Name _____ Class _____ Date _____

SECTION 3 The Muscular System

BEFORE YOU READ

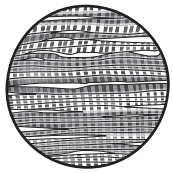
After you read this section, you should be able to answer these questions:

- What are the three kinds of muscle tissue?
- How do skeletal muscles work?
- How can exercise help keep you healthy?

National Science Education Standards
LS 1d, 1e

What Is the Muscular System?

The **muscular system** is made up of the muscles that let you move. There are three kinds of muscle in your body: smooth muscle, cardiac muscle, and skeletal muscle.



Skeletal muscle makes bones move.

Smooth muscle moves food through the digestive system.

Cardiac muscle pumps blood around the body.

Muscle action can be voluntary or involuntary. Muscle action that you can control is *voluntary*. Muscle action that you cannot control is *involuntary*. For example, cardiac muscle movements in your heart are involuntary. They happen without you having to think about it. Skeletal muscles, such as those in your eyelids, can be both voluntary and involuntary. You can blink your eyes anytime you want, but your eyes also blink automatically.

Kind of muscle	Where in your body is it found?	Are its actions voluntary or involuntary?
Cardiac	heart	involuntary
Smooth	digestive tract, blood vessels	involuntary
Skeletal	attached to bones and other organs	both

STUDY TIP

Circle As you read this section, circle any new science terms. Make sure you know what these words mean before moving to the next chapter.

Critical Thinking

1. Apply Concepts Your diaphragm is a muscle that helps you breathe. Do you think this muscle is voluntary or involuntary? Explain.

How Do Skeletal Muscles Work?

Skeletal muscles let you move. When you want to move, signals travel from your brain to your skeletal muscle cells. The muscle cells then contract, or get shorter. ☑

READING CHECK

2. Explain What causes skeletal muscle cells to contract?

_____

_____

HOW MUSCLES AND BONES WORK TOGETHER

Strands of tough connective tissue connect your skeletal muscles to your bones. These strands are called tendons. When a muscle that connects two bones contracts, the bones are pulled closer to each other. For example, tendons attach the biceps muscle to bones in your shoulder and forearm. When the biceps muscle contracts, your forearm bends toward your shoulder.

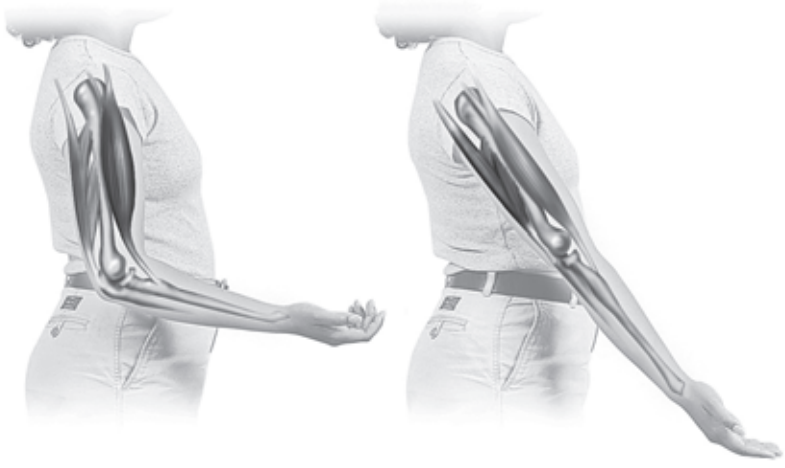
PAIRS OF MUSCLES

Your skeletal muscles often work in pairs to make smooth, controlled motions. Generally, one muscle in the pair bends part of the body. The other muscle straightens that part of the body. A muscle that bends part of your body is called a *flexor*. A muscle that straightens part of your body is an *extensor*. ☑

READING CHECK

3. Complete A muscle that bends part of your body is a _____.

In the figure below, the biceps muscle is the flexor. When the biceps muscle contracts, the arm bends. The triceps muscle is the extensor. When it contracts, the arm straightens out.



TAKE A LOOK

4. Identify On the figure, label the flexor muscle and the extensor muscle.

How Can You Keep Your Muscles Healthy?

Muscles get stronger when you exercise them. Strong muscles can help other organs to work better. For example, when your heart is strong, it can pump more blood to the rest of your organs. More blood brings more oxygen and nutrients to your organs.

Certain kinds of exercises can give muscles more strength and endurance. More endurance means that your muscles can work longer before they get tired.

Resistance exercise is a good way to make skeletal muscles stronger. During *resistance exercise*, the muscles work against the resistance, or weight, of an object. Some resistance exercises use weights. Others, such as sit-ups, use your own body weight as resistance.

Aerobic exercise can increase skeletal muscle strength and endurance. Aerobic exercise can also make your heart muscles stronger. During *aerobic exercise*, the muscles work steadily for a fairly long period of time. Jogging, skating, swimming, and walking are all aerobic exercises.

Type of exercise	Description	Example
Resistance		weight-lifting, sit-ups
	Muscles work steadily for a long time.	

MUSCLE INJURY

Most muscle injuries happen when people try to do too much exercise too quickly. For example, a *strain* is an injury in which a muscle or tendon is overstretched or torn. To avoid muscle injuries, you should start exercising slowly. Don't try to do too much too fast.

Exercising too much can also harm your muscles and tendons. For example, if you exercise a tendon that has a strain, the tendon cannot heal. It can become swollen and painful. This condition is called *tendonitis*.

Some people try to make their muscles stronger by taking drugs called *anabolic steroids*. These drugs can cause serious health problems. They can cause high blood pressure and can damage the heart, liver, and kidneys. They can also cause bones to stop growing.

Math Focus

5. Calculate A student is doing resistance exercise. After one week, she can lift a weight of 2 kg. After four weeks, she can lift a weight of 3 kg. By what percentage has the weight that she can lift increased?

TAKE A LOOK

6. Describe Complete the table to describe types of exercise.

Say It

Discuss In a small group, talk about some of the ways that exercise can help keep you healthy.

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Section 3 Review

NSES LS 1d, 1e

SECTION VOCABULARY

muscular system the organ system whose primary function is movement and flexibility	

1. List What three kinds of muscle make up the muscular system?

2. Identify Which kind of muscle movement happens without you having to think about it? Give two kinds of muscle that show this kind of movement.

3. Describe How are muscles attached to bones?

4. Explain How do muscles cause bones to move?

5. Describe What happens to muscle when you exercise it?

6. Compare How is aerobic exercise different from resistance exercise?

7. Identify What are two kinds of injuries to the muscular system?

8. Compare How is a flexor different from an extensor?

9. Explain What kinds of problems can anabolic steroids cause?