

IB Biology - Year 2  
Littleton High School  
Ms. Chen

NAME \_\_\_\_\_

Analysis

1-2	3-4	5-6

Evaluation

1-2	3-4	5-6

**Investigation - The Effect of Body Position on Heart Rate and Blood Pressure**  
**Note: Students participating in this activity MUST complete and turn in a signed consent form prior to participation.**

The following **IB criteria** will be assessed:

- Analysis
- Evaluation

**Background information:**

According to the American Heart Association (2012) your **heart rate** is the number of times your heart beats per minute. In most cases, normal resting heart rate is between 60 to 100 beats per minute. Your heart rate depends on numerous factors, including air temperature, altitude, fitness level and hydration level. The position of your body -- sitting, standing or lying down -- also influences how quickly your heart beats each minute. The position of your body may influence your blood pressure as well. According to The Harvard Medical School Family Health Guide (1999), normal blood pressure is 120 mmHg (systolic) over 80 mmHg (diastolic). Systolic pressure represents the force of the blood on the artery walls as the heart contracts. Diastolic blood pressure represents the force of the blood on the artery walls as the heart rests between beats.

1. American Heart Association. All About Heart Rate (Pulse). (2012). Retrieved October 23, 2013 from [http://www.heart.org/HEARTORG/Conditions/More/MyHeartandStrokeNews/All-About-Heart-Rate-Pulse\\_UCM\\_438850\\_Article.jsp](http://www.heart.org/HEARTORG/Conditions/More/MyHeartandStrokeNews/All-About-Heart-Rate-Pulse_UCM_438850_Article.jsp)
2. Komaroff, Anthony. The Harvard Medical School Family Health Guide. (1999). Free Press. New York, New York.

## Procedure

### **Part 1: Heart Rate**

1. Have participant stand next to a desk or lab table for two minutes.
2. Measure pulse. (Count for 10 seconds and record - radial pulse at wrist).
3. Have participant sit quietly in a chair for two minutes.
4. Measure pulse. (Count for 10 seconds and record - radial pulse at wrist).
5. Have participant recline completely, and lay quietly for two minutes.
6. Measure pulse. (Count for 10 seconds and record - radial pulse at wrist).
7. Have participant stand up from reclining position (stand next to a desk or lab table) and measure pulse immediately. (Count for 10 seconds and record - radial pulse at wrist)

\*Allow participant to sit and rest for five minutes before beginning part 2.

### **Part 2: Blood Pressure**

1. Affix blood pressure cuff (sphygmomanometer) and stethoscope to the proper location on participant's arm:
  - a. Thread the blood pressure cuff onto the participant's arm, leaving it loose (and above the elbow).
  - b. While the arm is relaxed, locate participant's pulse by lightly pressing your index and middle fingers slightly to the inside center of the elbow - just above the bend (where the brachial artery is).
  - c. Place the head of the stethoscope over the participant's brachial artery.
  - d. Keeping the stethoscope in place, position the blood pressure cuff so that it is directly over the stethoscope (to hold it in place) and the lower end is approximately  $\frac{1}{2}$  - 1 inch above the bend in the elbow.
  - e. Adjust the blood pressure cuff so that it is snug (it stays in place and holds the stethoscope, but it does not cut off circulation).
2. Have participant stand next to a desk or lab table for two minutes.
3. Measure blood pressure:
  - a. Position participant's arm so that the stethoscope is parallel to the atria of the heart.
  - b. Make sure participant's arm is relaxed.
  - c. Place stethoscope in your ears (tilt ear pieces slightly forward to get the best sound). You should hear participant's pulse.
  - d. Close the airflow valve on the bulb of the blood pressure cuff by turning the screw clockwise.

- e. Inflate the cuff by squeezing the bulb (watch the pressure gauge while inflating the cuff - inflate it until you can no longer hear participant's pulse).
  - f. While watching the pressure gauge, SLOWLY release the airflow valve on the blood pressure cuff by turning it counterclockwise.
  - g. Listen carefully for the FIRST pulse beat and record the pressure reading (this is the systolic blood pressure - the pressure of blood on the artery wall as the heart contracts).
  - h. Continue to SLOWLY deflate the cuff while watching the pressure gauge.
  - i. Listen carefully until the sound of the pulse disappears. Record the pressure reading (this is the diastolic pressure - the pressure of blood on the artery wall as the heart relaxes).
  - j. Deflate the cuff completely.
4. Have participant sit quietly in a chair for two minutes.
  5. Repeat step 3.
  6. Have participant recline completely, and lay quietly for two minutes.
  7. Repeat step 3.
  8. Have participant stand up from reclining position (stand next to a desk or lab table) and measure blood pressure (repeat step 3) immediately.