Chapter Quiz

Write your answers on a separate sheet of paper.

1. What are two kinds of body tissues?
2. What are two organs? What do they do?
3. What are two body systems? What do they do?
4. What are the five senses and the organs that go with each sense?
5. Which body organ helps keep you at a steady temperature? How does it do this?
6. Where are billions of your nerve cells found?
7. What are important uses of your bones?
8. What is one kind of voluntary muscle? What is one kind of involuntary muscle?
9. What chemicals cause changes in the body at puberty?
10. What are male and female sex cells called? Where are they made?

Test Tip
Always reread the questions and your answers at the end of a test if you finish early. Many times you know the right answer, but rushing may cause you to make a mistake.

Research Project

Bones continue to grow throughout the teens. To keep them strong and healthy, you need to take in enough calcium in the food you eat. Research how much calcium is needed by an adult man, a 13-year-old boy or girl, and a woman over 50. Write up a daily menu for each person that includes food containing enough calcium.

Chapter 11 Getting Energy Into and Around the Body

Everything you do during the day requires energy. The more active you are, the more energy your body needs. Which people in the picture are using the most energy? Which are using the least energy?

Learning Objectives

- Describe the digestive system and what it does.
- Describe the respiratory system and what it does.
- Describe the circulatory system and what it does.
- Explain how blood pressure and heart disease are linked.
- LAB ACTIVITY: Measure the air in your lungs.
- SCIENCE IN YOUR LIFE: Show how different forms of physical activity affect the health of the heart and other muscles.

Words to Know

digestion	the process of breaking down food into molecules the cells can absorb
enzyme	a body chemical; in digestion, it helps break down food
esophagus	a long tube leading from the throat to the stomach
respiration	the process that gets oxygen to the body's cells and removes waste gases
larynx	a box-shaped structure below the throat
trachea	a long tube leading from the larynx to smaller branching tubes that go to the lungs; also called the windpipe
bronchi	two small tubes that branch off from the trachea and enter the lungs
circulation	the process of moving blood around the body
blood vessel	a tube that carries blood around the body
artery	a blood vessel that carries blood away from the heart
vein	a blood vessel that returns blood to the heart
capillary	a tiny blood vessel that connects an artery to a vein
plasma	the liquid part of blood
red blood cell	a blood cell that carries oxygen and carbon dioxide throughout the circulatory system
white blood cell	a blood cell that fights off bacteria and sickness in the body
platelet	a part of the blood that helps stop injuries from bleeding

11-1 Digestion

Words to Know

digestion	the process of breaking down food into molecules the cells can absorb
enzyme	a body chemical; in digestion, it helps break down food
esophagus	a long tube leading from the throat to the stomach

Eating for Life

Your body depends on the food you eat. It changes the food into energy that you need to carry out your daily activities. These activities include walking, talking, breathing, thinking, and sleeping. The process of breaking down food into molecules the cells can absorb is called **digestion.**

Suppose you ate cereal for breakfast this morning. By the afternoon, that cereal has probably been broken down into molecules. Those molecules would already be in your blood, traveling to your cells to be turned into energy.

✓ **What do you get from the food you eat?**

The Digestive System

The first step in the process of digestion is taking a bite of food and then chewing it. This helps break the food down into smaller pieces. Enzymes in your mouth help break down these pieces further. An **enzyme** is a body chemical.

Remember
Involuntary muscles are muscles that are not attached to bone.

After you chew the food, you swallow it. It goes down your **esophagus.** This is a long tube leading from your throat to your stomach. Involuntary muscles along the esophagus help to push the food down.

Your stomach contains involuntary muscles and enzymes, too. These muscles move in a wavelike motion. This breaks down the food even more.

From the stomach, food moves into your small intestine. By now, the food has become just a lot of molecules ready to enter your cells. These molecules pass through the walls of your small intestine and into the blood.

However, not all the food you eat reaches your blood. Parts of it cannot be used. These parts are waste. The solid waste, called *feces*, passes from the small intestine to the large intestine. The feces pass out of the body through an opening below the large intestine called the *anus*.

Remember
A molecule is a group of two or more atoms that are joined by chemical bonds.

Science Fact

The liquid waste, or *urine*, passes out of the body through the kidneys and the bladder. This is part of another system called the *excretory system*.

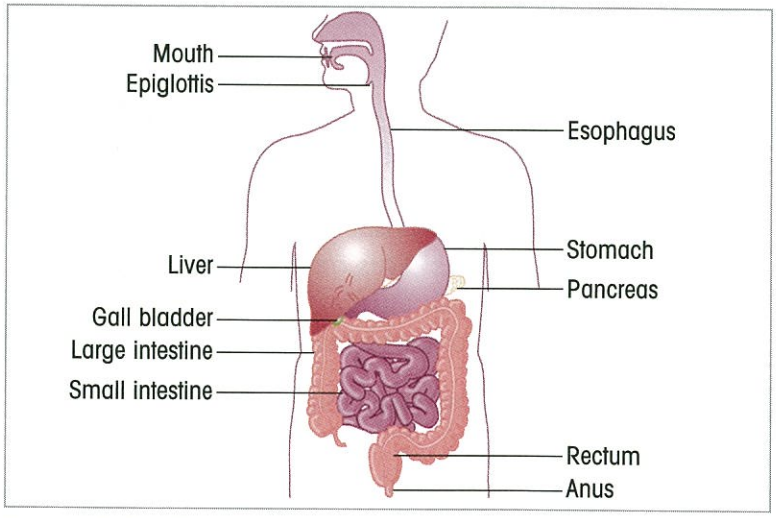


Figure 11-1 *The digestive system breaks down food.*

✓ **What does your digestive system do?**

Lesson Review

1. What gives your body the energy it needs?
2. What are three ways that food is broken down?
3. **CRITICAL THINKING** If your body stopped making enzymes, how would that affect you?

11·2 Respiration

Words to Know

respiration	the process that gets oxygen to the body's cells and removes waste gases
larynx	a box-shaped structure below the throat
trachea	a long tube leading from the larynx to smaller branching tubes that go to the lungs; also called the windpipe
bronchi	two small tubes that branch off from the trachea and enter the lungs

Breathing for Life

Remember
All cells, including plant cells, use oxygen to release energy from food. This process is called cellular respiration.

You learned that digestion gets food molecules to all your cells. However, your cells need oxygen, too. **Respiration** is the process that gets oxygen to the cells and removes waste gases. This oxygen, you recall, was produced by plants. Both animals and plants use oxygen in the air to carry out respiration.

✓ **How does respiration help animals?**

The Respiratory System

When you take a breath, you bring air into your body. You breathe in through your nose or your mouth. From there, the air goes down your throat past the **larynx.** This box-shaped structure below the throat is also called the voice box because it contains organs known as vocal cords. Vocal cords produce the sounds for speech. The air then goes down a long tube called the **trachea.** The trachea is also called the windpipe. From the trachea, the air enters two small tubes called **bronchi**, which enter the lungs.

Science Fact

Plants need carbon dioxide for photosynthesis. Humans breathe out carbon dioxide with every breath.

Your lungs are like sponges. They have many small pockets called *air sacs* in them. When you breathe in, the sacs fill with air. The oxygen in the air passes from the air sacs into your blood.

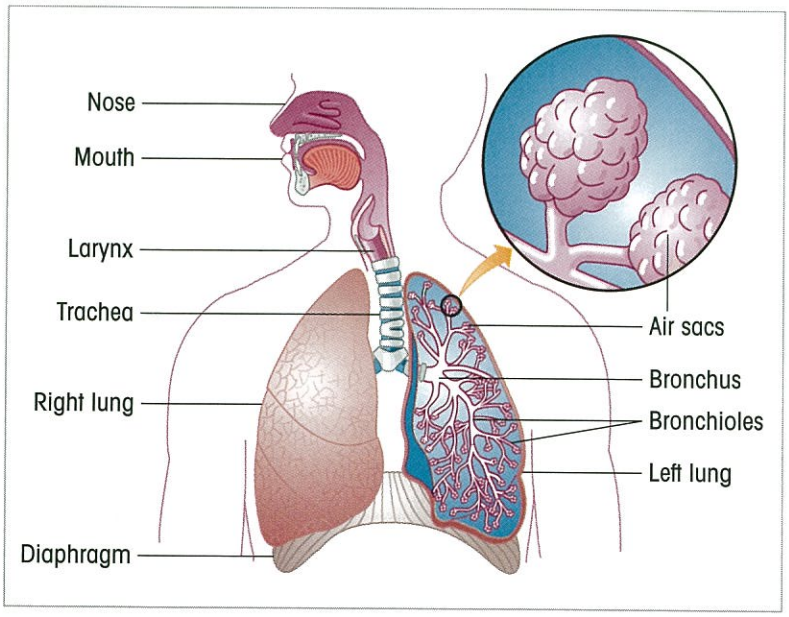


Figure 11-2 *The respiratory system gets oxygen to your cells.*

Your blood carries the oxygen to all of your cells. The oxygen combines with the food molecules in the cells. Energy is released. Carbon dioxide and water vapor are produced as byproducts. The blood carries these byproducts to the lungs. When you breathe out, you release these byproducts into the air.

✓ **What does the respiratory system do?**

Lesson Review

1. What path does air take after entering the body?
2. How does oxygen pass from your lungs into your blood?
3. **CRITICAL THINKING** How are we dependent on plants?

11-3 Circulation

Words to Know

circulation	the process of moving blood around the body
blood vessel	a tube that carries blood around the body
artery	a blood vessel that carries blood away from the heart
vein	a blood vessel that returns blood to the heart
capillary	a tiny blood vessel that connects an artery to a vein
plasma	the liquid part of blood
red blood cell	a blood cell that carries oxygen and carbon dioxide throughout the circulatory system
white blood cell	a blood cell that fights off bacteria and sickness in the body
platelet	a part of the blood that helps stop injuries from bleeding

Pumping for Life

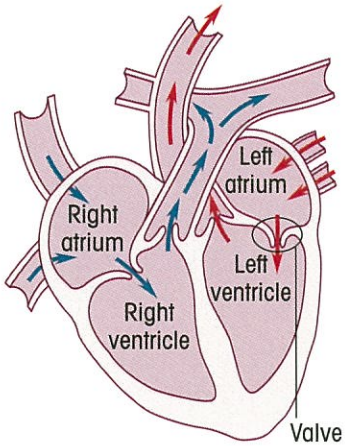


Figure 11-3 *The heart*

Circulation is the process of moving blood around the body. The blood brings food and oxygen to all the body's cells. It also carries wastes away from the cells. The most important organ of the circulatory system is the heart. It is a muscle about the size of your fist.

The heart is made up of four sections called *chambers*. The upper chambers are called the *atria*. The lower chambers are called the *ventricles*. Each chamber acts as a pump, squeezing together to push blood to every part of the body. Valves between the atria and the ventricles open and close to control the flow of blood. Tubes connected to the heart take blood to or away from the heart.

✓ **What is the purpose of the circulatory system?**

The Circulatory System

The circulatory system has many blood vessels. A **blood vessel** is a tube that carries blood around the body. There are three kinds of blood vessels.

- An **artery** is a blood vessel that carries blood *away* from the heart. The blood goes to all the body's cells.
- A **vein** is a blood vessel that *returns* blood to the heart.
- A **capillary** is a tiny blood vessel that connects an artery to a vein. Capillaries are the smallest blood vessels in the circulatory system. In some, only one blood cell can pass through at a time.

Science Fact

Black and blue marks are caused by broken blood vessels. If you fall and hit your arm, many tiny capillaries will break. The spilled blood trapped under your skin causes it to darken.

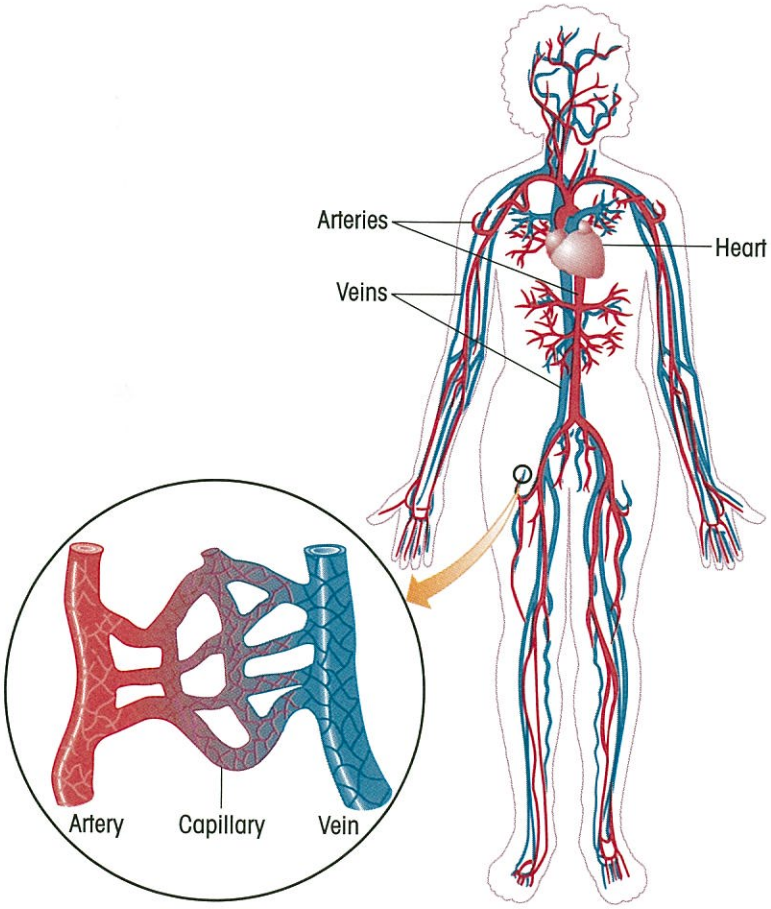


Figure 11-4 *The circulatory system moves blood around the body.*

Blood is made up of a liquid part and three solid parts. **Plasma** is the liquid part of blood. Plasma is made up mostly of water. It carries the food molecules, wastes, and other materials around the body.

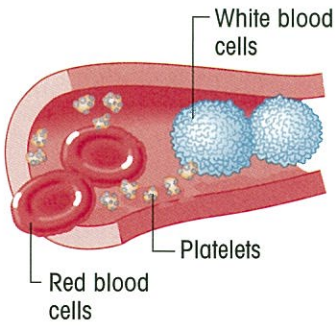


Figure 11-5 *Blood has three solid parts.*

The three types of solids in the blood are red blood cells, white blood cells, and platelets. A **red blood cell** carries oxygen and carbon dioxide throughout the circulatory system. A **white blood cell** fights off bacteria and sickness in your body. When people get sick, the body produces a lot of white blood cells. A **platelet** is a part of the blood that helps stop injuries from bleeding. Platelets group together to close off a cut.

✓ **What is blood made up of?**

Heart Disease

Blood pressure is a measure of how hard it is for blood to get through blood vessels. The narrower the blood vessels, the higher the pressure is. High blood pressure can damage the heart and lead to heart disease. Heart disease kills hundreds of thousands of Americans each year.

Remember
The respiratory system and the circulatory system work together to bring oxygen to all the body cells.

A heart attack happens when blood vessels to the heart muscle become clogged. The heart cannot get the oxygen it needs to continue pumping. Without the heart pumping, the rest of the body suffers. It cannot get the oxygen it needs to stay alive.

Scientists are learning how to prevent heart disease. Here are some ways to keep your heart healthy:

- Do not smoke.
- Eat fewer fatty foods. They can cause blood vessels to become clogged.
- Get plenty of exercise. Exercise makes your heart pump more blood through the circulatory system. This makes your circulatory system stronger.

✓ What causes a heart attack?

Lesson Review

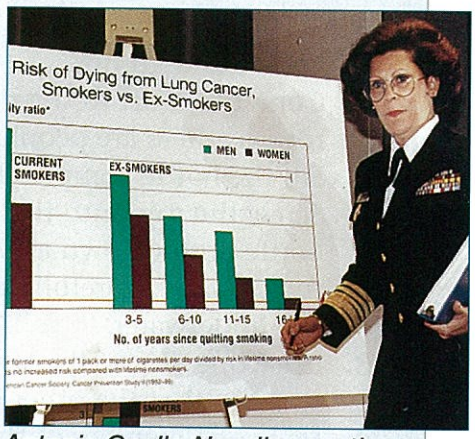
1. What is the purpose of the circulatory system?
2. What is the difference between an artery and a vein?
3. **CRITICAL THINKING** Why is it important to keep blood vessels to the heart muscle open?

Modern Leaders in Science

ANTONIA COELLO NOVELLO

Antonia Coello Novello was the first woman and the first Hispanic to serve as Surgeon General of the United States. She served from 1990 to 1993.

Research had shown that more than 3,000 teenagers become regular smokers each day. This concerned Dr. Novello greatly. In the United States, about 390,000 people die every year from heart and lung diseases caused by smoking. Cigarette smoke damages the lungs and prevents the body from getting the oxygen it needs. Dr. Novello fought to have more educational programs on the dangers of smoking.

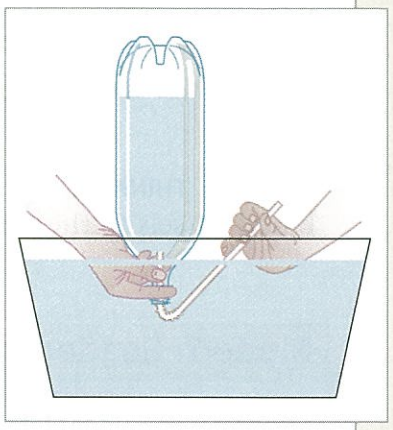


Antonia Coello Novello was the first female Surgeon General of the United States.

CRITICAL THINKING How did Dr. Novello help people?

LAB ACTIVITY
How Much Air Is There?

BACKGROUND
When you breathe in, air sacs in your lungs fill with air. This is how oxygen enters your body. Your lungs must be able to hold a lot of oxygen.



PURPOSE
You will see how much air people's lungs hold.

MATERIALS
clear plastic bottle with a cap, small tub of water, a flexible drinking straw per student, marking pen or masking tape, ruler

WHAT TO DO
1. Form small groups.
2. Copy the chart to the right. Add as many rows as there are people in your group.
3. Fill the bottle completely with water. Screw the cap onto the bottle. Turn the bottle upside down and place it in the tub of water. Carefully unscrew the cap underwater.
3. Place one end of the straw into the bottle. Bend the straw so that the other end is above the water.
4. Have one member of the group take a deep breath and then breathe out through the straw into the bottle. Mark the level of the water on the bottle at the end of the breath.
5. Use the ruler to measure the distance from the bottom of the bottle to the mark. Write the distance on the chart.
6. Repeat Steps 1 to 5 until each member in the group has recorded a breath measurement.

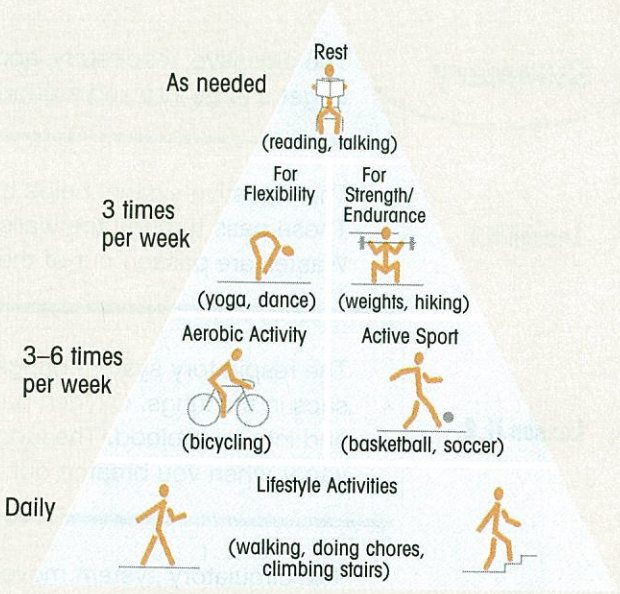
Name	Deep Breath Out
	____ inches
	____ inches
	____ inches

DRAW CONCLUSIONS
- What happened to the water level when you breathed into the straw? Why did this happen?
- Whose lungs in your group hold the largest amount of air?

SCIENCE IN YOUR LIFE
The Activity Pyramid

Keeping the heart and other muscles of your body healthy is a lifelong responsibility. There are different types of physical activity. Each one has different health benefits.

Carmen works hard to keep her body in good physical shape. She uses the Physical Activity Pyramid to plan her weekly fitness routine. She knows that activities from the bottom three sections of the pyramid are especially good for the circulatory system.



Physical Activity Pyramid

Make a chart like the one below.

Use the pyramid to plan a weekly routine. Then fill in the chart with the names of activities to do each day. An activity should be continued for at least 15 minutes to be recorded.

Day	Lifestyle	Aerobic	Active Sport	Flexibility	Strength/ Endurance	Rest
Su						
M						
T						
W						
Th						
F						
S						

Critical Thinking

How is the Physical Activity Pyramid useful for someone who is not very active?

Chapter

11 Review

Summary

The digestive, respiratory, and circulatory systems all work together to get energy into and around the body.

Lesson 11.1

The digestive system helps break down food into molecules. These pass through the walls of the small intestine into the blood. Wastes are passed out of the body.

Lesson 11.2

The respiratory system brings oxygen into the body. Air travels to sacs in the lungs. Oxygen passes through the walls of the air sacs and into your blood. The lungs release carbon dioxide and water vapor when you breathe out.

Lesson 11.3

The circulatory system moves blood around the body. Blood carries food and oxygen to all the body cells. It also carries wastes away from the cells. The main parts of the circulatory system are the heart, arteries, veins, and capillaries.

Vocabulary Review

Write *true* or *false* for each sentence. If the sentence is false, replace the underlined term to make the sentence true.

1. An enzyme is a substance that breaks down food.
2. The bronchi are the tubes that enter the lungs.
3. Air travels down the larynx to the esophagus.
4. A capillary connects an artery to a vein.
5. The liquid part of the blood is called urine.
6. A red blood cell helps stop injuries from bleeding.
7. A white blood cell fights off bacteria and sickness.
8. An artery returns blood to the heart.

Chapter Quiz

Write your answers on a separate sheet of paper.

1. Where does food go after you have chewed it?
2. Where does food go that is not digested?
3. What systems get oxygen to the cells?
4. Where do the bronchi lead?
5. What two byproducts do you breathe out into the air?
6. What do the valves of the heart do?
7. What are the three different kinds of blood vessels?
8. What are three solids found in blood? Describe their jobs.
9. Is high blood pressure good for a person or bad? Explain your answer.
10. What can you do to keep your heart healthy?

Test Tip
Reread your answers to all the questions. Be sure that you have answered both parts of any two-part question.

Research Project

CPR stands for cardiopulmonary resuscitation. It is a procedure used to save lives. It is a way to restart a person's heart and breathing. A person who has stopped breathing is not taking in oxygen. Do some research on CPR. Find out when it is used, the basics of the procedure, and how you can learn CPR in your community. Write a report on what you find out.

Chapter 12 Staying Healthy

The foods we eat can help our bodies grow strong. These people are eating many different kinds of foods. Why is it important to eat a variety of foods?

Learning Objectives

- Explain the causes of disease.
- Describe how the immune system fights disease.
- Identify the nutrients needed for a healthy diet.
- Describe the Food Guide Pyramid.
- Explain how to guard your health.
- LAB ACTIVITY: Compare the nutrients in different foods.
- ON-THE-JOB SCIENCE: Apply using the Food Guide Pyramid to serving healthy foods.