

11-1 How Does the Heart Work?

The heart is a muscular organ which pumps blood. It is divided into four chambers. The two upper chambers take in blood. The two lower chambers pump blood out of the heart. An upper chamber is called an atrium. A lower chamber is called a ventricle.

Blood moves only in one direction in the heart. Between each atrium and each ventricle there is a valve. The valve acts like a door that opens in only one direction.

Blood first moves into the two upper chambers. The top chambers then pump blood through the valves into the lower chambers. As the lower chambers fill with blood, the valves close. When the lower chambers squeeze together, the blood is forced out of the heart. Blood does not move back into the top chambers.

EXPLORATION

OBJECTIVES

In this exercise, you will:

- a. examine the outside and inside parts of a heart.
- b. trace the pathway of blood through the heart.
- c. follow the events within the heart as it pumps blood.

KEYWORDS

Define the following keywords:

atrium _____

contract _____

coronary artery _____

heart valves _____

ventricle _____

MATERIALS

sheep heart on paper towel or
colored pencils: red and blue

PROCEDURE

Part A. Parts of the Heart

1. Obtain a sheep heart from your teacher. Do not turn it over. The right side of the sheep heart is on your left side. The left side of the heart is on your right side.

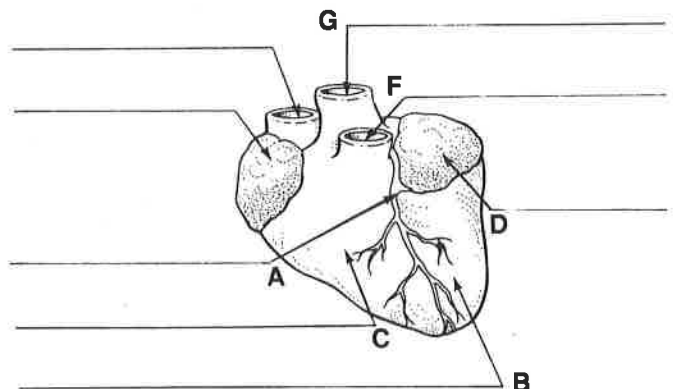


FIGURE 1.

2. On your sheep heart, find the parts listed in Table 1. Use the information in the table to help you.
3. Label the eight parts of the heart correctly on Figure 1. To help with the labels use the letters provided in the table and on the figure.

Table 1. Front Parts of the Heart

Part	Location	Traits	Name
A	across front of heart center	small blood vessel	coronary artery
B	bottom right chamber	large muscle section or chamber	left ventricle
C	bottom left chamber	large muscle section or chamber	right ventricle
D	top right chamber	small muscle section or chamber	left atrium
E	top left chamber	small muscle section or chamber	right atrium
F	top center	large blood vessel* from right ventricle	pulmonary artery
G	top center behind F	large blood vessel* from left ventricle; largest artery in body	aorta
H	top left	large blood vessel* from right atrium	vena cava

*All you will see is a hole where the blood vessel was attached to the heart.

Part B. Direction of Blood Flow Through the Heart

1. Examine Figure 2. It is a diagram of the inside of a heart. Arrows show the direction of blood flow.
2. Examine Figure 3 on the next page, which shows the inside of a sheep's heart. The arrows outlined in dashes indicate *possible* directions of blood flow. Using Figure 2 as a guide, fill in with a pencil the arrowheads that show the correct direction of blood flow.
3. Label the inside parts of this figure using Figure 2 as a guide.

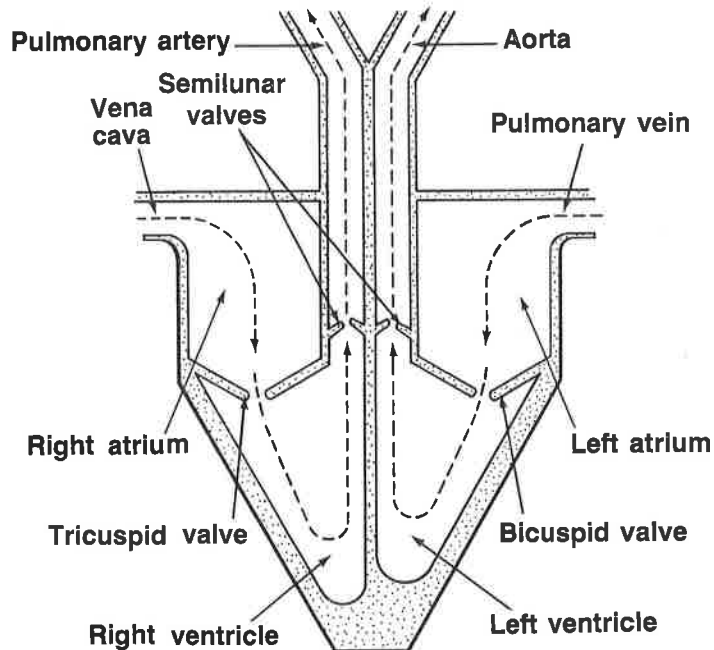


FIGURE 2. Blood flow through the heart

Part C. Condition of Blood in the Heart

All blood on the heart's right side has little oxygen and much carbon dioxide. Blood on the left side has much oxygen and little carbon dioxide.

1. Using colored pencils, fill in the arrows in Figure 3 to show these differences in gas content:
 - a. all arrows that indicate blood with much oxygen should be colored red.
 - b. all arrows that indicate blood with much carbon dioxide should be colored blue.

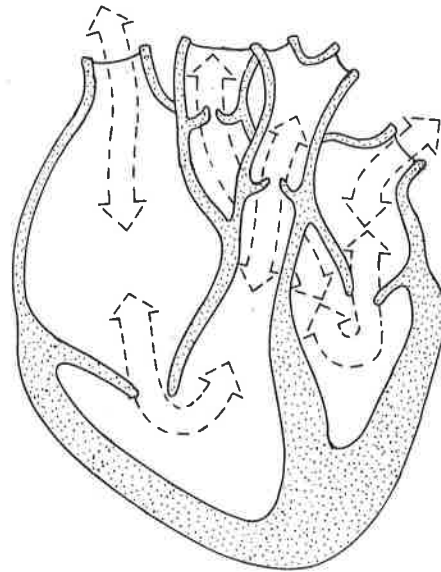


FIGURE 3. Inside of a sheep's heart

Part D. Pumping Action of the Heart

Blood enters the two top chambers of the heart. Because they are made of muscle, they are able to squeeze together or contract. When this happens, blood is pumped to the two bottom chambers which are relaxed. These events are shown in Figure 4.

1. Note that certain valves in Figure 4 are open while other valves are closed. Complete the first column of Table 2.

Once blood fills the two bottom chambers they contract. Blood is then pumped out of the heart into the rest of the body. These events are shown in Figure 5.

2. Note which valves are open or closed in Figure 5. Complete the second column of Table 2.

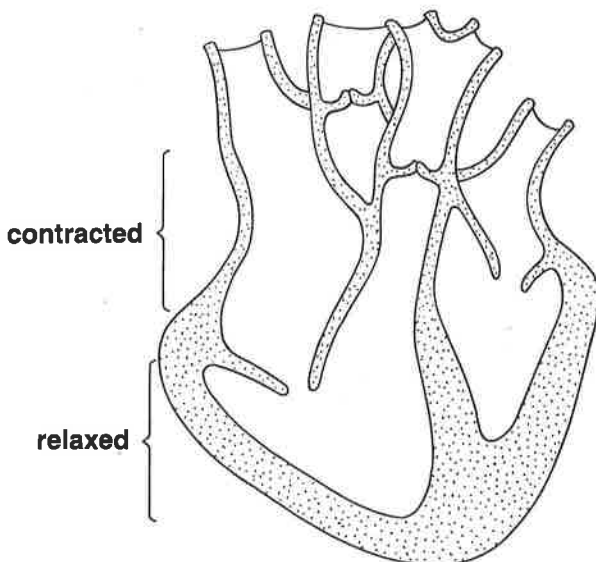


FIGURE 4. Blood entering ventricles

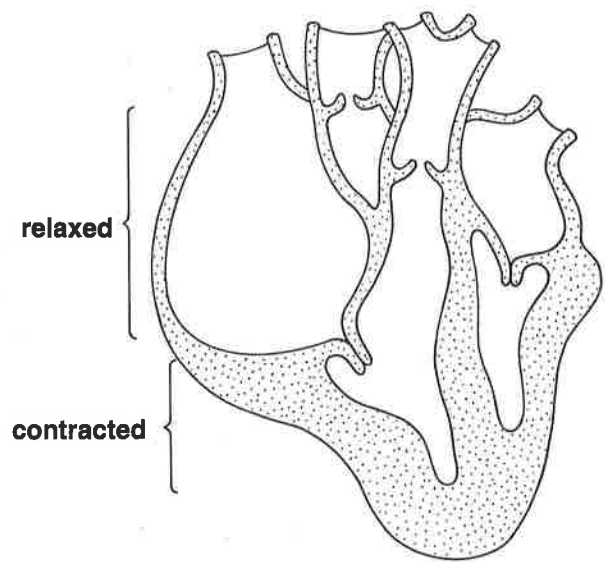


FIGURE 5. Blood leaving ventricles

Table 2. The Opening and Closing of Parts of the Heart

	Blood entering ventricles	Blood leaving ventricles
Top chambers (atria) relaxed or contracted?		
Bottom chambers (ventricles) relaxed or contracted?		
Semilunar valves open or closed?		
Bicuspid valve open or closed?		
Tricuspid valve open or closed?		

QUESTIONS

1. What is the job of the coronary artery? _____
2. Blood is pumped from the heart to the body through the aorta.
 - a. Which chamber does this job? _____
 - b. Does this blood have more oxygen or more carbon dioxide? _____
 - c. Which valves are open during this process? _____
3. Blood is pumped from the heart to the lungs through the pulmonary artery.
 - a. Which heart chamber does this job? _____
 - b. Does this blood have more oxygen or more carbon dioxide? _____
 - c. Which valves are open during this process? _____
4. Trace a drop of blood through the heart by putting these heart chambers and valves in proper order: left atrium, semilunar valve, right atrium, right ventricle, bicuspid valve, tricuspid valve, left ventricle, semilunar valve.
Begin with the right atrium. _____

5. Using colored pencils, indicate if each heart chamber listed in question 4 contains blood with more oxygen (red pencil) or more carbon dioxide (blue pencil). Underline each part in your answer to question 4 with the proper color.

The heart has _____ chambers.

The two top receiving chambers are called the

The two bottom pumping chambers are called the

Name the three layers of the heart wall

What is the thick wall between the ventricles called?

Name and give the location of the four heart valves.

Name

Location

Name the vessels that feed the heart muscle.

Name the vessels that return blood from the heart.

What is the major artery that leaves the heart and feeds the rest of the body?

Name its three main branches.

Name the artery that goes to the lungs for oxygen.

Name the veins that return blood with oxygen from the lungs back to the heart.

Name the vein that returns blood from the head and arms.

Name the vein that returns blood from the lower body.

What structures keep the valves from extending back into the atria?

Using the numbered terms from page 6 and 7, trace the flow of blood through the heart and body starting in the right atrium and returning to the right atrium.