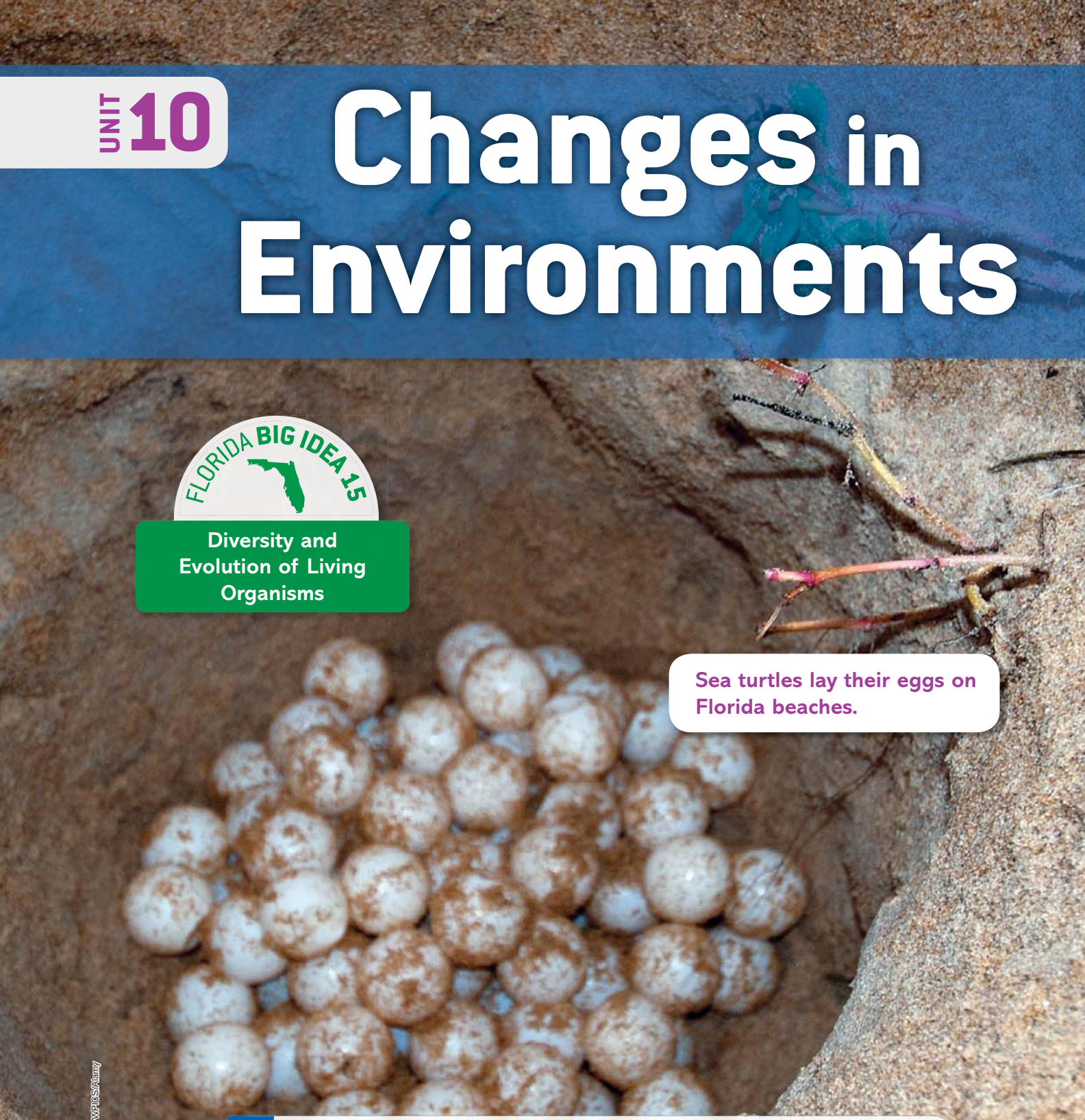
UNIT 10

Changes in Environments

FLORIDA BIG IDEA 15

Diversity and Evolution of Living Organisms



Sea turtles lay their eggs on Florida beaches.

I Wonder Why

Sea turtles hatch in the sand and make their way to the ocean. Why do sea turtles need to be protected? *Turn the page to find out.*

Here's Why

Human activities, such as walking on nests, can accidentally harm turtle eggs. Turtle nests are protected so that the young turtles can safely hatch and reach the ocean.

Essential Questions and Florida Benchmarks

Science Notebook

Before you begin each lesson, write your thoughts about the Essential Question.

SC.5.L.15.1 Describe how, when the environment changes, differences between individuals allow some plants and animals to survive and reproduce while others die or move to new locations.

ESSENTIAL **QUESTION**

How Do Environmental Changes Affect Organisms?

Engage Your Brain

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

A forest fire can change a landscape in a matter of minutes! Trees are burned, and animals run for shelter. How could a forest fire be a good thing?

_____

_____

_____

_____

ACTIVE **READING**

Lesson Vocabulary

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

_____ _____

_____ _____

_____

Compare and Contrast

Many ideas in this lesson are connected because they explain comparisons and contrasts—how things are alike and different. Active readers stay focused on comparisons and contrasts when they ask themselves, How are these things alike? How are they different?

It's All Around You

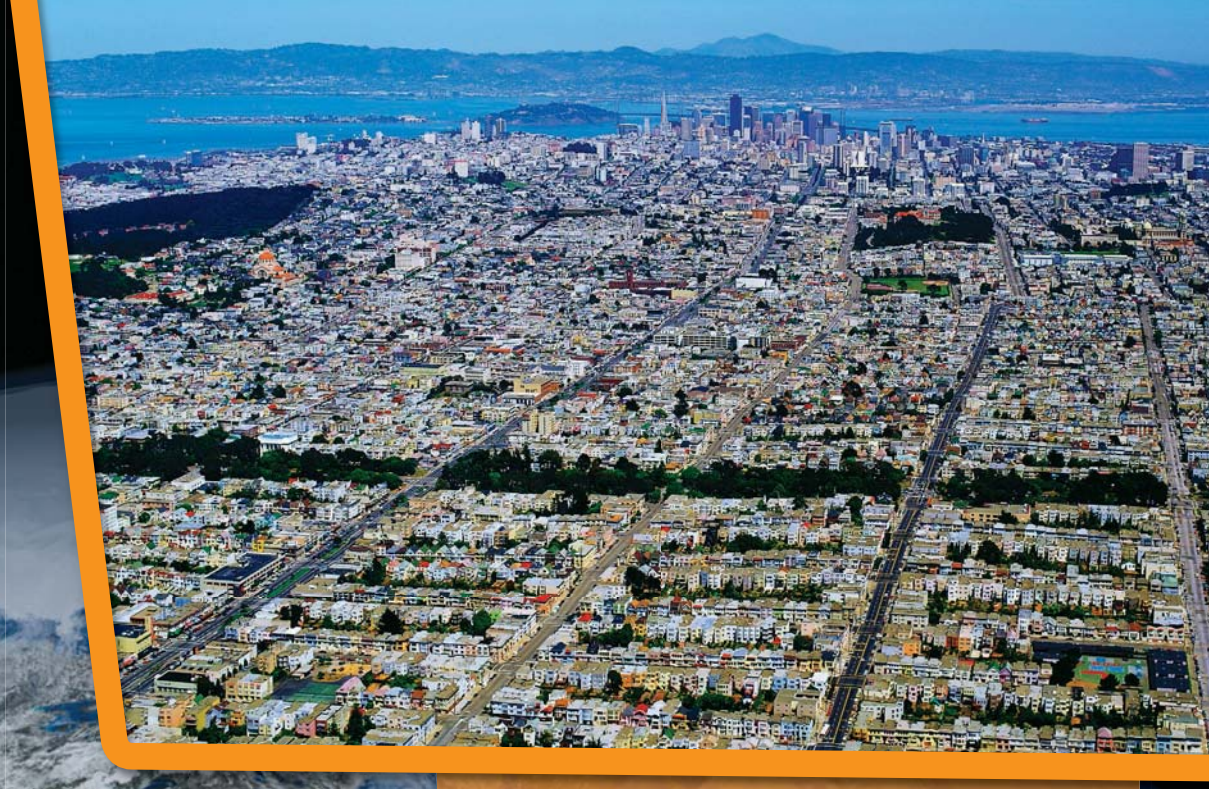
As far as we know, Earth is the only planet that we can live on. Water and air are two important reasons why life is possible on Earth.

ACTIVE READING As you read this page, circle things that make up environments on Earth.

What do oceans, clouds, fish, and birds all have in common? These things are all part of the environment. The **environment** is all of the living and nonliving things in nature. We depend on the environment for our food, air, and water and for a safe place to live. We share the environment with all other life on Earth. Every other living thing also depends on the environment to meet its needs for food, air, water, and a place to live. In this way, every living thing on Earth is connected.

You and the other living things around you interact with each other and with the nonliving parts of the environment. For example, think about the ways that honeybees interact with the living and nonliving things around them. Bees get nectar from a field of flowers, drink water from puddles, and sting animals if they get too close to the hive. Living things that interact with each other form a community. A community of living things and the nonliving things around them are called an **ecosystem**. Bees, birds, flowers, soil, water, and sunlight are all part of an ecosystem.

(bkgd) ©NASA



air

land

This photograph shows part of a city. The nonliving environment includes the streets, buildings, bridges, and cars. The living part of this environment includes people, trees, ants, birds, cats, dogs, and other living things that call the city home.

What's in Your Environment?

In the space below, draw your local environment. Label each part.

Change Comes Naturally

The environment can change in response to natural events. Some of these events occur quickly. Others take place more slowly.

ACTIVE READING As you read this page, draw a box around events that change the environment rapidly. Draw a circle around events that change the environment slowly.

Storms can bring heavy rains and flood the land, which changes the environment. Natural events, such as floods, earthquakes, volcanic eruptions, and droughts, can change the environment very quickly.

In contrast, events such as an ice age happen more slowly. An ice age happens when Earth has colder-than-normal temperatures for a very long time. Large areas of land might be covered with ice for thousands of years.

Volcanic eruptions can also change the environment over a long period of time. How? A violent eruption sends gases and dust high into the air. The materials block sunlight from reaching Earth's surface. This can cause temperatures to drop for months or years.

The last ice age reached its peak about 18,000 years ago. Ice nearly 4 kilometers thick covered large parts of North America.

Is It Cold Enough For You?

Think about the environment during an ice age. How do you think the ice age affected living things?

Volcanoes can cause rapid change as hot flowing lava scorches the surrounding ecosystem. Volcanoes can also cause long-term change as dust and gases block out the sun's rays.

A forest fire is a natural cause of environmental change. Forest fires destroy vegetation. But many ecosystems need fire to stay healthy. Some trees even make seeds that cannot grow unless they have been burned!

Animal Architects

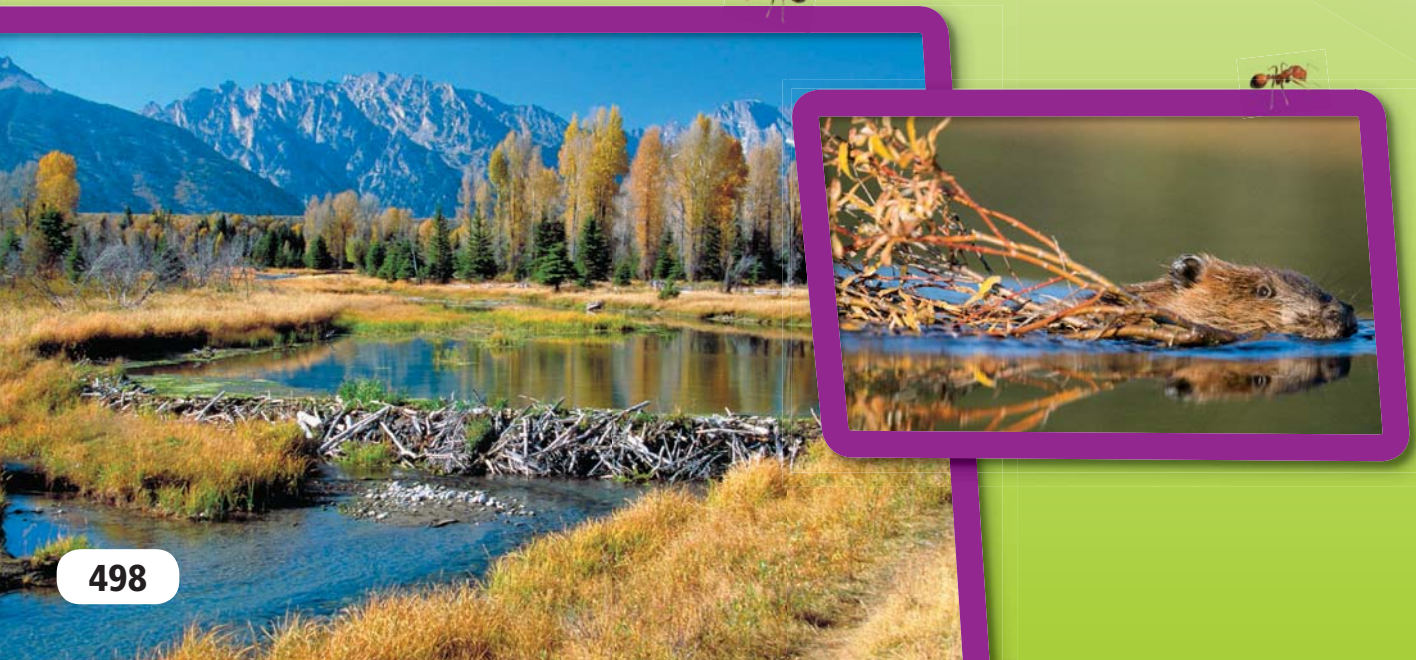
Living things are affected by their environment. Living things, in turn, can cause changes to their environment. These changes can be both helpful and harmful, depending on the point of view.

ACTIVE READING As you read this page, draw boxes around clue words that signal examples.

Beavers are only about 1 meter long, but they have a very large effect on their environment. For example, beavers use their teeth to cut trees. They use the trees to build dams across streams. Beaver dams cause ponds and wetlands to form.

The trees that beavers cut down to build their dam are harmed. In addition, organisms that lived in the flowing water of the stream and on the dry land around the stream must move.

But beaver dams provide a home for organisms that rely on ponds and wetlands. Ponds made by beaver dams increase the number of different kinds of organisms that can live in the area.



Fire ants are tiny red ants with very painful bites! They tend to attack in swarms and can even kill small animals. They live in dirt mounds that can be home to more than 100,000 ants! Fire ants were accidentally brought to the United States on a cargo ship. Since then, they have spread over all of the southeastern United States.

Harvester ants are large ants that eat seeds. As fire ants spread, they wipe out colonies of native harvester ants. Fire ants are an invasive animal. This means that they are invading an ecosystem that was not their original home. In their new home, they affect the native plants and animals.

Harvester ants are a favorite food of the horned lizard. Because there are fewer harvester ants, horned lizards have less food to eat. Now very few horned lizards remain. If they are not protected, in time there may be no horned lizards left!

Cause and Effect

Fill in the graphic organizer below to show a cause-and-effect relationship between fire ants and their ecosystem.

Cause	→	Effect

Humans Change the Environment

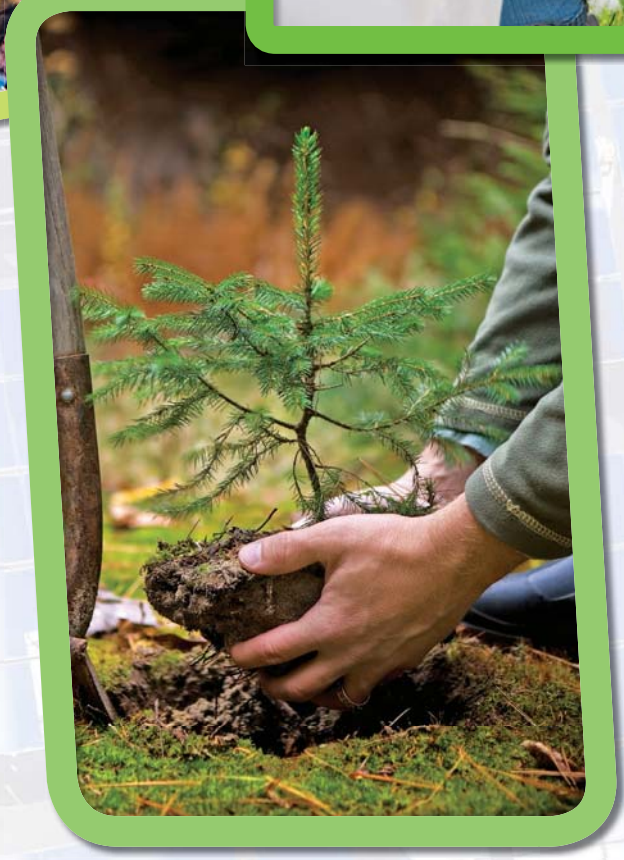
Humans are part of the environment and we have a large impact on our ecosystems. The effects of humans on the environment are both harmful and beneficial.

ACTIVE READING As you read these two pages, draw brackets around phrases that describe ways people harm the environment. Underline phrases that describe ways people help the environment.

Many human activities are harmful to an ecosystem. For example, people mine coal to get energy to power homes and businesses. Open-pit mining, like the mine shown here, kills all the plants living in that area. Other organisms must move to find food.

People cut down forests to use the wood or to clear space for homes. When the trees in an area are cut down, as they were in the bottom photograph, organisms that usually live in the forest must move or die. This effect is called habitat destruction. A *habitat* is a place where an organism usually lives.

Humans produce a large amount of waste that is disposed of as trash. Most trash ends up in landfills. If landfills are not built properly, wastes can pollute soil and water. **Pollution** is any harmful substance that gets into the environment. Pollution can kill organisms or cause diseases.



Not all changes caused by humans are harmful. People work to protect their environment and to protect organisms from harm as a result of ecosystem change. Protecting ecosystems and the organisms living in them is called **conservation.**

People try to restore habitats and repair damaged ecosystems by replanting trees and cleaning up pollution. People also remove invasive plants and animals so native organisms can survive.

In addition, people try to help organisms affected by natural disasters. People care for animals injured or orphaned by these disasters.

What Can You Do To Help?

In the space below, list things that you can do to help the environment. Include things you already do and things you would like to do in the future.

Living Things Change

Look at the snakes slithering down this page. Each snake looks different, but they are all the same kind of snake. Why don't they look the same?

ACTIVE READING As you read these two pages, circle the clue word or phrase that signals a detail such as an example or an added fact.

You don't look exactly like your parents. You have many similarities, but there are also small differences that make you unique. Every organism is slightly different from every other organism. Sometimes these differences can be very important.

Corn snakes, like the ones shown here, come in many colors and patterns. Some are very light colored, some are golden brown, and some are bright orange. Suppose a hawk is flying over a wheat field, looking for a snack. Which of these snakes is least likely to become lunch? If you guessed the golden brown snake, you are correct. Why? Its color would blend in with the wheat. The hawk would not see it, and the snake would survive. The snake would reproduce and pass on its coloring to its offspring. Its golden brown offspring would have a better chance of surviving in the wheat field and would also produce more offspring. Eventually, most of the snakes living in the wheat field would be golden brown.

DO THE MATH

Find Median and Mean

Length of Corn Snakes	
Snake 1	3.5 m
Snake 2	5.5 m
Snake 3	4.6 m
Snake 4	5.1 m
Snake 5	4.8 m
Snake 6	3.9 m
Snake 7	5.3 m

Adult corn snakes vary not only in color, but also in length. The table shows the lengths of several adult corn snakes. Study the data, and then answer the questions.

1. The median is the middle number of a data set when the numbers are placed in numerical order. Find the median of the data set. _____
2. The mean is the average of a data set. Find the mean of the data set. _____

Sometimes living things change because their environment changes. For example, bacteria have changed as a result of their changing environment. Since the discovery of antibiotics, people have learned how to kill bacteria. The first antibiotic, penicillin, saved many lives by killing bacteria that cause disease.

But in a very large population of bacteria, a few are not affected by penicillin. These bacteria survive and multiply. Over time, they produce large populations of bacteria that are not affected by penicillin.

Researchers have had to find new antibiotics to kill these bacteria. But, again, some bacteria are not killed. These bacteria continue to multiply.

Many types of antibiotics have been developed. And bacteria have become resistant to many of them. Now there are bacteria that are resistant to almost all known types of antibiotics. These bacteria are extremely difficult to kill.

Antibiotics in soaps and cleaners kill many bacteria. However, when not all of the bacteria are killed, the ones that survive multiply. Little by little, bacteria are becoming resistant to antibacterial soap and cleaners.

Gone!

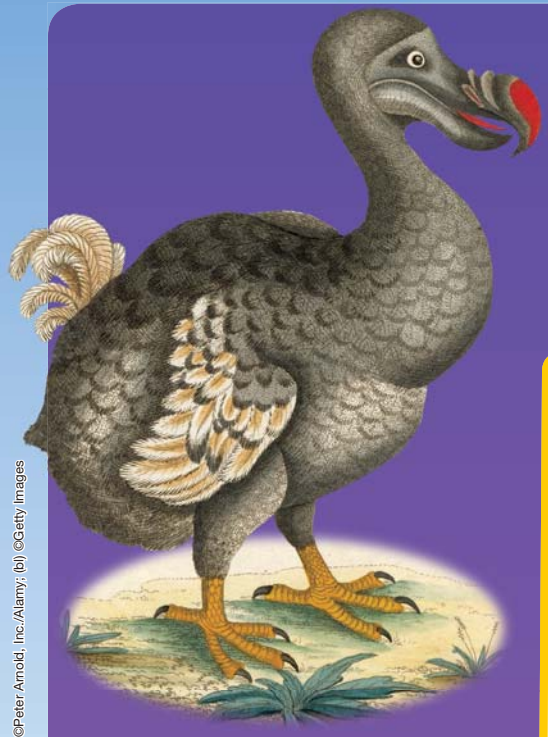
Some living things change when their environment changes. Some living things move to new places. Others simply do not survive.

ACTIVE READING As you read these two pages, underline the definition of *extinction*. Circle pictures of organisms that became extinct because of natural environmental change.

Millions of years ago, Earth was covered with giant reptiles! Now, most of those reptiles are extinct. **Extinction** happens when all the members of a certain kind of living thing die. Giant reptiles, such as the *Tyrannosaurus rex* shown here, lived in a time in which Earth was warm. Over time, the environment cooled, and many of the reptiles could not survive.

These dinosaurs, *Diplodocus* and *Triceratops* (from left to right), were large plant-eaters. They became extinct about 65 million years ago.

The Tasmanian wolf lived in Australia and New Guinea. Ranchers believed the wolves killed sheep and cattle, but this was never proven. The Tasmanian wolf was hunted to extinction by the 1930s.



The dodo bird lived on an island in the Indian Ocean. Around 1600, people came to the island. People hunted the birds for food. They cut down the island's forests to make room for houses. Nonnative animals, such as cats and pigs brought by people, destroyed the dodo birds' nests. Within 80 years after they were discovered, the dodo birds were extinct.

Time Traveler

If you could go back to the island of the dodo birds in 1600, what advice would you give to people to help conserve the dodo birds?

Today, people work to conserve habitats and protect organisms from extinction. Even so, many organisms are in danger of becoming extinct. As these organisms' environments continue to change, some will adapt, some will move, and some will not survive.

Sum It Up

Read the summary statements below. Each one is incorrect. Change the part of the summary in blue to make it correct.

1 1. Pollution is all the living and nonliving things that affect an organism's life.

_____

2. Some natural events that cause the environment to change slowly include earthquakes and floods. _____

3. People can help conserve habitats by mining, building landfills, and cutting down forests. _____

_____

4. Protecting ecosystems is an example of extinction. _____

2 The idea web below summarizes the lesson. Complete the web.

If the environment changes, living things change, 6. _____, or do not survive.

A community of living things and their environment are an 7. _____.

Living things rely on their environment for 5. _____, air, _____, and a place to live.

In a city, the buildings, streets, air, and water are all 8. _____ parts of the environment.

Fast environmental change can be caused by 9. _____ and _____.

Brain Check

Name _____

Vocabulary Review

1 Use the clues to unscramble the words below.

1. iavinvse _ _ _ _ _ _ _ _ : A nonnative animal that moves into a new place

2. ecnntavosroi _ _ _ _ _ _ _ _ _ _ _ _ : Protecting ecosystems and the organisms living in them

3. nlpituloo _ _ _ _ _ _ _ _ _ : Litter on the ground or harmful chemicals in the water

4. tsymeeocs _ _ _ _ _ _ _ _ _ : A group of organisms and their environment

5. radonsiu _ _ _ _ _ _ _ _ : A type of giant extinct animal

6. eeautrtpmer _ _ _ _ _ _ _ _ _ _ : How hot or cold something is

7. vebera _ _ _ _ _ _ : Can be helpful or harmful, depending on point of view

8. aaicbter _ _ _ _ _ _ _ _ : Have adapted to antibiotics

9. vmetneonrin _ _ _ _ _ _ _ _ _ _ : Everything around a living thing, including air, water, land, and sunlight

10. txoniecnit _ _ _ _ _ _ _ _ _ : Happened to dodo birds and Tasmanian wolves

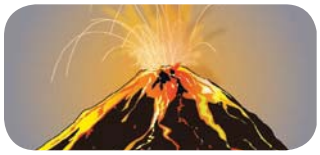
11. navoolc _ _ _ _ _ _ _ : Can cause long-term environmental change by blowing dust and gases into the sky

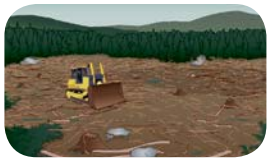
Bonus: What kind of dinosaur accidentally smashes everything in its path?

_____ _____

Apply Concepts

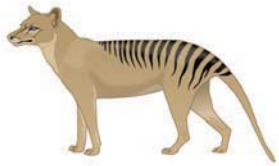
2 Label each of the following pictures as a change caused by people, by animals, or by a natural event.



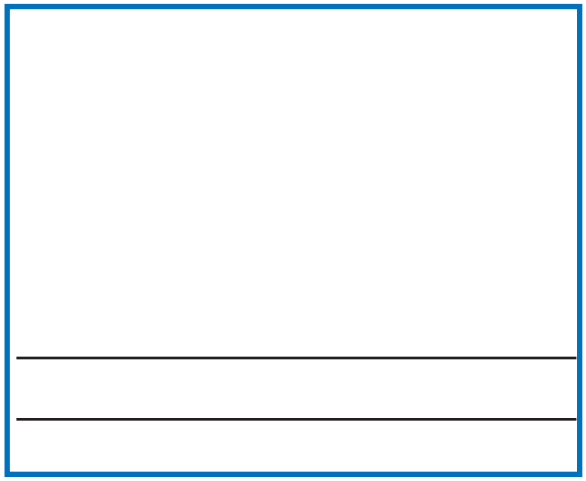


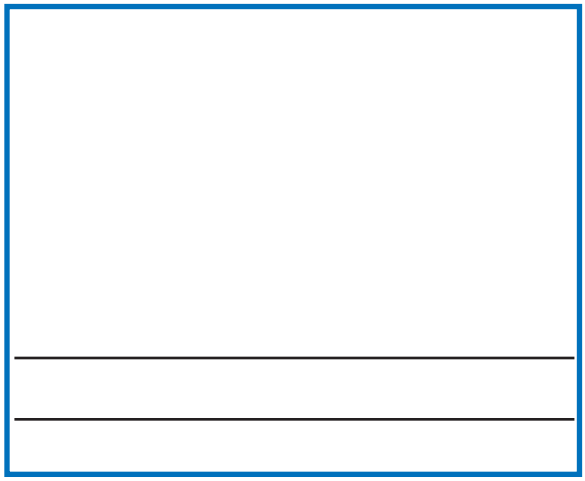
3 List some nonliving things found in Earth's environment. Give an example of how you use each thing.

4 Draw one circle around animals that became extinct because of natural events. Draw two circles around animals that became extinct because of human activities.

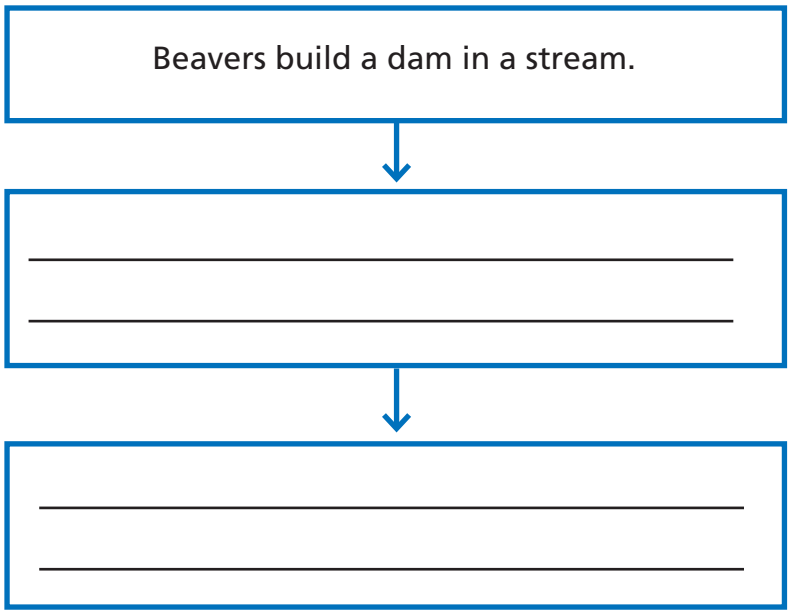


5 In the first box below, draw a landscape that includes a river. In the second box, draw how the same landscape might look after a flood. Include captions explaining how the environment changed.





6 Fill in the graphic organizer below to describe how beavers change the environment. The first box is already completed.



Describe a way that people might be able to solve each environmental problem listed below.

7 Coal mining can harm habitats and cause pollution.

8 Cutting a forest destroys habitats and can lead to soil erosion.

9 Waste from garbage in landfills can enter the ground and pollute soil and water.

10 Imagine that an orange tree frog eats only a certain type of small blue fly. A giant red fly starts moving into the tree frog's ecosystem. The red fly eats all the blue fly's food. In the space below, draw and illustrate a flow chart that shows what might happen to the frog.

Bonus: How might orange frogs change because of the red fly?

Take It Home!

See *ScienceSaurus*® for more information about organisms.

Quest for the Serpent Eagle

Jane Juniper is a wildlife surveyor. She is deep in the forest of Madagascar, an island off the coast of Africa, observing birds.

What's that sound? Jane hears a loud, screeching bird call that she never expected to hear. It sounds like... But could it be?

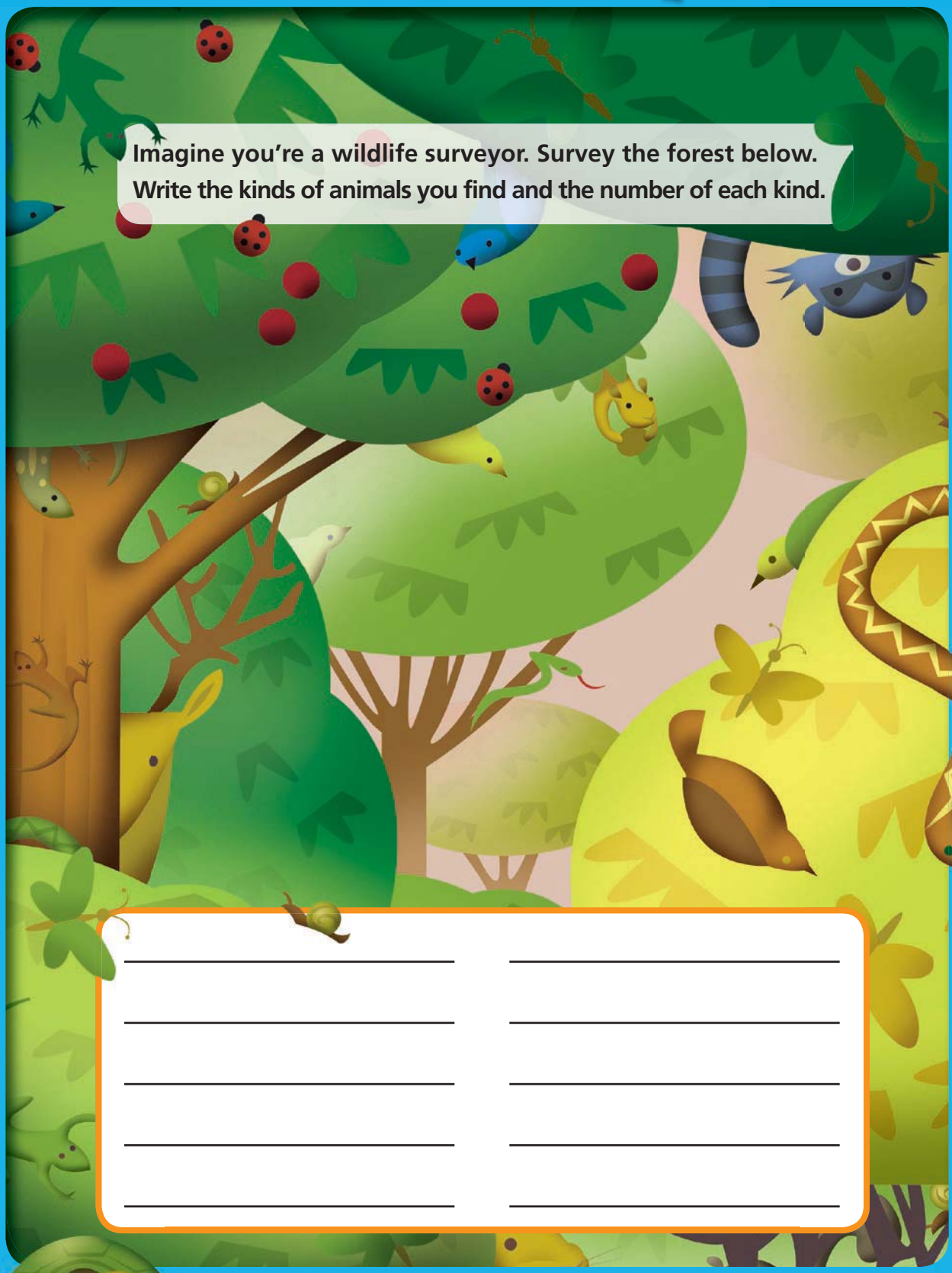
Jane tiptoes quietly through the forest, searching the trees for movement. There!

Jane stands perfectly still. The bird has a dark back and a striped chest. It has yellow eyes, and sharp talons. But it's not supposed to exist!

Jane Juniper has studied all about African birds. It takes her just a moment to be sure. But she is still amazed! With her camera she collects evidence of her find.

Jane Juniper, wildlife surveyor, found a bird that was thought to be extinct—a Madagascar Serpent Eagle!

Now You Be the Surveyor



Imagine you're a wildlife surveyor. Survey the forest below. Write the kinds of animals you find and the number of each kind.

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Name _____

ESSENTIAL **QUESTION**

How Does Drought Affect Plants?

Materials

- 5 plastic cups
- black marker
- 125 seeds
- potting soil
- water
- measuring cup

EXPLORE

A drought happens when a place gets much less rainfall than normal. What happens to plants when their environment changes and they do not get the usual amount of water?

Before You Begin—Preview the Steps

1. Label the cups A through E.
2. Fill each cup with moist potting soil. Plant 25 seeds in each cup.
3. Water the cups according to the following schedule:
   - Cup A—50 mL of water each day
   - Cup B—25 mL of water each day
   - Cup C—50 mL of water every other day
   - Cup D—50 mL of water once a week
   - Cup E—no water
4. Make a hypothesis about how the seeds in the different cups will grow.
5. Place the cups on a sunny windowsill. Observe the cups for two weeks.

Set a Purpose

What will you better understand about plants after doing this experiment?

State Your Hypothesis

Write your hypothesis, or testable statement.

Think About the Procedure

What parts of your experiment stay the same for each test group?

Why is it important to establish a control in your experiment?

What part of the experiment did you change?

Name _____

Record Your Data

Record your observations in the table below.

Plant Observations	
Cup A	
Cup B	
Cup C	
Cup D	
Cup E	

Draw Conclusions

Was your hypothesis supported? Why or why not?

_____

_____

What conclusions can you draw from this investigation?

_____

_____

_____

Claims • Evidence • Reasoning

1. What natural conditions did Cup A and Cup E represent? Explain your reasoning.

2. Did the plants in the cups that got the most water do the best? What inference can you claim, based on your results?

3. Suppose you are studying pea plants. You have evidence that half of the individual pea plants are able to survive in mild drought conditions. Why might this data be important?

4. How would you set up an experiment to test the following hypothesis: The amount of fertilizer does not affect how quickly plants grow. Draw and label a picture that shows your setup.

UNIT 10 Benchmark Review

Name _____

Vocabulary Review

Use the terms in the box to complete the sentences.

environment
pollution
ecosystem
extinction

1. A community of organisms and the environment in which they live is called a(n) _____.

2. All of the living and nonliving things that surround you make up your _____.

3. The disappearance of an entire kind of living thing is known as _____.

4. Harmful substances that get into the air, ground, and water are forms of _____.

Science Concepts

Fill in the letter of the choice that best answers the question.

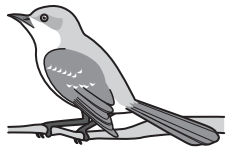
5. Twenty years ago, Mr. Jackson planted four trees in his front yard. The thickness of the bark on each tree is given in the table below.

Tree	Bark thickness (cm)
A	3.5
B	5.2
C	4.1
D	4.5

In Mr. Jackson's back yard, woodpeckers are nesting. Woodpeckers can damage a tree if they drill all the way through the bark. Based on these data, which tree is most likely to not be damaged by the woodpeckers?

(A) Tree A
(B) Tree B
(C) Tree C
(D) Tree D

6. The state bird of Florida is the mockingbird. Mockingbirds eat many types of food, including insects, berries, and seeds. Insects and seeds have hard coverings, but berries are soft.



If the plants that make berries don't grow well one year, which individual mockingbirds are most likely to survive?

(F) those who sing the loudest
(G) those with the strongest beaks
(H) those with the longest tail feathers
(I) those that lay eggs with the most spots

7. When the environment changes, differences between individuals allow some plants and animals to survive while others die or move to new locations. Which of these statements best describes how this happens?

   (A) Environmental changes cause variations in animals that lead to adaptations.

   (B) All animals are able to survive when the environment changes, which leads to their variations and adaptations.

   (C) Animals have variations, and when the environment changes, these variations allow populations to adapt and survive.

   (D) Animals have different adaptations that allow them to survive when the environment changes, which leads to variation.

8. Some zebras are taller, and some can run faster. Some have longer hair, and some have longer tails. What is the most important reason for a population to have individual variation?

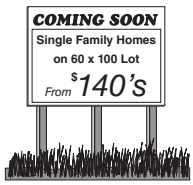
   (F) Variation helps individuals recognize each other.

   (G) Variation ensures that every individual will survive.

   (H) Variation determines how large a population can be.

   (I) Variation ensures that at least some individuals may be able to survive if the environment changes.

9. Environmental changes happen all the time. Some of these changes are easy to spot. For example, the figure below shows a sign that you might see while riding along a road in Florida.



   What can you conclude about environmental changes after seeing this sign?

   (A) Changes in the environment happen in cycles.

   (B) All changes to the environment happen naturally.

   (C) This environment will soon be changed by human activity.

   (D) Any change made to the environment will lead to extinction.

Name _____

10. Beach mice live on the Gulf coast of Florida's barrier islands. Despite their name, these beach mice are found in inland areas as well as along the beach. However, the beach mice that live inland are usually darker in color than those that live on the sandy beaches along the coast. Which of these statements explains this color difference?

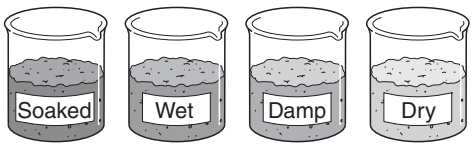
   (F) The mice are not related to each other.

   (G) The mice that live inland are colored by the mud.

   (H) The mice have adapted to living in their specific environment.

   (I) The mice on the sandy beaches have become lighter in the sun.

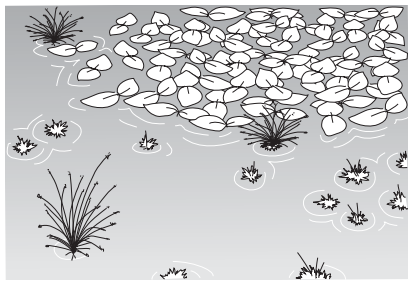
11. In a science experiment, soil was placed in four different beakers. The following diagram shows the conditions of the soil for each beaker.



Which of the following beakers models drought conditions?

(A) Beaker A
(B) Beaker B
(C) Beaker C
(D) Beaker D

12. The following picture shows a wetland in Florida and the plants that grow there.



Which of the following conditions do the plants shown have to cope with?

(F) wet soil
(G) low rainfall
(H) drought conditions
(I) very cold temperatures

Apply Inquiry and Review the Big Idea

Write the answers to these questions.

13. A farmer plants corn every year. One year, the farm experiences a drought and receives some rainfall, but much less than is normal during the growing season. Make a claim about what is likely to happen to the corn plants. Explain your reasoning.

14. Ricardo planted 50 grass seeds in three identical pots of soil. He watered one pot every day, watered one pot every third day, and gave one pot no water. He observed each pot and recorded the number of seeds that had sprouted after 30 days. The following table shows his results.
What conclusion can you draw from the data? How does the data support your conclusion?

Pot	Watered	Number of seeds sprouted
A	every day	36
B	every third day	25
C	not watered	0