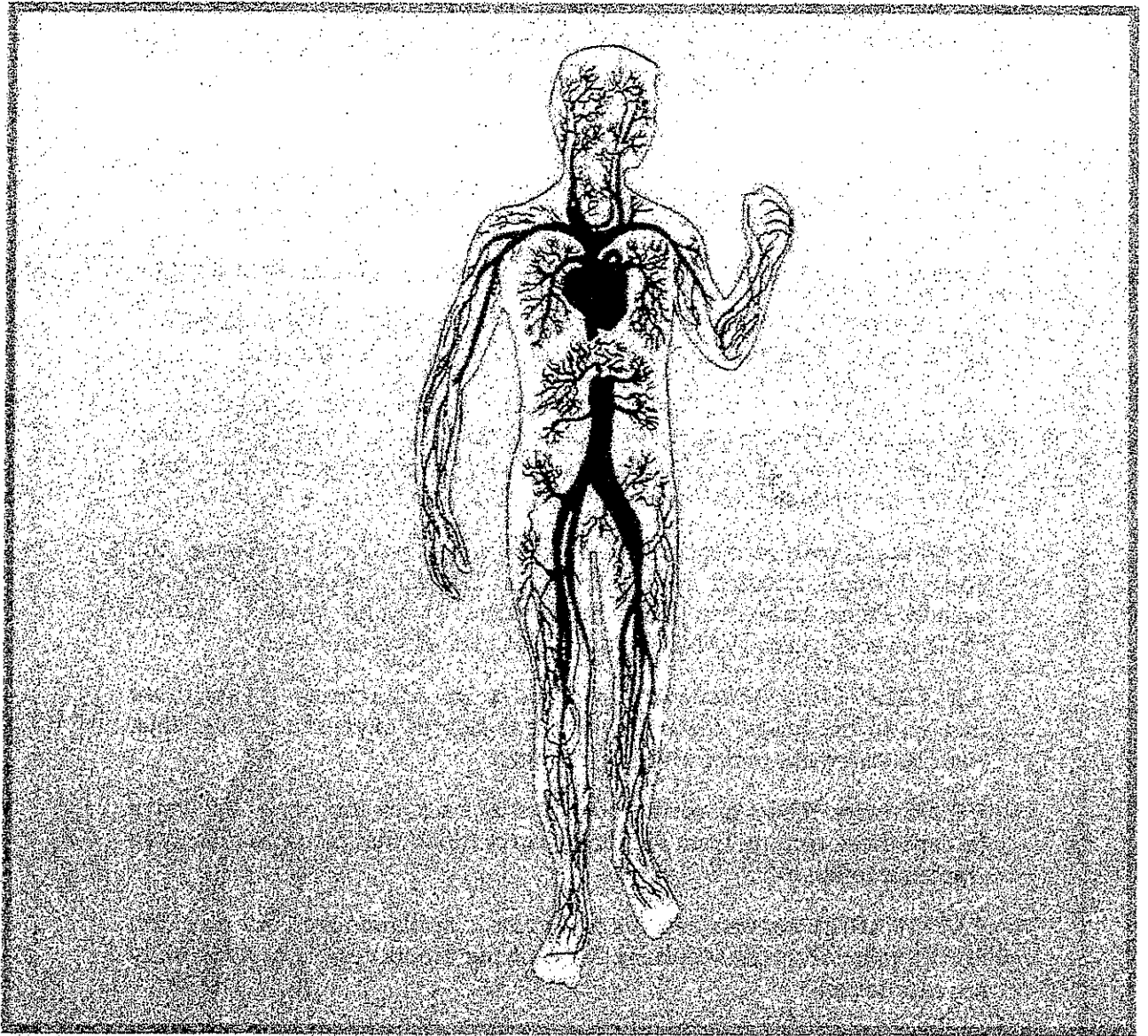


What is the circulatory system?



KEY TERMS

arteries: blood vessels that carry blood away from the heart

veins: blood vessels that carry blood to the heart

capillaries: tiny blood vessels that connect arteries to veins

LESSON

12

What is the circulatory system?

Can you imagine a messenger making trillions of stops in just thirty seconds? Your blood does!

Blood is an important body messenger. It is on the move day and night.

In just about thirty seconds, your blood moves (circulates) through your entire body. It reaches out to every one of your trillions of cells.

Blood transports (carries) to the cells all the things they need—such as oxygen and digested nutrients. The cells take in, or absorb, these materials. In exchange, the blood picks up waste materials from the cells. Waste materials include carbon dioxide, heat, and extra water.

Blood is pumped throughout the body by the heart. It flows through the body through a closed system of tubes. These tubes are called blood vessels. Your body has three main types of blood vessels: **arteries** [ART-ur-ees], **veins** [VANES], and **capillaries** [KAP-uh-ler-ees].

ARTERIES Carry blood away from the heart. All arteries (except those that go to the lungs) carry blood that is rich in oxygen and nutrients. Arteries carry the materials the cells need.

VEINS carry blood from the body (cells) back to the heart. All veins (except those coming from the lungs) carry blood that contains dissolved waste materials.

CAPILLARIES connect arteries and veins. Capillaries are very tiny. You need a microscope to see them. Most of the blood vessels in your body are capillaries.

The heart, blood vessels, and blood make up the **circulatory** [SUR-kyuh-luh-towr-ee] system. Circulation, or transport, is a vital function. Life cannot go on without it.

BLOOD VESSELS

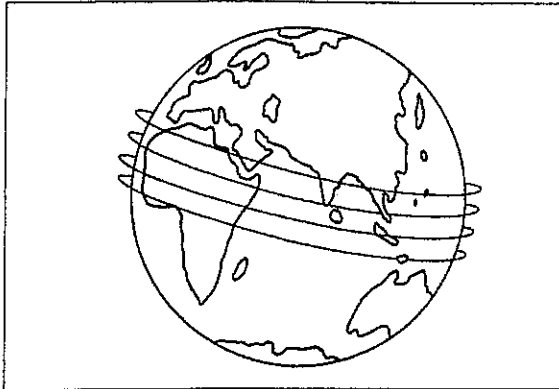


Figure A

Blood vessels are found in almost every part of the body.

If laid end to end, your blood vessels would stretch out to about 161,000 kilometers (100,000 miles)!

That's about 4 times the distance around the equator!

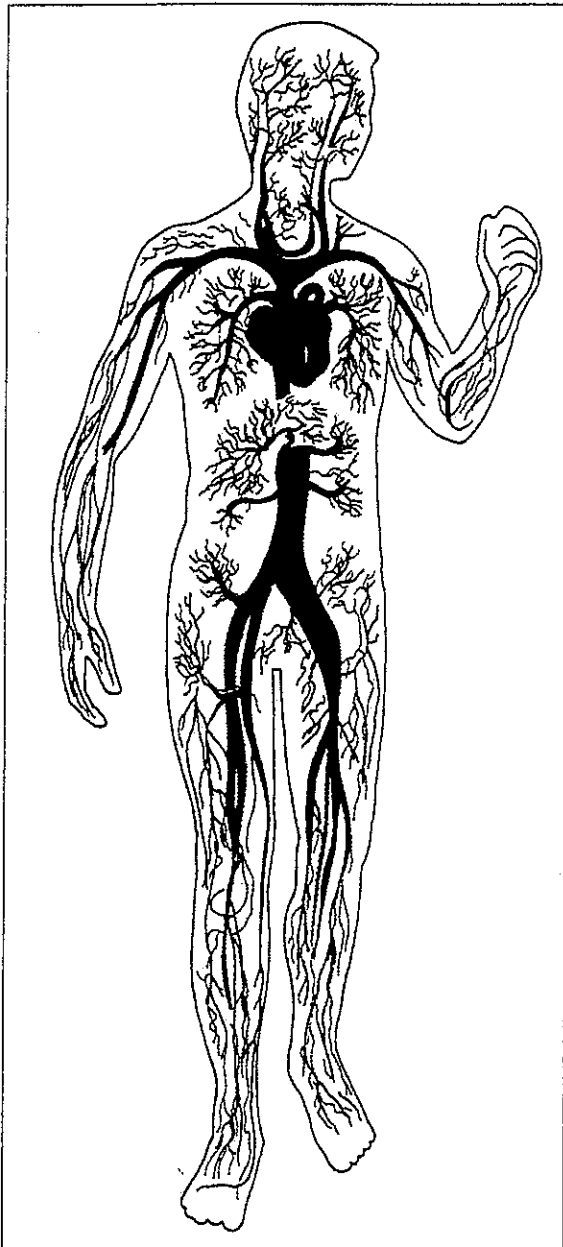


Figure B

Look at Figure B. The grey tubes show the arteries. The black tubes show the veins. Many thousands of tiny capillaries connect the arteries and the veins.

Write the correct term in each blank to answer the questions or complete the sentence.

1. What pumps blood through your body? _____
2. Blood vessels that carry blood away from the heart are called _____.
3. Vessels that carry blood back to the heart are called _____.
4. Blood moves from arteries to veins through tiny blood vessels called _____.
5. The heart, blood vessels, and blood make up the _____.

UNIT 10: THE CIRCULATORY SYSTEM

Look at Figure C. Then answer these questions:

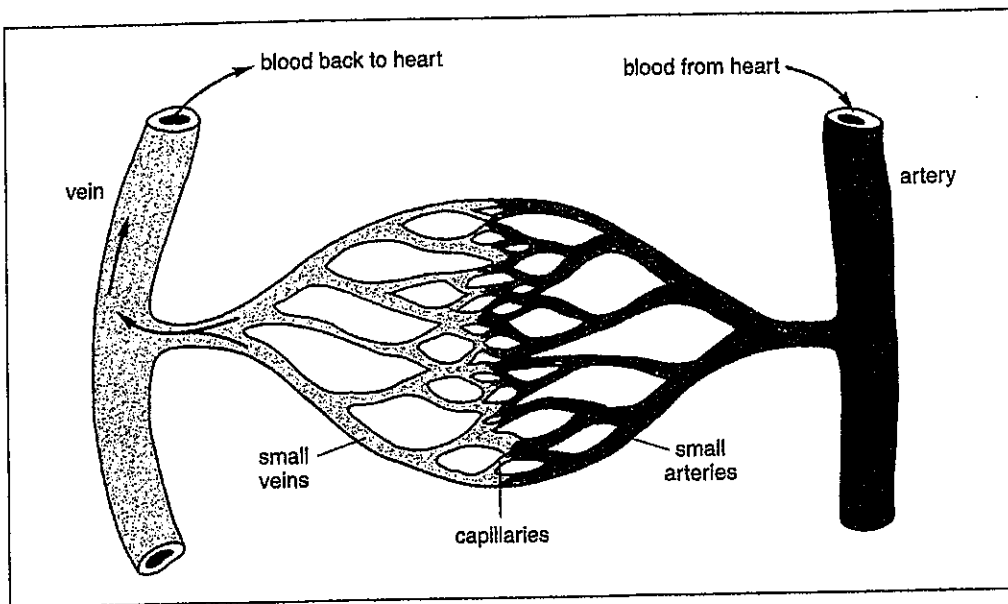


Figure C

1. Arteries branching away from the heart become smaller and smaller, larger and larger.
2. Veins leading back to the heart become smaller and smaller, larger and larger.
3. Most of our blood vessels are arteries, veins, capillaries.

Match each term in Column A with its description in Column B. Write the correct letter in the space provided.

Column A	Column B
_____ 1. circulation	a) carry blood away from the heart
_____ 2. heart	b) pumps blood
_____ 3. arteries	c) connect arteries and veins
_____ 4. veins	d) transport of materials in living things
_____ 5. capillaries	e) carry blood back to the heart

TELL IN THE BLANK.

Complete each statement using a term or terms from the list below. Write your answers in the spaces provided. Some words may be used more than once.

heart
capillaries
nutrients
veins

circulation
arteries
waste materials

oxygen
blood vessel
blood

1. The transport of materials in living things is called _____.
2. In humans, circulation is carried out by the liquid called _____.
3. Blood is pumped by the _____.
4. Blood brings to cells things like _____ and _____.
5. Blood picks up _____ from the cells.
6. Any tube that carries blood is called a _____.
7. The three kinds of blood vessels are _____, _____, and _____.
8. Blood is carried away from the heart by _____.
9. Blood is carried back to the heart by _____.
10. Arteries and veins are connected by tiny blood vessels called _____.

WORD SCRAMBLE

Below are several scrambled words you have used in this Lesson. Unscramble the words and write your answers in the spaces provided.

1. UCATLOCNIRI _____
2. NIVE _____
3. ILYCARLAP _____
4. THERA _____
5. RATYER _____

TRUE OR FALSE

In the space provided, write "true" if the sentence is true. Write "false" if the sentence is false.

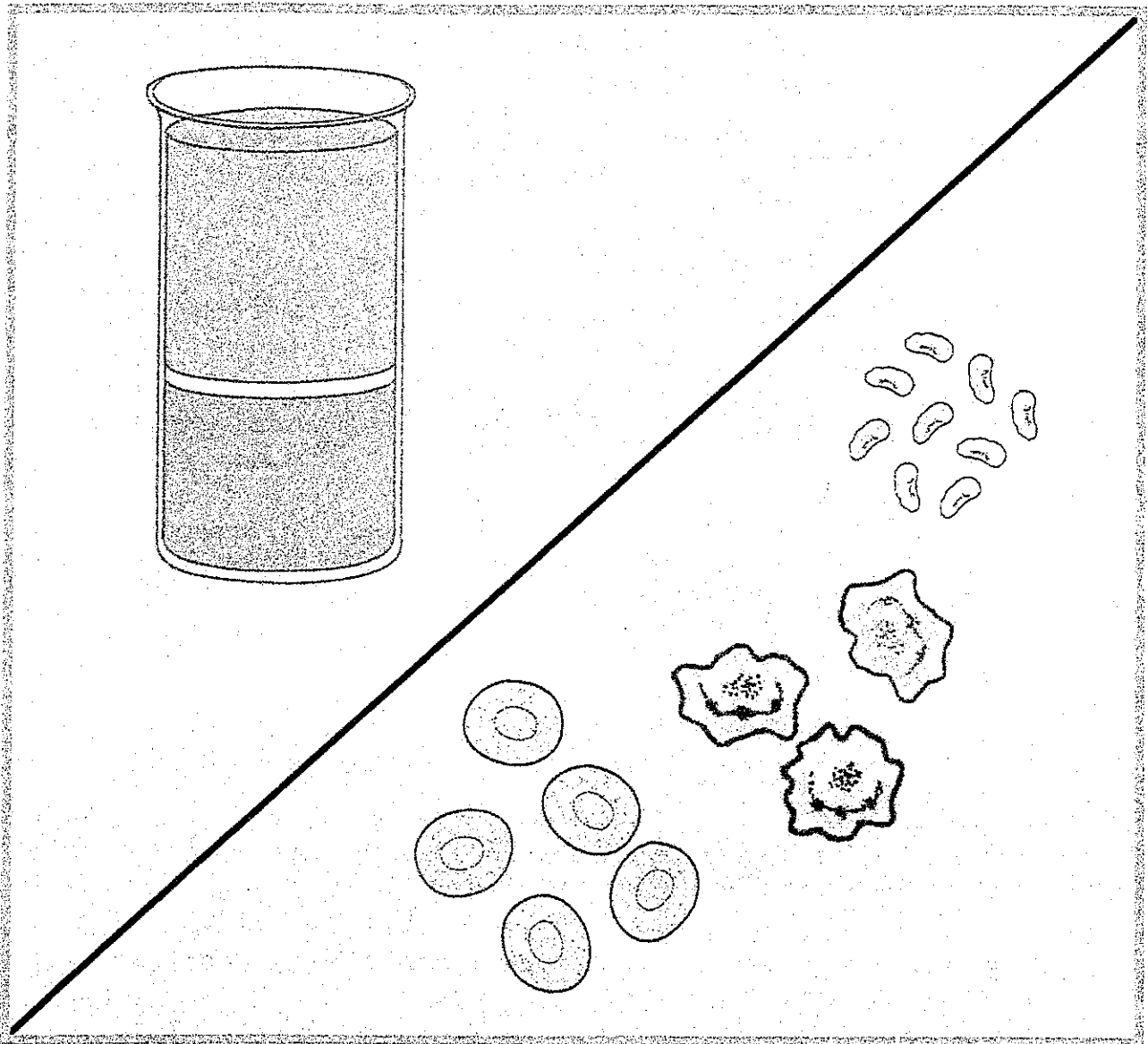
- _____ 1. Circulation is the transport of materials in living things.
- _____ 2. Life stops when circulation stops.
- _____ 3. Blood is pumped by the brain.
- _____ 4. Blood circulates through the body only a few times a day.
- _____ 5. Arteries carry blood away from the heart.
- _____ 6. Arteries transport carbon dioxide to the cells.
- _____ 7. Veins carry blood away from the heart.
- _____ 8. Capillaries pick up waste materials from the cells.
- _____ 9. Capillaries connect arteries and veins.
- _____ 10. Capillaries are the largest blood vessels.

REACHING OUT

Circulation is always carried out by a liquid. In humans and many other animals, that liquid is blood.

What liquid do you think carries out circulation in plants? _____

What is blood made of?



KEY TERMS

plasma: liquid part of blood

red blood cells: cells that give blood its red color and carry oxygen

white blood cells: cells that protect the body from disease

platelets: tiny, colorless pieces of cells help blood to clot

LESSON

What is blood made of?

13

In first aid, you learn how to help people who are hurt. An important first-aid rule is: "Treat Serious Bleeding First." A person can die very quickly from a loss of blood.

What is blood made of? Why is it so important to life?

Blood is the main tissue of transport in your body. It carries needed materials to the cells. It also carries waste materials away from the cells.

Blood has a liquid part and a solid part. The liquid part of blood is called plasma [PLAZ-muh]. The solid part of the blood is made up of blood cells.

PLASMA

Plasma is 90% water. It is straw colored. Digested food, important chemicals, and certain waste products are dissolved in plasma. These substances are carried to the cells by the plasma. The waste materials are carried away from the cells.

BLOOD CELLS

Your blood is made up of three kinds of blood cells: red blood cells, white blood cells, and platelets [PLAYT-lits]. These blood cells are carried in the flowing plasma.

Red blood cells contain a substance called hemoglobin [HEE-moh-gloh-bin]. Hemoglobin is red. It gives blood its color.

Oxygen links up with hemoglobin. Red blood cells carry this oxygen to all parts of the body. The same hemoglobin also picks up most of the carbon dioxide waste that is made by the cells.

White blood cells fight disease and infection. They destroy harmful germs in the body.

Platelets are tiny, colorless pieces of cells. They help stop bleeding. Platelets give off a chemical that helps blood clot.

BLOOD COMPOSITION

Figure A shows the composition of blood. Study Figure A, then answer the questions.

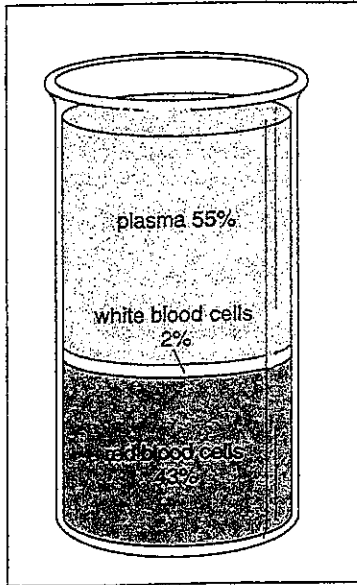


Figure A *Make-up of blood*

1. What percent of blood is liquid?

2. What is the name of the liquid part of blood? _____
3. a) The liquid part of blood is made up mostly of _____.
(If you need help, look back to the reading.)
b) What percent? _____
4. All of the blood cells together make up _____ percent of blood.

5. Red blood cells make up _____ percent of blood; white blood cells make up _____ percent.

BLOOD CELLS—THEIR SIZES AND NUMBERS

Figure B will give you an idea of the sizes and numbers of red and white blood cells found in your body. Study Figure B. Then answer the questions.

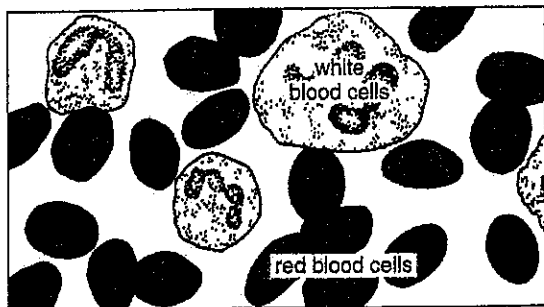


Figure B

1. Which blood cells are the largest? _____
2. Which type of blood cell is most numerous? _____
3. Which cells are shaped like "pinched" disks? _____

MORE ABOUT RED BLOOD CELLS *Do on your own - 5 mins*

Answer the following questions about red blood cells.

1. Oxygen is _____
needed by the cells, a cell waste
2. Which blood cells pick up and carry oxygen? _____
red blood cells, white blood cells, platelets
3. What substance in red blood cells joins with oxygen? _____
4. Where does the blood pick up this oxygen? _____
 - a) in the heart
 - b) in the arteries and veins
 - c) in the lungs
5. What gives blood its color? _____

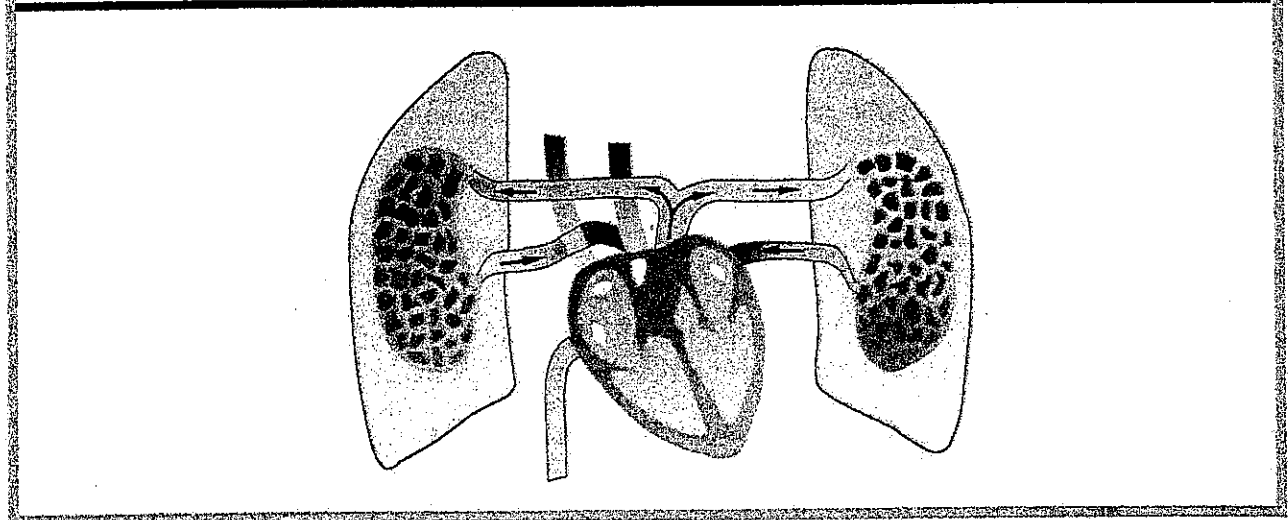
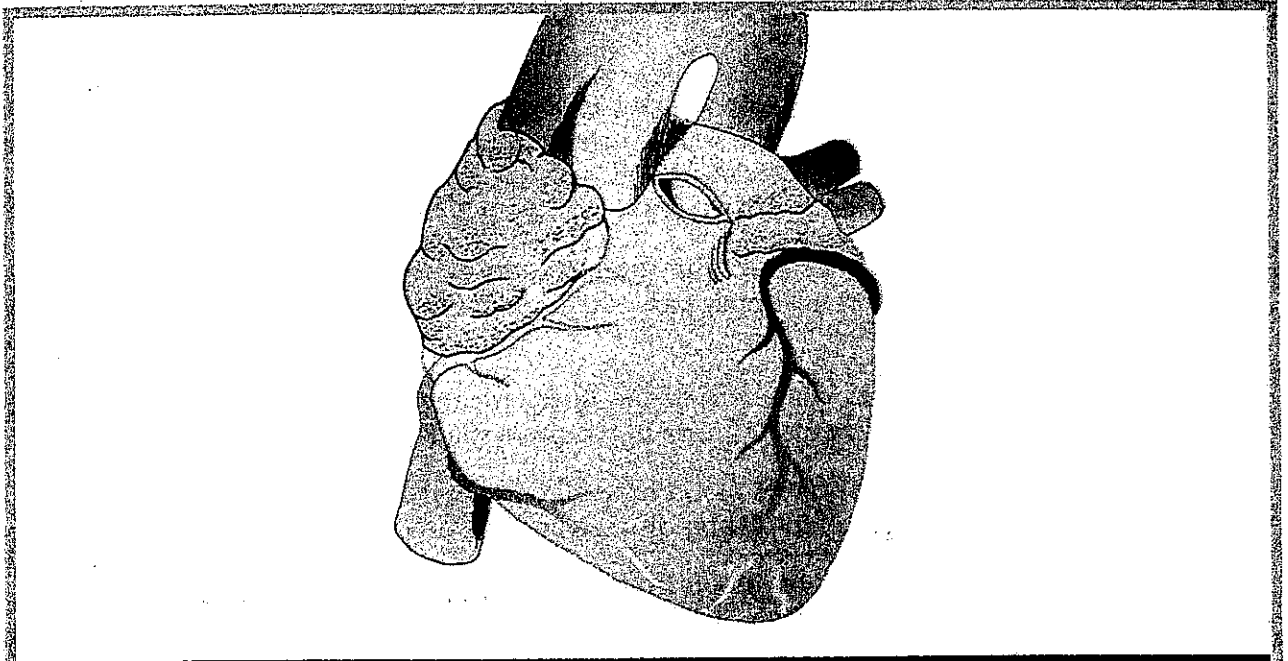
TO OR AWAY?

Blood has been called the "River of Life." Blood carries to the cells materials the cells need. In turn, blood carries away waste materials made by the cells.

Nine substances carried by the blood are listed in the chart below. Indicate whether each substance is carried to the cells or away from the cells. Place a check (✓) in the proper boxes.

	SUBSTANCE CARRIED BY THE BLOOD	CARRIED TO THE CELLS	CARRIED AWAY FROM THE CELLS
1.	digested food		
2.	oxygen		
3.	carbon dioxide		
4.	enzymes		
5.	hormones (used by the cells to regulate chemical reactions)		
6.	heat		
7.	harmful chemicals		
8.	extra (waste) water		
9.	vitamins and minerals		

How does your heart work?



KEY TERMS

atria: upper chambers of the heart

ventricles: lower chambers of the heart

valve: thin flap of tissue that acts like a one-way door

septum: thick tissue wall that separates the left and right sides of the heart

LESSON 14

How does your heart work?

Place your hand on your chest. The beating you feel is from your heart. It is keeping you alive. Your heart is mostly muscle tissue. It has only one job. Day and night, twenty-four hours a day, your heart pumps blood to every part of your body.

The human heart is divided into four separate spaces called chambers. Two chambers are in the upper part of the heart; two chambers are in the lower part.

ATRIA The upper chambers of the heart are the right and left atria [AY-tree-uh]. The singular of atria is atrium. Atria receive blood.

- The right atrium receives blood from all parts of the body. Blood in the right atrium is high in carbon dioxide and low in oxygen.
- The left atrium receives blood from the lungs. Blood in the left atrium is high in oxygen and low in carbon dioxide.

Both atria fill with blood at the same time.

VENTRICLES The lower chambers of the heart are the ventricles [VEN-tri-kuls]. Ventricles pump blood out of the heart.

- The right ventricle pumps blood to the lungs. This blood is high in carbon dioxide and low in oxygen. When the blood is in the lungs, it gives up its carbon dioxide. At the same time, the blood picks up fresh oxygen.
- The left ventricle pumps blood to all parts of the body except the lungs. Blood in the left ventricle is high in oxygen. It is low in carbon dioxide.

Both ventricles pump blood out of the heart at the same time. Every time your heart beats, blood is being "squeezed" out of the ventricles.

Blood moves in only one direction. The heart and veins have **valves** that keep the blood from flowing backward. A valve is a thin flap of tissue.

A muscular wall divides the right side of the heart from the left side. This wall is called the **septum**. Blood cannot flow from one side of the heart to the other.

HOW YOUR HEART WORKS

The human heart is like two separate pumping systems. One system serves the lungs. The other, serves the entire body.

Let us trace the path of blood into and out of the heart. NOTE: The heart diagrams are shown as if you were looking at the front of a person. The right side of the heart appears on the left side of the drawings. The left side of the heart appears on the right.

REMEMBER: In a working heart, both upper chambers fill with blood at the same time. Both lower chambers squeeze (pump blood out) at the same time.

We will study the right side of the heart first. Then, we will study the left side of the heart. In this way, you will better understand how the circulatory system works.

Veins Carry Blood from all Parts of the Body to the Heart

Answer the questions below. Search the reading and study the diagrams carefully to find the answers.

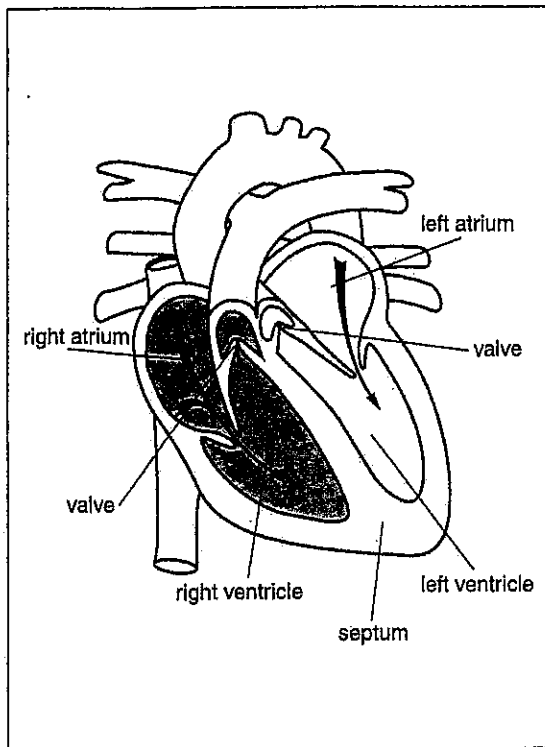


Figure A

1. Which chamber receives blood from all the body veins?

2. a) The blood passes from this chamber into the

- b) While this is happening, the valve between the right atrium and right ventricle is

_____ open, closed

3. The blood in the right ventricle is

high in _____, and low in _____
oxygen, carbon dioxide

in _____
oxygen, carbon dioxide

4. The body _____ use this blood.
can, cannot

5. Where must this blood go to get a fresh supply of oxygen? _____

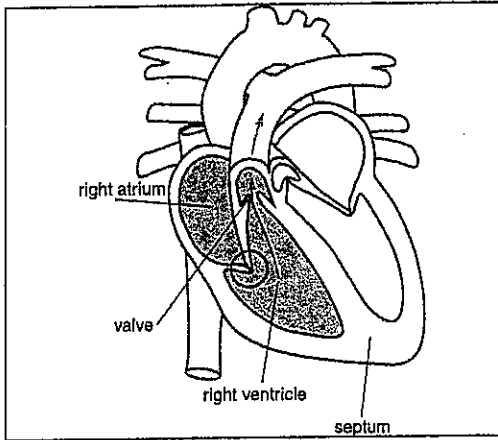


Figure B

6. a) When the right ventricle contracts, the valve between the upper and lower chambers is

_____ .
open, closed

b) What does this prevent? _____

7. Blood pumped out of the right ventricle goes _____ .
to the body, to the lungs

8. In the lungs, the blood gives up its _____ , and picks up

_____ .
oxygen, carbon dioxide

9. The blood _____ be used by the cells.
can, cannot

10. Where must the blood go before it can be sent to the entire body?

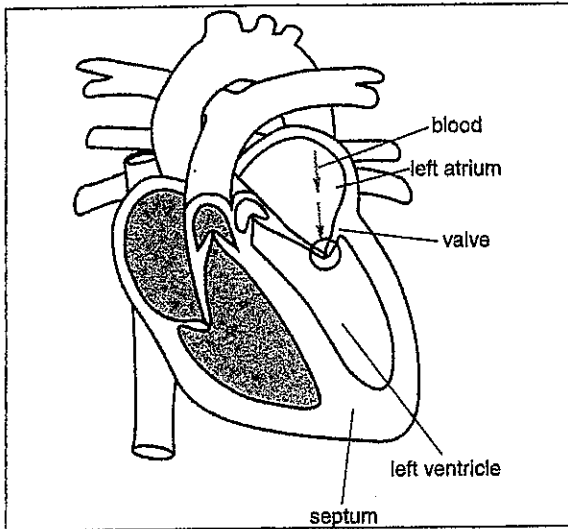


Figure C

11. Which chamber receives fresh blood from the lungs? _____
left atrium, left ventricle

12. a) The blood then passes into the

_____ .
left atrium, left ventricle

b) While this is happening, the valve between the left chambers is

is _____ .
open, closed

The Left Ventricle Contracts. This Forces Blood Out of the Heart to all Parts of the Body Except the Lungs.

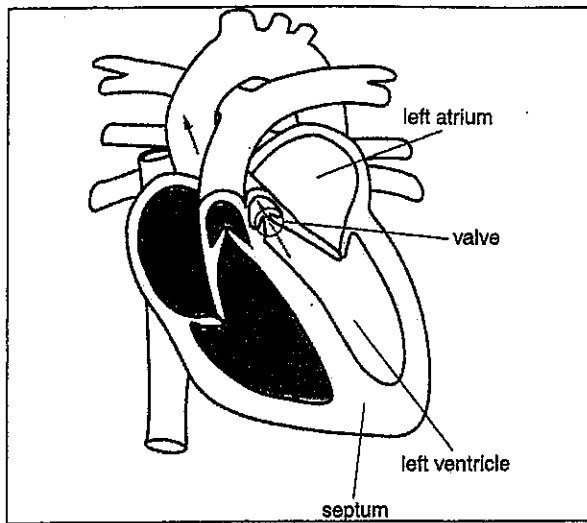


Figure D

13. a) When the left ventricle contracts, the valve between the left chambers is _____ .
open, closed
- b) Why? _____

14. Where does blood leaving the left ventricle go? _____

15. THEN, what do you think happens to the blood? _____

WHAT IS A PULSE?

Every time your ventricles contract, blood is forced out of your heart and into your arteries. This force pushes blood through your arteries in spurts. With each spurt, a beat can be felt. This beat is called a pulse.

Each pulse beat tells you that your ventricles are contracting.

PULSE BEAT = HEARTBEAT

How fast does your heart beat? It depends on several things—like age, activity, and how calm or excited you are.

The heart of a rested adult beats about 70 times a minute. A young person's heart beats slightly faster.

Activity, fear, worry, and excitement are all things that make the heart beat faster.

TRUE OR FALSE

In the space provided, write "true" if the sentence is true. Write "false" if the sentence is false.

- _____ 1. The heart is a muscle.
- _____ 2. The heart has many jobs.
- _____ 3. A human heart has four chambers.
- _____ 4. Heart chambers are called arteries and veins.
- _____ 5. Blood moves from the atria to the ventricles.
- _____ 6. Ventricles receive blood from veins.
- _____ 7. Arteries carry blood away from the heart.
- _____ 8. The right and left ventricles pump at the same time.
- _____ 9. Your heart stops beating when you are asleep.
- _____ 10. Your heart beats millions of times a year.

REACHING OUT

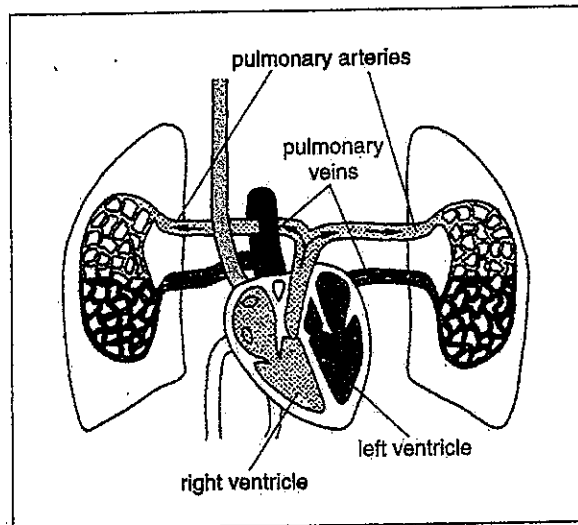


Figure H

- 1. Arteries carry "fresh" blood. There is one exception. Which artery is the exception?

- 2. Veins carry "stale" blood. There is one exception. Which veins are the exception?
