

HEART RATE AND BREATHING LAB

GETTING TO THE HEART OF THE MATTER

Each time the human heart beats, blood is pumped through the arteries to the lungs and rest of the body. As blood is forced through the arteries during a heart beat, the artery stretches and bulges slightly. This brief bulge is called a **pulse**, and can be felt in arteries on your wrist or neck. You can measure your **heart rate** by counting the number of pulses in a minute (or by counting for 20 seconds and multiplying by three). Your heart rate can change depending on physical condition, diet, and current activity. It can also change with external stimuli, such as being frightened unexpectedly or being placed in a calming room with soothing, relaxing music.

- **What are two activities in which you participate that might increase heart rate?**

- **What are two activities in which you participate might decrease heart rate?**

FINDING YOUR PULSE

To feel your pulse, find the artery in your wrist. Place the tips of the first two fingers of one hand on the palm side of your other wrist, just below the thumb and to the side of the tendons that run down the center of your wrist. You may need to press firmly in order to feel the pulse. Do NOT use your thumb to find your pulse, because your thumb has a pulse of its own!

RESTING PULSE RATE

Find your pulse, and then count the number of pulses for 20 seconds. Write this in the space provided, and then **multiply by three** to get the number of heartbeats per minute while at rest.

of pulses for 20 seconds: _____ **x 3 =** _____ **beats per minute, resting**

A BREATH OF FRESH AIR...

Respiration is also closely linked with your heart. As you inhale and bring air into your lungs, your **pulmonary artery** brings blood in need of oxygen to the lungs. Through tiny blood vessels called **capillaries**, blood is brought into contact with the **alveoli** (air sacs) of the lungs. Oxygen diffuses out of the alveoli and into the blood, while carbon dioxide diffuses out of the blood and into the alveoli. As you exhale, you get rid of this carbon dioxide. Oxygenated blood is carried back to the heart through the **pulmonary vein**, and is then pumped by the heart to the rest of the body. You can calculate your **breathing rate** by counting the number of breaths you take each minute. Your respiration rate will also change depending on external stimuli, current activity and your level of physical fitness.

- **What are two activities that might increase your rate of respiration?**

- **What are two activities that might decrease your rate of respiration?**

CALCULATING RESPIRATION RATE

To calculate your respiration rate, breathe normally and count the number of breaths you take in 20 seconds, then multiply by three.

of breaths for 20 seconds: _____ **x 3 =** _____ **breaths per minute**

LAB PROCEDURE:

You will be calculating heart and breathing rates during a variety of activities.

1. Using the lab stools, each person must perform **10 lifts** (stand up straight and bring your stool up to your chest, then back down—this is one lift). Upon finishing, **take your PULSE** and calculate your own heart rate. Record all the data in the table below.
2. Repeat **10 lifts**, then **calculate your breathing rate**. Record data in table.
3. Now performs **20 lifts**. **Take your pulse** and calculate your own heart rate. Record the data. Then **repeat the 20 lifts** and **calculate your breathing rate**. Record.
4. Rest for about 1 minute, and then **hold your breath for 20 seconds**. **Take your pulse DURING the 20 second breath-holding period and** save the number. **Calculate your breathing rate for 20 seconds FOLLOWING the breath-holding period**. Then **calculate your heart rate from the pulse** number you saved. Record all data.

ACTIVITY	YOUR HEART RATE	YOUR BREATHING RATE
Resting (fill in from above)		
10 chair lifts		
20 chair lifts		
Holding breath for 20 seconds		

ANALYSIS

1. What happens with the heart rate during and immediately after a period of physical activity?
2. What happens with the breathing rate during and immediately after a period of physical activity?
3. Look at your answers for number 1 and 2. Explain why this happens with BOTH the heart and breathing rates during physical activity.
4. Was there any noticeable difference in the heart rate when you held your breath? Why or why not?
5. Was there any difference in the breathing rate after holding your breath? Why or why not?
6. You are training for a new sport called Beat-The-Other-Team-With-Sticks-And-Take-The-Trophy. It requires a high level of athletic performance and is very demanding on the body. As you continue your training for this sport and increase your level of physical fitness, what will you notice about your heart and breathing rates during and after your training sessions? Why?