

**Laboratory Assignment #2: Predicting VO₂max
Fitness Assessments and Programming**

In preparation for each of the tests, you should do each of the following

- a. Do not eat within 1-hour of the test.**
- b. Do not drink caffeine within 2-hours of the test**
- c. Allow at least 15 minutes between each test for recovery.**

Note: In responding to the questions below, you cannot use any of the above three criteria as a basis for your explanations. The assumption is that you followed the above criteria.

1. Most average people would have a higher predicted VO₂max from the maximal 1.5 mile run test than from the Storer Maximal Bicycle Test. Was your predicted VO₂max highest from the 1.5 mile run test or the Storer Maximal Bicycle test? Explain why the predicted VO₂max is typically higher on the run test than on the bicycle test. If your VO₂max was higher for the Storer Test explain why.
2. In both the maximal 1.5 mile run test and the Storer Maximal Bicycle test the heart rate at the end of the test (assumed to be maximal heart rate) is **not** used in the computation of VO₂max which means that maximal heart rate is **not** a good predictor of VO₂max. Explain why the heart rate at the end of the test is not a good predictor of VO₂max?
3. Compare **all** of the predictions of VO₂max from the submaximal tests and the non-exercise tests to the **highest** prediction by one of the two maximal tests (1.5 mile run or Storer Bicycle Test). If a predicted value from the submaximal tests or non-exercise tests differs from the value from the maximal test by more than 5 ml kg⁻¹·min⁻¹, **explain** why your VO₂max values are not the same as your value from the maximal test. **Don't give generic reason or a list of all possible factors that could affect accuracy of prediction tests. Identify and explain specific reasons that apply in your situation for each test that is different. Also, explain how each factor would specifically affect the predicted VO₂max (would that factor cause the predicted value to be too high or too low?).** For example, if you typically train by running and the 1-mile jog test gave you a higher prediction than the YMCA bicycle test, this would be an appropriate possible reason to list. Make sure the effect fits the direction of deviation. For example if a predicted value is higher than your measured value but you use as a reason some factor that would reduce the prediction, then your reasoning is flawed. So, think about the direction of your deviations when you attempt to explain them and make sure the difference jive with the explanation.
4. In order to compute VO₂max using the YMCA bicycle test you usually have to use an age-predicted maximal heart rate because you do not know the true maximal heart rate. On the same YMCA bicycle test graph you used to determine your predicted VO₂max knowing your true maximal heart rate, determine your VO₂max values using the two age-predicted maximal heart rate (220-age) and [(208-(0.7 x age))]. Determine the amount (percentage) of error in the predicted VO₂max using the predicted maximal heart rates (as a **percentage** of the VO₂max predicted with your actual maximal heart rate). **Note: You determine the percentage of error in the predicted VO₂max, not the maximal heart rate.**
5. People who exercise a lot (like marathon runners) are usually significantly **underpredicted** by both of the non-exercise tests but usually more under-predicted by the Jackson test compared to the George test. Using the sample data below, compute the predicted VO₂max values using both non-exercise tests using your Excel spread sheet that you have used to make all the other computations. Below your name, enter the name Male Marathoner and fill in the necessary data in the appropriate cells and compute using the same equations you have already used for your computations. **Provide at least 2 reasons** why the marathon runner is under predicted by both non-exercise tests but by a higher amount for the Jackson test.

Male Marathoner Data: height 70 inches; weight 154 lbs; %fat 5%, age 25; runs 70 miles per week at an average of 6 minutes per mile.

6. As the fitness professional at the YMCA, you use the YMCA bicycle test to predict VO_2max in a 40-year old sedentary female as part of entry into an exercise program at your fitness facility. During the test, the seat is set at the appropriate height such that when the pedal is in the down position, there is just a slight bend at the knee. The predicted VO_2max from the result of the test is $33 \text{ ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$. Following the test, the sedentary female begins an appropriate exercise program that lasts for 8 weeks and includes both **appropriate** aerobic exercise (jogging/walking on a treadmill @ 60-75% of heart rate reserve 4-5 times per week for 30 minutes each session) and resistance training (2 times per week). She loses 5 pounds over the 8 weeks. After 8 weeks, a retest of the YMCA bicycle test is performed but the seat height is mistakenly placed 2 inches **lower** than on the initial test. The predicted VO_2max from the second test is $33 \text{ ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$. What are the **two most plausible reasons for the second VO_2max value being the same as the first after 8 weeks of appropriate cardiorespiratory training?**
7. Use your Excel spread sheet to make the computations requested in the following scenario. Enter data into the 2 rows under Male Marathoner (from #5) as Male Pre and Male Post: The 1 mile jog test is used to predict VO_2max in a 25-year old male as part of entry into an exercise program at a fitness facility. On the initial test, the male (weight = 170 lbs) jogs the mile in 10:00 minutes and his heart rate at the end of the mile is 170 (compute his VO_2max). This initial test is administered by an experienced fitness professional. They adhered to all the appropriate procedures. Following this Pre test, the male begins the same 8-week exercise program as the female in #6 above (same exercise, same intensities, same everything). At the end of the 8 weeks, the 1 mile jog test is re-administered to the male (still at the same weight of 170 lbs) but this time a new staff person administered the test and they didn't follow the appropriate protocol. During the last 200-300 meters of the run, the staff person encouraged the male to speed up their pace because they only had a short distance to go. The male did so and finished with a time of 9 min 30 seconds and a heart rate of 170 (compute VO_2max). **Explain** (be specific in your explanation and include as part of the explanation the mathematical reason as well as the theoretical reason) why the predicted VO_2max from the 1-mile jog test increased by only a very small amount when the expected increase from the training would have been minimally $5\text{-}7 \text{ ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$.
8. Using your data, create a spread sheet in Excel that looks exactly like the sample spread sheet except that your data will be in row 4, the Male Marathoner on row 5, Pre Male on row 6 and Post Male on row 7. Compute the VO_2max values for all of the prediction tests except the Lifecycle tests. To do this you must write the appropriate formula in the top cell for each column that will contain the calculated VO_2max value. If you write the correct equation, you should get the same values for the sample male and female as in the sample spreadsheet. **Close down the wasted space between columns so the entire spreadsheet will fit on one page with bigger print. Print the entire spreadsheet, including gridlines, on a single page using landscape orientation and the Fit To option (all located under the Page Setup in the File dropdown menu.**

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In preparing your responses to the questions below, follow these directions:

2. Type your responses using #12 font size, double spaced with 1 inch margins top, bottom, left and right. Number your responses the same as the numbers of the questions above.
3. Put your name in the top left hand corner of each page.
4. Put your class number in the top left hand corner (just below your name) of each page.
5. This lab will be graded on the items specified on the Lab Report Evaluation Sheet. When you use scientific terms like VO_2 max make sure they are written appropriately.
6. Turn in the assignment with the following pages in this order and stapled in top left-hand corner: (1) Lab Report 2 Evaluation Sheet with your name and class number filled in, (2) responses to the questions, (3) Excel spreadsheet with computed values for the sample male and female and your values, (4) Summary Table with all data filled in, (5) Fitness Test Data Sheet with all values filled in, (6) plotted graph for the YMCA bicycle test.

Late assignments will be accepted but there is a 10% per day penalty for being late until a maximum of 50 points remaining. After 5 days of being late, there is no further penalty.