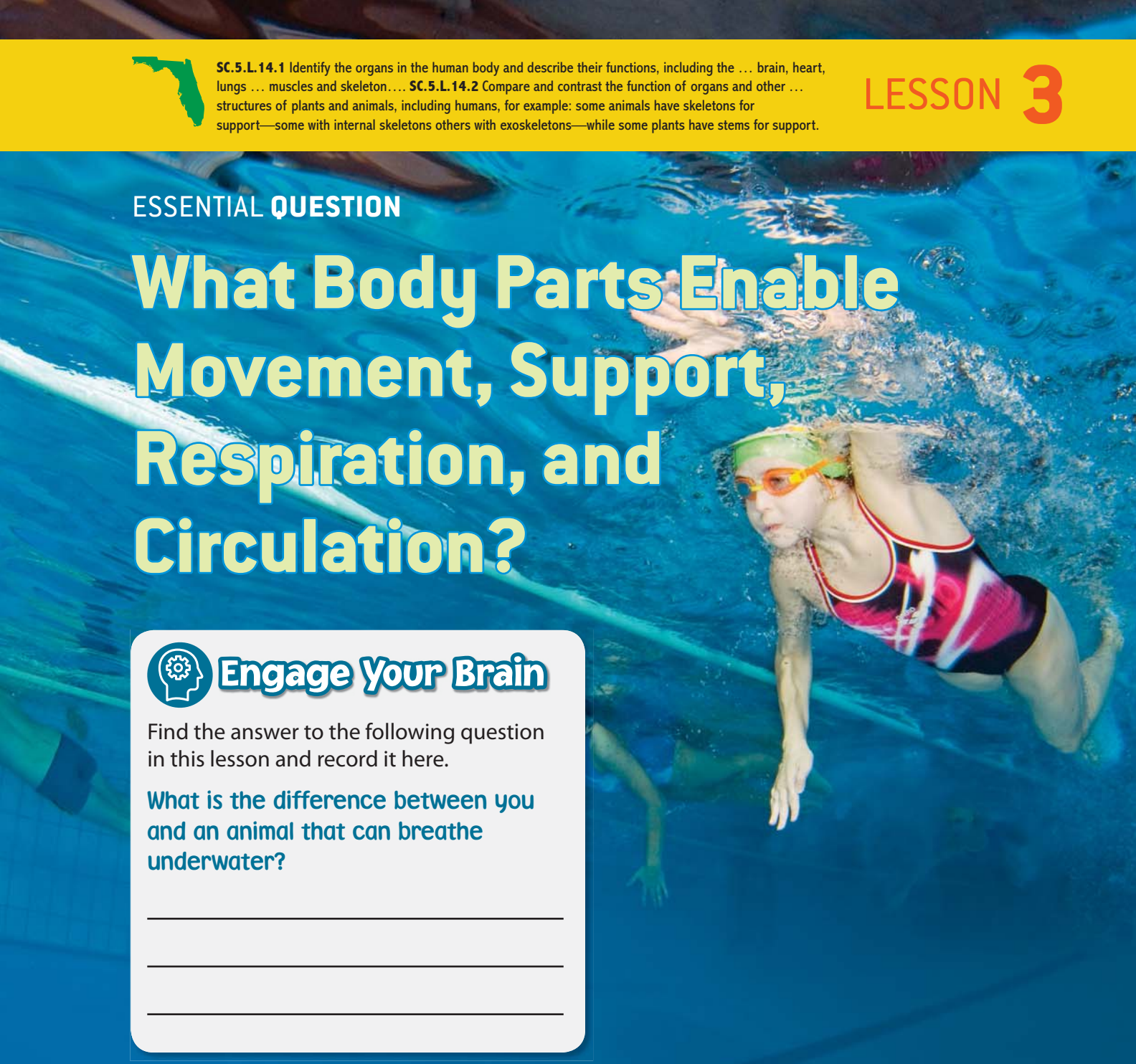
SC.5.L.14.1 Identify the organs in the human body and describe their functions, including the … brain, heart, lungs … muscles and skeleton…. **SC.5.L.14.2** Compare and contrast the function of organs and other … structures of plants and animals, including humans, for example: some animals have skeletons for support—some with internal skeletons others with exoskeletons—while some plants have stems for support.

LESSON 3

ESSENTIAL **QUESTION**

What Body Parts Enable Movement, Support, Respiration, and Circulation?



Engage Your Brain

Find the answer to the following question in this lesson and record it here.

What is the difference between you and an animal that can breathe underwater?

_____

_____

_____

ACTIVE **READING**

Lesson Vocabulary

List the terms. As you learn about each one, make notes in the Interactive Glossary.

_____ _____

_____ _____

_____

Main Ideas

The main idea of a paragraph is the most important idea. The main idea may be stated in the first sentence, or it may be stated elsewhere. Active readers look for main ideas by asking themselves, What is this section mostly about?

Strong Bones and Mighty Muscles

What would your body be like without bones and muscles? Your body would be a shapeless blob!

ACTIVE READING As you read these two pages, draw two lines under each main idea.

Organs that support and protect the body and store minerals are called **bones**. The ribs and skull are bones that protect internal organs. Bones attached to muscles help move the body. Bones have a hard outer layer that contains calcium. Inside bones is a spongy layer where blood cells are made.

The place where two or more bones meet is called a joint. Some joints, like the joints in your skull, don't allow the bones to move. Others joints, like the joint in your shoulder or knee, allow different types of movement. *Ligaments* [LIG•uh•muhntz] connect the bones of a joint.

Feel the tip of your nose. This is cartilage. Cartilage cushions the ends of bones and forms flexible parts like your ears and nose. Bones, ligaments, and cartilage form the *skeletal system*.

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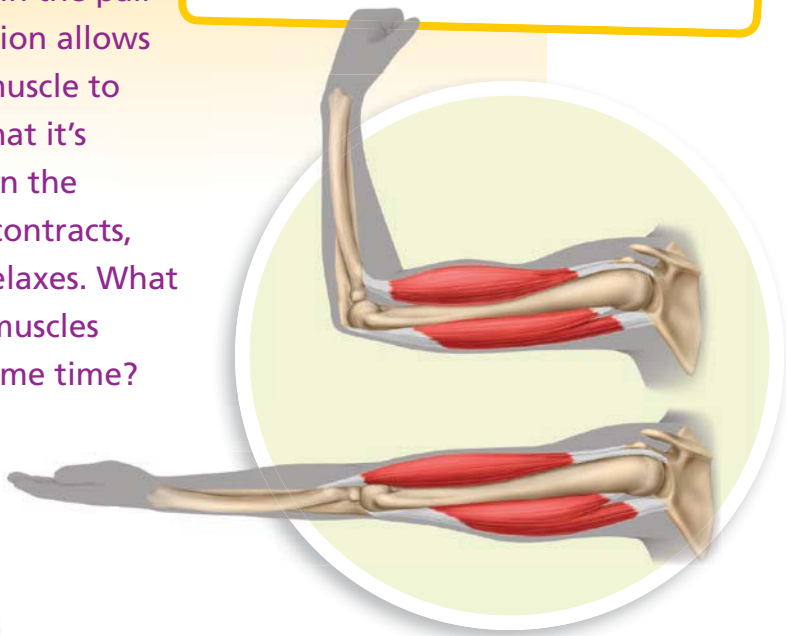
What Do Bones Do?

- support the body
- anchor muscles
- protect internal organs
- store minerals like calcium
- make blood cells

Muscles often work in pairs. When one muscle contracts, the other muscle in the pair relaxes. Cooperation allows the contracting muscle to move the bone that it's attached to. When the opposite muscle contracts, the first muscle relaxes. What happens if both muscles contract at the same time?

Let's Get Moving

Circle the muscle that bends your arm.



Muscles are organs that contract to produce movement in the body. There are three different types of muscles. The heart is made of one type of muscle. Another type makes up the walls of blood vessels and organs. Still another type of muscle pulls our bones to help us move.

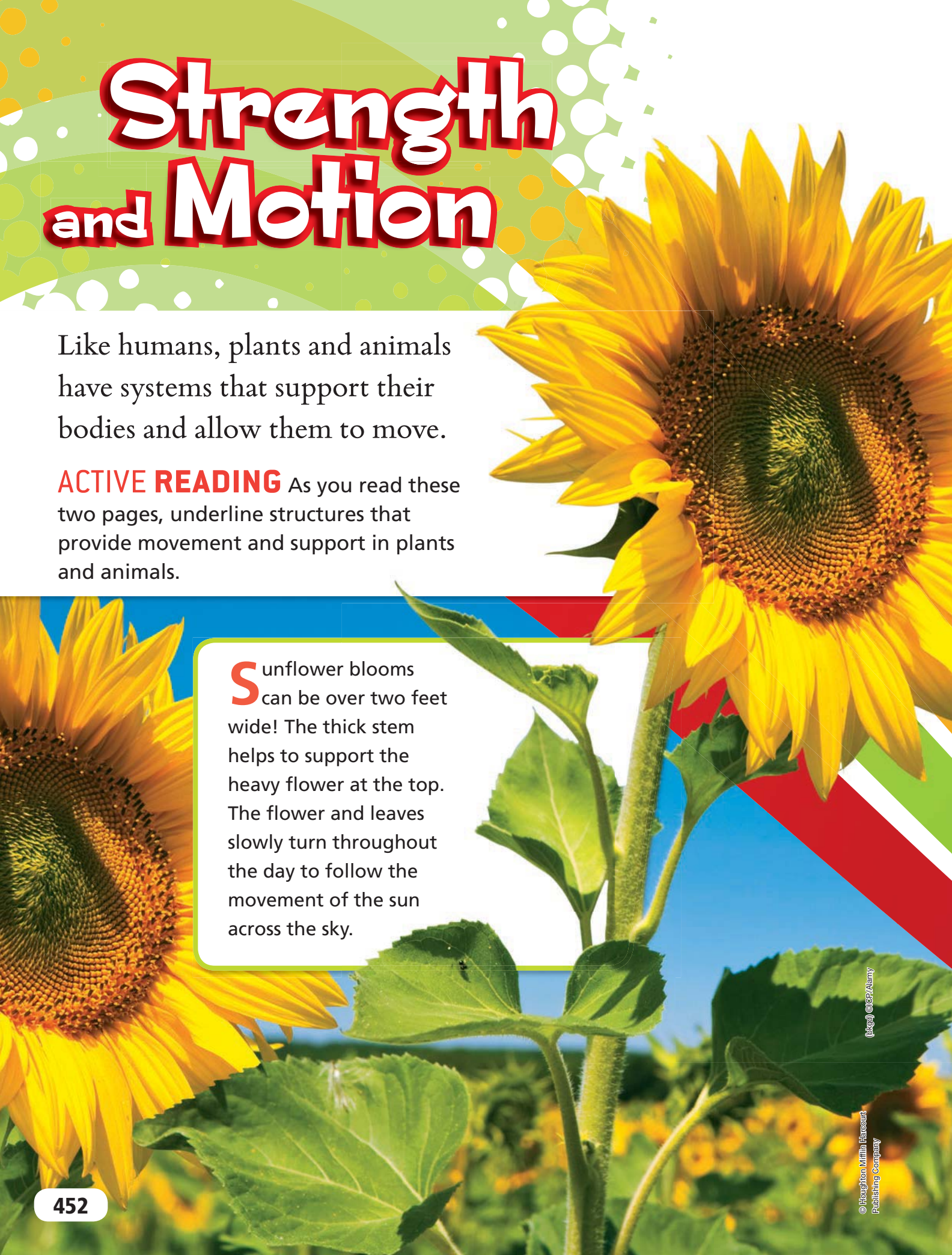
The major function of the *muscular system* is to produce movement in the body. You control some movements, like running. These movements are *voluntary.* Other movements, like the beating of your heart, happen without your having to think about them. These are *involuntary* movements.

Strength and Motion

Like humans, plants and animals have systems that support their bodies and allow them to move.

ACTIVE READING As you read these two pages, underline structures that provide movement and support in plants and animals.

Sunflower blooms can be over two feet wide! The thick stem helps to support the heavy flower at the top. The flower and leaves slowly turn throughout the day to follow the movement of the sun across the sky.



Cicadas [si•KAY•duhz] have a hard outer layer, called an **exoskeleton**. It's like having bones outside their bodies. Exoskeletons help protect them from being eaten. Their muscles are attached to their exoskeletons and move their bodies by pulling from the inside. As cicadas grow, they shed the old exoskeleton. Underneath is a new one.

A Hardened Life

How would your life be different if you had an exoskeleton?

The seal's flexible body lets it glide through water. Its flippers help it swim.

Sea stars use water in tiny tubes, called tube feet, to move. Muscles squeeze water into and out of the tubes, causing the tube feet to move. Suction cups on the ends of the feet help the sea star grip surfaces.

This sensitive plant responds to touch by closing its leaves.

Breathe In, Breathe Out

Take a deep breath. Do you feel "inspired"? You should. *Inspire* is another word for breathing in. Breathing out is called *expiring*.

ACTIVE READING As you read the text below, draw boxes around the five parts of the respiratory system that are described.

Organs in the *respiratory system* bring in oxygen that the body needs and release carbon dioxide, the body's waste gas. The main organs of the respiratory system are the **lungs**. Lungs are spongy organs that expand to fill with air.

Air enters your body through your nose or mouth. It flows through a tube in your throat called the *trachea* [TRAY•kee•uh]. The trachea branches into two smaller tubes called bronchi [BRAHNG•ky]. Where the bronchi enter the lungs, they branch into many bronchioles [BRAHNG•kee•ohlz]. At the end of each bronchiole are tiny sacs called alveoli [al•VEE•uh•ly]. Alveoli make up most of the lungs. When you inhale (breathe in), air flows into the lungs and the alveoli inflate like tiny balloons. When you exhale (breathe out) air flows back out of the alveoli and out of the lungs.

DO THE MATH

Solve Word Problems

On average, a person breathes about 20 times per minute.

There are 60 minutes in an hour. How many times does a person breathe in one hour?

_____

_____

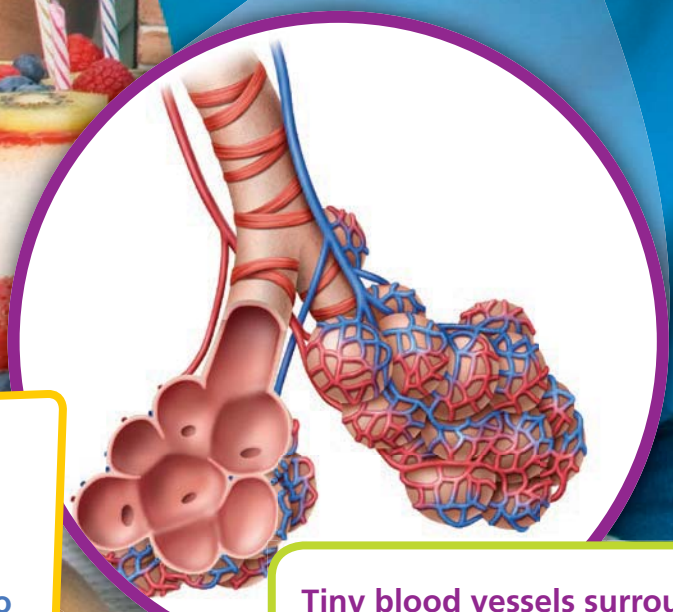
There are 24 hours in a day. How many times does a person breathe every day?

_____

If you take in about 1 liter of air with each breath, how much air passes through your lungs every day?

_____

You have two bronchi, one for each lung. These bronchi branch into smaller tubes called bronchioles.



Airflow

Draw arrows to show the path that air takes into and out of the alveoli.

Tiny blood vessels surround the alveoli. Red blood cells in the vessels absorb oxygen. At the same time, carbon dioxide is released from the blood into the alveoli.

Asthma Attack

Asthma is an illness that makes it hard for a person to breathe. During an attack, some kids say it feels like breathing through a straw.

ACTIVE **READING** As you read these two pages, draw a star next to what you consider to be the most important sentence, and be ready to explain why.

Constricted Airways

When people are having an asthma attack, their bronchi become swollen. The swelling makes their airways smaller. It is much harder to get air in and out of the lungs. People having an asthma attack may cough, wheeze, or feel like a weight is sitting on their chest. They struggle to breathe. Medication can help end an asthma attack. After the attack, a person's airways return to normal.

▶ **Fill in the sequence of events that lead to an asthma attack.**

Asthma trigger enters airway → **Airway becomes irritated** → **Bronchi become** _____

Airways become smaller → **It becomes difficult to** _____

Normal bronchi are open wide. Air can flow easily.

Constricted bronchi are smaller, making it difficult for air to pass through.

Pollen from plants can trigger an asthma attack.

Air pollution can trigger attacks.

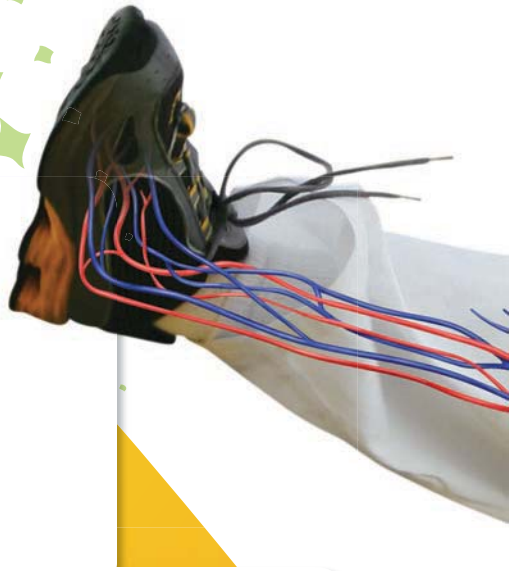
Triggers

The exact causes of asthma aren't known. Many people are born with it, but people sometimes develop asthma as they get older. Doctors do know that there are things that can cause an asthma attack. These things are called asthma triggers. Smoke, air pollution, and allergies are all possible triggers that start the process of an asthma attack.

Management

People who have asthma try to avoid things in the air that trigger attacks. However, a person can't always avoid triggers such as pollen or air pollution. A doctor can give people who suffer from asthma a device called an inhaler. An inhaler releases a mist of medicine that a person breathes in. This medicine can help open up airways during an attack. Other types of medicine help to prevent asthma attacks.

Beat It



Your heart is a powerful muscle. It never rests! The drum-like sound of your heart's contractions is called your heartbeat.

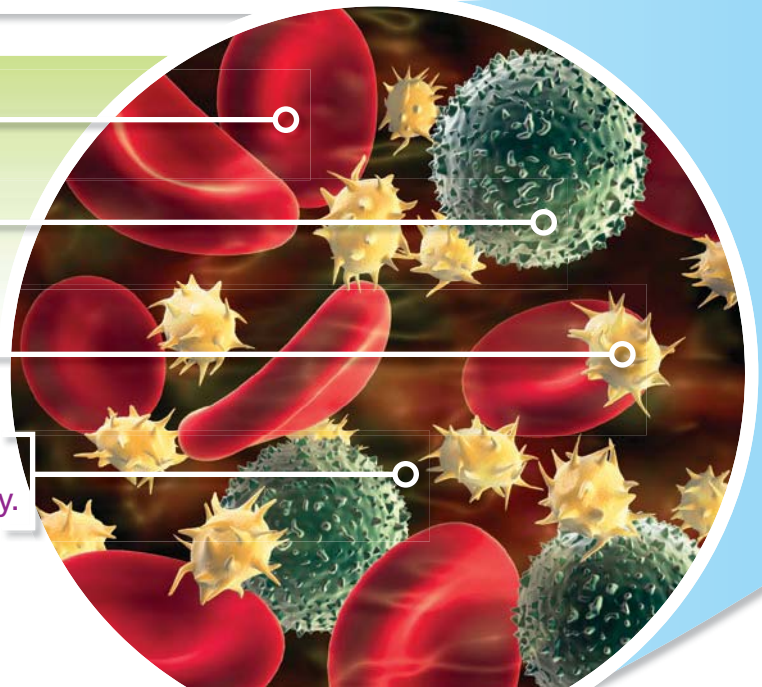
ACTIVE READING As you read this page, underline the four parts of blood and their jobs.

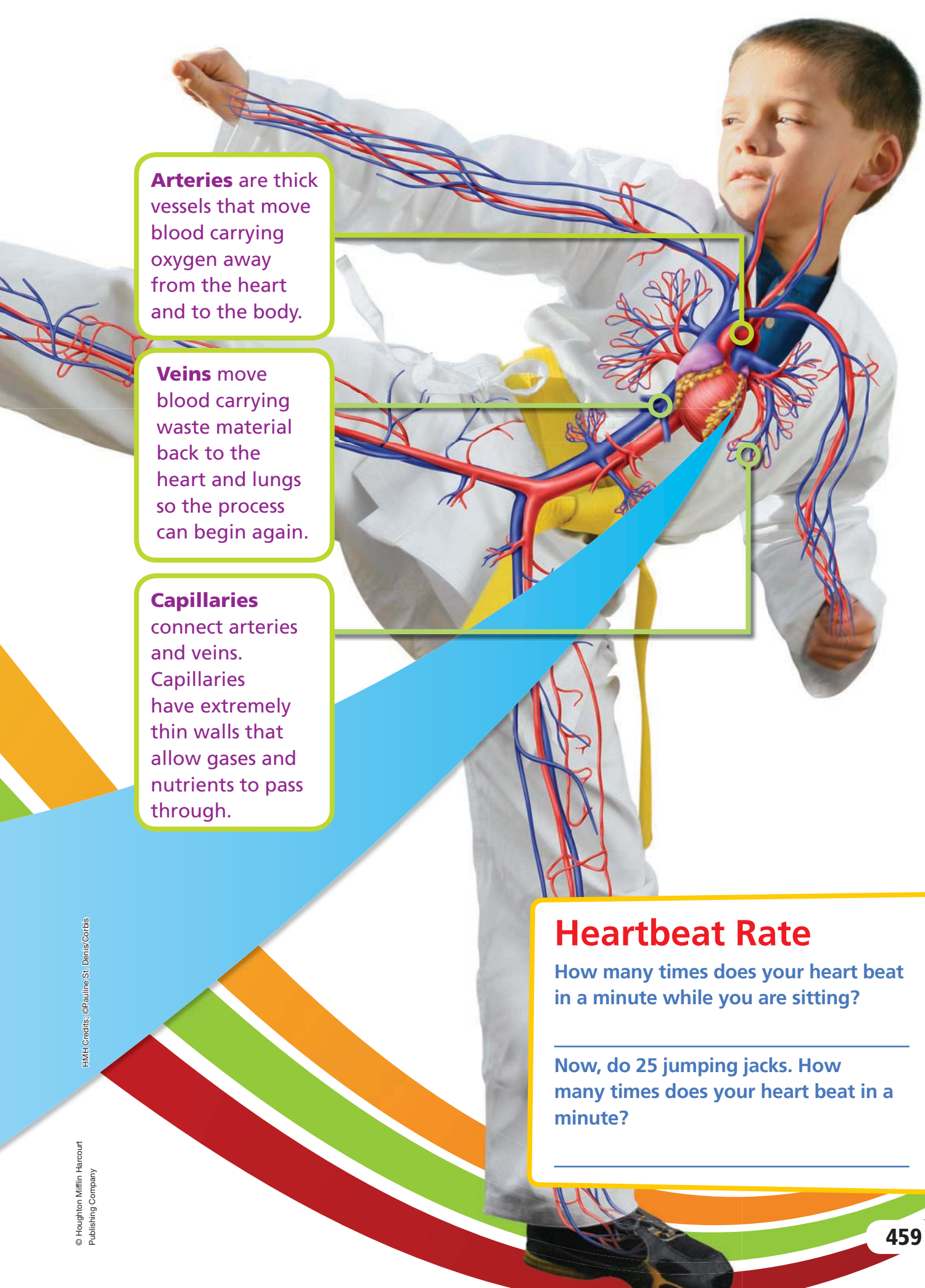
Your **heart** is a muscular organ that pumps blood throughout your body. It contracts in two phases. When the top part is relaxed, it fills with blood. Then the top contracts and the bottom relaxes. Blood is squeezed into the lower part of the heart. The lower part contracts and squeezes blood out of the heart, into vessels, and to all parts of the body.

Blood is made up of a clear liquid called plasma and small structures called blood cells. There are three main types of blood cells—red cells, white cells, and platelets.

Arteries are blood vessels that carry blood away from the heart to different parts of the body. Veins are blood vessels that bring blood back to the heart from the lungs and the body. Capillaries [KAP•uh•lair•eez] are tiny vessels with very thin walls. Oxygen and nutrients can pass through capillary walls to the body. Carbon dioxide passes from the body, through capillary walls, and into the blood to be carried back to the lungs.

The heart, vessels, and blood are all part of the *circulatory system.*





Arteries are thick vessels that move blood carrying oxygen away from the heart and to the body.

Veins move blood carrying waste material back to the heart and lungs so the process can begin again.

Capillaries connect arteries and veins. Capillaries have extremely thin walls that allow gases and nutrients to pass through.

Heartbeat Rate

How many times does your heart beat in a minute while you are sitting?

_____

Now, do 25 jumping jacks. How many times does your heart beat in a minute?

_____

Got Lungs?

Respiration and circulation may look very different in plants and animals, but these systems still have the same purposes.

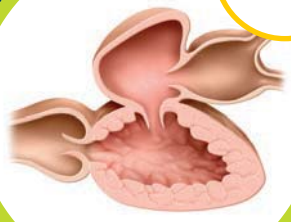
ACTIVE **READING** As you read these two pages, circle lesson vocabulary each time it is used.

Circulation or Respiration?

Write a *C* or an *R* in the circle next to each picture to tell whether circulation or respiration is being described.

Spiders have structures called book lungs that look like tiny books whose pages can fill with air. Book lungs bring oxygen to the spider's blood.

Fish cannot breathe in air. Instead, they have special structures called gills that can take oxygen from water.



Our hearts have four parts, or chambers. Fish hearts have only two chambers. Blood goes from the heart to the gills, then to the body, and then back to the heart.

Birds use huge amounts of energy to fly. They also use a lot of oxygen. To keep air flowing through their lungs constantly, birds have special sacs that store air. With these sacs, even when a bird is breathing out, air is moving into the lungs.

Plants take in air through special openings in leaves called *stomata*. The word *stoma* means "mouth," which is what these tiny structures look like.

Most plants have a transport system that moves fluid throughout a plant's body. This cross-section of a stem shows bundles of plant vessels.