

# Investigating Your Pulse Rate

**Introduction:**

IN 1996, TWO BASKETBALL PLAYERS (EITHER COLLEGE OR HIGH SCHOOL) DIED OF HEART FAILURE WHILE PLAYING BALL. THE PURPOSE OF THIS ACTIVITY IS TO PROVIDE STUDENTS THE OPPORTUNITY TO MEASURE THE VARIATION IN HEART RATES IN DIFFERENT PEOPLE AFTER PREFORMING DIFFERENT ACTIVIES, AS WELL AS LEARN ABOUT THE HEART!!

**What you need to know for this lab:** The pulse may be felt at points where arteries pass over solid tissue, known as pressure points e.g. in the wrist and neck. Pulse rate is a direct measure of heart rate.

Heart rate can vary with age as shown below:

**Average Heart Rate  
(beats per minute)**

- Newborn 140
- 7 years 85 – 90
- 14 years 80 – 85
- Adult 70 – 80

In normal healthy individuals the heart rate, and thus the pulse rate, varies with the phases of respiration. Irregular changes in heart rate occur in all people. Heart rate may be increased by exercise, nervous excitement, stress due to mental effort, by adrenaline entering the bloodstream or with increase in temperature caused by fever. The heart rate decreases when asleep and some medical conditions may also cause a drop.

**Safe Heart Rates (which are the same as Pulse Rates!)**

During experiments the safe heart rate should not be exceeded. The safe level is given as the maximum heart rate for age, minus 20 beats per minute

Maximum heart rate =  $210 - (0.65 \times \text{age})$

Age	Maximum Heart Rate	Safe Heart Rate
12	202	182
13	202	182
14	201	181
15	200	180
16	199	179
17	199	179
18	198	178

**THE PROBLEM TO SOLVE:** How will different physical activities affect my heart rate?

Hypothesis: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

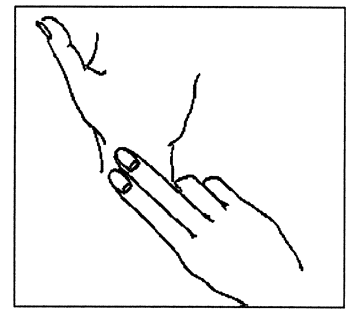
**Procedures and Observations:**

Work in pairs. Throughout this activity you and your partner will take turns being the subject and the experimenter

First you must learn how to take a pulse. Study the picture to the right and locate the pulse in your partner's wrist. After you have sat quietly for 1 minute, have your partner count your pulse for 15 seconds. *Record this number in Table 1 below. Determine your pulse rate for 1 minute by multiplying the number by 4 and record in Table 1.* Repeat two more times and record in the table. Switch roles with your partner. Record your average resting pulse rate in **Table 2**.

**Table 1**

Trial	Pulse Rate/15 sec.	Pulse Rate/min.
1		
2		
3		



**Perform the following activities, pulse should be taken by the experimenter for 15 seconds, record results in Table 2 and switch roles. Multiply this number by 4 and record on Table 2 and on the board.**

- 1) The subject should stand stiffly at attention for 2 minutes. Then while the subject is still standing at attention, the pulse should be taken by the experimenter for 15 sec. Switch roles.
- 2) While seated, the subject should take a deep breath, exhale part of it and hold the breath as long as possible. While breath is being held, the subject's pulse should be taken by the experimenter for 15 seconds. Switch roles.
- 3) While seated, the subject should take deep breaths regularly for 30 seconds. After the first 15 seconds, the pulse of the subject should be taken by the experimenter for the remaining 15 seconds of deep breathing. Switch roles.
- 4) The subject should run in place, do jumping jacks or deep knee bends for 2 minutes. Immediately after exercising, the subject should sit and the pulse should be taken by the experimenter for 15 seconds. Then it should be taken again every minute for 15 seconds for the next 6 minutes. The time need for you pulse to return to the sitting pulse rate is called *recovery time*. Switch roles.
- 5) Determine the class pulse rates for males and females in each activity and record them in **Table 2**

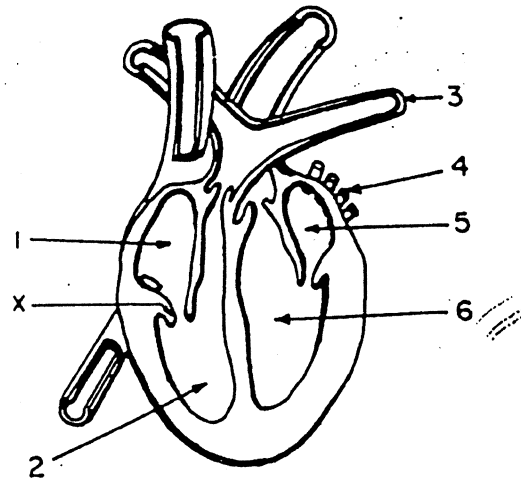


## **Conclusions and Applications**

1. How does your resting pulse rate compare with the average for your sex? Explain.
2. Why did you take a resting pulse rate (before the other activities)?
3. Why do you think holding your breath affects the pulse rate?
4. Compare the average male and average female pulse rates for the various activities.
5. For the same activity, do the pulse rates of females and males change in the same way?
6. Which activity increased your pulse rate the most? What does this increase indicate?
7. What do you think is the relationship between physical condition and pulse rate after exercise?  
Between physical condition and recovery time?

1. When a person runs up stairs, the increased heartbeat supplies muscle cells with more
  1. oxygen
  2. vitamins
  3. proteins
  4. minerals
2. The characteristic heart sounds heard with a stethoscope are due to the opening and closing of the
  1. arteries
  2. veins
  3. valves
  4. capillaries
3. Gases enter and leave the blood in the
  1. arteries
  2. veins
  3. capillaries
  4. heart chamber
4. When blood leaves the heart, it passes directly into vessels called
  1. arteries
  2. capillaries
  3. veins
  4. lymph vessels
5. The blood vessels that transport deoxygenated blood to the heart are known as
  1. arteries
  2. capillaries
  3. veins
  4. bronchi
6. Human blood carries the lowest concentration of carbon dioxide after leaving the
  1. lungs
  2. kidneys
  3. liver
  4. small intestine
7. Blood is pumped from the right side of the heart to the
  1. kidneys
  2. liver
  3. brain
  4. lungs

Base your answers to questions 8 through 10 on the diagram which represents a four-chambered mammalian heart.



8. Which heart chamber has the thickest muscular walls?
  1. 1
  2. 2
  3. 5
  4. 6
9. The blood entering the heart at 4 has *most recently* been in contact with the
  1. lungs
  2. kidneys
  3. body tissues
  4. small intestine
10. The structure labeled X is very important to circulation within the heart because it prevents blood going from
  1. area 1 to area 2
  2. area 2 to area 1
  3. area 2 to area 3
  4. area 2 to area 4
11. In order for oxygen to pass through the lungs, the lung membrane must be
  1. thick
  2. muscular
  3. moist
  4. dry

