

Daily Science

GRADE
5

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blood vessels, callus, cell, cell membrane, circulatory system, connective tissue, cytoplasm, dermis, digestive system, enzymes, epidermis, epithelial tissue, esophagus, hypodermis, intestines, marrow, muscle tissue, nucleus, organ, plasma, platelets, salivary glands, sebum, stem cells, tissue, villi

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Vocabulary

aquifer, condensation, conservation, contaminate, desalination, drought, evaporate, groundwater, humidity, irrigation, monsoon, oasis, porous, precipitation, prevailing winds, rain shadow, reclamation, reservoir, surface water, water cycle, watershed, water table, water vapor

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What's in This Book?

Daily Science provides daily activity pages grouped into six units, called Big Ideas, that explore a wide range of topics based on the national standards for life, earth, and physical sciences. Every Big Idea includes five weekly lessons. The first four weeks each center around an engaging question that taps into students' natural curiosity about the world to develop essential concepts and content vocabulary. The fifth week of each unit offers a hands-on activity and review pages for assessment and extra practice.

The short 10- to 15-minute activities in *Daily Science* allow you to supplement your science instruction every day while developing reading comprehension and practicing content vocabulary.

Unit Introduction

Key science concepts and national science standards covered in the unit are indicated.

Living things are made mostly of cells. Multicellular organisms have different cells that perform specialized functions.

Key Concept
Structure and function in living systems

National Standard
Specialized cells perform specialized functions in multicellular organisms. Groups of specialized cells cooperate to form a tissue, such as a muscle. Different tissues combine together to form larger, more complex functional units, called organs. Each type of cell, tissue, and organ has a distinct structure and set of functions that serve the organism as a whole.

Teacher Background

At the beginning of the fifth grade, students should understand what a cell is, although they may not understand how cells work together to perform specific functions. This Big Idea teaches students:

- the structure of cells;
- how cells work together to form tissue;
- the organization of tissue into organs; and
- the grouping of organs into systems necessary for complex functions.

For specific background information on each week's concepts, refer to the notes on pp. 8, 14, 20, and 26.

Unit Overview

WEEK 1: Why are bones hard and muscles soft?

Connection to the Big Idea: Muscles and bones are tissues of different types. Cells from both perform a specialized function. Students learn that nearly every cell in the body is either a muscle or bone, but they can perform different functions. Muscles and bones are comprised of muscle and connective tissue, respectively. They function to move and provide support for the body.

Content Vocabulary: cell, cell membrane, connective tissue, epiphysis, muscle tissue, nucleus, tissue

WEEK 4: How do people give blood without giving up a lot of it?

Connection to the Big Idea: Blood is a liquid tissue that is part of the circulatory system. Students learn that blood is made up of plasma and cells, provides the rest of the body with oxygen and nutrients, carries away carbon dioxide. Blood is constantly being regenerated in the bone marrow, but why is why people are able to donate blood?

Content Vocabulary: blood vessels, circulatory system, marrow, plasma, platelets, stem cells

WEEK 5: Unit Review

You can choose to do these activities to review concepts about cells in the body.

p. 12: Comprehension Students answer multiple-choice questions about key concepts in the unit.

p. 33: Vocabulary Students complete a crossword puzzle reviewing key vocabulary.

p. 34: Visual Literacy Students label a flowchart to reinforce their understanding of the digestive system.

p. 35: Hands-on Activity Students reconstruct the digestion process in the stomach, using a food storage bag, soda, bread, and gum. Instructions and materials needed for the activity are listed on the student page.

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6 Big Idea 1

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Background information is provided on the topic, giving you the knowledge you need to present the unit concepts confidently.

An overview of the four weekly lessons shows you each weekly question, explains what students will learn, and lists content vocabulary.

Week 5 review activities are summarized.

Weekly Lessons (Weeks 1–4)

Each week begins with a teacher page that provides additional background information specific to the weekly question.

Week 3

What happens if you swallow gum?

Most students, at one point or another, have pondered the effects of swallowing gum, and they may have incorrect assumptions about it. This week, in the process of discovering what actually happens when they swallow gum, students learn how the digestive system works.

The digestive system, like other organ systems, is a group of organs that work together to perform a function. The digestive system, digestes food, absorbs nutrients, and expels waste. The digestive system begins with the mouth, where saliva and enzymes break down food. From there, food moves to the stomach, where acids and other enzymes break it down further. The stomach then pushes the food into the small intestine, where salivary glands called villi absorb the food's nutrients and help move them into the bloodstream. Finally, the large intestine, where it is completed with other waste materials and expelled from the body.

Day One

Vocabulary: digestive system, esophagus, intestines
Materials: page 21

Introduce the vocabulary. After students have read the passage, ask them to explain what they think it means to say "gum is largely not digestible" even though it can pass through the body. It means the gum cannot be broken down! Tell students that there are other food ingredients, such as seeds and nuts, that are also not digestible. Have students complete the activity. Review the answers together.

Day Two

Vocabulary: enzymes, salivary glands
Materials: page 22

Ask students what happens after they chew gum for a long time. (It loses flavor!) Have students read the passage to understand that saliva and enzymes break down gum's sweeteners, so after a while you can't taste them. Have students complete the activities. Review the answers together.

Day Three

Vocabulary: villi
Materials: page 23

Ask students what happens to the gum once it gets to the stomach. (Hint: the answer is on the page.) After students have finished reading, compare their answers to the information in the passage. Have students complete the activities. Review the answers together.

Day Four

Vocabulary: villi
Materials: page 24

Have students read the passage. Tell them that despite their names, the small intestine is actually much longer than the large intestine. Then instruct students to complete the activities. Review the answers together.

Day Five

Vocabulary: villi
Materials: page 25

Have students complete the page independently. Then review the answers together.

Unit Question

Day 1 What happens if you swallow gum?

Name _____

1. Which organ receives food first, the esophagus or the stomach?

2. Which organ is between the stomach and large intestine?

3. What are the three functions of the digestive system?

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The student activity pages for Days 1–4 of each week use an inquiry-based model to help students answer the weekly question and understand fundamental concepts related to the Big Idea.

You may wish to have students complete the pages independently or collaboratively.

Weekly Lessons, continued

Each student page begins with a short passage.

Activities include a variety of writing, comprehension, vocabulary, critical thinking, visual literacy, and oral language practice.

Day 2 Weekly Question: What happens if you swallow gum?

Your digestive system starts with your mouth. When you chew food, you break it up into smaller pieces. As you chew, your **salivary glands** release saliva. Saliva moistens the food, and enzymes in the saliva start to break down the food's nutrients, so that your body can absorb them more easily. When you swallow, muscles move the food down your esophagus to your stomach.

However, when you chew on gum, something different happens. Saliva and enzymes break down the **starches** in the gum, but the

Day 3 Weekly Question: What happens if you swallow gum?

After food passes through your esophagus, it enters the stomach. Here, strong muscles form the stomach wall churn up the food. The stomach acids and enzymes that help break down the food. However, a wad of gum remains mostly intact. Even so, it doesn't stay in your stomach for seven years! Usually within hours, the wad of gum gets pushed into the small intestine along with the rest of the stomach contents.

Digestion is completed in the small intestine. The inside of the small intestine has finger-like bumps called **villi**. Villi help the villi and the nutrients move nutrients into the bloodstream.

Vocabulary:

- villi
- villus
- finger-like bumps in the small intestine help move nutrients into the bloodstream

Day 4 Weekly Question: What happens if you swallow gum?

After food is digested in the small intestine, anything left over that can't be absorbed as nutrients is moved into the large intestine as waste. The main job of the large intestine is to absorb water from the waste, compact the waste, and expel it from your body. This is ultimately what happens to the gum that you swallow. Since it is mostly intact, it passes harmlessly out of your body.

The digestive system works with other systems in your body. For example, water absorbed from the large intestine enters the blood stream through the walls of the digestive system. Kidneys cleanse the blood and remove dissolved waste, which is stored in the bladder until it is excreted as urine.

A. List the three main jobs of the large intestine.

- _____
- _____
- _____

B. Check the box next to the words that complete the analogy.

Intestine is to _____ system as kidney is to _____ system.

circulatory, voluntary digestive, nervous
 digestive, excretory respiratory, digestive

Day 5 Weekly Question: What happens if you swallow gum?

You _____ starts with your mouth. When you chew food, _____ produce saliva to moisten food, and _____ help break down the nutrients. The food goes down the _____ into the stomach and is broken down further. From there, food is pushed into the small _____, where finger-like _____ help absorb nutrients and deliver them to the body's bloodstream.

B. Label the parts of the digestive system, using the words in the box.

salivary glands, stomach, esophagus, large intestine, small intestine, heart, tissues, red blood cells

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Big Idea 1 • Week 3 23

Vocabulary words and definitions are provided for students.

Day 5 reviews the week's key concepts and vocabulary.

Unit Review (Week 5)

Visual Literacy: Students practice skills such as labeling diagrams, reading charts, and sequencing steps in a process.

Comprehension: Students review key concepts of the unit by answering literal and inferential comprehension questions.

Unit Review Comprehension: Use Your Brain Cells

Fill in the bubble next to the correct answer.

- What is the main function of muscle tissue? A) to help the body move B) to protect the body from disease C) to help the body digest food D) to support the body
- What are the layers of the skin? A) epithelial, theelial, dermotheelial B) blood, blood vessels, muscle C) epidermis, dermis, hypodermis D) tissue, dermis, epithelial
- Villi in the _____ help move nutrients into the blood. A) esophagus B) stomach C) large intestine D) small intestine
- Blood consists mostly of _____. A) blood cells and tissue B) plasma, red blood cells, and platelets C) water, marrow, and platelets D) oxygen, nutrients, and waste
- Two organ systems that work together are the _____. A) epithelial and connective B) digestive and excretory C) digestive and salivary systems D) circulatory and plasma systems
- What is the function of a cell's nucleus? A) to act as a barrier B) to cushion the cell C) to direct the cell's actions D) to form stem cells
- The substance that washes off your skin after a long bath is _____. A) epidermis B) callus C) epithelial tissue D) sebum

Unit Review Visual Literacy Tissues, Organs, & Systems

Complete the chart below with words from the box to show how the human body is organized and what it is made up of.

circulatory	digestive	epithelial	heart	tissues	red blood cells
-------------	-----------	------------	-------	---------	-----------------

Unit Review Vocabulary Get "Organ-ized"

Use the vocabulary words and clues below to solve the puzzle.

CROSSWORD:

- a gel-like substance in the cell
- cells grouped together form this
- where blood cells come from
- a part of the digestive system between the mouth and the stomach
- finger-like bumps in the small intestine
- chemicals in your salivary glands that break down food

DOWN:

- something that surrounds the cell
- middle layer of skin
- bottom layer of skin
- your heart is an _____
- blood parts that help blood clot
- a cell's control center
- the fundamental unit of life

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Big Idea 1 • Week 5 33

Hands-on Activity: Students participate in a hands-on learning experience.

Unit Review Hands-on Activity Can You Stomach This?

During digestion, food passes through the stomach, where it mixes with digestive juices and is churned by muscles forming the stomach wall. In this experiment, your hands provide the muscle, and soda does the job of the stomach acid.

What You Need:

- Place the soft drink, bread, and chewed gum in the food storage bag.
- Make sure most of the air is removed from the bag. Then seal the bag.
- Squeeze the bag with your hands for about a minute. Look at the contents of the bag.
- Record your observations.

What Did You Discover?

- What happened to the bread?
- What happened to the gum?
- Explain why the gum and the bread reacted the way they did.

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Big Idea 1 • Week 5 35

Vocabulary: Students review the vocabulary presented in the unit.

Big Idea 1



Living things are made mostly of cells. Multicellular organisms have different cells that perform specialized functions.

Key Concept

Structure and function in living systems

National Standard

Specialized cells perform specialized functions in multicellular organisms. Groups of specialized cells cooperate to form a tissue, such as a muscle. Different tissues are in turn grouped together to form larger functional units, called organs. Each type of cell, tissue, and organ has a distinct structure and set of functions that serve the organism as a whole.

At the beginning of the fifth grade, students should understand what a cell is, although they may not understand how cells work together to perform specific functions. This Big Idea teaches students:

- the structure of cells;
- how cells work together to form tissue;
- the organization of tissue into organs; and
- the grouping of organs into systems necessary for complex functions.

Teacher Background

All organisms are made of cells, sometimes called the “building blocks of life.” Many living things, such as bacteria, are made of a single cell. But most plants and animals are multicellular. Multicellular organisms have specialized cells, each with their own function.

When a collection of specialized cells work together to perform a specific function, they form a tissue. The human body contains four types of tissue: connective, which forms bones and blood; epithelial, which lines the body inside and out; nervous, which is found in the brain, spinal cord, and nerves; and muscle tissue, which helps the body move. Different tissues work together to form organs. Organs, in turn, are organized into systems that are responsible for the body’s complex functions of digestion, excretion, circulation, respiration, reproduction, and immunity.

For specific background information on each week's concepts, refer to the notes on pp. 8, 14, 20, and 26.

Unit Overview

WEEK 1: Why are bones hard and muscles soft?

Connection to the Big Idea: Muscles and bones are examples of tissues made from cells that perform a specialized function. Students learn that nearly every cell in the human body has similar parts, but they can perform different functions. Muscles and bones are comprised of muscle and connective tissue, respectively. They function to move and provide support for the body.

Content Vocabulary: *cell, cell membrane, connective tissue, cytoplasm, muscle tissue, nucleus, tissue*

WEEK 2: Why does skin wrinkle in the bathtub?

Connection to the Big Idea: Skin is comprised of different tissues that work together to form the body's largest organ. Students learn that skin has three layers and functions to protect the body and move substances in and out.

Content Vocabulary: *callus, dermis, epidermis, epithelial tissue, hypodermis, organ, sebum*

WEEK 3: What happens if you swallow gum?

Connection to the Big Idea: The digestive system is a system of organs that work together to digest food, provide the body with nutrients, and expel waste. Students learn that while most foods are broken down in the stomach and small intestine, gum stays mostly intact.

Content Vocabulary: *digestive system, enzymes, esophagus, intestines, salivary glands, villi*

WEEK 4: How do people give blood without running out of it?

Connection to the Big Idea: Blood is a liquid tissue that is part of the circulatory system. Students learn that blood is made up of plasma and cells, provides the rest of the body's cells with oxygen, and carries away carbon dioxide. Blood is constantly being regenerated in the bone marrow, which is why people are able to donate blood.

Content Vocabulary: *blood vessels, circulatory system, marrow, plasma, platelets, stem cells*

WEEK 5: Unit Review

You may choose to do these activities to review concepts about cells in the body.

p. 32: Comprehension Students answer multiple-choice questions about key concepts in the unit.

p. 33: Vocabulary Students complete a crossword puzzle reviewing key vocabulary.

p. 34: Visual Literacy Students label a flowchart to reinforce their understanding of cells, tissues, organs, and systems.

p. 35: Hands-on Activity Students reenact the digestion process in the stomach, using a food storage bag, soda, bread, and gum. Instructions and materials needed for the activity are listed on the student page.

Big Idea 1



Living things are made mostly of cells. Multicellular organisms have different cells that perform specialized functions.

Week 1

Why are bones hard and muscles soft?

Cells are the smallest unit of life. Nearly every cell in the human body has the same three parts: a nucleus, the surrounding cytoplasm, and a cell membrane. While cells can operate on their own, they also group together as tissue to perform specific functions. There are four types of tissues in the human body, and bones and muscles are two of these tissues. Skeletal muscle tissue, the most familiar type of muscle, is composed of long, thin muscle cells. The tissue contracts and releases in order to move the body. Connective bone tissue, on the other hand, is made of star-shaped cells surrounded by calcium and other hard minerals. Soft muscles and hard bones work together to give us strength, structure, and movement.

Day One

Vocabulary: cell, cytoplasm, cell membrane, nucleus

Materials: page 9

Introduce the vocabulary by reading each definition and having students look at the diagram in activity A to figure out what part of the cell is being referred to. Then have students read the passage and complete the activities. Review the answers together.

Day Two

Vocabulary: connective tissue, muscle tissue, tissue

Materials: page 10

Introduce the vocabulary. Remind students that cells can function on their own, but they can accomplish more difficult tasks by working together. Walk students through the diagram, pointing out where the muscle tissue and connective tissue are located on the body. Have students complete the activity. Review the answers together.

Day Three

Materials: page 11; rubber band

Demonstrate the properties of muscle by showing students the flexible quality of a rubber band. Tell them that muscle, unlike bone, can be stretched, and that if you pull too hard on a muscle, it can snap just like a rubber band does. After students have finished reading the passage, have them complete the activities. For activity B, you may first want to confirm students' understanding of *voluntary* and *involuntary*.

Day Four

Materials: page 12

Remind students that bone tissue is an example of connective tissue. Inform them that connective tissue not only forms bones, ligaments, tendons, and cartilage, but also blood. Have the students read the passage and complete the activities. Review the answers together.

Day Five

Materials: page 13

Have students complete the page independently. Then review the answers together.

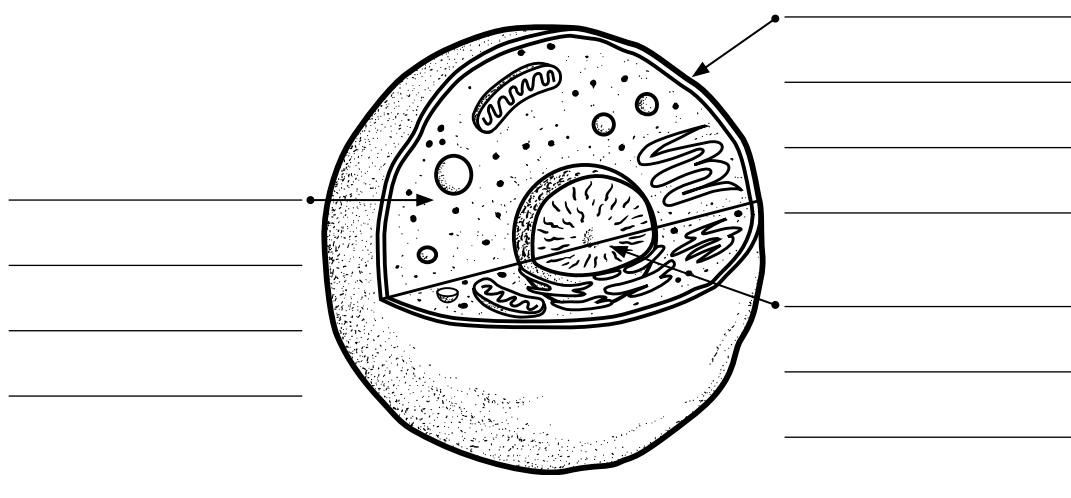
**Day
1****Weekly Question****Why are bones hard
and muscles soft?****WEEK 1**

All organisms are made up of **cells**. A cell is the smallest unit of living matter. Cells grow, reproduce, use energy, and produce waste. Nearly all the cells in your body have the same three parts. The first is the **cell membrane**, which surrounds the cell and acts as a barrier between the cell and the outside world. Inside the cell, a central **nucleus** controls the cell's activities. Between the membrane and the nucleus is the **cytoplasm**, a jelly-like substance that contains the materials and structures necessary for cells to do their job.

Although the cells in your body have similar parts, many of the cells do specific jobs. In order to do these jobs well, the cells look and act different from each other. The cells that make up your muscles are shaped differently and behave differently from those that make up your bones.

A. Use the vocabulary words to label the parts of the cell.

Briefly describe what each part does.

**B. What do you think the function of muscle cells is? What do you think the function of bone cells is?****Vocabulary****cell**

sel

the basic unit of structure and function in living organisms

cytoplasm

SY-toh-PLAZ-um
the jelly-like substance inside a cell

cell membrane

MEM-brain
the thin sack that surrounds a cell

nucleus

NEW-klee-us
the part of the cell that directs all of its activities

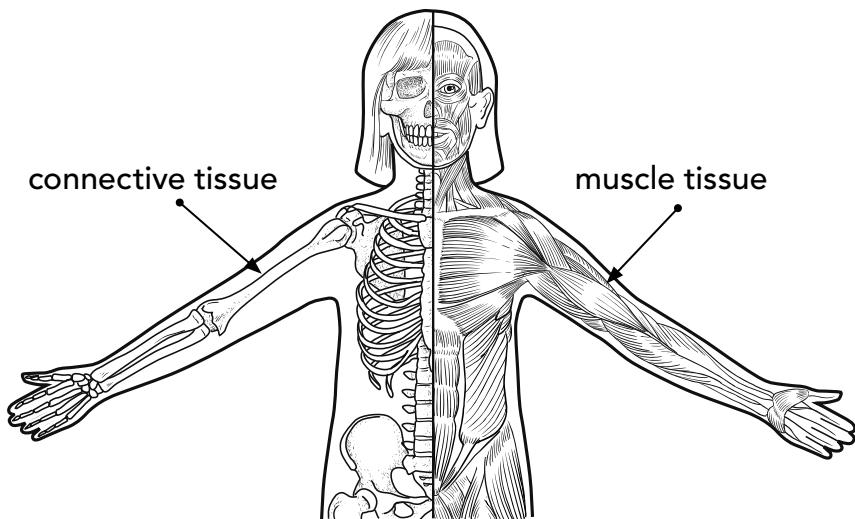
Big Idea 1

WEEK 1

Day 2

Weekly Question**Why are bones hard and muscles soft?**

Human beings are multicellular (MUL-tee-SEL-yoo-ler) organisms made of trillions of cells. Specialized cells in multicellular organisms, such as bone or muscle cells, group together to carry out particular functions, such as breathing, digesting, and moving. When similar cells work together, they form a **tissue**. The human body contains four types of tissue. Muscle cells form **muscle tissue**, which is responsible for movement. Bone cells make up part of the body's **connective tissue**, which also includes cartilage, tendons, and ligaments that help connect muscles and bones.

**Vocabulary****tissue**

TIH-shoo

a group of cells that work together to perform a specific function

connective tissue

kuh-NEK-tiv TIH-shoo
groups of cells that provide structure and support

muscle tissue

MUSS-ul TIH-shoo
groups of cells that can contract and expand to produce movement

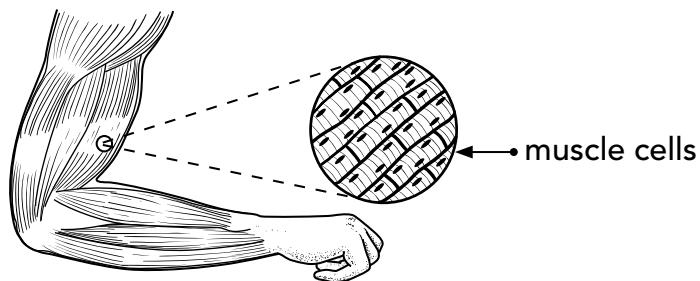
What kind of tissue do you think each body part is mostly made of?

1. your kneecaps _____
2. the cartilage in your nose _____
3. your heart _____
4. your shinbone _____
5. your tongue _____
6. the biceps in your arms _____

**Day
3****Weekly Question** —**Why are bones hard
and muscles soft?**

There are three types of muscle tissue that make up the muscles in your body. One type forms the muscles in your organs. Another type forms your heart muscle. The third type forms the muscles that attach to your skeleton. This skeletal muscle tissue is made up of long, thin cells that look like threads. Unlike most other cells, skeletal muscle cells have more than one nucleus. Muscle cells bundle together to form long, rope-like cords of tissue.

Every time you move, muscle tissue contracts and relaxes. When you “make a muscle” in your arm by flexing, you are actually contracting the muscle tissue, making it shorter and thicker. When you stop flexing, the muscle tissue releases, becoming longer and thinner.



A. Rewrite each sentence, changing a word or phrase to make the statement true.

1. The muscle tissue in your heart is made up of long, thin cells.
-

2. Skeletal muscle cells have a nucleus and many cell membranes.
-

3. When you flex your arm, the muscle tissue becomes longer and thinner.
-

B. Our bodies have some muscles that we can move voluntarily and some that move involuntarily (without us thinking about it). Name an example of each.

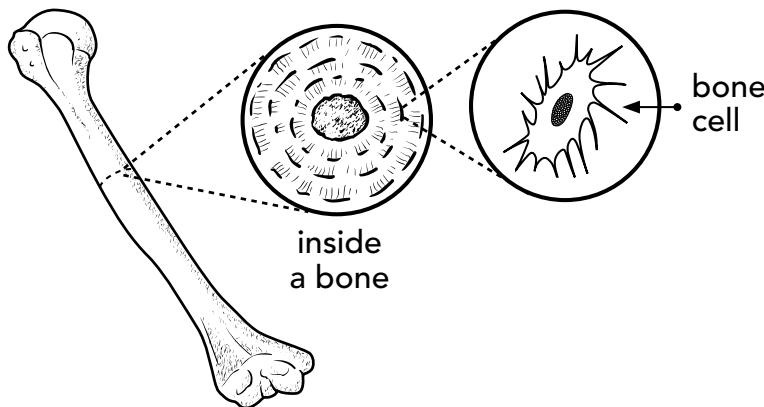
Voluntary: _____

Involuntary: _____

**Day
4****Weekly Question****Why are bones hard and muscles soft?**

Under a microscope, bone cells look very different from muscle cells. Bone cells are star-shaped and contain a nucleus and a thin ring of cytoplasm. Bone tissue is made up of layers of bone cells surrounded by calcium and other minerals. These minerals are what make our bones hard. Bones give our bodies shape and allow us to stand upright.

Hard bones and soft muscles work together to give us strength, form, and movement. Bones cannot move by themselves. They need muscles that contract and release to pull them into motion. But muscles can't contract and release without being attached to something hard and rigid, like bones. In order for our bodies to function, we need both bones and muscles.



- A.** Describe two ways that bone cells and muscle cells are alike and two ways they are different.

Alike: _____

Different: _____

- B.** Why do you think nutrition experts recommend that young people eat foods high in calcium?
- _____
- _____

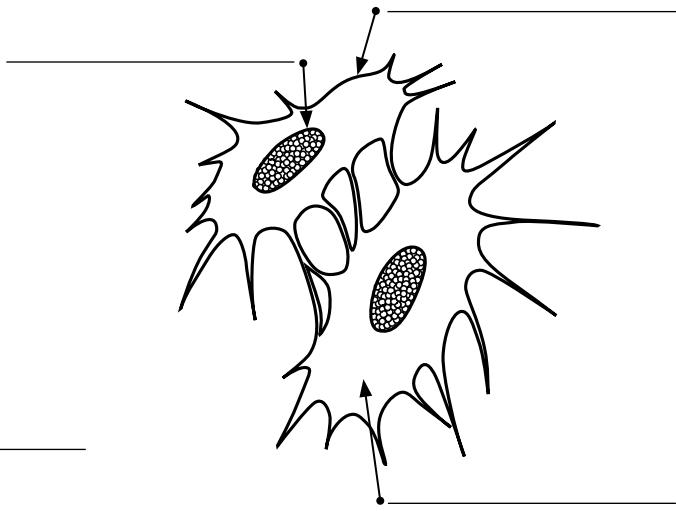
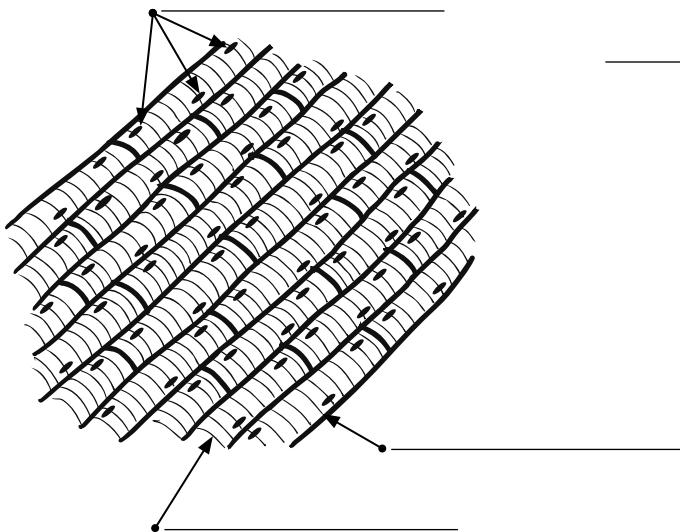
**Day
5****Weekly Question** —**Why are bones hard
and muscles soft?****WEEK 1**

- A. Use the words in the box to complete the paragraph.

membrane nucleus muscle tissue cell
 cytoplasm tissue connective tissue

The smallest unit of life is a _____. It contains a _____ that directs all of the cell's activities. It also has a _____ that acts as a barrier between the cell and the outside world. Inside the cell, there is a jelly-like substance called _____. Cells that group together to carry out a specific function are called _____. _____ supports the body. _____ helps us move.

- B. Label the *nucleus* (or *nuclei*), *cytoplasm*, and *cell membrane* of the muscle cells and bone cells.



Big Idea 1



Living things are made mostly of cells. Multicellular organisms have different cells that perform specialized functions.

Week 2

Why does skin wrinkle in the bathtub?

This week students discover why skin wrinkles by looking at the structure and function of the tissues that make up the layers of the skin. They learn that the skin is the largest organ in the human body. It is composed of two tissues: connective and epithelial tissue. These tissues work together to protect the body, regulate temperature, and move materials through the skin.

The tissues of skin are contained in three layers: the hypodermis, dermis, and epidermis. The epidermis is the layer that swells when soaked in water. Normally, skin is covered by sebum, an oily substance that acts like waterproofing. But after 20 minutes in water, the sebum is washed away and the skin absorbs the water, causing it to swell and wrinkle.

Day One

Vocabulary:
epithelial tissue, organ

Materials: page 15

Introduce the vocabulary and review the term *connective tissue* from Week 1 (tissue that supplies structure and support). Remind students that tissues are cells that work together to perform specialized jobs. Then tell them that, in much the same way, organs are tissues that work together. After students have finished reading the passage, have them complete the activities. Review the answers together.

Day Two

Vocabulary:
dermis, epidermis,
hypodermis

Materials: page 16

Introduce the vocabulary. Invite students to guess what the word root *derma* means. (skin) Then explain that *epi-* is a prefix that means "on top of," and *hypo-* means "below." Ask students if they can name the kind of doctor that specializes in skin care. (dermatologist) After students have finished reading the passage, have them complete the activities. Review the answers together.

Day Three

Vocabulary:
callus, sebum

Materials: page 17

Start the day by asking students if they know what a callus is and how they would get one. (a patch of tough skin that develops from rubbing against something constantly) After students have read the passage, have them complete the activities. For the oral activity, pair students together or discuss it as a group.

Day Four

Materials: page 18

After students have read the passage, ask if they can guess why their skin returns to normal several minutes after getting out of the bath. (The water absorbed by the callus dries out, and the epidermis shrinks.) Have them complete the activities and review the answers together.

Day Five

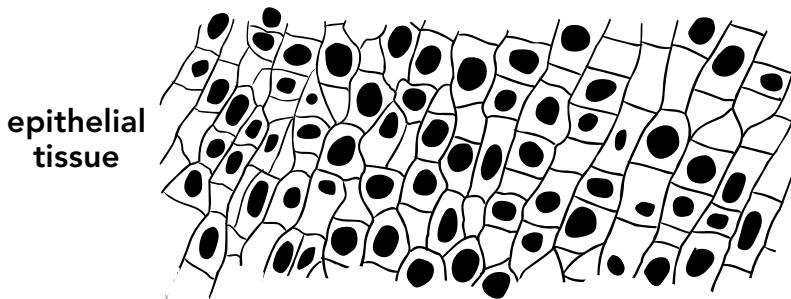
Materials: page 19

Have students complete the page independently. Then review the answers together.

**Day
1****Weekly Question****Why does skin wrinkle
in the bathtub?**

You may not think of your skin as an **organ**, but it is. In fact, it is the largest organ of your body. As an organ, your skin keeps your body from drying out, helps to keep your temperature constant, and acts as a barrier to disease.

Your skin is made up of two types of tissue: **epithelial tissue** and connective tissue. When you look at your skin, you are seeing epithelial tissue. Epithelial tissue protects your body from the outside world. It does the work of moving materials in and out of the body. It also secretes sweat that keeps us cool.



A. Name the two types of tissue that form your skin.

1. _____ 2. _____

B. What are the main jobs of epithelial tissue?

C. Check the box next to the phrase that completes the analogy.

Tissue is to organ as _____.

skin is to body

cell is to tissue

epithelial is to connective

barrier is to purpose

**WEEK 2****Vocabulary****epithelial tissue**

EP-ih-THEEL-ee-ul
TIH-shoo

tissue that covers
the inside and
outside surfaces
of the body

organ

OR-gun
a group of tissues
that perform
specific functions

Big Idea 1

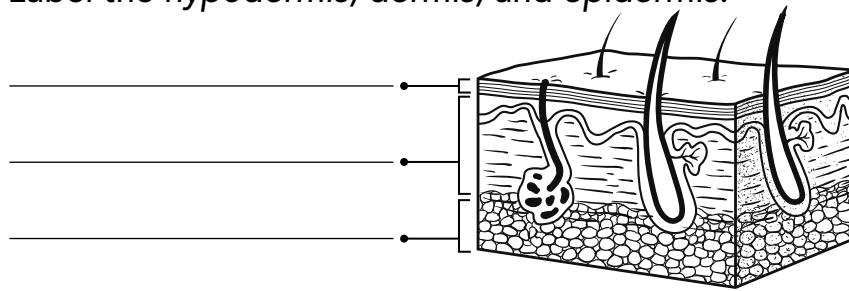
WEEK 2

Day 2**Weekly Question****Why does skin wrinkle in the bathtub?**

The tissues of the skin are contained in three layers. The bottom layer, called the **hypodermis**, is a layer of fat and connective tissue that helps connect the skin to muscles and bones.

The middle layer, the **dermis**, is composed mostly of connective tissue and includes hair roots, nerve endings, sweat glands, and blood vessels. The dermis cushions the body, regulates body heat, and registers sensations of pain, temperature, and pressure.

The top layer of your skin is the **epidermis**, which is made of epithelial tissue. The epidermis protects the other layers of your skin and prevents your body from losing water.

A. Label the hypodermis, dermis, and epidermis.**B. Write which layer of skin—the *hypodermis*, *dermis*, or *epidermis*—is described in each statement below.**

1. responsible for sense of touch _____
2. protects skin from damage _____
3. connects skin to muscle and bone _____

C. The tissues in your skin are also responsible for “goose bumps,” the raised hairs you get when you are chilled. As your skin registers the sensation of cold, tiny muscles attached to your hair roots make the hairs stand up. In which layer of skin do you think this happens? Explain your answer.**Vocabulary****dermis**

DER-miss

middle layer of the skin

epidermis

EP-ih-DER-miss

top layer of the skin

hypodermis

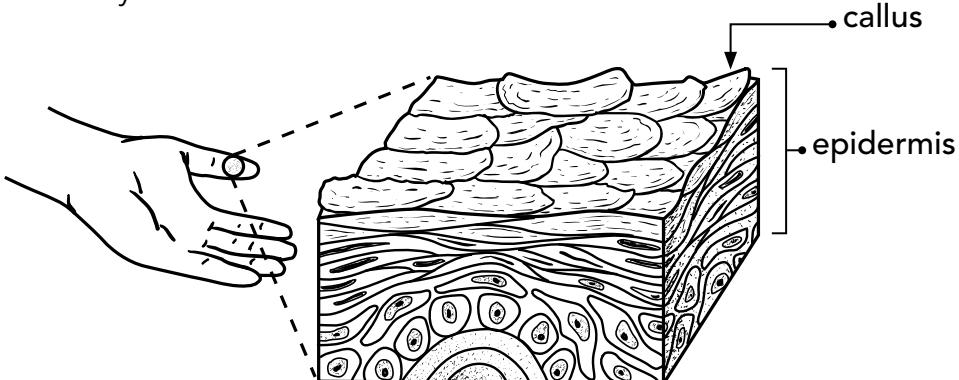
HI-poh-DER-miss

bottom layer of the skin

**Day
3****Weekly Question****Why does skin wrinkle in the bathtub?**

As a way of protecting your body, your epidermis contains flattened skin cells called **callus** cells that stack on top of each other like tiles. These cells are dry on the inside and have thick walls. Callus cells are tough and protect skin from damage. When there is a lot of friction on your skin, callus cells build up. This is what we call a callus.

An oily substance called **sebum** also protects your skin. Sebum acts like a natural waterproof seal, keeping your skin from absorbing too much water. Sebum also helps keep water inside skin cells so they don't dry out.



Write whether **callus** or **sebum** would protect your skin more in the situations below.

1. using a shovel to dig _____
2. swimming in a lake _____
3. staying outside on a hot day _____
4. handling a hot pan _____

**Talk**

Acne develops when excess sebum, dead skin cells, and bacteria that normally live on the skin plug up hair follicles. How does washing the skin help control acne?

**WEEK 2****Vocabulary****callus**

KAL-us

dry, tough skin cells

sebum

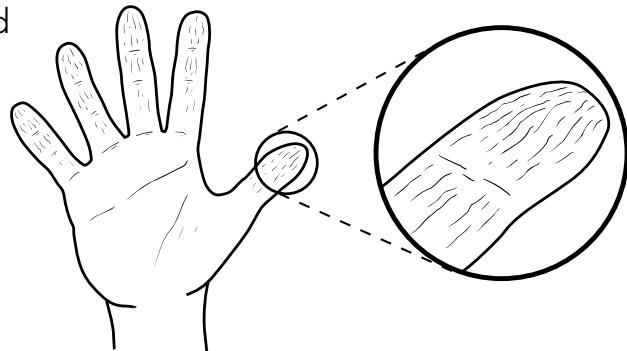
SEE-bum

an oily substance that covers the epidermis

Day 4**Weekly Question****Why does skin wrinkle in the bathtub?**

Although sebum normally protects your skin from absorbing too much water, when you soak your skin for more than 20 minutes, the sebum can be washed off. When that happens, the callus cells in the epidermis absorb water, and the cells puff up and become soft. Callus cells are thickest on hands and feet, so they swell the most.

So why does skin wrinkle, instead of just puff up, when it expands? The epidermis is firmly attached in some places to the dermis, which doesn't expand when soaked in water. These points of attachment between the layers of skin form the indentations of a wrinkle.

**A. Answer the questions.**

1. Based on the picture above, which part of the hand has the most callus cells?

2. Why doesn't your skin wrinkle when you go outside in the rain?

3. Why doesn't the skin on your stomach wrinkle after a swim?

- B.** Ducks' feathers are waterproof, due in part to a gland near their tail. When ducks clean themselves, they spread a substance from this gland over their feathers. How is this substance like sebum? How is it different? Explain your answer.

**Day
5****Weekly Question****Why does skin wrinkle
in the bathtub?**

- A. Use the words in the box to complete the paragraph.

sebum organ epithelial hypodermis
 dermis callus epidermis

WEEK 2

Your skin is the body's largest _____. It is made up of connective and _____ tissue. The bottom layer of skin, or the _____, connects your skin to your muscles and bones. The middle layer, or the _____, regulates body temperature and senses pain. The _____ protects the other layers of skin from damage. This layer is helped by oily _____ and tough _____ cells.

B. Write true or false.

1. Callus cells only protect your skin from water. _____
2. Organs are made up of tissues. _____
3. The skin is the largest organ in the body. _____

C. There are three levels of burns you can get on your skin. First degree burns are the least serious, and third degree burns are the most serious. In which layers of the skin do you think first, second, and third degree burns happen? Explain your answer.

Big Idea 1



Living things are made mostly of cells. Multicellular organisms have different cells that perform specialized functions.

Week 3

What happens if you swallow gum?

Most students, at one point or another, have pondered the effects of swallowing their gum, and they may have incorrect assumptions about it. This week, in the process of discovering what actually happens when they swallow gum, students learn how the digestive system works.

The digestive system, like other organ systems, is a group of organs that work together to perform a function—specifically, digesting food, absorbing nutrients, and expelling waste. The digestive system begins with the mouth, where saliva and enzymes break down food. From there, food moves to the stomach, where acids and other enzymes break it down even further. The stomach contents get pushed from the stomach into the small intestine, where small finger-like bumps called *villi* absorb the food's nutrients and help move them into the bloodstream. Finally, the food makes it to the large intestine, where it is compacted with other waste materials and expelled from the body.

Day One

Vocabulary: digestive system, esophagus, intestines

Materials: page 21

Introduce the vocabulary. After students have read the passage, ask them to explain what they think it means to say “gum is largely not digestible” even though it can pass through the body. (It means the gum cannot be broken down.) Tell students that there are other food ingredients, such as seeds and fiber, that are also mostly indigestible. Have students complete the activity. Review the answers together.

Day Two

Vocabulary: enzymes, salivary glands

Materials: page 22

Ask students what happens after they chew gum for a long time. (It loses flavor.) Have students read the passage to understand that saliva and enzymes break down gum’s sweeteners, so after a while you can’t taste them. Have students complete the activities. Review the answers together.

Day Three

Vocabulary: villi

Materials: page 23

Ask students to predict what they think happens to the gum once it gets to the stomach. Write their answers on the board. After students have finished reading, compare their answers to the information in the passage. Have students complete the activities. Review the answers together.

Day Four

Materials: page 24

Have students read the passage. Tell them that despite their names, the small intestine is actually much longer than the large intestine. Then instruct students to complete the activities. Review the answers together.

Day Five

Materials: page 25

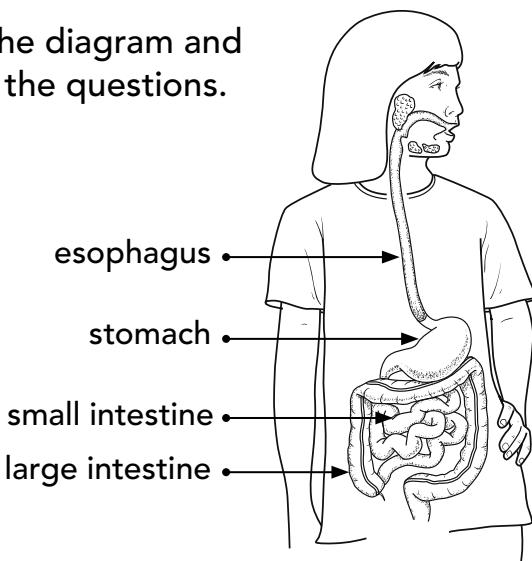
Have students complete the page independently. Then review the answers together.

**Day
1****Weekly Question** _____**What happens if you swallow gum?**

Have you ever been warned not to swallow gum? Maybe you've been told that gum sticks to your intestines, or that it takes seven years to digest! These stories about gum are so widespread that they have been discussed in actual science articles. But are they true? No, not really. Gum is made from a chewy, rubber-like material that is largely not digestible. However, gum is able to pass through the body because of the body's **digestive system**.

The digestive system is an example of an organ system in which different organs of the body cooperate to perform a function. It is composed of organs such as the **esophagus**, stomach, and small and large **intestines**. These organs work together to break down food, absorb nutrients from food, and expel waste.

Use information from the diagram and the passage to answer the questions.



1. Which organ receives food first, the esophagus or the stomach? _____
2. Which organ is between the stomach and large intestine? _____
3. What are the three functions of the digestive system? _____
- _____
- _____

**WEEK 3****Vocabulary****digestive system**

dy-JESS-tiv

SISS-tum

a group of organs that work together in the body to digest food

esophagus

ih-SAH-fuh-gus

a tube that connects the mouth and the stomach

intestines

in-TESS-tinz

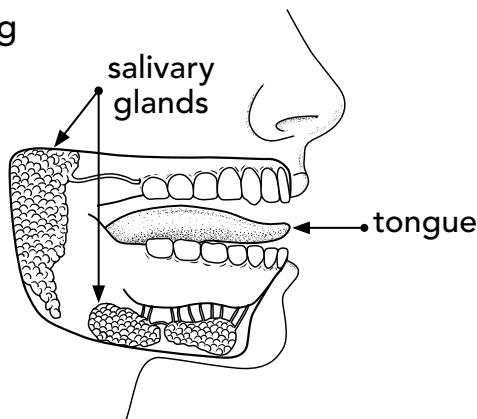
a set of tube-like organs that form part of the digestive track

**Day
2****Weekly Question** —**What happens if you swallow gum?**

Your digestive system starts with your mouth. When you chew food, you break it up into smaller pieces. As you chew, your **salivary glands** secrete saliva. Saliva moistens the food, and **enzymes** in the saliva start to break down the food's nutrients so that your body can absorb them more easily. When you swallow, muscles move the food down your esophagus to your stomach.

However, when you chew on gum, something different happens. Saliva and enzymes break down the sweeteners in the gum, but the rest of the gum stays in one wad. If you happen to swallow it, it will move to the stomach in one piece.

- A.** Write a caption for the diagram, explaining the role that chewing and saliva play in digestion.
-
-
-



- B.** Answer the questions.

1. How are enzymes similar to chewing, and how are they different?
-
-

2. What are two possible problems with swallowing food before you chew it properly?

a. _____

b. _____

Vocabulary**enzymes**

EN-zymz

chemicals that aid reactions in the body

salivary glands

SAL-ih-VAIR-ee

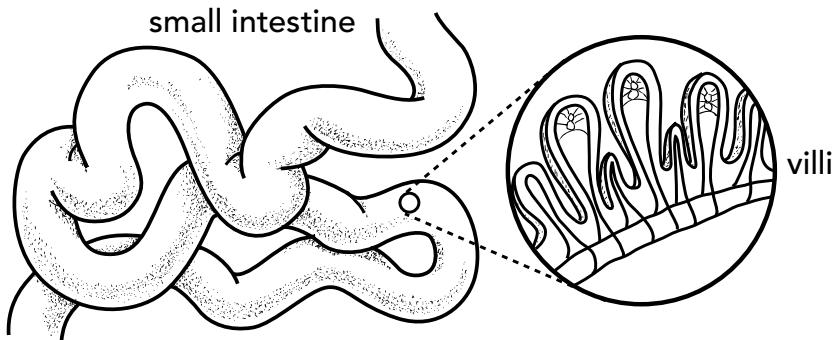
glandz

glands that secrete saliva enzymes

**Day
3****Weekly Question** —**What happens if you swallow gum?**

After food passes through your esophagus, it enters the stomach. Here, strong muscles that form the stomach wall churn up the food. The stomach secretes acids and enzymes that help further break down the food. However, a wad of gum remains mostly intact. Even so, it doesn't stay in your stomach for seven years! Usually within hours, the wad of gum gets pushed into the small intestine along with the rest of the stomach contents.

Digestion is completed in the small intestine. The inside of the small intestine is lined with small, finger-like bumps called **villi**. Nutrients from the digested food are absorbed through the villi and passed into the bloodstream. The blood then carries the nutrients to cells throughout the body.

**A. Complete the sentences below, using words from the passage.**

1. Enzymes and _____ break down food in the stomach.
2. Nutrients enter the bloodstream with the help of _____.
3. Digestion is completed in the _____.

B. Sometimes when you are ill or eat something spoiled, your brain sends a signal to your stomach to force its contents out of your body. What works in your stomach to make this happen?

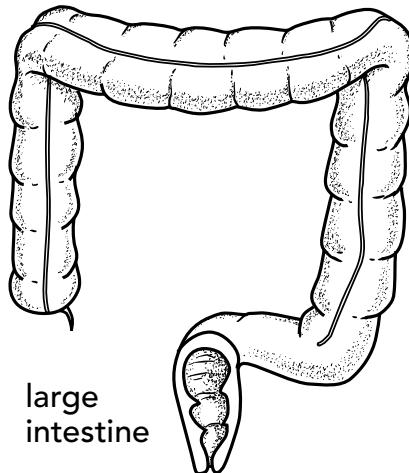
**WEEK 3****Vocabulary****villi**

VIL-eye
finger-like bumps in the small intestine that help move nutrients into the bloodstream

**Day
4****Weekly Question** —————**What happens if you swallow gum?**

After food is digested in the small intestine, anything left over that can't be absorbed as nutrients is moved into the large intestine as waste. The main job of the large intestine is to absorb water from the waste, compact the waste, and expel it from your body. This is ultimately what happens to the gum that you swallow. Since it is not digestible, it passes harmlessly out of your body.

The digestive system works with other systems in your body. For example, water absorbed from the large intestine enters the blood and passes through the organs of the excretory (EKS-krih-TOR-ee) system. Kidneys cleanse the blood and remove dissolved waste, which is stored in the bladder until it is excreted as urine.

**A. List the three main jobs of the large intestine.**

1. _____
2. _____
3. _____

B. Check the box next to the words that complete the analogy.

Intestine is to _____ **system** as **kidney** is to _____ **system**.

- | | |
|--|--|
| <input type="checkbox"/> circulatory, voluntary | <input type="checkbox"/> digestive, nervous |
| <input type="checkbox"/> digestive, excretory | <input type="checkbox"/> respiratory, digestive |

Name _____

**Day
5**

Weekly Question —

What happens if you swallow gum?

Daily Science

**Big
Idea 1**

WEEK 3

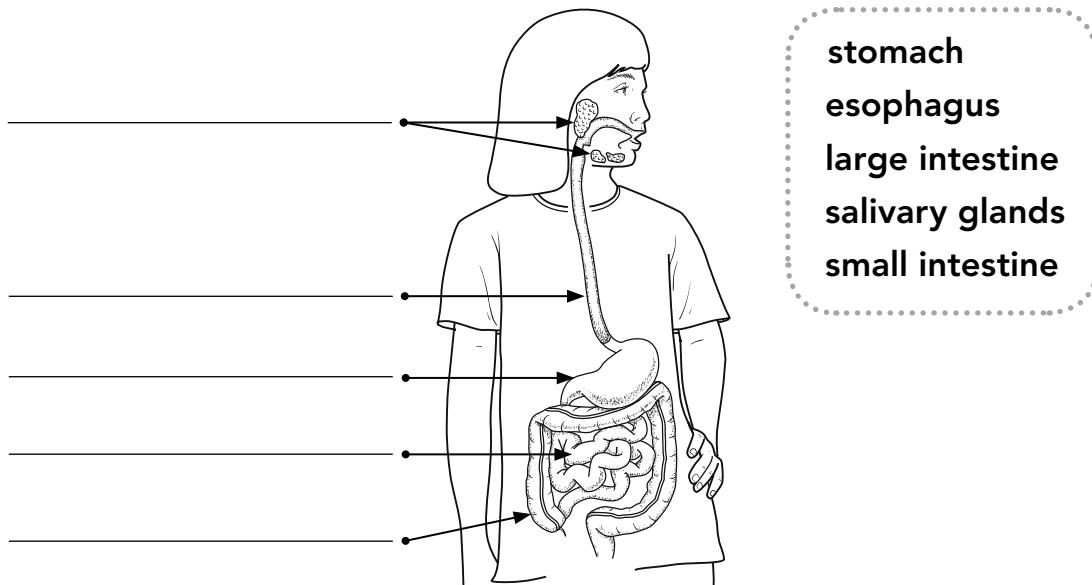
A. Use the words in the box to complete the paragraph.

**esophagus digestive system enzymes
intestine salivary glands villi**

Your _____ starts with your mouth.

When you chew food, _____ produce saliva to moisten food, and _____ help break down the nutrients. The food goes down the _____ into the stomach and is broken down further. From there, food is pushed into the small _____, where finger-like _____ help absorb nutrients and deliver them to the body's bloodstream.

B. Label the parts of the digestive system, using the words in the box.



Big Idea 1



Living things are made mostly of cells. Multicellular organisms have different cells that perform specialized functions.

Week 4

How do people give blood without running out of it?

This week students learn about the body's blood supply by first examining blood's function as part of the circulatory system. The circulatory system is made up of organs such as the heart and blood vessels, which include the arteries, veins, and capillaries. The heart pumps blood to the body, and blood vessels bring nutrients and oxygen to all of the body's cells. Blood is made up of plasma and cells. Liquid plasma contains dissolved nutrients and waste. Red blood cells deliver oxygen and remove carbon dioxide. White blood cells fight infection, and platelets help blood clot. However, although blood circulates in the circulatory system, it is actually produced in the bone marrow. Marrow produces stem cells, which become the cells in blood.

Day One

Vocabulary: *blood vessels, circulatory system*

Materials: page 27

Introduce the vocabulary. Point out that the word *vessel* can refer to a ship or to an object that holds food or drink. Ask students what these things have in common with blood vessels. (They all hold or carry something.) Remind students that blood carries nutrients from the digestive system and also picks up oxygen in the lungs, which are part of the respiratory system. After students have finished reading the passage, direct them to complete the activities. Review the answers together.

Day Two

Vocabulary: *plasma, platelets*

Materials: page 28

Introduce the vocabulary and inform students that plasma is made mostly of water. If necessary, review the term *connective tissue* before students read the passage. Tell them to refer to the illustrations as they read. After students have finished reading, have them complete the activity. Review the answers together.

Day Three

Vocabulary: *marrow, stem cells*

Materials: page 29

Introduce the vocabulary. Explain to students that stem cells have the potential to turn into any number of specialized cells, and not just blood cells. This is why scientists have such an interest in studying them. After students have read the passage, have them complete the activities. Review the answers together.

Day Four

Materials: page 30

Ask students if they know anyone who has ever given blood. Explain that only the blood of healthy people can be donated. This is so that diseases are not transmitted when the blood is used. After students finish reading, you may want to read the chart as a group before they complete the activity independently. Review the answers together.

Day Five

Materials: page 31

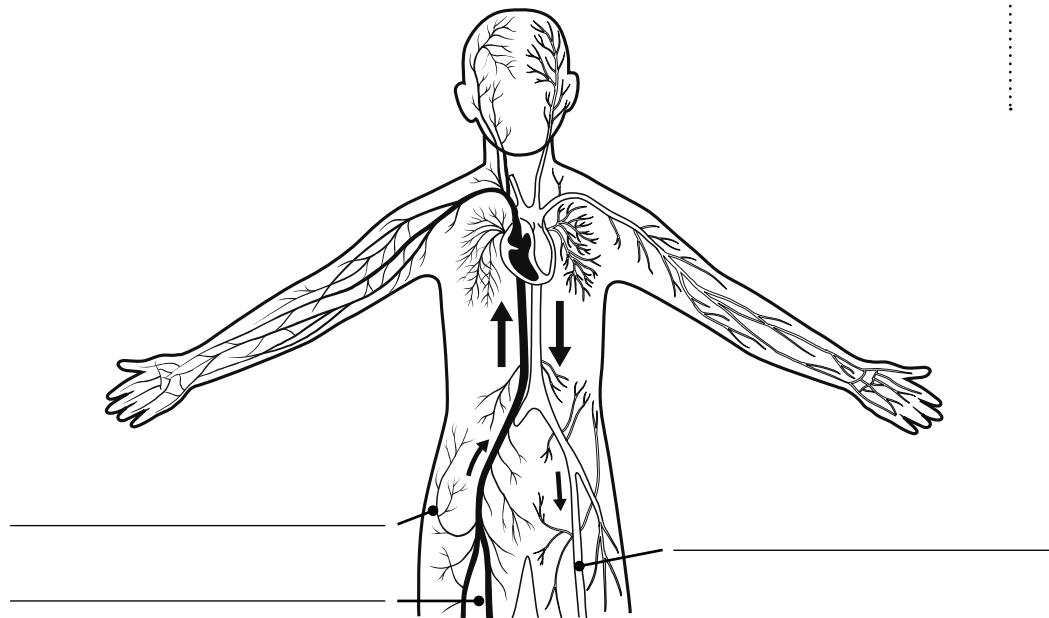
Have students complete the page independently. Then review the answers together.

**Day
1****Weekly Question****How do people give blood without running out of it?**

Blood is the link between every cell in your body. Working together with the heart, lungs, muscles, brain, and digestive system, blood transports oxygen and nutrients everywhere they are needed. Blood also shuttles the waste products produced by cells to places in the body where the waste can be eliminated.

Blood is part of your body's **circulatory system**. This system includes the heart, which pumps blood throughout the body, and the **blood vessels**, such as the arteries and veins. Blood leaves your heart through the arteries. Tiny vessels called capillaries (KAP-ih-LAIR-eez) allow blood to reach each cell and connect the arteries to the veins, which return blood to the heart.

- A.** Judging by the direction that the blood is flowing in the diagram, label the *artery*, *capillary*, and *vein*.



- B.** Name the two main functions of blood.

1. _____
2. _____

**WEEK 4****Vocabulary****blood vessels**

BLUD VESS-ulz
tubes that transport blood throughout the body

circulatory system

SER-kew-lih-tor-ee SISS-tum
the system of organs that pump blood throughout the body

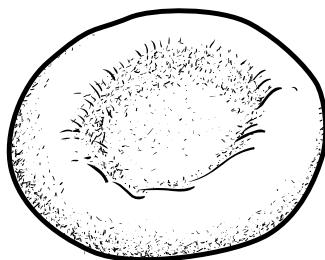
Big Idea 1

WEEK 4

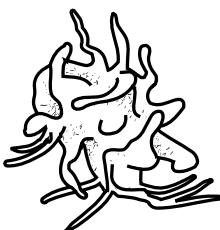
Day 2**Weekly Question****How do people give blood without running out of it?**

Blood is a liquid connective tissue made of cells suspended in a watery fluid called **plasma**. Plasma brings dissolved nutrients to cells and carries the cells' waste products away.

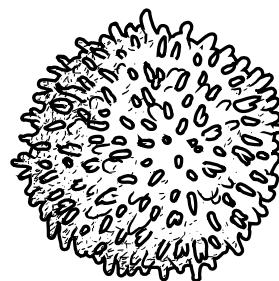
Blood contains three types of cells. Red blood cells, which give blood its color, account for 99% of all blood cells. Red blood cells transport oxygen to all body cells. White blood cells, on the other hand, are far fewer in number but have the important job of attacking infection. **Platelets**, which are the third type of blood cell, are not really cells at all but are fragments of larger blood cells. These small, irregularly shaped bodies collect at the site of an injury and help blood to clot, or form a scab.



red blood cell



platelet



white blood cell

Vocabulary**plasma**

PLAZ-muh
fluid containing dissolved nutrients and waste

platelets

PLAYT-lits
particles in blood that help make blood clot

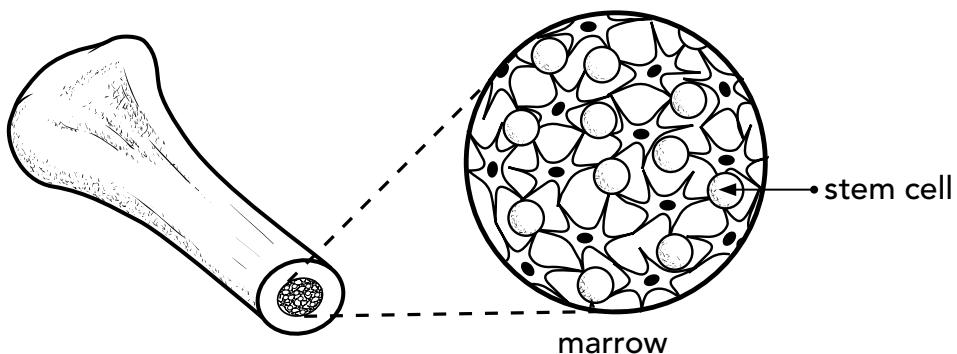
Answer the questions.

1. Which part of your blood transports nutrients? _____
2. Which cells help you get over a cold? _____
3. Which cells help heal a cut? _____
4. Why is blood red? _____
5. What would happen to someone without platelets? _____

**Day
3****Weekly Question****How do people give blood without running out of it?**

Blood is essential for life. So what happens when we lose blood? Our bodies actually lose blood all the time—not just from cuts and injuries, but also because blood cells in the body live only for a few days or, at most, a few months. Because of this, our bodies are continuously producing new blood.

Blood cells start out as **stem cells** located in your bone **marrow**. Bone marrow is a spongy, gel-like material inside certain bones, such as your leg and hip bones. Bone-marrow stem cells become the red blood cells, white blood cells, and blood platelets you need to stay healthy. More than 100 billion new blood cells are created in the bone marrow every day.

**A. Write true or false.**

- 1.** Plasma starts out as stem cells.

- 2.** Bone marrow is contained in all the bones of the body.

- 3.** Blood cells can die after a few days.

- B.** If the body makes 100 billion new blood cells each day, approximately how many blood cells can it make each hour?

C. Use words from the passage to complete the sentence.

Bone _____ contains _____ cells, which become _____ cells.

**WEEK 4****Vocabulary****marrow**

MARE-oh

soft tissue found inside certain bones

stem cells

STEM selz

cells that can become other types of cells

**Day
4****Weekly Question****How do people give blood without running out of it?**

Even though blood is constantly replenished in the body, losing too much blood suddenly can endanger a person's life. That's why people donate blood, which can be stored and used for such emergencies.

The human body contains about 5 quarts of blood. Blood donors typically give 1 unit, which is about 1 pint, or 10% of the blood they have. Their body is able to replace the blood fairly quickly. Liquid plasma is fully restored within a day or two. The blood cells take a few weeks to regenerate in the bone marrow and return to normal levels.

Donating blood gives the gift of health. For some people, it is the gift of life.

Use the chart to answer the questions about how donated blood is used.

Reason for Needing Blood	Blood Parts Needed		
	Red blood cells	Platelets	Plasma
Accident	4–100 units	none	none
Liver transplant	10–40 units	10–30 units	20–25 units
Open-heart surgery	2–6 units	1–10 units	2–4 units
Cancer treatment	10–20 units	10–15 units	none

- Which part of donated blood is most frequently used? _____
- Which medical event can require the most units of blood? _____
- How many total units of blood parts does a liver transplant require? _____
- What is the minimum number of blood parts needed for open-heart surgery? _____

**Day
5****Weekly Question****How do people give blood without running out of it?**

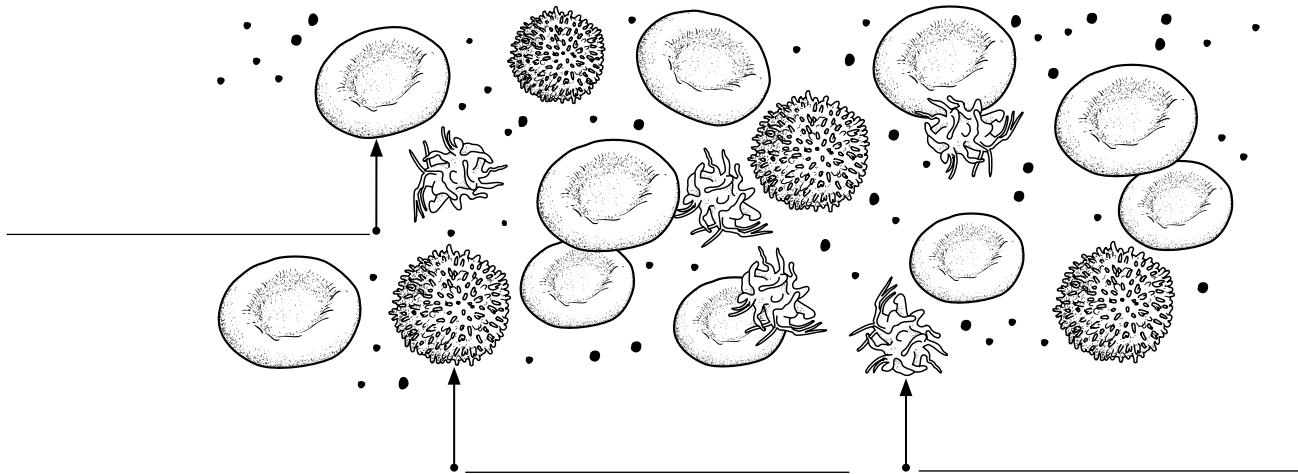
- A. Use the words in the box to complete the paragraph.

marrow stem cells blood vessels
 plasma platelets circulatory system

WEEK 4

Blood is pumped through the body's _____, which is made up of _____ such as veins, arteries, and capillaries. Blood contains a liquid substance called _____, as well as red blood cells, white blood cells, and _____. Blood is made in the bone _____ and comes from non-specialized cells called _____.

- B. Label a *red blood cell*, *white blood cell*, and *platelet*.



- C. Why is it important for people to donate blood?

**Unit
Review****Comprehension****Use Your Brain Cells**

Fill in the bubble next to the correct answer.

Daily Science

**Big
Idea 1**
WEEK 5

- 1.** What is the main function of muscle tissue?
 - (A) to help the body move
 - (B) to protect the body from disease
 - (C) to help the body digest food
 - (D) to support the body

- 2.** What are the layers of the skin?
 - (A) epithelial, thelial, dermoothelial
 - (B) callus, blood vessels, muscle
 - (C) epidermis, dermis, hypodermis
 - (D) tissue, dermis, epithelial

- 3.** Villi in the _____ help move nutrients into the blood.
 - (A) esophagus
 - (B) large intestine
 - (C) stomach
 - (D) small intestine

- 4.** Blood consists mostly of _____.
 - (A) blood cells and tissue
 - (B) plasma, red blood cells, and platelets
 - (C) water, marrow, and platelets
 - (D) oxygen, nutrients, and waste

- 5.** Two organ systems that work together are the _____.
 - (A) epithelial and connective systems
 - (B) digestive and excretory systems
 - (C) digestive and salivary systems
 - (D) circulatory and plasma systems

- 6.** What is the function of a cell's nucleus?
 - (A) to act as a barrier
 - (B) to cushion the cell
 - (C) to direct the cell's actions
 - (D) to form stem cells

- 7.** The substance that washes off your skin after a long bath is _____.
 - (A) epidermis
 - (B) callus
 - (C) epithelial tissue
 - (D) sebum

Name _____

Unit Review

Vocabulary

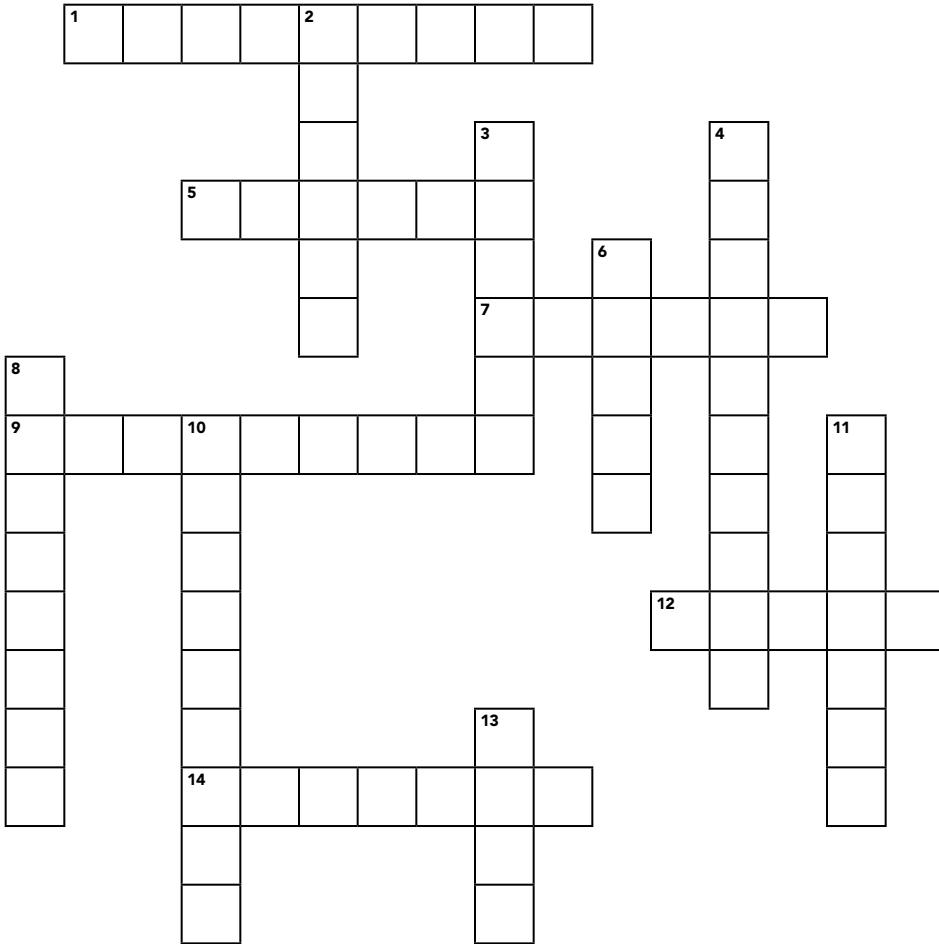
Get "Organ-ized"

Daily Science

**Big
Idea 1**

WEEK 5

Use the vocabulary words and the clues below to solve the puzzle.



ACROSS

1. a jelly-like substance in the cell
5. Cells grouped together form this.
7. where blood cells come from
9. a part of the digestive system between the mouth and the stomach
12. finger-like bumps in the small intestine
14. chemicals in your salivary glands that break down food

DOWN

2. This contains dissolved nutrients.
3. middle layer of skin
4. bottom layer of skin
6. Your heart is an _____.
8. something that surrounds the cell
10. blood parts that help blood clot
11. a cell's control center
13. the fundamental unit of life

Name _____

**Unit
Review**

Visual Literacy

Tissues, Organs, & Systems

Daily Science

**Big
Idea 1**

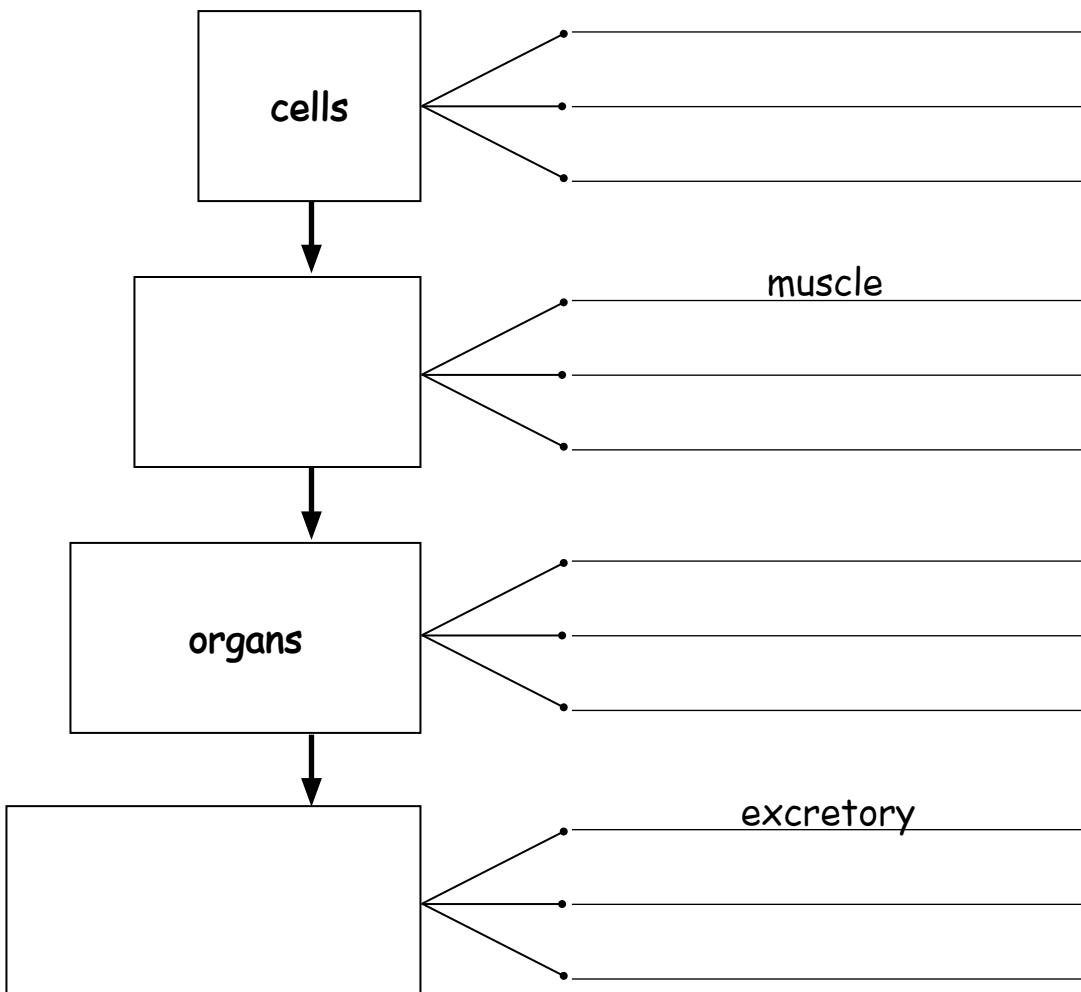
WEEK 5

Complete the chart below with words from the box to show how the human body is organized and what it is made up of.

circulatory digestive heart intestines
connective epithelial tissues red blood cells
esophagus platelets systems white blood cells

Organization

Examples



**Unit
Review****Hands-on Activity****Can You Stomach This?****Daily Science****Big
Idea 1****WEEK 5**

During digestion, food passes through the stomach, where it mixes with digestive juices and is churned by muscles forming the stomach wall. In this experiment, your hands provide the muscle, and soda does the job of the stomach acid.

What You Need

- see-through, sealable food storage bag
- $\frac{1}{3}$ cup carbonated soft drink
- slice of bread
- wad of chewed gum
- measuring cup

1. Place the soft drink, bread, and chewed gum in the food storage bag.
2. Make sure most of the air is removed from the bag. Then seal the bag.
3. Squeeze the bag with your hands for about a minute. Look at the contents of the bag.
4. Record your observations.

What Did You Discover?

1. What happened to the bread?
-

2. What happened to the gum?
-

3. Explain why the gum and the bread reacted the way that they did.
-

Big Idea 2



An ecosystem is a community in which every living thing fills a role.

Key Concept

Roles of organisms in ecosystems

National Standard

Populations of organisms can be categorized by the function they serve in an ecosystem.

By fifth grade, students should be familiar with the concept of organisms and their natural habitats. However, they are probably not aware of the ways that organisms interact within their habitats to form ecosystems. In this unit, students learn that:

- in the soil ecosystem, earthworms act as decomposers;
- polar bears and pandas are consumers that have evolved adaptations to survive in their different ecosystems;
- lions are predators at the top of their food chain in the savanna ecosystem; and
- plants are producers that compete for sunshine in the rainforest ecosystem.

Teacher Background

An ecosystem is made up of a group of organisms interacting with one another and their environment. This natural community can encompass the entire planet or be contained in a single drop of water. Each organism plays an important role in its ecosystem, regardless of its size or shape. From lowly earthworms to kingly lions, all species contribute to the health of their ecosystem and may even be connected to the health of the planet.

In this Big Idea, students will learn about the roles of producers, consumers, and decomposers in their ecosystems by studying familiar plant and animal species. Producers, consumers, and decomposers are connected to one another through the transfer of energy. Producers provide energy for the consumers that eat them. And prey organisms provide energy for the predators that hunt them. When those organisms die, they supply energy for the decomposers that recycle organic material for the producers to use again. This transfer of energy sustains every ecosystem on Earth.

For specific background information on each week's concepts, refer to the notes on pp. 38, 44, 50, and 56.

Unit Overview

WEEK 1: Why do earthworms like dirt?

Connection to the Big Idea: Earthworms are decomposers that recycle organic matter and benefit the health of the soil ecosystem. Students learn that soil is the ideal habitat for earthworms because it is moist and dark. But earthworms also help the soil by aerating it and providing nutrients for plants, which are in turn eaten by animals.

Content Vocabulary: *aerate, castings, decomposer, ecosystem, exposure, hydrated*

WEEK 2: Why do pandas eat plants but polar bears eat meat?

Connection to the Big Idea: Giant pandas and polar bears are consumers that have evolved distinct adaptations to survive in their habitats. Students learn that these bears are related species but live in such different ecosystems that they have evolved adaptations for completely separate diets.

Content Vocabulary: *adaptation, carnivore, consumer, herbivore, omnivore*

WEEK 3: Is the lion really the king of the jungle?

Connection to the Big Idea: Lions are top predators of the savanna ecosystem. Students learn that this ecosystem, as well as others, contains food chains that overlap to form complex food webs. Although lions are at the top of their own food chains, they share the top predator spot with hyenas and cheetahs in the savanna food web.

Content Vocabulary: *competition, food chain, food web, predator, prey, savanna*

WEEK 4: How can so many different plants live in the rainforest?

Connection to the Big Idea: Plants of the rainforest, like all plants, are producers. Students learn that competition for sunlight among primary producers has resulted in a multilayered ecosystem that rises hundreds of feet above the ground.

Content Vocabulary: *canopy, diversity, epiphyte, overstory, producer, rainforest, understory*

WEEK 5: Unit Review

You may choose to do these activities to review concepts about organisms' roles in their ecosystems.

p. 62: Comprehension Students answer multiple-choice questions about key concepts in the unit.

p. 63: Vocabulary Students write vocabulary words from the unit to match clues.

p. 64: Visual Literacy Students match organisms of the rainforest with their roles in the ecosystem.

p. 65: Hands-on Activity Students watch as earthworms mix soil and fulfill their role as decomposers. Instructions and materials needed for the activity are listed on the student page.

Big Idea 2



An ecosystem is a community in which every living thing fills a role.

Week 1

Why do earthworms like dirt?

The natural habitat of earthworms is soil. But it's not just a place for the worm to live. Soil is also an ecosystem—a community of organisms and the environment that they inhabit. A healthy soil ecosystem provides nutrients for plants that grow in the soil, as well as animals that eat the plants.

This week students learn that earthworms fulfill an integral role in the soil's ecosystem. They act as decomposers, ingesting soil and all its contents, and excreting nutrient-rich castings. Worms also improve the quality of soil by burrowing. They pull top layers filled with organic matter down into the soil, creating a balanced mixture. Their burrowing aerates the soil and allows for water drainage. Soil provides earthworms advantages as well. Not only does it contain the worms' food, but it also keeps them hydrated and helps regulate their body temperature.

Day One

Vocabulary:
decomposer, ecosystem

Materials: page 39

Discuss with students the difference between a habitat (the environment in which an organism lives) and an ecosystem (a collection of organisms and the habitat they share). Tell them that soil is a habitat because it's where the earthworms live. Then explain that it's also an ecosystem because it contains many living things that share the habitat. Have students complete the activities. Review the answers together.

Day Two

Vocabulary: exposure,
hydrated

Materials: page 40

Introduce the vocabulary. Point out the illustration of the worm, and have students examine the structures of its body. Ask them to find differences in the worm's organs from our own. (Worms have five hearts and one long intestine that runs from mouth to anus.) After students have read the passage, have them complete the activities.

Day Three

Vocabulary: aerate,
castings

Materials: pages 40
and 41

Refer back to the illustration on page 40 and point out the worm's digestive tract. Explain that earthworms ingest soil at one end, extract the organic nutrients, and expel the rest out the other end. Then introduce the vocabulary. After students have read the passage, have them complete the activities. Review the answers together.

Day Four

Materials: page 42

Have students read the passage. Point out that not only do organisms play a role in their particular ecosystem, but ecosystems play a role in supporting other ecosystems. Have students complete the activities and review the answers together.

Day Five

Materials: page 43

Have students complete the page independently. Then review the answers together.

**Day
1****Weekly Question****Why do earthworms like dirt?**

If you have ever dug in a garden, you've probably found a lot more than just dirt. A closer look might have revealed ants and centipedes, or perhaps a network of plant roots. And although you might not have seen them, soil teems with microorganisms. An ounce of soil can contain 100,000 algae, 1,000,000 fungi, and 100,000,000 bacteria!

In a sense, healthy soil is "alive," crawling with worms, insects, and microscopic life. Soil is an **ecosystem** that includes not only the minerals in the dirt but also all the organisms that make the soil their habitat. In the soil ecosystem, earthworms play the role of **decomposers**. Earthworms break down and recycle matter mostly from dead plants.

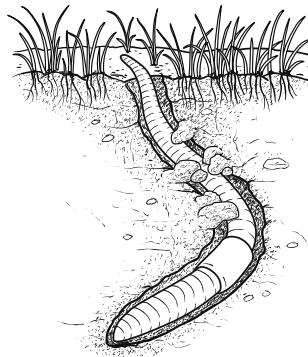
- A.** Check the box next to the phrase that completes the analogy.

Home is to **community** as _____.

- | | |
|--|--|
| <input type="checkbox"/> earthworm is to algae | <input type="checkbox"/> habitat is to ecosystem |
| <input type="checkbox"/> ecosystem is to soil | <input type="checkbox"/> earthworm is to habitat |

- B.** Complete the paragraph with words from the passage.

Garden soil contains worms, insects, and thousands upon thousands of tiny _____, including algae and bacteria. These living things share the same environment, making soil their _____. The combined elements of the organisms and their environment functioning together form an _____. Earthworms play a critical role in this tiny world. As _____, they break down dead or decaying plant material and help renew the soil.

**WEEK 1****Vocabulary****decomposer**

DEE-kom-POH-zer
an organism that feeds on dead plant or animal matter

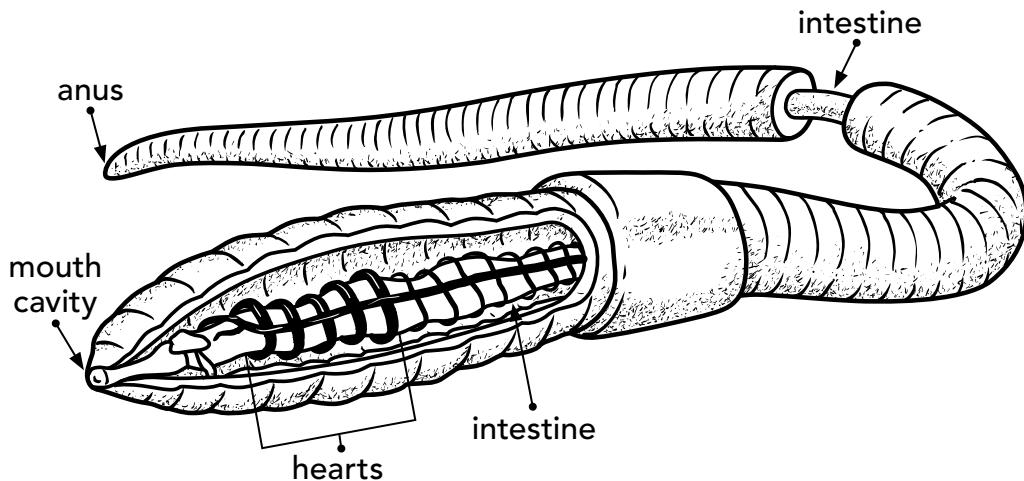
ecosystem

EE-koh-SIS-tum
a group of organisms and the environment in which they live

**Day
2****Weekly Question****Why do earthworms like dirt?**

Soil has many properties that attract earthworms. One reason earthworms like dirt is because it contains their food. The worms ingest dead and decaying plant matter that falls into the soil. Earthworms also graze on tiny living organisms in the soil, such as bacteria and fungi.

Another reason earthworms like dirt is because it shields their soft bodies from **exposure**. Earthworms have no protective shell or tough skin to keep in moisture. By staying underground, earthworms avoid being dried out by the sun's hot rays. The damp, cool earth keeps the worms **hydrated**. The soil also helps the worms maintain a lower body temperature, which keeps them alive.

**A. Describe three ways soil benefits earthworms.**

1. _____
2. _____
3. _____

B. Write a sentence about earthworms, using the words *exposure* and *hydrated*.

WEEK 1**Vocabulary****exposure**

eks-POH-zhur
being exposed, or
unprotected from
harsh weather
conditions

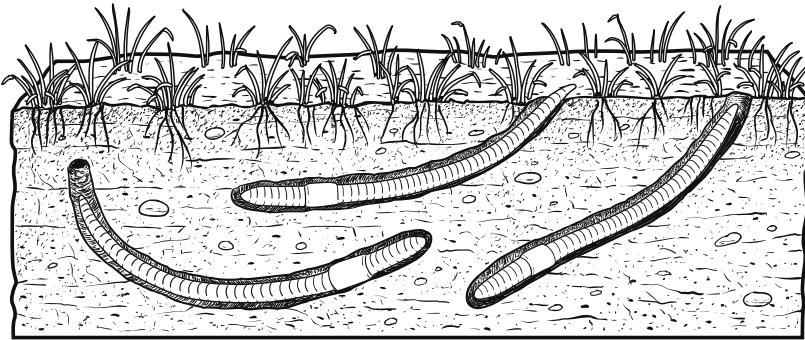
hydrated

HI-dräy-tid
maintaining enough
fluid

**Day
3****Weekly Question****Why do earthworms like dirt?**

Not only is soil good for earthworms, but earthworms are good for the soil. When earthworms eat, they swallow small pieces of dirt along with plant and animal matter. The worms break this material down into smaller pieces and expel it in the form of **castings**, which are rich in minerals and nutrients that are beneficial to plants and other organisms.

In addition to enriching the soil with their castings, earthworms also burrow into the soil and **aerate** it, allowing oxygen to enter. By burrowing, the worms bring organic-rich top layers to the soil deeper down. Burrowing also improves drainage by helping water penetrate the soil.

**A. Write true or false.**

- 1.** When earthworms burrow, they remove nutrients from the soil. _____
- 2.** Castings contain the nutrients other organisms need to survive. _____
- 3.** Earthworms prevent water and oxygen from getting too deep in the soil. _____

B. Describe three ways earthworms improve soil.

- 1.** _____
- 2.** _____
- 3.** _____

**WEEK 1****Vocabulary****aerate**

AIR-ate

to expose to air

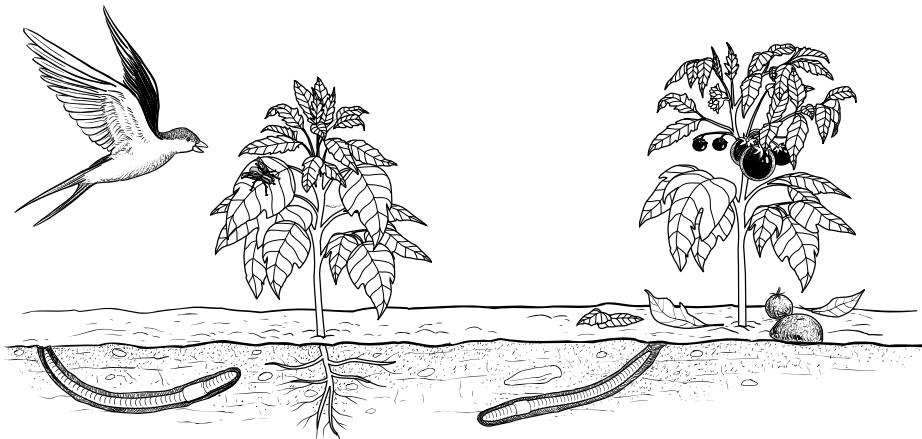
castings

KASS-tingz

the waste expelled by earthworms

**Day
4****Weekly Question****Why do earthworms like dirt?**

Earthworms are just one of the necessary parts of a garden ecosystem. Nutrients and water in garden soil allow plants, such as tomatoes or lettuce, to grow. Plants provide food for insects and animals that wander into the garden. Animals, in turn, are consumed by other animals. Ultimately, the wastes and remains of plants and animals return to the garden soil. In this way, all the plants and animals make their contribution to the garden ecosystem and allow worms to do their job as decomposers and recyclers.



- A.** Number the events below in the correct order to show the cycle that occurs in a garden ecosystem. The first step is given.

- ____ Insects and other animals eat plants.
- ____ Nutrients help plants grow.
- 1** Worm castings enrich the soil with nutrients.
- ____ Worms decompose plant material.
- ____ Animals and plants die.

- B.** What do you think would happen to the garden ecosystem if there were no more earthworms?
-

**WEEK 1**

Name _____

**Day
5**

Weekly Question

Why do earthworms like dirt?

- A. Use the words in the box to complete the paragraph.

castings hydrated decomposers
aerate exposure ecosystem



WEEK 1

Soil and all the living things in it make up an _____.

Earthworms act as _____, eating decaying matter in the soil and expelling it in the form of nutrient-rich _____.

The worms also _____ the soil, which helps circulate oxygen. In return, the cool, moist soil protects earthworms from _____ and keeps them _____.

- B. Many people separate kitchen waste from their garbage to create compost, a mixture of decaying organic matter used to improve soil. Earthworms are often added to the mixture. Use this information to answer the questions below.

1. How do you think earthworms help the process of composting?

2. Why can't all trash be used to make compost?

Big Idea 2



An ecosystem is a community in which every living thing fills a role.

Week 2

Why do pandas eat plants but polar bears eat meat?

Giant pandas and polar bears are both members of the bear family. However, although they are related, pandas and polar bears have wildly different habitats and diets. This week students learn that both of these types of bears have special adaptations that help them survive in their particular ecosystems. Pandas have an extra “thumb” and flat molars that help them eat bamboo, the staple of their diet. Polar bears, on the other hand, have adaptations that allow them to hunt seals in the Arctic.

Because of their specific adaptations, neither species adjusts well to changes in the environment. Recent decline in the numbers of pandas and polar bears may be related to loss of habitat. The dwindling populations of pandas and polar bears serve as a reminder to us about the vulnerability of ecosystems and the consequences of habitat destruction.

Day One

Vocabulary: adaptation, consumer

Materials: page 45

To activate prior knowledge, have students name some similarities and differences between pandas and polar bears. (e.g., both are bears, both have fur; polar bears hunt seals, pandas eat bamboo) Then introduce the vocabulary. For *consumer*, you might discuss the meaning of this word as it relates to people (i.e., “buyers of products”). After students have finished reading the passage, direct them to complete the activities.

Day Two

Vocabulary: herbivore, omnivore

Materials: page 46

Introduce the vocabulary and have students read the passage. Confirm students’ understanding of how molars help pandas chew by asking students to describe the difference between their own molars and their other teeth. (Molars are flat, wide, and in the back of the mouth; other teeth are sharp, thin, and in the front of the mouth.) Have students complete the activities. Then review the answers together.

Day Three

Vocabulary: carnivore

Materials: page 47

Introduce the vocabulary word. Then ask: **Are humans carnivores, herbivores, or omnivores?** (Humans are omnivores, although some people choose not to eat meat.) After students have finished reading, have them complete the activities. Review the answers together.

Day Four

Materials: page 48

After students have read the passage, have them complete the activities. For the oral activity, you may want to pair students or discuss the question as a group. If necessary, prompt students to consider such ideas as replanting bamboo forests, breeding polar bears and pandas in zoos, reducing causes of global warming, etc.

Day Five

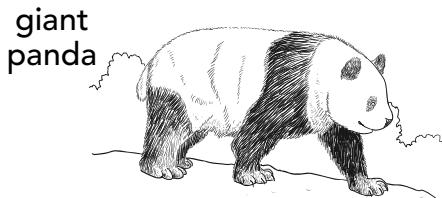
Materials: page 49

Have students complete the page independently. Then review the answers together.

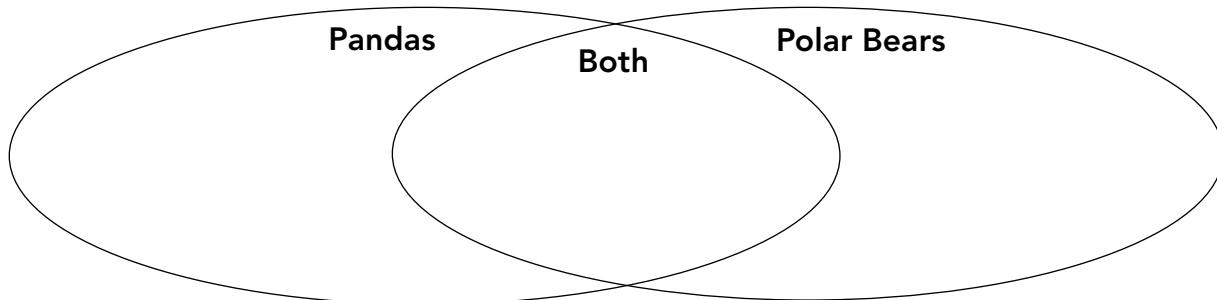
**Day
1****Weekly Question****Why do pandas eat plants
but polar bears eat meat?**

Giant pandas and polar bears are both members of the bear family. Although they are related, pandas and polar bears live in very different ecosystems. Giant pandas live in the rainy, mountainous forests of central China. They have a diet that is almost entirely made up of bamboo. Polar bears live on the flat, barren ice of the Arctic Circle. They hunt a type of seal that also lives there.

Because pandas and polar bears rely on other organisms in their ecosystem for food, they are **consumers**. To fit their unique diets and ecosystems, both giant pandas and polar bears have special **adaptations** to help them survive.



- A. Use information from the passage to fill in the diagram below, comparing pandas to polar bears. Include where they live and what they eat.



- B. Explain how you think each animal's adaptation helps the animal survive in its particular ecosystem.

1. dolphin's blowhole: _____
2. camel's long eyelashes: _____
3. monkey's tail: _____

**WEEK 2****Vocabulary****adaptation**

AD-ap-TAY-shun
changes in an organism to become more suited to its environment

consumer

kon-SOO-mer
an organism that relies on other plants and animals for food

Big Idea 2

WEEK 2

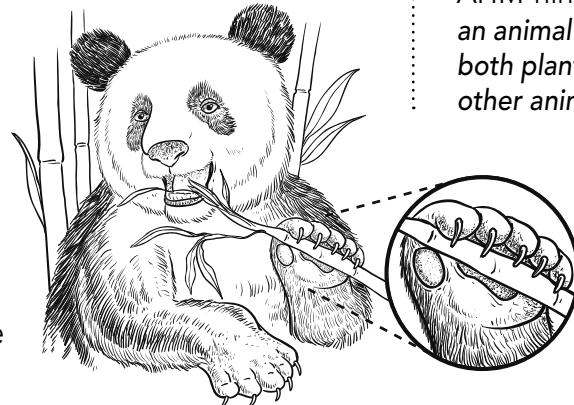
Day 2**Weekly Question****Why do pandas eat plants but polar bears eat meat?**

Giant pandas live in a very small mountain region in central China. This area has plenty of rain, mild summers, and cool winters. The climate is good for the bamboo plant, which grows densely in the mountain forests. And *this* is good for pandas.

Although most bears are **omnivores**, pandas are **herbivores**. They spend about 12 hours every day eating bamboo! Why so much? It's because bamboo isn't very nutritious and their digestive systems can't digest it well. So pandas have to consume huge amounts for their bodies to absorb enough nutrients.

In order to eat bamboo, pandas have developed certain adaptations. One adaptation is flat molars that help pandas grind the plant material. Pandas also have a long bone that extends from their wrist, which allows them to better grasp bamboo shoots and leaves.

Nobody knows for sure why the pandas eat bamboo instead of other plants. But some scientists think it is because bamboo grows so densely, and the pandas don't have to compete with other animals for it.

**A. Describe two adaptations that help pandas survive on a diet of bamboo.**

1. _____

2. _____

B. Rewrite each sentence, changing or adding words as needed to make the statement true.

1. Most bears are herbivores. _____

2. Pandas easily digest bamboo. _____

3. A panda's habitat is hot and dry. _____

Vocabulary**herbivore**

HER-bih-vor

*an animal that eats only plants***omnivore**

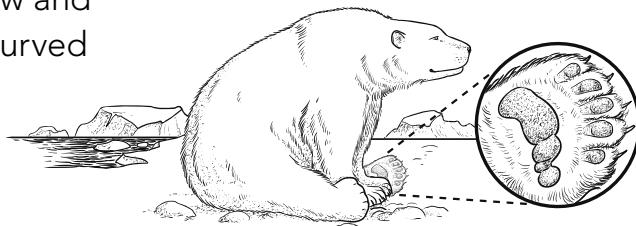
AHM-nih-vor

an animal that eats both plants and other animals

**Day
3****Weekly Question****Why do pandas eat plants
but polar bears eat meat?**

Far north in the Arctic Circle, polar bears live on the sea ice, swim in the frigid waters, and inhabit nearby islands and coastlines. Their habitat is frozen most of the year, and plants do not survive in these extreme conditions. So polar bears have adapted by becoming **carnivores**. They rely on a diet that consists entirely of meat—specifically, seals. Polar bears rarely catch the seals on land or in the open water, however. Instead, the bears hunt seals by waiting on the edges of holes in the ice, where the seals surface to breathe.

Polar bears have special adaptations for living on the ice and hunting the seals. To keep from slipping, the bears have small, soft bumps on the bottom of each paw and tufts of fur between their toes. Their thick, curved claws grip the ice, as well as catch and hold their prey. In addition, a polar bear's toes are slightly webbed, which helps it swim between pieces of ice.

**A. Explain how each feature of a polar bear's paw helps it survive.**

- 1.** webbed toes: _____
- 2.** thick, curved claws: _____
- 3.** bumps on pads: _____

B. Answer the questions.

- 1.** Why are polar bears carnivores, and not omnivores like other bears?

- 2.** Polar bears have certain adaptations that most other bears don't have, including two layers of fur and a thick layer of fat called blubber. What do you think these adaptations are for?

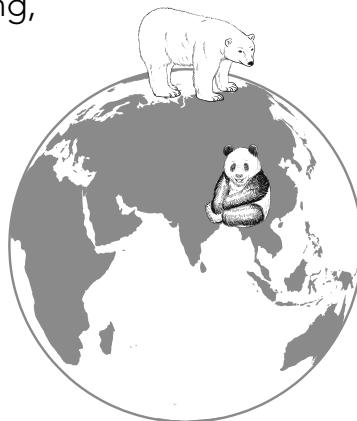
**WEEK 2****Vocabulary****carnivore**

KAR-nih-vor
an animal that eats other animals

Big Idea 2**WEEK 2****Day 4****Weekly Question****Why do pandas eat plants but polar bears eat meat?**

Polar bears and pandas have very specific needs for survival. Polar bears depend on the presence of sea ice in order to hunt and breed. Giant pandas depend on a single plant for almost all their food. However, these animals are now being threatened with extinction. Pandas are in danger because large parts of their habitats are being destroyed, which means less bamboo for them to eat. Polar bears are at risk because the polar ice caps are melting, leaving the bears with fewer pieces of solid ice from which to hunt seals. If these changes continue, it is likely that neither polar bears nor pandas will survive.

What would be the impact of this loss on the bears' ecosystems? Scientists are currently studying this to find out more. But the good news is that the bears' shrinking populations have increased people's awareness of habitat loss and some of its causes. And this, in turn, has helped us understand the relationship between all living and nonliving things within any ecosystem—including our own.



Write true or false.

1. Melting sea ice is making it easier for polar bears to hunt seals. _____

2. Pandas depend on one kind of animal for their food. _____

3. Because of habitat loss, polar bears and pandas could possibly become extinct. _____

4. An ecosystem can be affected by changes to one habitat. _____

 **Talk**

Many people are making efforts to try to save pandas and polar bears from possible extinction. What kinds of things do you think people could do to help these animals survive?

Name _____

Daily Science

Day
5

Weekly Question

Why do pandas eat plants but polar bears eat meat?

- A. Use the words in the box to complete the paragraph.

omnivores carnivores adaptations
consumers herbivores habitats

WEEK 2

Pandas and polar bears are both _____. However, unlike other bear species, which eat both plants and animals, neither pandas nor polar bears are _____. Pandas are _____ and polar bears are _____. Both pandas and polar bears have developed _____ that allow these animals to consume the food sources available in their particular _____.

- B. Would a polar bear be able to survive in a panda's habitat?
Explain why or why not.

- C. Name three characteristics of, or things found in, the ecosystem of pandas. Then name three in the polar bear ecosystem.

Panda ecosystem:

1. _____ 2. _____ 3. _____

Polar bear ecosystem:

1. _____ 2. _____ 3. _____

Big Idea 2



An ecosystem is a community in which every living thing fills a role.

Week 3

Is the lion really the king of the jungle?

Lions are majestic beasts that have been a symbol of royalty and power in human lore from earliest times. This week students discover that lions do not live in the jungle but are part of a grassland ecosystem in which they play the role of top predator. Lions prey on a variety of animals, including zebras, buffalos, impalas, wildebeests, and giraffes. Lions compete against other carnivores for their food, and even though they are large animals that dominate their prey by utilizing a cooperative hunting style, they still share the top predator position with hyenas and cheetahs.

As is the case with most ecosystems, the savanna ecosystem is complex and consists of many food chains overlapping to form a food web. Lions, hyenas, and cheetahs are all kings of the savanna, if not the jungle.

Day One

Vocabulary: *predator, prey*

Materials: page 51; photos of animals listed in the passage (optional)

Ask students if they can think of any examples in literature, TV, or movies of lions portrayed as kings or rulers. (*The Lion, the Witch, and the Wardrobe*; *The Lion King*; etc.) Remind students that lions are in the *feline*, or cat, family. Introduce the vocabulary and show students any photos you have of animals that live in the lion's habitat. Then have students read the passage and complete the activities. Review the answers together.

Day Two

Vocabulary: *food chain, savanna*

Materials: page 52; world map

Introduce the vocabulary. Then help students find East Africa on the map, and explain that much of the region is covered in savanna grasslands. After students have read the passage, have them complete the activities. For activity A, explain that the arrows point from the organism that is consumed to the organism that does the consuming. Review the answers together.

Day Three

Vocabulary: *competition, food web*

Materials: page 53

Ask students what they think about when they hear the word *competition*. (e.g., sporting events, spelling bees, reality TV) Point out that animals compete in the wild, but for very different reasons. Introduce the vocabulary. After students have finished reading, have them complete the activities. Review the answers together.

Day Four

Materials: page 54

After students have read the passage, have them complete the activities. For activity B, you may want to work as a group and inform students that the rabbit population in Australia is now completely out of control. The rabbits are suspected of being responsible for the loss of many other plant and animal species.

Day Five

Materials: page 55

Have students complete the page independently. Then review the answers together.

**Day
1****Weekly Question****Is the lion really the king
of the jungle?**

In literature, art, and folklore, lions have long been the symbol of kings and royalty. Their very appearance suggests strength and power. They are the largest of all felines and are one of the top **predators** in their ecosystem. Adult lions generally weigh 300 to 400 pounds and stand about 3½ feet tall from their shoulders to the ground. With powerful legs, a strong jaw, and sharp teeth and claws, lions can kill **prey** even bigger than themselves.

In fact, lions can hunt and kill nearly any species they encounter. But they prefer to eat hooved animals, such as zebras, impalas, wildebeests, and water buffalos. They have also been known to feast on smaller mammals, such as wart hogs and hares. However, lions will generally avoid animals that can fight back or injure them, such as hippos and porcupines.

**A. Complete the analogy, using the vocabulary words.**

Lion is to _____ as **zebra** is to _____.

B. Name four characteristics that make lions good predators.

1. _____

3. _____

2. _____

4. _____

C. Write true or false.

1. Lions are capable of killing every species they encounter.

2. Lions are in the feline family.

3. Hippos and porcupines can injure lions.

**WEEK 3****Vocabulary****predator**

PRED-ih-ter
an animal that kills and eats other animals

prey

pray
an animal hunted or caught for food by another animal

Big Idea 2

WEEK 3

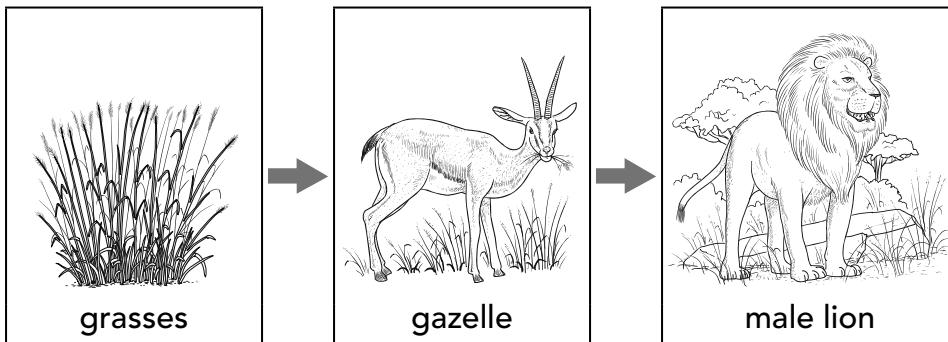
Day 2

Weekly Question**Is the lion really the king of the jungle?**

Despite being known as the “king of the jungle,” lions do not actually live in a jungle. They are found mostly in the **savannas** of East Africa. The savannas are wide grasslands dotted with scattered shrubs and trees. This habitat is very warm and usually dry, except for a short rainy season.

In the savanna ecosystem, lions are at the top of the **food chain**. They eat the zebras, wildebeests, impalas, and other animals that in turn eat the grasses and shrubs. Although the idea of a food chain may seem simple enough, the relationship between predators and prey in an ecosystem can be complex. For example, lions can kill and eat crocodiles, but crocodiles have been known to eat lions, too.

- A.** Write a caption explaining the diagram below. Use the terms **food chain** and **savanna** in your caption.



- B.** List three characteristics of a lion's habitat.

1. _____
2. _____
3. _____

Vocabulary**food chain**

FOOD chayn
a sequence of organisms in a community in which each member feeds on the one below it

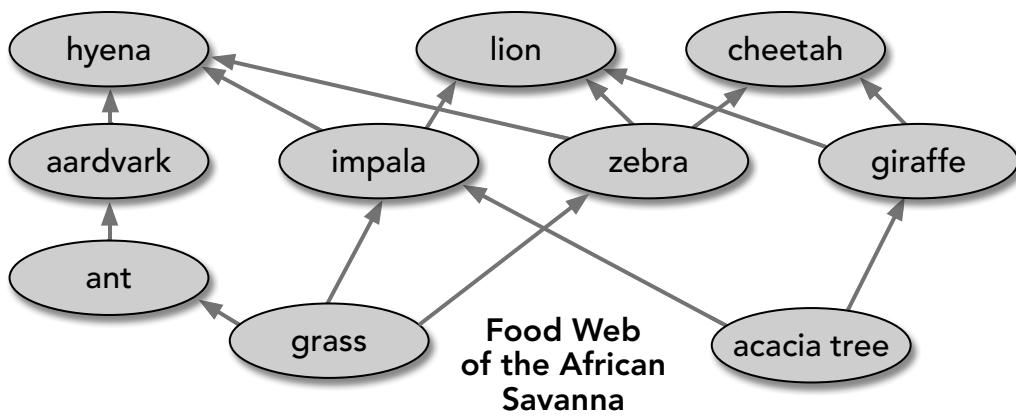
savanna

suh-VAN-uh
hot, often dry grassland with scattered trees

**Day
3****Weekly Question****Is the lion really the king of the jungle?**

Lions are at the top of more than one food chain. They eat not just the hoofed animals that eat the grass, but they may also eat small mammals that in turn feed on trees, seeds, or insects. In addition, lions are in **competition** with other predators, such as hyenas and cheetahs, who are at the top of their own food chains. These overlapping and interconnected food chains all make up a giant **food web**.

Although the lions compete with other top predators, they have advantages. One advantage is their size. Often, it is the largest carnivore that wins a battle over food. Also, lions hunt their prey in groups called *prides*. Teamwork helps the lions defend their kill from other carnivores.



- A. What are three food chains you see in the food web above? Fill in the blanks below to show three different chains. (There may be more than one way to complete each chain.)

1. acacia tree → _____ → lion
2. _____ → _____ → cheetah
3. _____ → ant → _____ → _____

- B. Cheetahs might be smaller than lions, but they have another competitive advantage. What do you think it is? How does it help them?
-

**WEEK 3****Vocabulary****competition**

KOM-peh-TISH-un
a struggle between two or more organisms for a limited resource

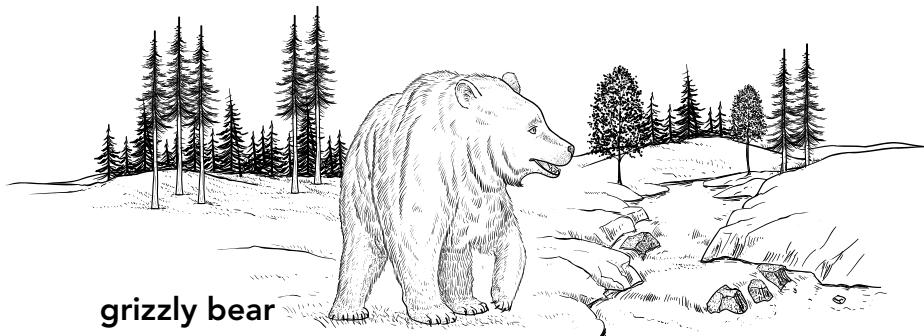
food web

FOOD web
a network of interconnected food chains

**Day
4****Weekly Question****Is the lion really the king
of the jungle?**

Every ecosystem has its own particular food web. In Alaska, the grizzly bear and the wolf are top predators that compete for salmon, elk, rabbits, and other prey. The rabbits and elk eat plants found on land, while the salmon feed on plankton and small fish.

The grizzlies in Alaska, the lions in East Africa, and in fact, all the top predators in any ecosystem play the important role of controlling the number of animals below them in the food web. Without predators, other animal populations could greatly increase. And with so many populations competing for limited food and water, these animals could perish from starvation. So every organism, no matter where it is in the food web, helps every other one.



A. Complete two Alaskan food chains, using information from the passage.

Write the names of the organisms in the spaces provided.

1. → →

2. → →

B. Humans introduced rabbits to Australia in the 1700s. However, there are not many predators in the Australian food web. What do you think happened to the rabbits? What impact do you think this had on vegetation?

Name _____

**Day
5**

Weekly Question

Is the lion really the king of the jungle?

Daily Science



WEEK 3

- A. Use the words in the box to complete the paragraph.

food chain food web prey
competition predators savanna

Lions are part of the ecosystem of the African _____,
where they act as top _____. They hunt _____
such as zebras and antelope. Lions are in _____ with other
carnivores, but they still sit at the top of their own _____.
Lions belong to more than one food chain, so they are part of a
_____.

- B. Explain the difference between a food chain and a food web.

- C. Check the box next to the phrase that completes each analogy.

1. Lion is to zebra as _____.

cheetah is to savanna
 mouse is to lizard

hyena is to gazelle
 grass is to seeds

2. East Africa is to lion as _____.

grizzly bear is to salmon
 Alaska is to grizzly bear

gazelle is to East Africa
 Alaska is to hyena

Big Idea 2



An ecosystem is a community in which every living thing fills a role.

Week 4

How can so many different plants live in the rainforest?

Almost 100 years ago, American naturalist William Beebe saw the rainforest as “another continent of life [yet] to be discovered, not upon the Earth, but one to two hundred feet above it.” This week students learn that the rainforest contains hundreds of thousands of plant species, the vast majority of which are located high above the forest floor. Each of these rainforest plant species, like all plants, plays the role of producer in its ecosystem.

The conditions of the rainforest—12 hours of sunlight every day and abundant rainfall—support a rich diversity of plant life. And those plants support a wide variety of animal life as well. In fact, it is estimated that nearly 50 percent of all plant and animal species on Earth are contained within the rainforest. Nonetheless, scientists are only beginning to unlock the secrets of this complex ecosystem.

Day One

Vocabulary: *producer, rainforest*

Materials: page 57

After introducing the vocabulary, you may want to review the process of photosynthesis with students before they read the passage. (Plants convert water and carbon dioxide into food using sunlight, and release oxygen as a byproduct.) Instruct students to read the passage and complete the activities. After they have finished, review the answers together.

Day Two

Vocabulary: *canopy, overstory, understory*

Materials: page 58

Ask students what they think of when they hear the word *canopy*. (cover over a bed, tent, etc.) Tell them that rainforest trees create a canopy of leaves that shades plants below. Then introduce the vocabulary. After students have read the passage, have them complete the activities. Review the answers together.

Day Three

Vocabulary: *epiphyte*

Materials: page 59; pictures of epiphytes (optional)

Introduce the vocabulary word and show students the pictures of various species of epiphytes (e.g., ferns, orchids, and mosses) if you have them. After students have finished reading the passage, have them complete the activities. Review the answers together.

Day Four

Vocabulary: *diversity*

Materials: page 60

Introduce the vocabulary word. Ask students if they can think of applications of the word *diversity* outside of the rainforest. (people, cultures, etc.) Have students read the passage and complete the activities. Review the answers together.

Day Five

Materials: page 61

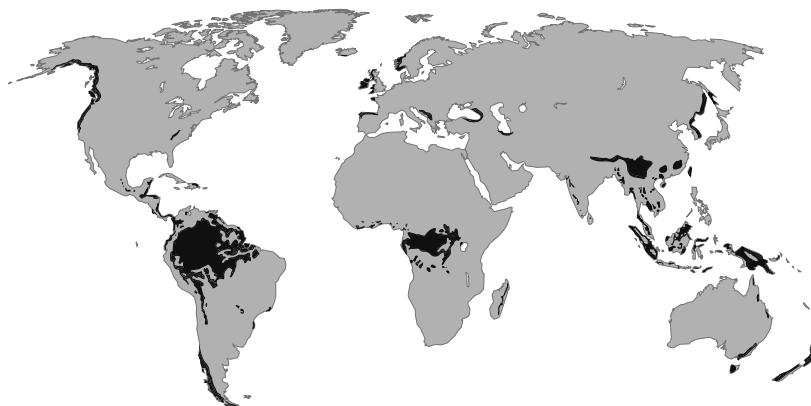
Have students complete the page independently. Then review the answers together.

**Day
1****Weekly Question****How can so many different plants live in the rainforest?**

When you think of a **rainforest**, you might imagine tangles of tall trees and exotic plants showered in rain. This rain is, in fact, what gives rainforests their name. An average rainforest can receive more than 100 inches of rain in a year. By comparison, a desert gets 10 or fewer inches of rain annually.

The majority of the world's rainforests are near the equator, so they are always warm and humid. Being near the equator also means that they get about 12 hours of sunlight every day of the year. These tropical conditions of regular sun and rain are ideal for plant growth.

Plants of the rainforest ecosystem, like all plants, are **producers**. They make their own food through the process of photosynthesis. With so much sun and rain available, hundreds of thousands of plant species are able to thrive in the rainforest.



The dark areas on the map show where the world's rainforests are.

A. List three physical characteristics of a tropical rainforest.

1. _____

3. _____

2. _____

B. Which of these inhabitants of the rainforest is *not* a producer?

Fill in the correct bubble.

(A) fern

(B) banana tree

(C) monkey

(D) passionflower

**WEEK 4****Vocabulary****producer**

pro-DOO-sur
an organism that makes its own food

rainforest

RANE-for-ist
a forest with at least 80 inches of rainfall every year

Big Idea 2

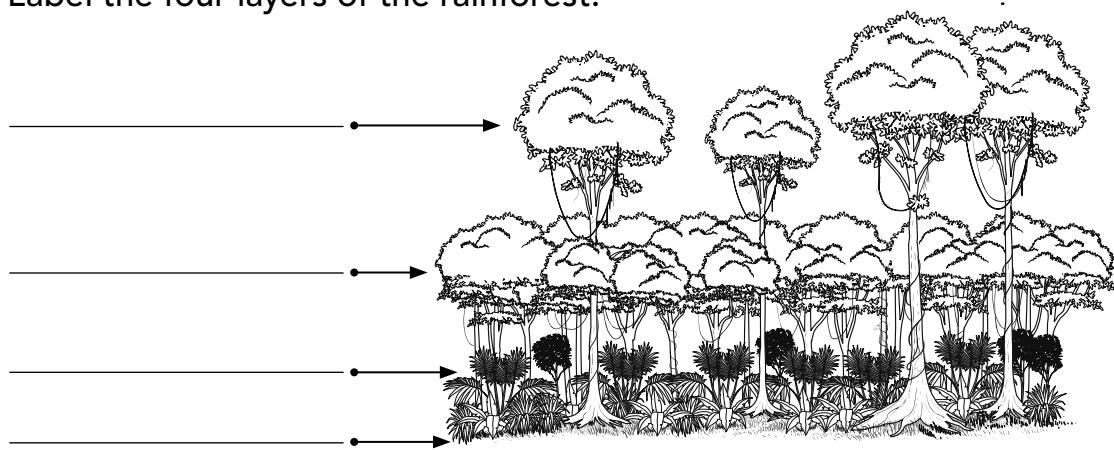
WEEK 4

Day 2**Weekly Question****How can so many different plants live in the rainforest?**

Although water is readily available in a rainforest, sunlight is harder to find. Plants must compete for sunlight, literally climbing over one another to reach it. Plants that grow the tallest reach the most light, while those that are on the ground receive very little.

The rainforest is divided into four layers of plants that have adapted to different levels of sunlight. At the top, rising more than 200 feet into the air, are the scattered giant trees that make up the forest **overstory**. While the overstory gets direct sun, its trees can also be subjected to hot, drying wind. The next layer is the forest **canopy**. The canopy is a dense ceiling of closely-spaced trees and plants. This layer traps humidity, and it also captures most of the sunlight.

Only 5% of sunlight reaches the third layer, which is called the **understory**. The understory includes shorter trees and shrubs with large leaves that help catch the available light. Below the understory is the forest floor. You would need a flashlight to explore this layer! Yet there are still a few plants that are able to grow here.

A. Label the four layers of the rainforest.**B. Based on the information in the passage, which layer do you think has the largest amount of trees and plants? Explain your answer.****Vocabulary****canopy**

KAN-uh-pee
dense upper layer
of rainforest foliage

overstory

OH-ver-STOR-ee
tallest layer of
rainforest trees

understory

UN-der-STOR-ee
layer of rainforest
plants that grow
beneath the canopy

**Day
3****Weekly Question****How can so many different plants live in the rainforest?**

The heart of the rainforest community lies far above the ground, in the canopy. This is where the greatest concentration of plant life is, because of the many plants that have evolved adaptations in order to grow closer to the sunlight.

Some plants, called **epiphytes**, grow on the trunks and branches of trees in the canopy. These rootless plants include species of ferns, mosses, and orchids. Instead of reaching down into the soil for nutrients, most epiphytes rely on dead organic matter that falls from above. Other plants called *lianas* (lee-AH-nuhs) have roots on the forest floor. These woody vines grow up the sides of trees in order to reach the sun.

**A. Write true or false.**

1. Orchids get most of their nutrients from the soil. _____
2. Epiphytes are a type of woody vine. _____
3. The canopy of the rainforest contains more plants than the understory does. _____
4. Lianas grow up the sides of trees to get sunlight. _____

B. Describe two ways that plants in the canopy find nutrients.

1. _____
2. _____

**WEEK 4****Vocabulary****epiphyte**

EH-pih-fite

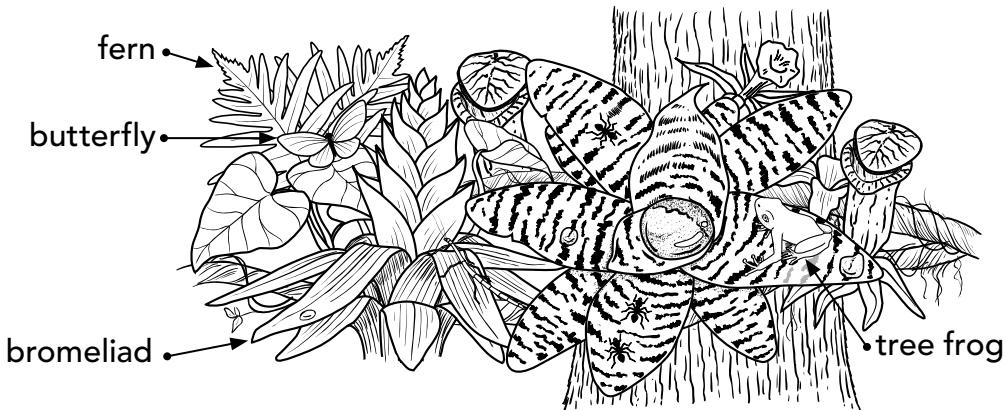
a plant that grows above the ground, supported by another plant

Big Idea 2**WEEK 4****Day 4****Weekly Question****How can so many different plants live in the rainforest?**

The rainforest is home not only to many thousands of plant species but also to an abundance of animal life, including monkeys, snakes, lizards, birds, and insects. In the rainforest ecosystem, these animals act as consumers, feeding on plants and other animals. But the animals also help the plants survive. They pollinate flowers, help scatter seeds, and provide nutrients to plants when the animals die or produce waste.

Probably no other environment on Earth houses the richness and **diversity** of life as the rainforest does. According to some estimates, the rainforest is home to about 50% of all living things on Earth! Yet we are only beginning to explore this amazingly complex ecosystem. In fact, some scientists believe that there could be millions of species in the rainforest that we have yet to discover.

A. Write a caption to go with the picture below. Use the word *diversity*.



B. List three ways that the animals of the rainforest help plants survive.

1. _____
2. _____
3. _____

**Day
5****Weekly Question****How can so many different plants live in the rainforest?**

- A. Use the words in the box to complete the paragraph.

epiphytes producers understory canopy
 rainforest diversity overstory

WEEK 4

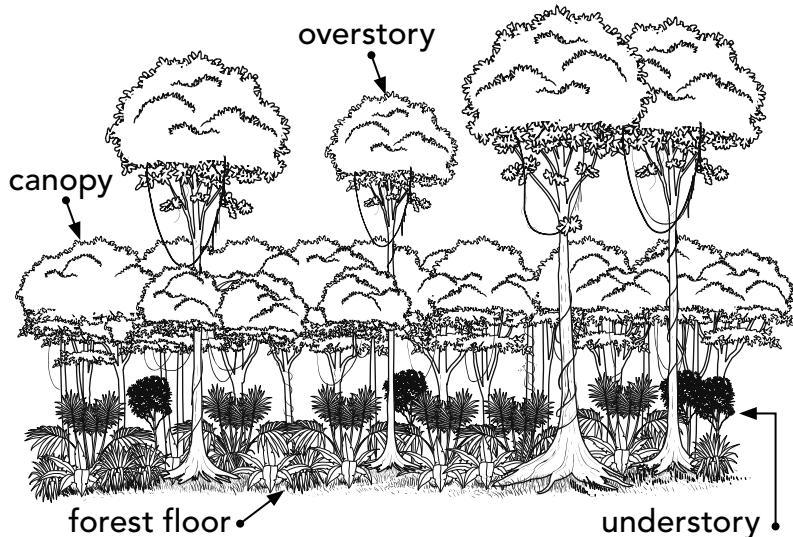
With so much sunlight and rain, the _____ ecosystem supports a wide _____ of life. Plants play the role of _____ within the rainforest. Since it is too hot and dry in the _____, and too dark in the _____, most of the rainforest plant species live in the _____. Here, plants called _____ reach sunlight by growing on the branches and trunks of trees.

- B. Use the picture of the rainforest to answer the questions.

1. In which layer do the decomposers live?

2. In which layer are most of the epiphytes?

3. Which layer gets the most direct sunlight?





Unit Review

Comprehension — **Ecosystems**

A. Fill in the bubble next to the correct answer.

1. The savanna habitat is characterized by _____.
Ⓐ seasonal ice covering a cold ocean
Ⓑ lush forest with an understory of bamboo
Ⓒ open grasslands with scattered trees
Ⓓ dense, humid jungle

2. Polar bears are _____, while pandas are _____.
Ⓐ predators, prey Ⓑ carnivores, herbivores
Ⓒ omnivores, carnivores Ⓓ producers, decomposers

3. The relationship between a predator and its prey is an example of _____.
Ⓐ a food chain Ⓑ an ecosystem
Ⓒ competition Ⓓ diversity

4. Which rainforest layer has the most diversity of life?
Ⓐ overstory Ⓑ forest floor
Ⓒ understory Ⓓ canopy

5. The polar bear's webbed feet are an example of an _____.
Ⓐ environment Ⓑ adaptation
Ⓒ ecosystem Ⓓ omnivore

6. Earthworms are _____.
Ⓐ producers Ⓑ consumers
Ⓒ decomposers Ⓓ epiphytes

B. List two ways in which earthworms are good for soil.

1. _____

2. _____

**WEEK 5****Unit
Review****Vocabulary****Word Connections**

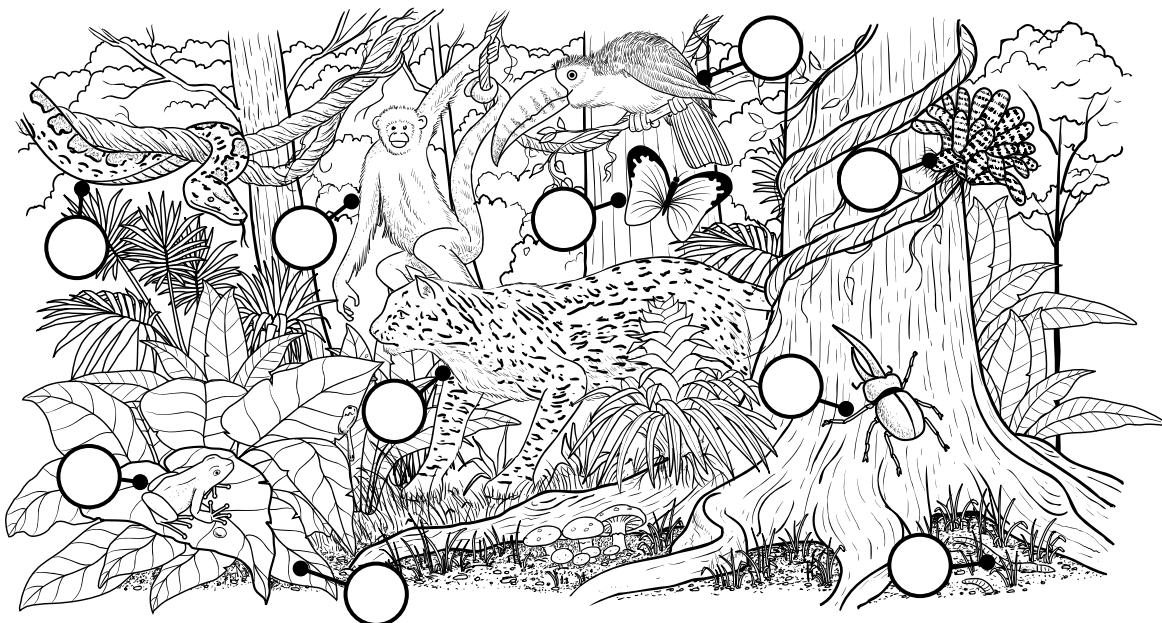
Write the word from the box that matches or completes each clue.

diversity	predator	aerate	herbivore	competition
carnivore	epiphyte	canopy	producer	decomposer
omnivore	hydrated	savanna	consumer	
exposure	food web	castings	adaptation	

1. a synonym for variety _____
2. These are made by worms. _____
3. This organism lives on dead plants or animals. _____
4. A panda's molars are an example of this. _____
5. an ecosystem found in East Africa _____
6. You need water to stay this way. _____
7. You'll find the _____ between the overstory and the understory.
8. This animal eats both plants and meat. _____
9. This animal would never eat bamboo. _____
10. This rainforest plant doesn't have roots. _____
11. When earthworms burrow through soil, they _____ it.
12. being unprotected from harsh weather _____
13. This organism relies on other organisms for food. _____
14. A _____ is made up of interconnected food chains.
15. This organism makes its own food. _____
16. the opposite of prey _____
17. Grizzly bears are in _____ with wolves.
18. A _____ would never eat another animal.

**Unit
Review****Visual Literacy****Rainforest Role Call****Daily Science****Big
Idea 2****WEEK 5**

This illustration shows just a few of the organisms in the rainforest ecosystem. In the circle next to each plant or animal, write the letter of the description that best matches the role of that organism.



- a. a decomposer living in the soil
- b. a rootless producer that grows on trees
- c. a six-legged decomposer that ingests rotting wood
- d. a consumer that is a large carnivore and lives on the ground
- e. a small carnivore that breeds in water gathered on plants
- f. a winged herbivore that flits through the canopy
- g. a large-billed omnivore that flies and perches in the canopy
- h. an omnivore that swings from branches in the canopy
- i. a predator that slithers through the understory and canopy
- j. a producer that obtains nutrients from the soil

**Unit
Review****Hands-on Activity****Movers and Shakers****Daily Science****Big
Idea 2****WEEK 5**

Here's how to make a mini-ecosystem for earthworms, using a soda bottle and a little creativity.

What You Need

- 4 earthworms (available in bait and tackle shops, pet stores, or most gardens)
- dark, moistened potting soil
- dampened sand
- moist, light-colored mulch
- 2 2-liter soda bottles with the top third of each bottle cut off (Save the tops.)
- shredded lettuce
- tape and aluminum foil

1. Pour the sand, then the mulch, and then the potting soil into each bottle.
2. Place the shredded lettuce on top of the soil.
3. Put earthworms into only one of the bottles.
4. Tape the top portion back onto each bottle.
5. Cover both bottles with aluminum foil and keep them in a cool place away from sunlight.
6. Check your bottle ecosystems every day over the next week. Keep the soil moist and add more lettuce as needed.

What Did You Discover?

1. Compare what happened to the lettuce in the two ecosystems.
-

2. Compare what happened to the soil layers.
-

3. Based on your observations, how do earthworms benefit the soil?
-

Big Idea 3



Water covers most of Earth's surface. It circulates between oceans and land in a process called the water cycle.

Key Concept

The Water Cycle

National Standard

Water, which covers the majority of the Earth's surface, circulates through the crust, oceans, and atmosphere in what is known as the "water cycle." Water evaporates from the Earth's surface, rises and cools as it moves to higher elevations, condenses as rain or snow, and falls to the surface where it collects in lakes, oceans, soil, and rocks underground.

By fifth grade, students have learned about the water cycle but may not understand how the processes of the water cycle affect the water we use. This Big Idea teaches students:

- how water is continuously recycled;
- that fresh water is stored beneath Earth's surface as groundwater;
- how the forces of weather and the shape of the land determine where precipitation falls; and
- that fresh water is a limited resource we must conserve.

Teacher Background

The amount of water on Earth is constant. The water we have now is the water we had 350 million years ago, and it is the same water we will have millions of years from now. This is because of the vital process of the water cycle. The sun's rays evaporate surface water, the water vapor cools and condenses into clouds, those clouds release precipitation back to the surface, and the cycle continues.

There is concern, however, that we may be experiencing what some call a water crisis. While the amount of water is constant, the human population keeps growing. And usable fresh water from lakes, rivers, and groundwater, which is limited to begin with, is becoming more and more polluted due to human activities. Fortunately, new water cleansing and conservation techniques are now being developed to ensure the quality and availability of this most valuable resource.

For specific background information on each week's concepts, refer to the notes on pp. 68, 74, 80, and 86.

Unit Overview

WEEK 1: Do we really drink the same water that dinosaurs did?

Connection to the Big Idea: Water moves from ocean to atmosphere to land by way of the water cycle. Students learn that through the processes of evaporation, condensation, and precipitation, water is constantly being recycled on Earth.

Content Vocabulary: *condensation, evaporate, humidity, precipitation, water cycle, water vapor*

WEEK 2: Why don't rivers and lakes soak into the ground?

Connection to the Big Idea: Precipitation can penetrate Earth's surface and collect underground as groundwater. Students learn that, in fact, water in rivers and lakes does soak into the ground. When the ground is fully saturated with water, the water then collects above the ground.

Content Vocabulary: *aquifer, groundwater, irrigation, porous, surface water, water table*

WEEK 3: What makes deserts so dry?

Connection to the Big Idea: Patterns of wind and topography determine how much rain a particular region gets. Students learn that prevailing winds blow moisture inland, but mountains often block precipitation, creating a rain shadow where deserts form. Students also discover the ways in which people survive and even thrive in deserts by using reservoirs and groundwater.

Content Vocabulary: *monsoon, oasis, prevailing winds, rain shadow, reservoir, watershed*

WEEK 4: Can we run out of water?

Connection to the Big Idea: Fresh water is a limited resource that needs to be conserved. Students learn that human populations are growing and contaminating water supplies. However, through processes of reclamation, desalination, and conservation, people can restore usable water supplies.

Content Vocabulary: *conservation, contaminate, desalination, drought, reclamation*

WEEK 5: Unit Review

You may choose to do these activities to review concepts about Earth's water supply.

p. 92: Comprehension Students answer multiple-choice questions about key concepts in the unit.

p. 93: Vocabulary Students write vocabulary words from the unit to match clues.

p. 94: Visual Literacy Students label a diagram to reinforce their understanding of the water cycle.

p. 95: Hands-on Activity Students create their own water cycle in a plastic container. Instructions and materials needed for the activity are listed on the student page.

Big Idea 3



Water covers most of Earth's surface. It circulates between oceans and land in a process called the water cycle.

Week 1

Do we really drink the same water that dinosaurs did?

Seen from space, Earth is a bright blue planet capped by polar ice and marbled by swirls of white clouds. Liquid water covers 71% of Earth's surface, and although most of Earth's water is in the oceans, water is also present in the atmosphere, on land, and in the ground. This week students learn that water moves between land, sea, and air through a process called the water cycle. Sun heats the liquid water, which evaporates and mixes with the atmosphere. As water vapor rises and cools, it condenses into a liquid and eventually falls back to the ground as precipitation.

For the most part, all the water on Earth today is the same water that has been here for billions of years. We drink the same water as the dinosaurs did, and, more importantly, the same—and only—water that future generations will drink.

Day One

Vocabulary: water cycle

Materials: page 69;
globe

Introduce the vocabulary word. Ask students to name the three different states of matter that water can form. (solid, liquid, gas) Point out that water moves through the water cycle in all three of these states. After students have read the passage, use the globe to help them visualize the large percentage of Earth's surface that is ocean water. Then have students complete the activities and review the answers together.

Day Two

Vocabulary: evaporate,
humidity, water vapor

Materials: page 70

Introduce the vocabulary. Ask students to describe what the air feels like on a humid day. (warm, wet, heavy, etc.) Have them read the passage and complete the activities. Review the answers together.

Day Three

Vocabulary:
condensation,
precipitation

Materials: page 71;
hand mirrors

Introduce the vocabulary. Distribute hand mirrors and have students "fog" the mirror with their breath. Ask them to describe what is happening. (Water vapor from their warm breath is condensing on the cooler glass.) After students have read the passage, have them complete the activities. Review the answers together.

Day Four

Materials: page 72

Inform students that plants and animals are part of the water cycle because they drink, retain, and excrete water from their systems. After students have finished reading, have them complete the activities and review the answers together.

Day Five

Materials: page 73

Have students complete the page independently. Then review the answers together.

**Day
1****Weekly Question****Do we really drink the same water that dinosaurs did?****WEEK 1**

Earth is often called the Blue Planet. That's because almost three fourths of Earth's surface is covered by water. Most of that water is salt water found in the world's oceans. Salt water contains dissolved minerals and is not drinkable. Less than 3% of all the water on Earth is fresh water, the kind we drink.

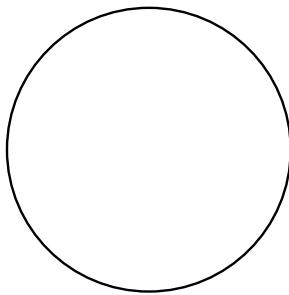
Although you might think that most of the fresh water on Earth is found in lakes and rivers, in fact, only a small fraction can be found in these places. Most of the fresh water is frozen in polar ice caps and glaciers. The rest exists in the atmosphere as gas or clouds, or is located underground. Even though water is found in different places and in different forms, all of the water on Earth is constantly interacting. Water travels from oceans to air to land and back to sea in a continuous process called the **water cycle**.

Vocabulary**water cycle**

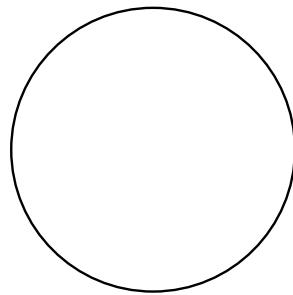
WAH-ter SY-kul
the continuous movement of water on, above, and below Earth's surface

- A.** Fill in the two circles below to create pie charts, one showing the percentage of water on Earth, and one showing the percentages of salt water and fresh water.

Percentage of Earth's surface covered by water



Percentage of salt water vs. fresh water



- B.** Write true or false.

1. Fresh water can occur as a gas, liquid, or solid. _____
2. A small fraction of fresh water is frozen in polar ice caps. _____
3. Water from the ocean can end up in the air or on land. _____
4. Three quarters of Earth's water is salt water. _____

- C.** If all of Earth's water was represented by 100 milliliters, how many milliliters of fresh water would there be? _____

Big Idea 3

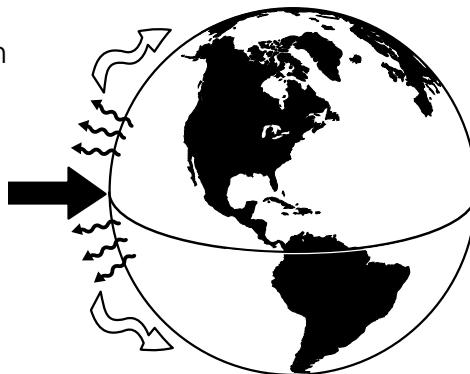
WEEK 1

Day 2

Weekly Question**Do we really drink the same water that dinosaurs did?**

The movement of water between the ocean, air, and land is powered by the sun. Energy from the sun heats liquid water and causes it to **evaporate**, or change into an invisible gas called **water vapor**. Water vapor enters the atmosphere, where it mixes with other gases. We describe the amount of water vapor in the air in terms of **humidity**. When there is more moisture in the air, the humidity is higher.

Most of the evaporation on Earth is from oceans close to the equator, where heating by the sun is greatest. Warm, humid air from the equator then moves long distances, traveling by wind and weather to anywhere in the world.



- A.** Number the steps below in the correct order to show how water evaporates in the water cycle.

- ___ Wind transports water vapor to other parts of the world.
- ___ Water evaporates and turns into water vapor.
- ___ Sun heats the water.
- ___ Water vapor mixes with other gases to become part of the atmosphere.

- B.** Use the vocabulary words to complete the sentences.

1. Heating by the sun causes water to _____.
2. The more _____ in the air, the higher the _____.

Vocabulary**evaporate**

ih-VAP-ur-AYT
to change from a liquid into a gas

humidity

hew-MID-ih-tee
the amount of moisture in the air

water vapor

WAH-ter VAY-per
the gaseous form of water