chapter 17 Structure and Movement

section ● The Skeletal System

Before You Read

What is your favorite sport? On the lines below, name all the body parts you use to play this sport.

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What You'll Learn

- five functions of the skeletal system
- the differences and similarities between the movable and the immovable joints

Read to Learn

Mark the Text

Identify the Important Points Write a phrase beside each of the main headings to summarize the main point of that section.

Living Bones

The bones in your body are very much alive. Each is a living organ made of several different tissues. Like all living tissues, bone tissue is made up of cells that take in nutrients and use energy. Bone cells have the same needs as other body cells.

What are the major functions of the skeletal system?

All 206 bones in your body make up your **skeletal system.** It is your body's framework, just like the framework of a building. The skeletal system has five major functions.

1. The skeleton gives shape and support to your body.
2. Bones protect your internal organs. For example, the skull surrounds the brain.
3. Major muscles are attached to bones. These muscles help bones move.
4. Blood cells are formed in the center of many bones in soft tissue called red marrow.
5. Major amounts of calcium and phosphorus compounds are stored in the skeleton for later use. Calcium and phosphorus make bones hard.

Reading Check

1. **Identify** Where are blood cells formed?

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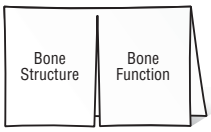
FOLDABLES™

● **Describe** Make a two-tab book Foldable, as shown below, to organize facts about bone structure and function.



Picture This

2. **Identify** Circle the name of the membrane that covers the surface of bone.

Reading Check

3. **Explain** How do bone cells get nutrients?

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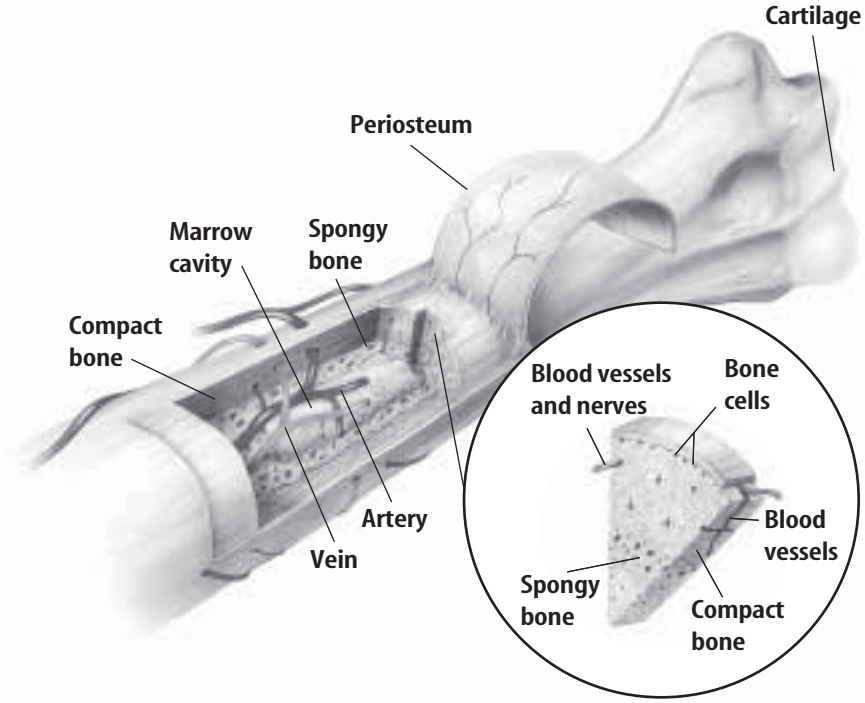
Bone Structure

Bones are different sizes and shapes. The shapes of your bones are inherited. But, a bone's shape can change when the attached muscles are used.

As you can see in the figure below, bones are not smooth. They have bumps, edges, round ends, rough spots, and many pits and holes. Muscles and ligaments attach to some of the bumps and pits. The figure below shows that blood vessels and nerves enter and leave the bone through the holes.



The figure above shows that the surface of a living bone is covered with a tough, tight-fitting membrane called the **periosteum** (per ee AH stee um). Small blood vessels in the periosteum carry nutrients into the bone. Its nerves signal pain. Cells involved in the growth and repair of bone also are found in the periosteum. ✔

What keeps bones from breaking?

Under the periosteum is a hard, strong layer called compact bone. This bone tissue gives bone strength. It has a framework containing deposits of calcium phosphate that makes the bone hard and keeps them from being easily broken. Bone cells and blood vessels are found in compact bone.

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Spongy Bone Spongy bone is tissue found in the ends of long bones such as those in your thigh and upper arm. Spongy bone has many small, open spaces that make bones lightweight. In the centers of long bones are large openings called cavities. These cavities and the spaces in spongy bone are filled with yellow and red marrow. Yellow marrow is made up of fat cells. Red marrow makes 2 million to 3 million red blood cells per second.

Why is cartilage important in joints?

The ends of bones are covered with a smooth, slippery, thick layer of tissue called **cartilage.** Cartilage protects the joints and absorbs shock. It also makes movement easier because it lessens friction between bones. People with damaged cartilage have pain when they move, because the bones rub together.

Reading Check

4. **Identify** two functions of cartilage.

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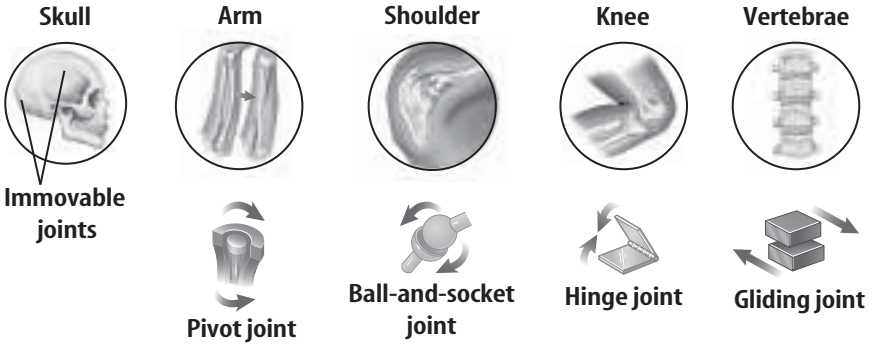
Bone Formation

Before you were born, your skeleton was made of cartilage. Over time, the cartilage was replaced by bone. Bone-forming cells called osteoblasts (AHS tee oh blasts) deposit calcium and phosphorus in bones, making bones hard. Throughout your life, healthy bone tissue is being formed. Osteoblasts build up bone.

Another type of bone cell, called an osteoclast, breaks down bone tissue. Osteoclasts release calcium and phosphorus into your bloodstream. This keeps the amount of calcium and phosphorus in your blood at healthy levels.

Joints

You are able to move because your skeleton has joints. Anyplace where two or more of your bones come together is a **joint.** The bones that make up a joint are kept apart by cartilage and are held in place by a tough band of tissue called a **ligament.** Muscles move bones by moving joints. The figure below shows the different types of joints in your body.



Picture This

5. **Classify** Use the figure to determine which kind of joint you use in each of the following activities.

   a. raise your arm

   _____

   b. kneel

   _____

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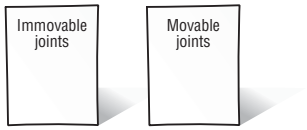
FOLDABLES™

● **Describe** Make quarter-sheet Foldables, as shown below, to organize key terms and concepts about immovable and movable joints.



What is an immovable joint?

An immovable joint allows little or no movement. The skull has immovable joints.

What are the types of movable joints?

All movements require movable joints. As you can see in the figure on the previous page, there are four types of movable joints—pivot, ball-and-socket, hinge, and gliding.

Pivot Joints In a pivot joint, one bone rotates in a ring of another bone that does not move. Turning your head is an example of a pivot movement.

Ball-and-socket Joints Your legs and arms can swing in almost any direction because they have ball-and-socket joints. This kind of joint consists of a bone with a rounded end that fits into a cuplike cavity on another bone. This joint gives you a wide range of motion.

Hinge Joints A hinge joint has a back-and-forth movement like hinges on a door. Elbows, knees, and fingers have hinge joints. Hinge joints have a smaller range of motion than ball-and-socket joints.

Gliding Joints Your wrists, ankles, and vertebrae have gliding joints. In a gliding joint, one part of a bone slides over another bone. This joint also moves back and forth.

Why do your bones move smoothly?

If your bones did not have cartilage at the ends, they would wear away at the joints. Cartilage allows bones to slide more easily over each other by reducing friction. Pads of cartilage, called disks, are located between the vertebrae in your back. These disks act as cushions and prevent injury to your spinal cord. A fluid that comes from nearby blood vessels keeps the joint lubricated. ☑

What is arthritis?

Arthritis is the most common joint problem in humans. About one out of every seven people in the United States suffers from arthritis. It causes pain, stiffness, and swelling of the joints. There are more than 100 different forms of arthritis that can damage the joints.

Reading Check

6. **Describe** What are the functions of disks?

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After You Read

Mini Glossary

cartilage: a smooth, slippery, thick layer of tissue that covers the ends of bones

joint: the place where two or more bones come together

ligament: a tough band of tissue that holds bones together at the joint

periosteum (per ee AH stee um): a tough, tight-fitting membrane on the surface of a living bone

skeletal system: the framework of bones in the body

1. Review the terms and their definitions in the Mini Glossary. Use two terms in the glossary to write a sentence describing some part of the skeletal system.

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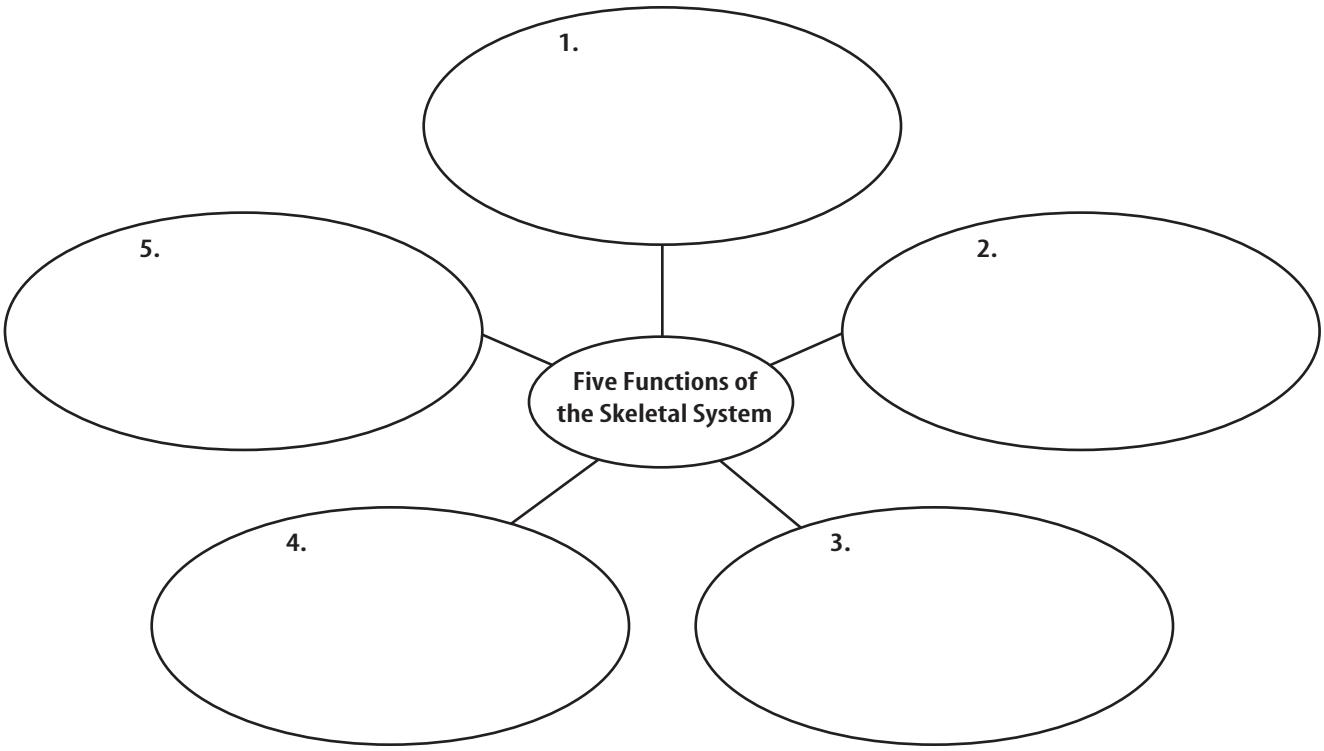
_____

_____

2. Complete the concept web below by naming the five functions of the skeletal system.



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

End of Section