**Regulation of Human Heart Rate**

**Introduction Questions**

1. Why do you need to have a heart? Why do you need to have blood circulate to all the parts of your body?
2. How does your heart pump blood? What is a heart beat?
3. Does your heart always beat at the same rate?
4. List some activities or stimuli that you think may increase a person's heart rate.

An activity is something a person does, and a stimulus is an input from the environment around a person.

1. Why would it be useful for the heart to beat faster during these activities or in response to these stimuli?
2. Are there any activities or stimuli that you think may decrease a person's heart rate?

Today, after you learn how to measure heart rate accurately, your group will design an experiment to test how a stimulus or activity affects heart rate. You will carry out your experiment, analyze your data, and prepare a conclusion for your experiment

**Measuring Heart Rate Accurately**

Each time the heart beats, blood is pumped into the arteries. As the blood surges into the arteries during a heart beat, each artery stretches and bulges. This brief bulge of the artery is called a pulse. To measure heart rate you will count the number of pulses in the artery in the wrist in a 30 second interval.

To feel the pulse, find the artery in your partner's wrist. Place the tips of the first two fingers of one hand on the palm side of your partner's wrist, over toward the thumb side of his or her wrist. You may need to press quite firmly in order to feel the pulse of blood which each heart beat sends through the artery. Don't use your thumb to feel the pulse in the wrist, because your thumb has a pulse of its own.

Practice counting the number of pulses in 30 seconds. Multiply that number by 2 to get heart rate (number of heart beats per minute). After you have practiced, it is important to check the accuracy of your heart rate measurements.

1. In your group choose:
   1. One person to be the subject
   2. One person to measure the pulse count in the left arm
   3. One person to measure the pulse count in the right arm
   4. One person to use the stop watch to time a 30 second interval, and say when the count of beats should begin and end
2. Both people who are measuring pulse count should write down the number of beats for the 30 second interval before saying the number out loud.

Pulse count in 30 seconds \_\_\_\_\_\_

1. Compare the results found by the two different people who were measuring pulse counts. Did you both count about the same number of pulses in the 30 second interval? If you got different results, can you figure out why?
2. Try to improve your technique, and repeat step 2 until both people who are measuring pulse counts get the same number of pulses in the 30 second interval (or within 1 or 2 of the same number).
3. Once you have accurate readings, use the final, accurate set of measurements to calculate the heart rate for this subject (beats per minute).

Heart rate = \_\_\_\_\_ beats per minute

**Designing Your Experiment**

Discuss how you could test your ideas on which activities or stimuli which may increase or decrease heart rate. Choose a hypothesis that your group would like to test. Write your hypothesis here:

**Plan your experimental procedure.**

Try to keep everything constant, except for the one stimulus or activity you want to test. This will allow you to measure the effect of the stimulus or activity you are testing. To reduce inaccuracies, try to avoid any physical activity (e.g. changing seats or change in posture) except for the movement that you are testing.

* In the space below, describe the procedure for your experiment. Be specific about what you plan to do to your subjects (the stimulus) or what you want your subjects to do (the activity). Specify when and how often you will measure heart rate; you will need to measure resting heart rate two or three times before your stimulus or activity, and you will need to measure heart rate during and/or after your stimulus or activity.

**List of Specific Numbered Steps in Your Procedure**

**Getting Ready to Do the Experiment**

Make a data sheet to collect the data during your experiment next time. The data sheet should include places to record the:

· names of each student in the group

· resting heart rates (pulse counts) for each subject before the stimulus or activity, and the heart rates during and/or after the stimulus or activity

· anything you notice which might affect the results, for example, other things which may be happening in the room during your experiment or changes in each subject's mood during the experiment.

**Analyzing Your Results**

Discuss the best way to analyze your data in order to test your hypothesis. You may want to use one of the following methods of analysis.

* For each subject, calculate the change in heart rate (difference between the resting heart rate and the heart rate during or after the stimulus or activity). Calculate the average change in heart rate for all subjects in the experiment. Make a table to show the individual values and the average change in heart rate.
* For each subject, graph the resting heart rate and the heart rate during and/or after the stimulus or activity. Calculate the average resting heart rate and the average heart rate during and/or after the stimulus or activity. Graph these averages. Be sure to label both axes of any graph that you make.

Each student should analyze the data and double check your table or graphs.

Do your results support your hypothesis? What conclusions can you draw

from your experiment?

**Formal Lab Report – Due November 25/26**

Each student will make a formal lab report that will include a Purpose statement, a Hypothesis, a Materials list, a Procedure, an Observation section, an Analysis section, and a Conclusion.