


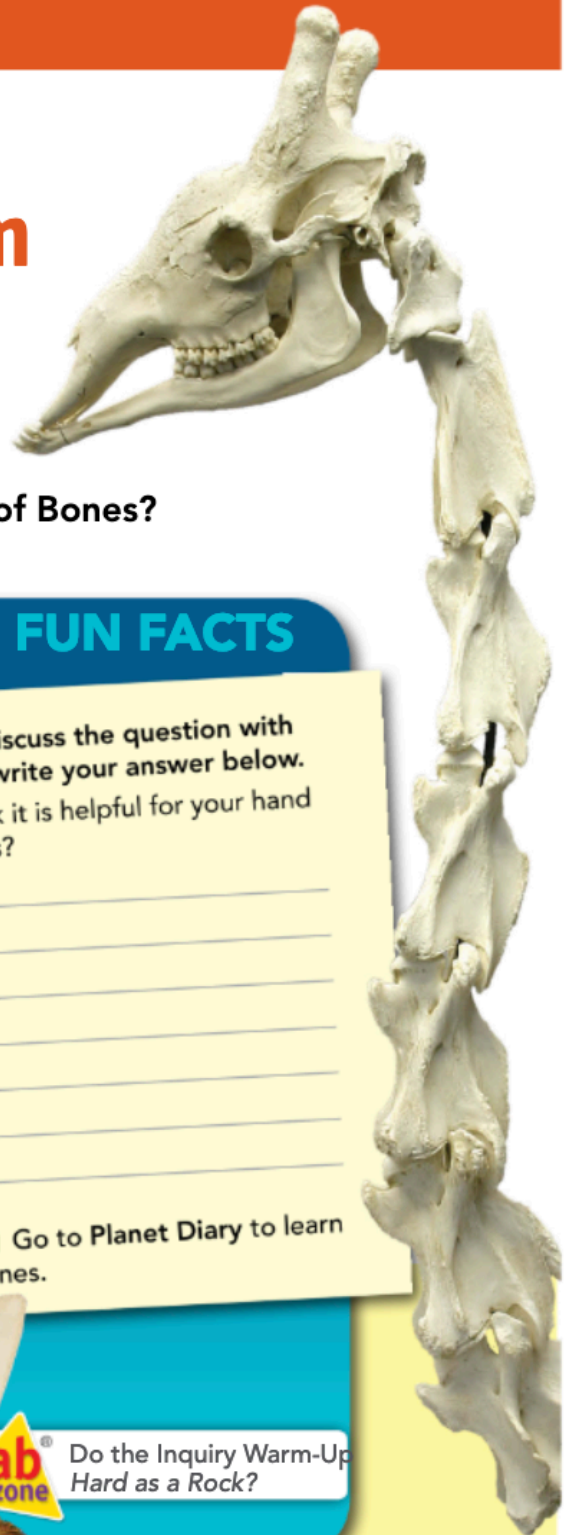


# The Skeletal System



-  What Does the Skeleton Do?
-  What Role Do Joints Play?
-  What Are the Characteristics of Bones?



## my planet DiARY

### Know Your Bones!

Here are some fascinating facts you may not know about your bones.

- You have the same number of bones in your neck as a giraffe. However, a single bone in the neck of a giraffe can be as long as 25 centimeters.
- You have 27 bones in each hand and 26 bones in each foot. They account for 106 of the 206 bones in your body.
- You do not have a funny bone. You have a sensitive spot on your elbow where a nerve passes close to the skin. If you hit this spot, the area feels funny.
- No one is truly "double-jointed." People who are able to twist in weird directions have very flexible joints.

## FUN FACTS

**Communicate** Discuss the question with a partner. Then write your answer below.  
Why do you think it is helpful for your hand to have 27 bones?

---



---



---



---




---



---



---

 **PLANET DIARY** Go to Planet Diary to learn more about bones.





Do the Inquiry Warm-Up  
Hard as a Rock?

**Vocabulary**

- skeleton • vertebrae • joint • ligament
- compact bone • spongy bone • marrow
- cartilage • osteoporosis


**Skills**

-  Reading: Summarize
-  Inquiry: Classify



## What Does the Skeleton Do?

If you have ever visited a construction site, you have seen workers assemble steel pieces into a rigid frame for a building. Once the building is finished, this framework is invisible.

Like a building, you have an inner framework. Your framework, or **skeleton**, is made up of all the bones in your body. Just as a building would fall without its frame, you would collapse without your skeleton.  **Your skeleton has five major functions. It provides shape and support, enables you to move, and protects your organs. It also produces blood cells and stores minerals and other materials until your body needs them.**

**Shape and Support** Your skeleton shapes and supports your body. It is made up of about 206 bones of different shapes and sizes. Your backbone, or vertebral column, is the center of your skeleton. A total of 26 small bones, or **vertebrae** (vur tuh bray) (singular *vertebra*), *make up your backbone*. **Figure 1** shows how vertebrae connect to form the backbone or vertebral column.

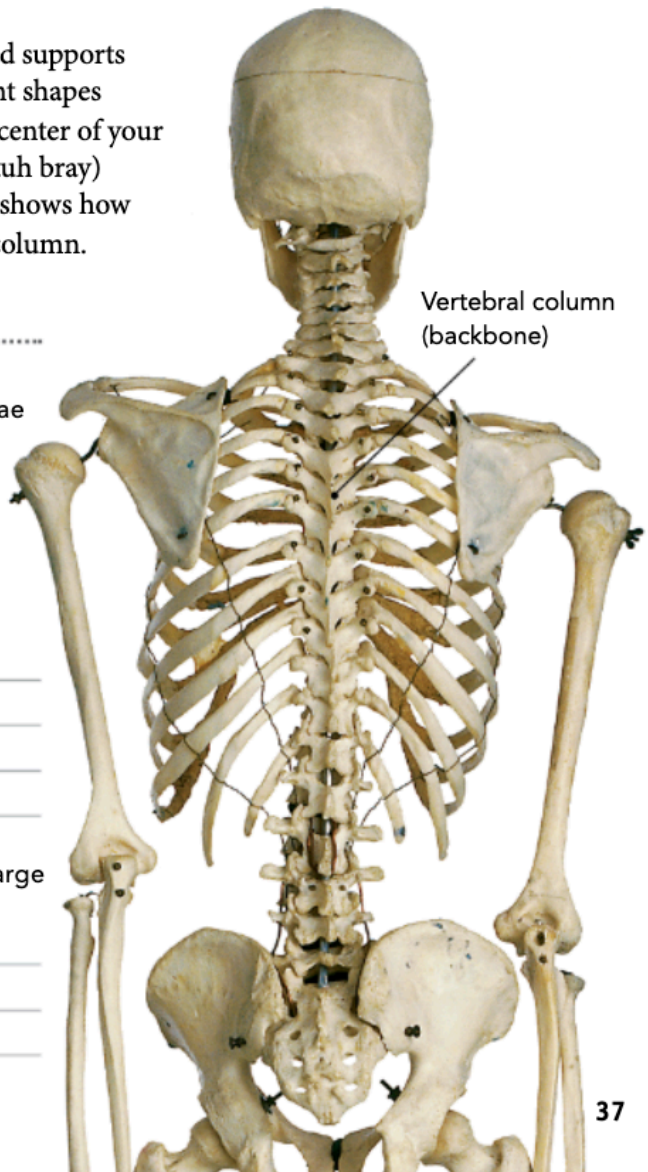



FIGURE 1 .....

**The Vertebral Column**

Just like a flexible necklace of beads, your vertebrae move against each other, allowing you to bend and twist.

 Use the photo to answer the questions about your vertebrae.

1. **Interpret Photos** Which body parts does the vertebral column support?

---



---



---



---

2. **CHALLENGE** What is the advantage of having large vertebrae at the base of the vertebral column?

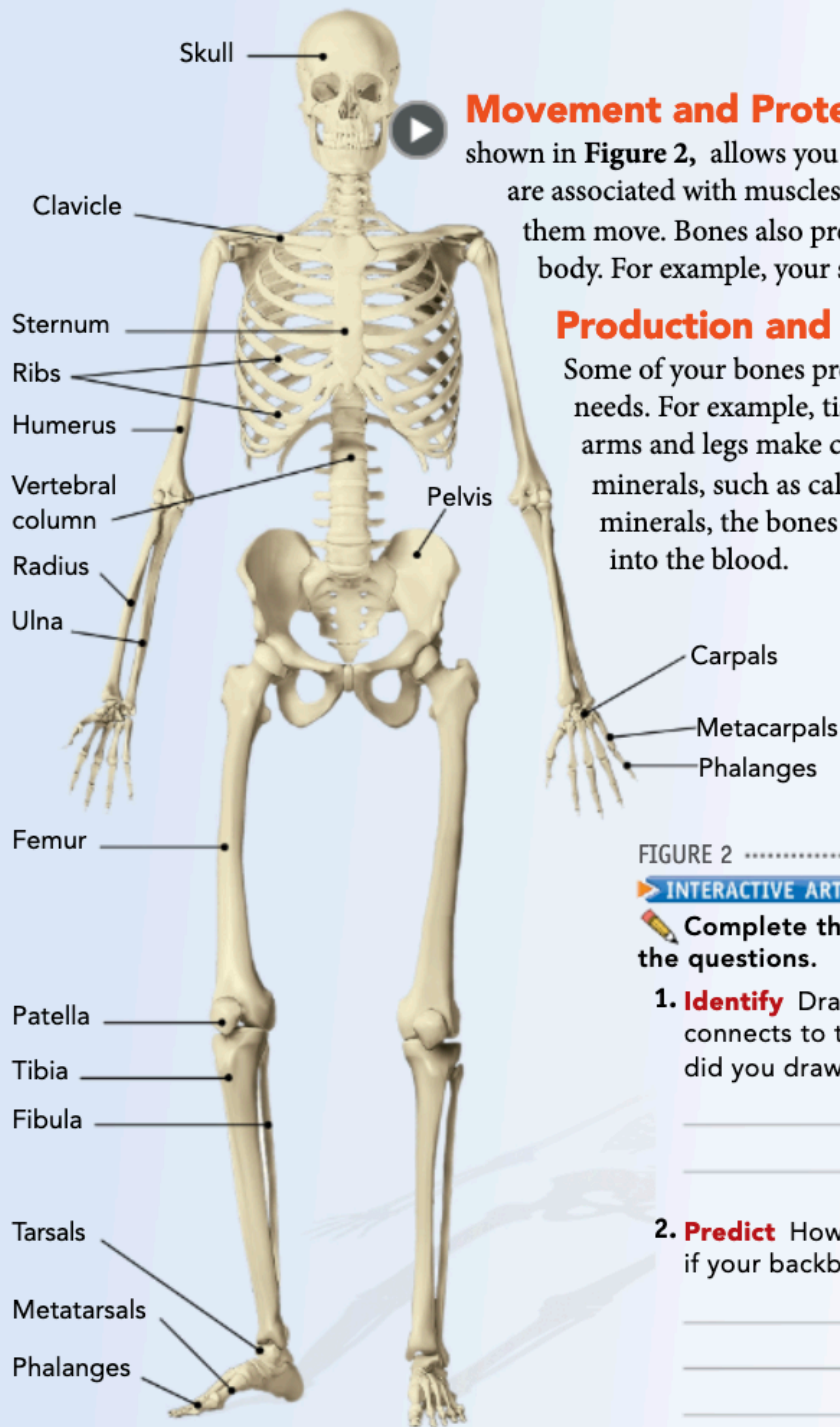
---



---



---



**Movement and Protection** Your skeleton, as the one shown in **Figure 2**, allows you to move. Most of the body's bones are associated with muscles, which pull on the bones to make them move. Bones also protect many of the organs in your body. For example, your skull protects your brain.

**Production and Storage of Substances**

Some of your bones produce substances that your body needs. For example, tissues in the long bones of your arms and legs make certain blood cells. Bones also store minerals, such as calcium. When the body needs these minerals, the bones release small amounts of them into the blood.

FIGURE 2 .....

**INTERACTIVE ART The Skeleton**

**Complete the activity below and answer the questions.**

1. **Identify** Draw a path to show how the tibia connects to the vertebral column. Which bones did you draw a path through?

---



---

2. **Predict** How would your movement change if your backbone were one long bone?

---



---



---



**Assess Your Understanding**

got it? .....

I get it! Now I know that my skeleton

I need extra help with

Go to **my science COACH** online for help with this subject.



## What Role Do Joints Play?

If your leg had only one long bone, how would you get out of bed? Luckily, your leg has many bones so you can move it easily. A **joint** is a place where two bones come together. **Joints allow bones to move in different ways.** You have two kinds of joints: immovable and movable.

**Immovable Joints** Immovable joints connect bones but allow little or no movement. The bones of the skull are held together by immovable joints.

**Movable Joints** Most joints are movable. They allow the body to make many different movements such as those shown in **Figure 3**. The bones in movable joints are held together by **ligaments**, which are made of strong connective tissue.

**Infer** What would happen if your skull bones had movable joints?

---



---



---



---

FIGURE 3 .....

**INTERACTIVE ART** **Movable Joints**

Movable joints allow you to move in different ways.

**Classify** Write the name of another joint of each type on the line in each box.

**Hinge Joint**  
This joint allows forward or backward motion. Your knee is a hinge joint that allows you to bend and straighten your leg.

---

**Gliding Joint**  
This joint allows one bone to slide over another. Your wrist has a gliding joint that allows it to bend and flex.

---

**Ball-and-Socket Joint**  
This joint allows the greatest range of motion. Your hip has a ball-and-socket joint that allows you to swing your leg in a circle.

---

**Pivot Joint**  
This joint allows one bone to rotate around another bone. You use this joint to turn your arm at your elbow side-to-side.

---



## What Are the Characteristics of Bones?

The word *skeleton* comes from the Greek words meaning “a dried body.” This suggests that a skeleton is dead, but bones are not dead at all. **Bones are complex living structures that grow, develop, and repair themselves. Bones are also strong and lightweight.**

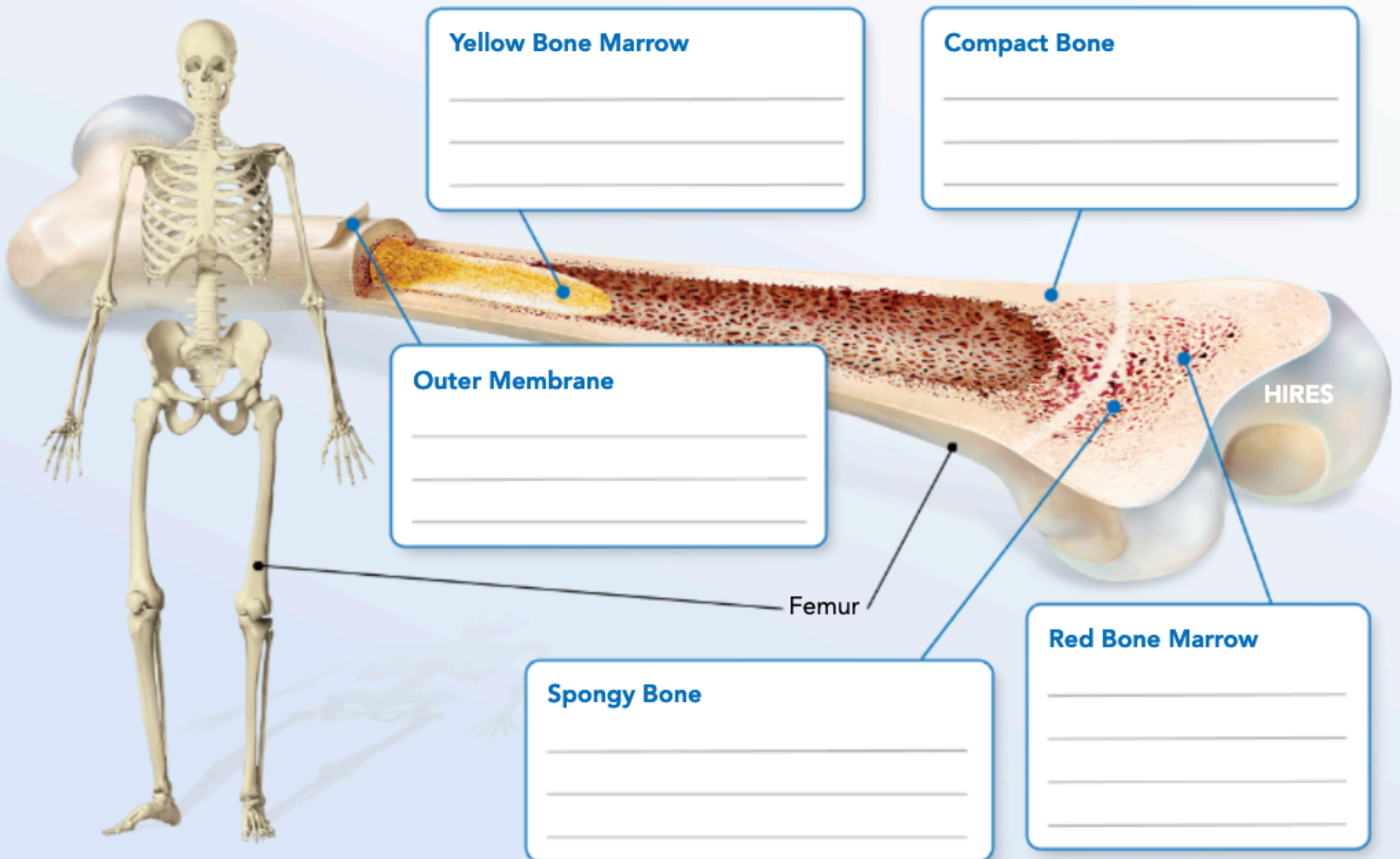
Bones are made up of bone tissue, blood vessels, and nerves. A thin, tough outer membrane covers all of a typical bone except the ends. Beneath the membrane is a thick layer of **compact bone**, which is hard and dense but not solid. Compact bone contains minerals that give bones strength. Small canals in the compact bone carry blood vessels and nerves from the bone’s surface to its living cells.

Long bones, such as the femur in **Figure 4**, have a layer of spongy bone at the ends and under the compact bone. The small spaces within **spongy bone** make it lightweight but still strong. Bone also has two types of soft connective tissue called **marrow**. Red bone marrow fills the spaces in some of your spongy bone. It produces most of your blood cells. Yellow bone marrow is found in a space in the middle of the bone. It stores fat.

FIGURE 4 .....  
**Bone Structure**

Many tissues make up the femur, the body’s longest bone.

**Relate Text and Visuals**  
Write notes to describe each part of the bone and what it does.






**Bone Strength** Bone is both strong and lightweight. Bones can absorb more force without breaking than concrete or granite rock can. Yet bones weigh much less than those materials. In fact, only about 20 percent of an average adult's body weight is bone. Bone feels as hard as a rock because it is made of tightly packed minerals—mainly phosphorus and calcium.

**Bone Growth** Because bones are alive, they form new bone tissue as you grow. Your bones are growing longer now, making you taller. Even after you are fully grown, bone tissue continues to form. For example, every time you play soccer or basketball, some of your bones absorb the force of your weight. They respond by making new bone tissue. New bone tissue also forms when a bone breaks.


**Bone Development** When you were born, most of your bones were cartilage. **Cartilage** is a strong connective tissue that is more flexible than bone. As you grew, most of that cartilage was replaced with bone. Some cartilage still protects the ends of your bones. You also have cartilage in your ears and at the tip of your nose.

 **Infer** Infants are born with soft spots in their skull made out of cartilage. What do you think happens to soft spots over time?

---



---

 **Summarize** Write a summary about the characteristics of bones.

<b>Bone Strength</b>	<hr/> <hr/> <hr/>
<b>Bone Growth</b>	<hr/> <hr/> <hr/>
<b>Bone Development</b>	<hr/> <hr/> <hr/>






**Healthy Bones** A combination of a balanced diet and regular exercise are important for healthy bones. A balanced diet includes foods that contain enough calcium and phosphorus to keep your bones strong while they are growing. You should eat dairy products; meats; whole grains; and green, leafy vegetables.

Exercise helps build and maintain strong bones. During activities such as running and dancing, your bones support the weight of your entire body. These weight-bearing activities help your bones grow stronger. However, to prevent injury, always wear appropriate safety equipment when exercising.

As you age, your bones start to lose some minerals. This mineral loss can lead to **osteoporosis** (ahs tee oh puh ROH sis), a condition in which bones become weak and break easily. You can see how osteoporosis causes the spaces in a bone to become larger, reducing its density and strength in **Figure 5**.

FIGURE 5 .....  
**Osteoporosis**

Regular exercise and a diet rich in calcium with vitamin D can help prevent osteoporosis later in life.

 **Compare and Contrast**  
The photos show two bones. Label the healthy bone and the bone with osteoporosis. Then explain your choices.

---



---




---



---



**Lab zone** Do the Quick Lab Soft Bones?

 **Assess Your Understanding**

**2a. Explain** How do eating a balanced diet and exercising regularly help your bones?

---



---



---

**b. Apply Concepts** How do you know that bone is living tissue?

---



---



---

**got it?**

I get it! Now I know that my bones are \_\_\_\_\_

---



---




---



---

I need extra help with \_\_\_\_\_

Go to **my science**  **COACH** online for help with this subject.