

Name _____ Lab Day _____ Date _____

Classroom Teacher _____ Lab Teacher _____

Standard 4

Lab 13 The Human Heart

Heart muscle contracts and relaxes to pump blood throughout your body. Your circulatory system is made up of arteries, veins and capillaries. The blood carries oxygen, carbon dioxide and other materials.

When you complete this lab you should be able to:

- *trace a drop of blood through the heart using the correct pathway
- *determine the oxygen/carbon dioxide content of the blood in the heart, arteries and veins.
- *explain the difference between systole and diastole
- *draw and identify the differences between an artery and vein.

Material: Microscope
 Slide of artery and vein
 Red and blue colored pencil

Procedure:

Part A Anatomy and blood flow of the heart.

Look at figure 1. Locate the names of the chambers and blood vessels. This diagram is a view from the front of the heart. (The right and left side seem to be reversed.) All the shaded areas represent muscle. Unshaded areas represent blood filled chambers.

1. Look at the right side of the heart. Where is blood moving to from the right side of the heart? (follow the arrows) _____
2. Blood coming back to the left side of the heart comes from the _____

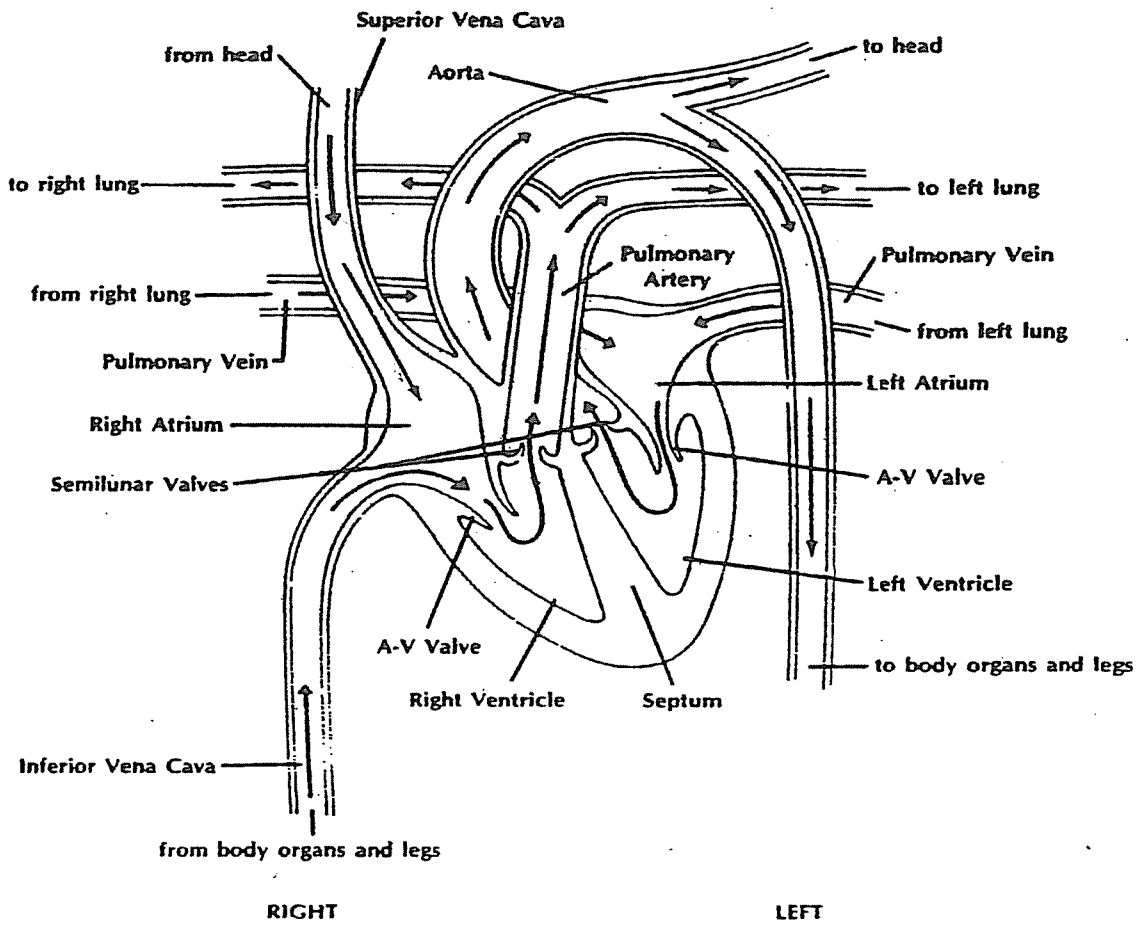
Part B Condition of the blood as it flows through the heart.

Blood on the **right side** of the heart is **deoxygenated**. That means it is low in oxygen and high in carbon dioxide. Blood is returning to the heart from the body. The cells of the body took the oxygen needed from the blood and carbon dioxide waste was added to the blood and taken away.

Blood on the **left side** of the heart is **oxygenated**. That means the blood is high in oxygen and low in carbon dioxide. The blood has just come back from the lungs.

- * Color the right side of the heart blue. (deoxygenated)
- * Color the left side of the heart red. (oxygenated)

FIGURE 1



Fill in the table below, indicating the oxygen content of the blood. Use the terms oxygenated and deoxygenated. Remember what you just did in figure 1.

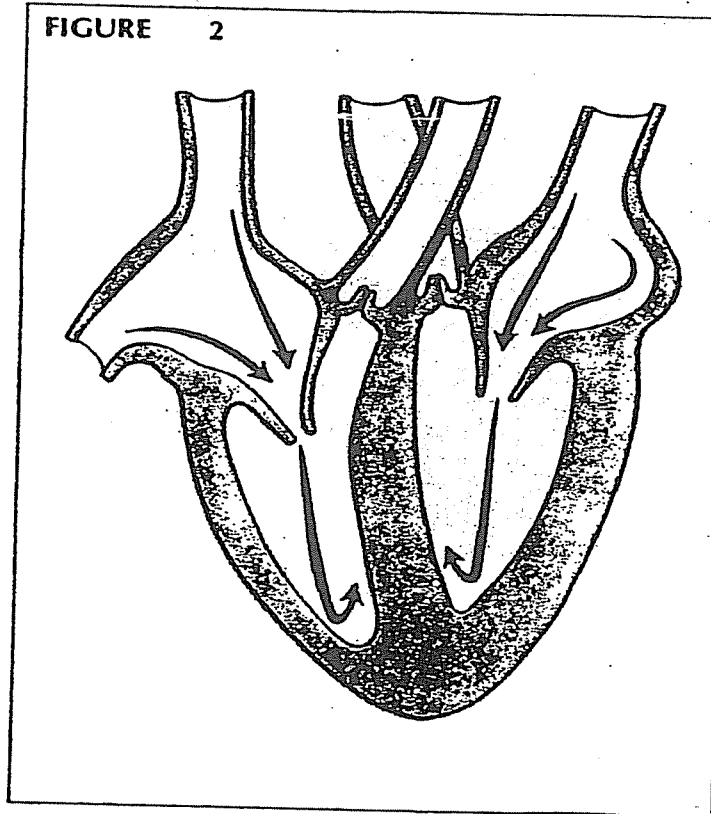
Table 1 Oxygen content of the blood.

Chamber or Vessel	Oxygenated or Deoxygenated
Left ventricle	
Right ventricle	
Left atrium	
Right Atrium	
Pulmonary artery	
Pulmonary Vein	
Superior Vena Cava	
Inferior Vena Cava	
Aorta	

Part C Heart Pumping Action

In order to move blood through the heart, a pumping action must occur. It is the ventricles that aid in the pumping action of the heart. Heart valves keep the blood flowing in ONE DIRECTION as the ventricles squeeze or pump blood through the heart.

Examine figure 2 showing the ventricles relaxed and not pumping blood. This relaxed condition is called diastole.



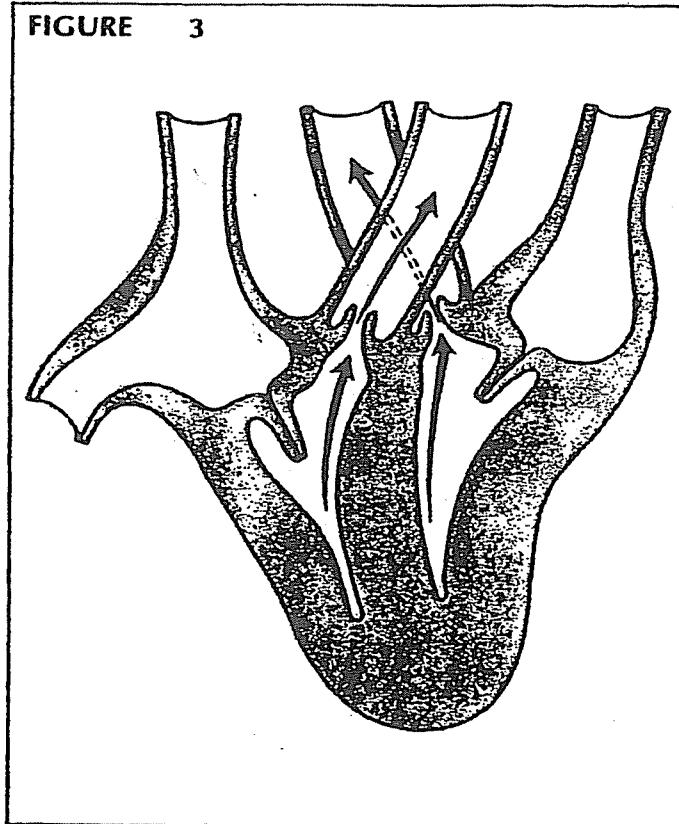
Circle the appropriate choice for each state of the heart below:

In the diastole state, the ventricles are:

1.	Relaxed	Pumping
2.	A.V. valves are open	A.V. valves are closed
3.	Blood is flowing past the A.V. valves	No blood is flowing past the A.V. valves
4.	Blood is flowing into the ventricles from the atria	No blood is flowing into the ventricles from the atria
5.	Semilunar valves are open (tips not touching)	Semilunar valves are closed (tips touching)
6.	Blood is flowing past the semilunar valves	No blood is flowing past the semilunar valves
7.	Blood is flowing out of the ventricles into the aorta and pulmonary artery	Blood is ^{not} flowing out of the ventricles into the pulmonary artery + aorta

During diastole, are the ventricles filling or being emptied of blood? _____

Examine figure 3, showing the ventricle sides pushing in and squeezing and pumping the blood out of the heart. This pumping action is called systole.



In the systole state, the ventricles are:

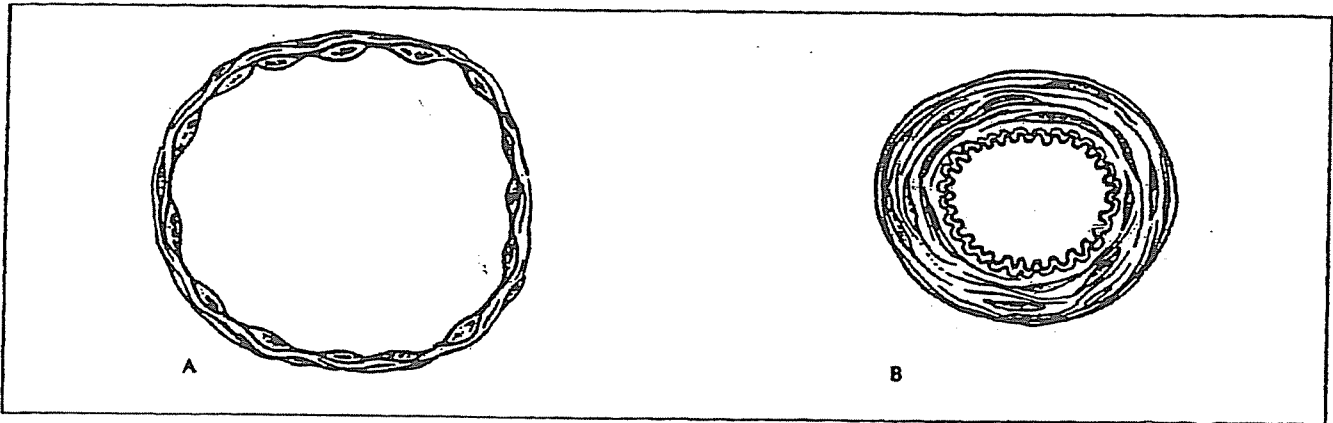
	Relaxed	Pumping
8.		
9.	A.V. valves are open	A.V. valves are closed
10.	Blood is flowing past the A.V. valves	No blood is flowing past the A.V. valves
11.	Blood is flowing into the ventricles from the atria	No blood is flowing into the ventricles from the atria
12.	Semilunar valves are open (tips not touching)	Semilunar valves are closed (tips touching)
13.	Blood is flowing past the semilunar valves	No blood is flowing past the semilunar valves
14.	Blood is flowing out of the ventricles into the aorta and pulmonary artery	Blood is ^{not} flowing out of the ventricles into the pulmonary artery & aorta

During systole, are the ventricles filling or being emptied of blood? _____

A continuous pattern of systole and diastole allows the heart to pump blood to all parts of the body. The heart relaxes and fills with blood, then pumps that blood through the body. You detect this pattern every time you feel your pulse.

Arteries take blood away from the heart. They are thicker than veins to withstand the force of the blood as it is pumped out of the heart. Veins are thinner and have valves.

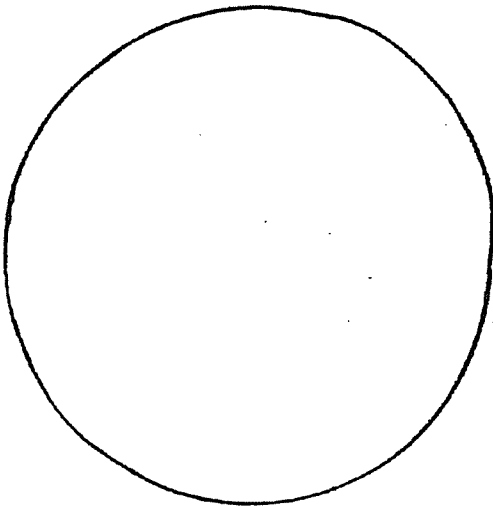
Look at figure 4.



1. Which of the drawings is the artery? _____ Why? _____

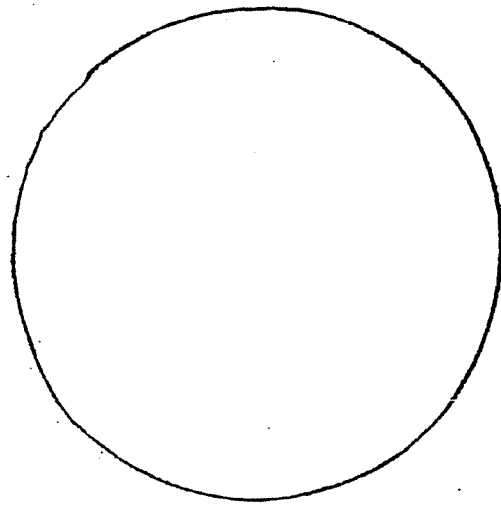
2. Which is the vein? _____ why? _____

Using the prepared human artery and vein slides, Diagram them to the best of your ability. State the magnification.



ARTERY

Magnification _____



VEIN

Magnification _____

Summary questions

1. Do veins carry blood away or toward the heart? _____
2. Do veins carry oxygenated or deoxygenated blood? _____
3. Are there any exceptions to that rule? _____. If so, state the exception _____
4. Why is there no pulse in a vein?

5. Do arteries carry blood away or toward the heart? _____
6. Do arteries carry oxygenated or deoxygenated blood? _____
7. Are there any exceptions to that rule? _____. If so, state the exception _____
8. Why is there a pulse in an artery?

9. What is the largest artery? _____
10. What is the largest vein? _____

11. What structure separates the left and right side of the heart? _____
12. What is the average human pulse rate? _____ (next page)
13. Your heart ejects 60 ml of blood each time it pumps. How many ml can your heart pump in a minute. _____ ml (60 x average human pulse rate)
14. Type of muscle found in the heart is _____ (page 927 textbook)
15. What controls the heart rate in humans?

16. Where does blood go when it leaves the
aorta _____
pulmonary vein _____
pulmonary artery _____

17. Where does blood come from before entering the
superior vena cava _____
inferior vena cava _____
pulmonary vein _____

18. Define "hardening of the arteries" (atherosclerosis) (page 949 textbook)

19. Why are capillaries an important part of the circulatory system?

The resting heart rates of several different animals were determined and recorded in the data table that follows below.

Data Table

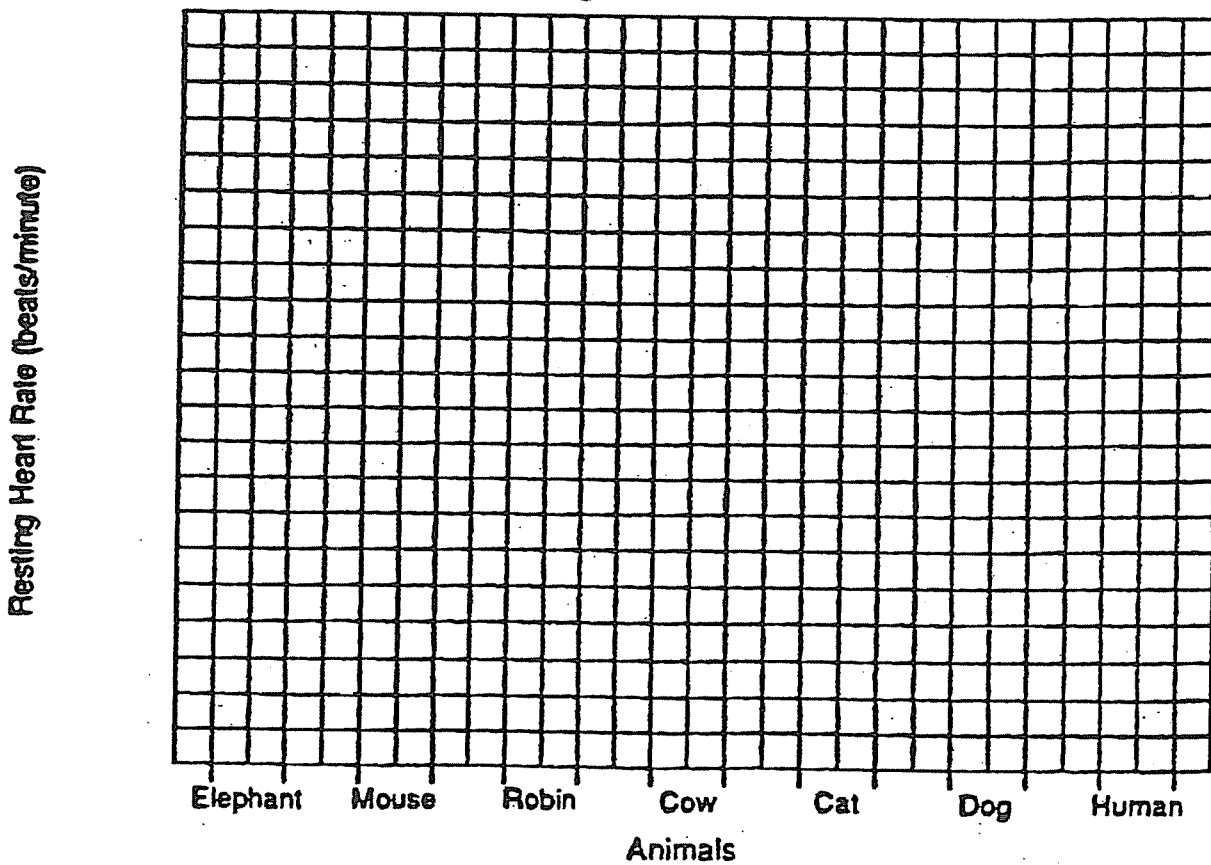
Animal	Resting Heart Rate (beats per minute)
Elephant	25
Mouse	1000
Robin	570
Cow	65
Cat	120
Dog	100
Human	72

Using the information in the data table above, construct a BAR GRAPH on the grid provided.

* You will get one point for a correct scale on the y axis (resting heart rate).

* You will get one point for correct shading each bar.

Resting Heart Rate In Animals



What relationship (pattern) do you see between body mass and resting heart rate?

4. Name one factor that may cause an increase in a person's RESTING heart rate.