

Procedure:

PART A: Resting (no exercise)

Measuring Carbon Dioxide Production:

1. Use a graduated cylinder to measure out 20 mL of tap water and pour it into a small beaker.
2. Use a dropper to add 8 drops of bromthymol blue to make a BTB solution.
3. Using a straw, exhale into the BTB solution. (CAUTION: Do not inhale the solution!)
4. Time how long it takes for the blue solution to turn yellow. Record the time in **Table 1**.
5. Wash out the beaker repeat steps 1-4 twice more.
6. Average the results of the 3 trials. Record this in **Table 1**.

Measuring Breathing Rate:

1. Count the number of breaths (1 breath = inhale + exhale) you take in 1 minute. Record this in **Table 2**.
2. Repeat this 2 more times.
3. Average the 3 trials to get your average breathing rate. Record this in **Table 2**.

Measuring Heart Rate:

1. While you calculate your breathing rate, have your partner take your pulse.
2. Count the number of beats in 30 seconds and multiply that number by 2. Record this in **Table 3**.
3. Repeat this 2 more times.
4. Average the 3 trials to get your average heart rate. Record this in **Table 3**.

PART B: Increased Muscle Activity (Exercise)

1. Exercise for exactly 1 minute by doing jumping jacks.
2. While you are exercising, your partner should get the BTB solution ready as in Part A.
3. After 1 minute of exercise, immediately exhale through the straw into the BTB solution. Time how long it takes for the BTB to turn yellow. Record this in **Table 1**.
4. Then quickly calculate your breathing and heart rates as you did before. You only need to do this once.
5. Record these values in **Tables 2 & 3**. *Remake your BTB solution.*
6. Exercise as you did before, but for 2 continuous minutes.
7. Immediately exhale through the straw into the BTB solution. Time how long it takes for the BTB to turn yellow. Record this in **Table 1**.
8. Then quickly calculate your breathing and heart rates as you did before. You only need to do this once.
9. Record these values in **Tables 2 & 3**.
10. If there is time, repeat the entire procedure for your lab partner. Record data from 2 OR 3 other subjects in the class to get more data depending on if you partner was able to go or not.