

SECTION 2 Blood

BEFORE YOU READ

After you read this section, you should be able to answer these questions:

- What is blood?
- What is blood pressure?
- What are blood types?

National Science Education Standards
LS 3a, 3b

What Is Blood?

Your cardiovascular system is made up of your heart, your blood vessels, and blood. **Blood** is a connective tissue made up of plasma, red blood cells, platelets, and white blood cells. Blood travels in blood vessels and carries oxygen and nutrients to all parts of your body. An adult human has only about 5 L of blood. All the blood in your body would not even fill up three 2-L soda bottles! ✓

STUDY TIP

Ask Questions As you read this section, write down the questions that you have. Then, discuss your questions with a small group.

READING CHECK

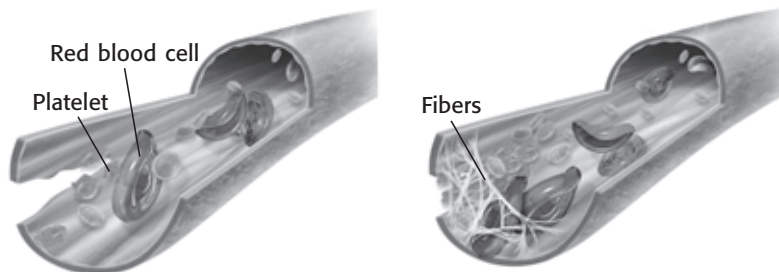
1. Define What is blood?

PLASMA

The fluid part of the blood is called plasma. *Plasma* is made up of water, minerals, nutrients, sugars, proteins, and other substances.

PLATELETS

Platelets are pieces of larger cells found in bone marrow. When you get a cut, you bleed because blood vessels have been opened. Platelets clump together in the damaged area to form a plug. They also give off chemicals that cause fibers to form. The fibers and clumped platelets form a blood clot and stop the bleeding.



Critical Thinking

2. Infer If a person does not have enough platelets in her blood, what will happen if she gets a cut?

SECTION 2 Blood *continued*

Math Focus

3. Calculate One cubic millimeter of blood contains 5 million RBCs and 10,000 WBCs. How many times more RBCs are there than WBCs?

RED BLOOD CELLS

Most blood cells are *red blood cells*, or RBCs. RBCs carry oxygen to all the cells in your body. Cells need oxygen to do their jobs. *Hemoglobin* is the protein in red blood cells that carries the oxygen. It is what makes RBCs look red.

WHITE BLOOD CELLS

A *pathogen* is a virus, bacteria, or other tiny particle that can make you sick. When pathogens get into your body, *white blood cells*, or WBCs, help kill them. WBCs can fight pathogens by:

- leaving blood vessels to destroy pathogens in tissues
- making chemicals called *antibodies* to help destroy pathogens
- destroying body cells that have died or been damaged

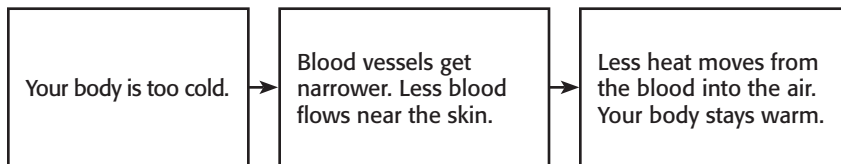
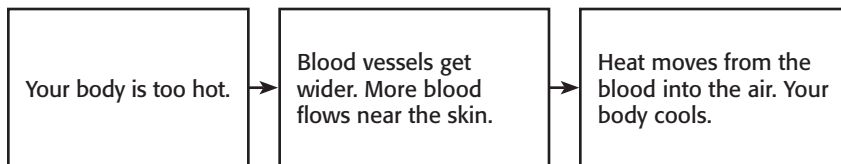
Most WBCs are made in bone marrow. Some mature in the lymphatic system. ✓

✓ **READING CHECK**

4. Identify Where are most white blood cells made?

How Does Blood Control Body Temperature?

Your blood also helps keep your body temperature constant. Your blood vessels can open wider or get narrower to control how much heat is lost through your skin.



What Is Blood Pressure?

When your heart beats, it pushes blood out of your heart and into your arteries. The force of the blood on the inside walls of the arteries is called **blood pressure**. Blood pressure is measured in millimeters of mercury (mm Hg).

STANDARDS CHECK

LS 3b Regulation of an organism's internal environment involves sensing the internal environment and changing physiological activities to keep conditions within the range required to survive.

5. Explain How do wider or narrower blood vessels help your body stay at a constant temperature?

SECTION 2 Blood *continued*

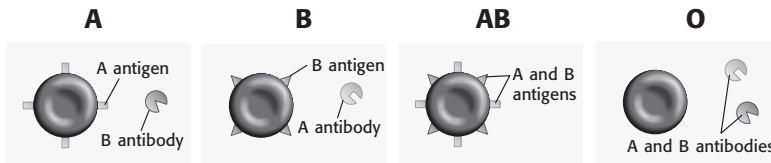
SYSTOLIC AND DIASTOLIC PRESSURE

Blood pressure is given by two numbers, such as 120/80. The first, or top, number is systolic pressure. *Systolic pressure* is the pressure in arteries when the ventricles contract. The rush of blood causes arteries to bulge and produce a pulse. The second, or bottom, number is diastolic pressure. *Diastolic pressure* is the pressure in arteries when the ventricles relax.

For adults, a blood pressure of 120/80 mm Hg or less is healthy. High blood pressure can cause heart or kidney damage.

What Are Blood Types?

Every person has one of four blood types: A, B, AB, or O. Chemicals called *antigens* on the outside of your RBCs determine which blood type you have. The plasma of different blood types may have different antibodies. *Antibodies* are chemicals that react with antigens of other blood types as if the antigens were pathogens. ✓



This figure shows which antigens and antibodies may be present in each blood type.

IMPORTANCE OF BLOOD TYPES

A person can lose blood from an injury, illness or surgery. To replace lost blood, a person can receive a blood transfusion. A *transfusion* is when a person is given blood from another person.

However, a person cannot receive blood from just anyone. If someone who is type A gets type B blood, the type B antibodies can make the RBCs clump together. The clumps can block blood vessels. A reaction to the wrong blood type can kill you.

Blood type	Can receive blood from:	Can donate blood to:
A	types A and O	types A and AB
B	types B and O	types B and AB
AB	types A, B, AB, and O	type AB only
O	type O only	types A, B, AB, and O

READING CHECK

6. Identify What determines your blood type?

TAKE A LOOK

7. Identify What kinds of antigens are found on the RBCs of a person with type AB blood?

TAKE A LOOK

8. Identify Which blood type can receive blood from the most other blood types? Which type can donate blood to the most other types?

Section 2 Review

NSES LS 3a, 3b

SECTION VOCABULARY

blood the fluid that carries gases, nutrients, and wastes through the body and that is made up of platelets, white blood cells, red blood cells, and plasma

blood pressure the force that blood exerts on the walls of arteries

1. **Identify** What are two functions of white blood cells?

2. **Describe** Complete the table to describe the two parts of blood pressure.

Type of pressure	Description	Where it is found in a blood-pressure measurement
systolic		top number
	pressure in the arteries when ventricles relax	

3. **List** What are three functions of blood?

4. **Infer** Why does your face get redder when you are hot?

5. **Explain** Why is it important that a person with type O blood only receive a blood transfusion from another person with type O blood?

6. **Predict** If a person has a disease that causes hemoglobin to break down, what can happen to his RBCs?
