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| **A Day in the Life of Your Heart** |

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| **Objective**  Track your heart rate throughout the day to see which activities cause it to beat faster.  **Introduction**  "Lub-dub, lub-dub, lub-dub." That is the sound the doctor hears when he or she uses a **stethoscope** to listen to your heart. The doctor listens to make sure the heartbeat sounds normal and has a regular, steady rhythm. But did you know that you can figure out how fast your heart is beating without a stethoscope? This is done by taking your **pulse.**   |  | | --- | | Human Biology and Health Science Project the human heart | | **Figure 1.** The human heart, like the one pictured above, is a muscle that pumps blood to all other parts of the body. (Wikipedia, 2008.) |   Every time the heart beats it is pushing out blood, which is full of oxygen, throughout your body. By placing your fingers over a blood vessel close to the surface of your skin, you can feel the pulse of the blood rushing through the blood vessel every time your heart beats. If you count the number of pulses you feel in 1 minute, you will know how fast your heart is beating. But if you are trying to figure out what your **heart rate** is immediately after exercise or another physical activity, it is better to only count the pulses for 10 seconds and then multiply that number by 6 to get the number of pulses in 60 seconds (1 minute). That's because the heart recovers quickly from physical activity, and to get the most accurate data about how quickly the heart was beating *during* the activity, it is important to measure as quickly as possible *after* the activity. Equation 1, below, shows the formula for calculating heart rate.  **Equation 1:**   |  | | --- | | heart rate = (# of pulse beats in 10 seconds) × 6 | |  |   **Materials and Equipment Required:** Stopwatch, Notebook, Graph paper  **Procedure:**  ***Practice Taking Your Pulse and Calculating Heart Rate***  Before starting your experiment, it is important that you have practiced taking your pulse and using that data to calculate heart rate.   1. There are two spots usually used to take a pulse: the **carotid artery** in the neck and the **radial artery** in the wrist.    1. For descriptions on how to find these spots, check out the [Learn2 Take a Pulse](http://www.tutorials.com/09/0902/09025.asp) website.  |  | | --- | | Human Biology and Health  Science Project person taking his own pulse | | **Figure 2.**These photos show a person taking his own pulse using the carotid artery, located in the side of the neck, and the radial artery on the inside of the wrist. |  1. Press the fingertips of your index and middle fingers over either the radial or carotid artery. Gently wiggle your fingertips around until you feel a steady, rhythmic pulse. Don't push too hard. (Do not use thumb to take a pulse) 2. Once you've found the pulse, use your other hand to start the stopwatch. Or have a helper run the stopwatch for you. 3. Using the stopwatch to keep track of the time, count the number of beats you feel in 10 seconds. 4. Multiply the number of beats in 10 seconds by 6 to get the total number of beats in 1 minute (which is 60 seconds). This calculation is illustrated in Equation 1 in the Introduction.   ***Collecting Your Heart Rate Data***  Once you've got the hang of taking your pulse and calculating your heart rate, you are ready to start your experiment*. The goal is to measure your heart rate several times throughout the day.*   1. Take your pulse first thing in the morning, before you've even gotten out of bed. This is your *resting heart rate.* Record the data in a table, like the one below, in your lab notebook.    1. Take your pulse within the first 5 minutes of waking up.    2. While taking your pulse, you should either still be lying down or have just sat up in bed. Make sure to take your pulse *before* you get out of bed.    3. You might want to put your stopwatch, notebook, and a pen next to your bed the night before so that you have all the equipment you need the next morning to take your pulse without getting out of bed. 2. Choose four more times of day to take your pulse. Try to pick things that you do at a similar time every day so that it will be easy for you to repeat the pattern again each day. Try to space out the activities you are measuring over the whole day.    1. Two of the activities should be quiet activities. Some examples are:       * Reading a book       * Playing a board game or computer game       * Watching TV       * Eating a meal or a snack       * Riding in the car       * Drawing, painting, or working on some other art project    2. Two of the times should be while you are doing physically active tasks. Some examples are:       * Running around at recess       * Playing a sport       * Dancing to music       * Jumping rope       * Climbing, running, or jumping at the playground       * Actively playing with your friends, parents, or siblings    3. Make sure to record what you were doing, what time of day you were doing it, and your pulse rate each time in a data table in your notebook. 3. Take your pulse just before you go to sleep, while you are lying or sitting in your bed. Record the data in your notebook.  |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Day** | **Time of Day** | **Activity** | **Pulse (Beats per 10 seconds)** | **Heart Rate (bpm)**  **heart rate = (# of pulse beats in 10 seconds) × 6** | | *Day 1* |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |  |  1. Repeat steps 1-3 on two more days for **a total of three days' worth of data** (each with six activities). Try to make the three days as similar as possible, doing the same activities at the same times of day.   ***Analyze the Data***   1. Using Equation 1, change your pulse data into heart rate data for each time of day and activity. Record the heart rate data in the data table in your Notebook. 2. Make a line graph showing your heart rate data.    1. You can make the graph by hand or use a website like [Create a Graph](http://nces.ed.gov/nceskids/createagraph/) to make the graph on the computer and print it.    2. Put the heart rate data on the y-axis. Label your activity and the time of day on the x-axis.    3. Make one line for each day's worth of data.   ***Rubric: Due on SEPTEMBER 10th , 2013.***   1. *Completed line graph containing data collected over 3 days – 10M* 2. *Questions Answered on an A4sheet – 10M (2×5 =10)*  * *Look at the three lines representing your data. Do they follow the same pattern? When was your heart rate the lowest? What activity made your heart beat the fastest?* * *What effects do exercise and physical activity have on heart rates?* * *What is the range of heart rates for a healthy person?* * *What is blood pressure?* * *How does the heart pump blood?*  1. *On time submission and Presentation (neat graph, table containing collected data on an A4sheet and answers to questions on an A4 sheet): 5M*   **Reference sites:**  Have an adult help you do further research by visiting the following websites. These websites offer more information on pulses and heart rates:   * Learn2 Corporation. (2004). *Learn2 Take a Pulse.* Retrieved June 12, 2008 from <http://www.tutorials.com/09/0902/09025.asp> * Cleveland Clinic Heart and Vascular Institute. (n.d.). *Pulse and Target Heart Rate.* Retrieved June 12, 2008 from<http://my.clevelandclinic.org/heart/prevention/exercise/pulsethr.aspx>   This website will give you more information about how the heart and blood vessels work.   * Baffa, G. (2005, March). *Your Heart & Circulatory System.* Retrieved June 18, 2008 from <http://www.kidshealth.org/kid/htbw/heart.html> |