Exploring Skeletal and Muscular Systems

Guide to Reading

- Building Vocabulary
  As you read this lesson, use each new highlighted term in a sentence. Write the sentences in your notebook.
  - skeletal system (p. 66)
  - joints (p. 66)
  - tendons (p. 66)
  - ligaments (p. 66)
  - cartilage (p. 66)
  - muscular system (p. 67)

- Focusing on the Main Ideas
  In this lesson, you will be able to
  - discuss the functions of the skeletal and muscular systems.
  - recognize how bones and muscles work together.
  - describe how to keep your bones and muscles healthy.

- Reading Strategy
  Finding the Main Idea Look at the main headings in this lesson. For each heading, write a sentence that states the main idea.

Quick Write

Why do you think healthy bones are important to good health? Explain your ideas in a few sentences.

The Skeletal System

The skeletal system is the framework of bones and other tissues that supports the body. This system also protects your internal organs and helps you move. The 206 bones in your body make blood cells and store calcium and other minerals.

Joints are the places where two or more bones meet. Some joints allow the bones to move. Others, such as those in the skull, never move but protect organs instead. Figure 3.4 on the following page shows the major bones in the skeletal system. It also describes the primary types of joints.

Several types of connecting tissue allow bones and muscles to work together as they move. Tendons are a type of connecting tissue that joins muscles to bones and muscles to muscles. Your Achilles tendon, for example, attaches your calf muscle to your heel bone. Ligaments are a type of connecting tissue that holds bones to other bones at the joint. Ligaments make it possible for your knees and ankles to work. Cartilage is a strong, flexible tissue that allows joints to move easily, cushions bones, and supports soft tissues. The tip of your nose contains cartilage. Cartilage also pads your knee joint.

Reading Check

Define What are ligaments?
**FIGURE 3.4**

**The Skeletal System**

Here are some of the major bones and joints of the skeletal system. What type of joint are the vertebrae?

- **Cranium (skull)**
- **Cervical vertebrae (neck bones)**
- **Clavicle (collarbones)**
- **Scapula (shoulder blade)**
- **Sternum (breastbone)**
- **Humerus (upper arm)**
- **Rib cage**
- **Ulna**
- **Radius**
- **Carpals (wrist)**
- **Metacarpals (hand)**
- **Phalanges (fingers)**
- **Thoracic vertebrae (upper back, behind sternum)**
- **Lumbar vertebrae (lower back)**
- **Pelvis**
- **Pivot Joint**
  - The end of one bone rotates inside a ring formed by another. The joint can move up and down and from side to side. One pivot joint is located between the first two vertebrae, connecting the head to the neck.
- **Gliding Joint**
  - One part of a bone glides over another bone, allowing a small range of sideways movement. The vertebrae in the back that protect the spinal cord are examples of gliding joints.
- **Ball-and-Socket Joint**
  - The ball-shaped head of one bone moves inside the cup-shaped socket of another. The joint can move in all directions. The hip is a ball-and-socket joint.

**The Muscular System**

The human body has more than 600 muscles. The **muscular system** includes tissues that move parts of the body and control the organs. It provides the power and flexibility you need to move. The three main types of muscles are skeletal, smooth, and cardiac.
**Figure 3.5** identifies skeletal muscles. These muscles are voluntary. That means you can control them. For example, imagine you want to turn your head. Your brain sends messages to muscles in your neck. In response, the neck muscles contract, or shorten. This causes your head to turn. Skeletal muscles work in pairs to move bones. As one muscle contracts, the other muscle lengthens. **Figure 3.6** shows how the muscles move when you move your arm.

**FIGURE 3.5**

**The Muscular System**

Here are the major skeletal muscles and their functions. What is the function of the trapezius?

- Facial muscles (open and close eyes and mouth, aid in chewing, make facial expressions)
- Trapezius (raises head)
- Sternomastoid (turns head)
- Deltoid (raises arm)
- Pectoralis major (moves arm)
- Biceps brachii (bends elbow)
- External oblique (aids breathing)
- Sartorius (flexes knee and hip)
- Quadriceps femoris (straightens leg)
- Extensor digitorum longus (extends toes)
- Tibialis anterior (flexes foot)
- Triceps brachii (straightens arm)
- Latissimus dorsi (lowers arm)
- Gluteus maximus (extends thigh)
- Hamstring muscles (bend leg at knee)
- Biceps femoris (rotates femur and extends thigh)
- Gastrocnemius (raises heel)
Your body's organs and blood vessels contain smooth muscles. These muscles are involuntary. That means they move without you consciously controlling their movement. The heart has its own special type of involuntary muscle called cardiac muscle.

**Caring for Your Bones and Muscles**

To keep your bones and muscles in good shape, stay physically active. Do flexibility exercises so you can move more easily and work out more safely. Choose physical activities that strengthen your muscles and bones. Also do activities that build cardiovascular endurance. Your heart and lungs will have more power.

"Stand up straight!" No doubt someone has told you this at least once in your life. It's good advice. Proper posture keeps bones, joints, and muscles in the right places. Just remember, good posture is not stiff posture. Sit and stand in a correct but relaxed way. Your lower back should be slightly curved. If you use a backpack, try not to overload it. Otherwise, you could strain your back.

**FIGURE 3.6**

**Paired Movement**

Pairs of muscles work together to move bones. They use opposite actions.

**What muscles move when you bend your arm?**

A To bend the arm, muscles in the top part of the arm—especially the biceps brachii—contract, or shorten, pulling the bone of the forearm upward. At the same time, the triceps brachii—on the opposite side of the arm—must relax and extend, or lengthen.

B To straighten the arm again, the biceps brachii relax. The triceps brachii now contract, pulling the arm into a straight line.

**Scoliosis**

A person with scoliosis has a spine that curves sideways. No one knows what causes this curvature. Doctors usually find it in young people between the ages of 10 and 14. Your school may provide screening for scoliosis.

Use reliable sources to find out how doctors treat scoliosis. Report your findings to the class.
From time to time, check to make sure you have good posture. Why is having good posture important?

When you lift heavy objects, keep your back straight. Bend your knees as you lift, and use your legs to do most of the work. If you get hurt, don’t try to keep using the injured area. Visit a doctor or other professional health services right away.

Have you heard the saying “You are what you eat”? It’s true. When you follow a healthful eating plan, your bones and muscles get the proper nutrients. Carbohydrates provide fuel for energy. Foods high in protein can help build muscle. Foods high in vitamin D, calcium, and other minerals help your bones grow and become stronger.

**Reading Check**

Describe How should you lift heavy objects to protect your skeletal and muscular systems?

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**Lesson 2 Review**

**After You Read**

Review this lesson for new terms, major headings, and Reading Checks.

**What I Learned**

1. **Explain** What are the functions of the skeletal and muscular systems?
2. **Vocabulary** Define cartilage.
3. **Distinguish** How do ligaments and tendons differ?
4. **Describe** How can you care for your skeletal and muscular systems?
5. **Identify** Which muscle turns your head?

**Thinking Critically**

6. **Analyze** Why do you think poor posture may cause backaches?
7. **Explain** Why do you think cardiac muscle is involuntary?

**Applying Health Skills**

8. **Practicing Healthful Behaviors** Learn some exercises to strengthen your bones. Ask a physical education teacher or other fitness expert for help. Demonstrate the exercises for your class.