the calculated test set load.
- Step 6:** Instruct the subject to lie on the bench on his or her back with five points of contact (head, shoulders and upper back, buttocks, left foot, and right foot).
- Step 7:** Assume the spotting position depicted in figure 12.4a.
- Step 8:** Instruct the subject to grasp the bar using a pronated grip with hands approximately shoulder-width apart.
- Step 9:** Lift the barbell off the rack with an alternated grip while the subject is grasping the bar (see figure 12.4b). The subject should hold the barbell at arm's length.
- Step 10:** Have the subject lower the barbell in a controlled fashion while inhaling until it touches the chest by moving the elbows down past the torso and slightly away from the body (see figure 12.4c). Once the barbell touches the chest, instruct the subject to press the bar upward while exhaling until the arms are fully extended (see figure 12.4d). This pattern should be completed six times. While the subject is performing each repetition, follow the bar with an alternated grip in order to assist the subject if needed.
- Step 11:** Once the last repetition has been completed for the set, help the subject place the bar onto the rack (see figure 12.4e).
- Step 12:** Adjust the weight to a load corresponding to 70% of the test weight previously calculated. During this time, the subject rests for 3 min.
- Step 13:** Repeat steps 6 through 11.
- Step 14:** While the subject rests for 3 min, change the weight to a load corresponding to 90% of the predetermined test weight.

- Step 15:** Repeat steps 6 through 11.
- Step 16:** Adjust the weight on the bar to the test set weight (87% of estimated 1RM) while the subject rests for 3 min. After the 3 min, complete steps 6 through 11, but have the subject perform as many repetitions as possible.
- Step 17:** If the subject completes fewer than 10 repetitions with the predetermined load, the test is complete. Record the total number of repetitions completed (RTF), as well as the load used (RepWt), in the appropriate location on the individual data sheet. Skip to step 21.
- Step 18:** If the subject performs more than 10 repetitions, increase the load by 2.5% to 5.0% while the subject rests for 3 min.
- Step 19:** Repeat steps 6 through 11, but have the subject perform as many repetitions as possible.
- Step 20:** After the subject completes step 19, the tester can then complete step 17. Continue this process until reaching a weight where the subject can lift fewer than 10 times.
- Step 21:** Using the Adams (5) equation, calculate the subject's predicted 1RM bench press.

$$\text{Predicted 1RM (kg)} = \text{RepWt (kg)} / (1 - 0.02 \times \text{RTF})$$

Place the weight used for the RM test in the RepWt (kg) location and place the number of repetitions (RTF) completed in the appropriate location. Using a calculator, perform the calculation and record the result on the individual and group data sheets.

- Step 22:** Using the Brown (13) equation, calculate the subject's predicted 1RM bench press.

$$\text{Predicted 1RM (kg)} = (\text{RTF} \times 0.0338 + 0.9849) \times \text{RepWt (kg)}$$

Place the weight used for the RM test in the RepWt (kg) location and place the number of repetitions (RTF) completed in the appropriate location. Using a calculator, perform the calculation and record the predicted 1RM in the appropriate location on the individual and group data sheets.

- Step 23:** Using the Mayhew et al. (34) equation, calculate the subject's predicted 1RM bench press.

$$\text{Predicted 1RM (kg)} = \text{RepWt (kg)} / (0.522 + 0.419 e^{-0.055 \times \text{RTF}})$$

Place the weight used for the RM test in the RepWt (kg) location and place the number of repetitions (RTF) completed in the appropriate location. Using a calculator, perform the calculation and record the predicted 1RM in the appropriate location on the individual and group data sheets.

- Step 24:** Using the O'Conner et al. (39) equation, calculate the subject's predicted 1RM bench press.

$$\text{Predicted 1RM (kg)} = 0.025 \times [\text{RepWt (kg)} \times \text{RTF}] + \text{RepWt (kg)}$$

Place the weight used for the RM test in the RepWt (kg) location and place the number of repetitions (RTF) completed in the appropriate location. Using a calculator, perform the calculation and record the predicted 1RM in the appropriate location on the individual and group data sheets.

- Step 25:** Using the Reynolds (40) equation, calculate the subject's predicted 1RM bench press.

$$\text{Predicted 1RM (kg)} = \text{RepWt (kg)} / (0.5551 e^{-0.0723 \times \text{RTF} + 0.4847})$$

Place the weight used for the RM test in the RepWt (kg) location and place the number of repetitions (RTF) completed in the appropriate location. Using a calculator, perform the calculation and record the predicted 1RM in the appropriate location on the individual and group data sheets.

- Step 26:** Using the Tucker et al. (49) equation, calculate the subject's predicted 1RM bench press.

$$\text{Predicted 1RM (kg)} = 1.139 \times \text{RepWt (kg)} + 0.352 \times \text{RTF} + 0.243$$

Place the weight used for the RM test in the RepWt (kg) location and place the number of repetitions (RTF) completed in the appropriate location. Using a calculator, perform the calculation and record the predicted 1RM in the appropriate location on the individual and group data sheets.

Question Set 12.1

1. Why is it important to test muscular strength?
2. When performing the 1RM bench press tests, what are some important factors to remember as a tester? As a subject?
3. What was your predicted 1RM for the bench press? Did any of the formulas differ from your previously established 1RM? Was this pattern similar for the class as a whole?
4. Why might a 1RM prediction differ from an actual 1RM? (Hint: Is there a physiological reason?)
5. Using Excel or an equivalent spreadsheet program, create a graph of each of the estimated maximum results and the actual 1RM. Which formula best estimates the 1RM? Which formula is the worst? What might explain the differences between the regression equations used to predict 1RM?
6. Explain the pros and cons of 1RM and RM testing. Which test is safer and why?
7. Why is important to use fewer than 10 repetitions when predicting 1RM values? What is the physiological reason for performing fewer than 10 repetitions?

LABORATORY ACTIVITY 12.1

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: _____ %

1RM Bench Press Test

Perceived maximum	Load	kg	Completed
Set 1	5-10 repetitions at 40%-60% of perceived maximum		☐
Set 2	3-5 repetitions at 60%-80% of perceived maximum		☐
Set 3	1 repetition at 90% of perceived maximum		☐
Set 4	1RM attempt		☐
Set 5	1RM attempt		☐

Note: 1 min rest between sets 1 and 2; 3 min rest preceding sets 3, 4, and 5.

Absolute 1RM = _____ kg

Relative 1RM = load (kg) / body weight (kg) = _____

Strength classification = % rank = _____

Notes:

Bench Press Predicted Maximum Test

Set	Load	Repetitions	Repetitions Completed	Completed
Warm-up set 1		6		☐
3 min rest				
Warm-up set 2		6		☐
3 min rest				
Warm-up set 3		6		☐
3 min rest				
Test set 1		To failure		☐
3 min rest				
Test set 2*		To failure		☐

*If test set 1 results in more than 10 repetitions, repeat the test after adding weight.

Bench Press 1RM Prediction Equations

Resistance (RepWt)		kg	Note: This resistance is 87% of 1RM.
Number of repetitions (RTF)			
1RM prediction	Adams (5)		
	Brown (11)		
	Mayhew et al. (34)		
	O'Conner et al. (39)		
	Reynolds et al. (40)		
	Tucker et al. (49)		