

section ● The Muscular System

What You'll Learn

- the major function of the muscular system
- how the three types of muscles differ
- how muscles move body parts

● Before You Read

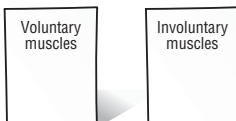
On the lines below, describe a movement you make that uses muscles.

Study Coach

Create a Quiz Write a quiz question for each heading on a separate sheet of paper. Exchange quizzes with another student. Together discuss the answers to the quizzes.

FOLDABLES™

● **Describe** Make a Foldable from quarter sheets of notebook paper, as shown below, to organize key terms and concepts about voluntary and involuntary muscles.



● Read to Learn

Movement of the Human Body

Muscles help make all your movements possible. A **muscle** is an organ that can relax, contract, and provide the force to move your body parts. In the process, energy is used and work is done.

What are voluntary and involuntary muscles?

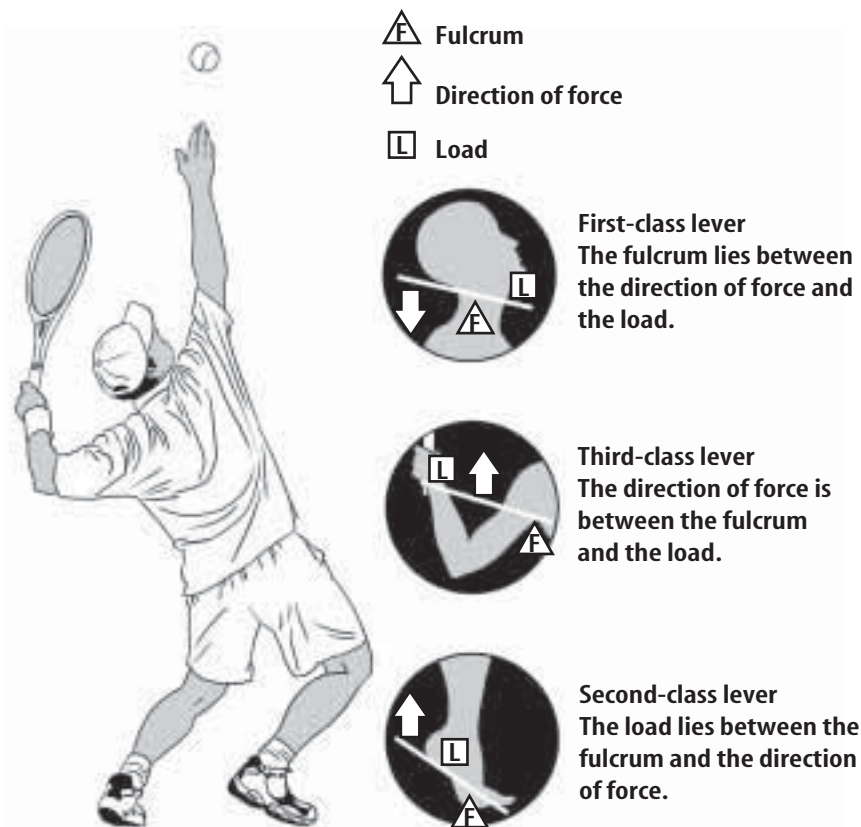
Muscles that you are able to control are called **voluntary muscles**. The muscles in your face, hands, arms, and legs are voluntary muscles. You can choose to move them or not move them.

Muscles that you are not able to consciously control are called **involuntary muscles**. These muscles are always working. Involuntary muscles pump blood through your blood vessels and move food through your digestive system.

Your Body's Simple Machines—Levers

A machine, such as a bike, is any device that makes work easier. A simple machine does work with only one movement. The hammer is a type of simple machine called a **lever**. A lever is a rod or plank that pivots or turns about a point. The point is called a fulcrum.

Types of Levers The action of bones, joints, and muscles working together is like a lever. In your body, your bones are the rods and your joints are the fulcrums. The relaxation and contraction of muscles provide the force to move body parts. There are three types of levers—first-class, second-class, and third-class. The figure below shows how all three levers are used in the body when serving a tennis ball.



Classification of Muscle Tissue

There are three types of muscles in your body—skeletal muscle, cardiac muscle, and smooth muscle. The muscles that move bones are **skeletal muscles**. They are the most common muscle type in your body. They are attached to bones by thick bands of tissue called **tendons**. Skeletal muscles are voluntary muscles. You choose to use them or not use them, such as when you walk or when you rest.

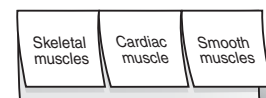
Cardiac muscle is found only in the heart. This involuntary muscle contracts about 70 times per minute. **Smooth muscles** are found in your intestines, bladder, blood vessels, and other internal organs. They are involuntary muscles that slowly contract and relax.

Picture This

- 1. Identify** In the drawing of the tennis player, circle and label the three types of levers in the body that are used to serve a tennis ball.

FOLDABLES™

- **Organize** Make a three-tab Foldable, as shown below, to organize facts about skeletal muscles, cardiac muscle, and smooth muscles.

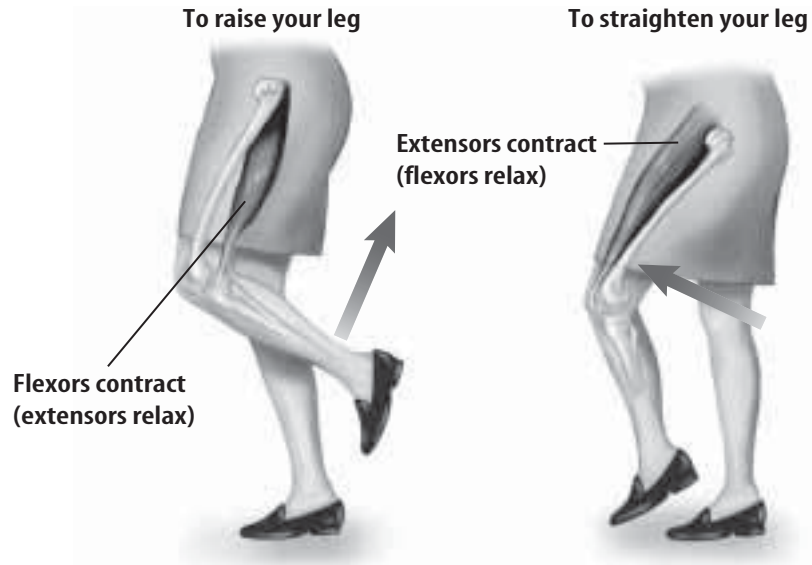


Picture This

- 2. Describe** Use these drawings to explain to a classmate how muscles work by pulling, rather than by pushing.

Working Muscles

You are able to move because skeletal muscles work in pairs, as shown in the figure below. When one muscle of a pair contracts, the other muscle relaxes, or returns to its original length. Muscles always pull. They never push. When the muscles on the back of your upper leg contract, they shorten. This pulls your lower leg back and up. When you straighten your leg, the back muscles lengthen and relax. At the same time, the muscles on the front of your leg contract.



How do muscles change?

Skeletal muscles that do a lot of work become strong and large. Some of this change in muscle size is because of an increase in the number of muscle cells. Most of the change is because individual muscle cells become larger. Muscles that are not exercised become soft, flabby, and weak.

How are muscles fueled?

Your muscles need energy to contract and relax. Your blood carries energy-rich molecules to your muscle cells. As the muscle contracts, part of the chemical energy changes to mechanical energy (movement). Some of the chemical energy changes to thermal energy (warmth) as muscles are used. The thermal energy of muscle contractions helps keep your body temperature constant. When the supply of energy-rich molecules is used up, the muscle becomes tired and needs to rest. While your muscle rests, your blood supplies more energy-rich molecules to your muscle cells. 

Reading Check

- 3. Explain** why your muscles need energy?

● After You Read

Mini Glossary

cardiac muscle: muscle found only in the heart

involuntary muscle: a muscle, such as the heart muscle, that cannot be consciously controlled

lever: a rod or plank that pivots or turns about a point; a simple machine

muscle: an organ that can relax, contract, and provide the force to move your body parts

skeletal muscle: a muscle that moves the body

smooth muscle: the muscle found in the intestines, bladder, blood vessels, and other internal organs

tendons: thick bands of tissue that attach muscles to bones

voluntary muscle: a muscle, such as a leg or arm muscle, that can be consciously controlled

1. Review the terms and their definitions in the Mini Glossary. Write a sentence explaining the difference between voluntary muscles and involuntary muscles.

2. Fill in the table below to identify the three types of muscle tissues and explain the functions of each.

Types of Muscle Tissue	Function of the Muscle Tissue

3. How did the quiz help you review what you have learned about the muscular system?



Visit life.msscience.com to access your textbook, interactive games, and projects to help you learn more about the muscular system.

End of
Section