

On Level



SCIENCE • GRADE 4

California Content Standards
Life Sciences: 3.A
Life Sciences: 3.B
Life Sciences: 3.C
Life Sciences: 3.D

# Interdependence in Ecosystems

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FOR:

California's  
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Content Standards  
Covered

•  
Reproducible  
Student Book

•  
Reproducible  
English-language  
Arts Activities

# Interdependence in Ecosystems

## California's Content Standards Met

### GRADE 4 SCIENCE

**LIFE SCIENCES: 3**—Living organisms depend on one another and on their environment for survival. As a basis for understanding this concept:

- a. Students know ecosystems can be characterized by their living and nonliving components.
- b. Students know that in any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive at all.
- c. Students know many plants depend on animals for pollination and seed dispersal, and animals depend on plants for food and shelter.
- d. Students know that most microorganisms do not cause disease and that many are beneficial.

### GRADE 4 ENGLISH LANGUAGE ARTS

#### 1.0 WORD ANALYSIS, FLUENCY, AND SYSTEMATIC VOCABULARY DEVELOPMENT

*Vocabulary and Concept Development 1.5*—Use a thesaurus to determine related words and concepts.

#### 2.0 READING COMPREHENSION

*Structural Features of Informational Materials 2.1*—Identify structural patterns found in informational text (e.g., compare and contrast, cause and effect, sequential or chronological order, proposition and support) to strengthen comprehension.

*Comprehension and Analysis of Grade-Level-Appropriate Text 2.2*—Use appropriate strategies when reading for different purposes (e.g., full comprehension, location of information, personal enjoyment).

*Comprehension and Analysis of Grade-Level-Appropriate Text 2.6*—Distinguish between cause and effect and between fact and opinion in expository text.

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# Student Book

*Interdependence in Ecosystems*

Print pages 5 – 18 of this PDF for the student book.

# How to Make the Student Book

- The student book is contained on pages 5–18 of this PDF. It begins on the next page.
- To make one student book, or a two-sided master copy that can be photocopied, you will print on both sides of seven sheets of 8.5" x 11" paper.
- Do a test printout of one book first to familiarize yourself with the procedure.
- Follow these instructions carefully.

## First—Select the Paper

Since you will be printing on both sides of the sheets of paper, select a good quality white paper. We recommend using at least a 22 lb sheet.

## Second—Check Printer Settings

Be sure you have the correct page setup settings for your computer and printer. You will print these pages in landscape format.

## Third—Print EVEN Pages

Open the PDF of the book you want to print. Select print from your file menu. In your printer's dialogue box enter pages 5–18 to print. Then select EVEN pages only. It is important to print only the EVEN pages first. Click "Print" to print the even pages. (**Important note:** The first page that prints will be blank. DO NOT discard this page. It will be needed to print the cover in the next step.)

## Fourth—Print ODD Pages

When the even pages have printed, flip the stack of pages over to print the odd pages. Place the stack back in your printer. Select print from the file menu again. In your printer's dialogue box, select pages 5–18 to print. Then select ODD pages. Click "Print" to print the odd pages.

## Fifth—Fold the Book

You now have a complete book. Check to be sure the pages are in the correct order with the book's cover as the top page. Then fold the stack of paper in half.

## Sixth—Staple the Book

Use an extended-length stapler to staple the pages together. Place two staples in the spine of the book.

## Please Note

Printers vary in how they output pages. Do a test printing of one book and adjust the procedure as necessary.

If you want to make a one-sided master copy, print ALL pages 5–18 at once. Then select "one-sided to two-sided" on the copy machine.

# Interdependence in Ecosystems California's Content Standards Met

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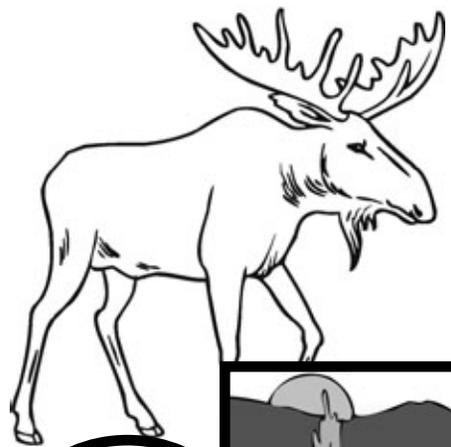


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# Interdependence in Ecosystems

by  
Linda Barr





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## INTRODUCTION

# Parts of an Ecosystem

An ecosystem is all the living and nonliving things in one area. The living things are people, other animals, plants, and other types of living things. The nonliving things include such things as water, sunlight, soil, and air.

The nonliving parts of an ecosystem are important. They affect which plants and animals can live there. For example, a tropical rain forest has lots of water and sunlight. It's also warm. Many kinds of living things thrive there.

Other forests are drier and cooler. Yet far fewer kinds of plants and animals live in these forests than in the tropical rain forest. In fact, winters in evergreen forests are very cold. Not many animals can survive them.

**ecosystem:** a large community of living things and their environment; can include many different habitats

---

The nonliving parts of a desert also limit the kinds of plants and animals that can live there. Few living things can survive with high heat and little water. Grasslands are cooler and wetter than deserts. Still, they do not get enough rain for trees. That's why they are called grasslands.

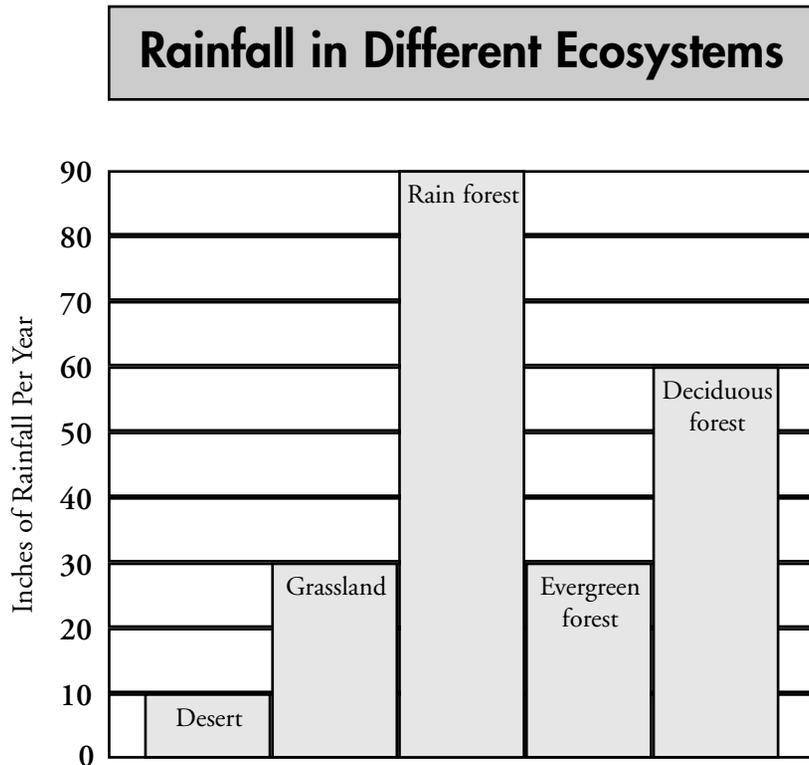
Coral reefs are underwater. Only fish, animals that make coral, and certain other living things can survive here.

Many living things can live only in certain ecosystems. Elephants would not survive in an evergreen forest. Yet some living things can live in many **habitats**. One example is cockroaches. They **adapt** to those habitats.

*What parts of your ecosystem are different from a rain forest? What parts are different from a desert?*

**habitat:** the place where a living thing can meet all of its needs  
**adapt:** to change as conditions change

This graph shows the average rainfall in several ecosystems. Which ecosystem receives the most rain? Which receives the least?



*How does the amount of rainfall affect the living things in each ecosystem?*

# Adaptation

## Body Parts

Over many, many years, animals adapt to the ecosystem where they live. They develop body parts that help them survive. For example, animals in the Arctic need to stay warm. Some have developed layers of fur and fat. Others have thick feathers.

Animals in the desert have adapted in different ways. Snakes and lizards have scales. These scales help keep water in their bodies.

Other body parts help animals survive, too. Frogs and ducks live near water. Webbed feet help them swim fast. A jaguar's muscular legs and sharp claws and teeth allow it to run fast and capture its **prey**.

**prey:** an animal that is eaten by other animals; examples: mouse, rabbit, or bird

---

## Behaviors

When winter comes, some animals cannot find enough food, so they **migrate** to a warmer place. Many birds head south for the winter. Whales migrate to have their babies where it's warmer. In spring, the birds and whales head back north.

Some animals survive winter by **hibernating**. First, they store fat in their bodies by eating a lot. Next, they find a hole in a tree or the ground and go into a deep sleep. Their heart rates slow down, and their bodies get cooler. They breathe less often. Their bodies use energy from the stored fat. Hibernators include mice, chipmunks, squirrels, and bats.

**migrate:** to travel from one place to another and back again  
**hibernate:** to go into a very deep sleep-like state for a long while

---

## CHAPTER 2

# Interdependence

*Interdependence* means that things rely, or depend, on each other. You know that animals depend on plants for food. Some animals eat plants. Other animals eat animals that ate plants. Animals also depend on plants for shelter.

Did you know that plants depend on animals? To produce seeds, flowers must receive **pollen** from other flowers. To make sure they get this pollen, many flowers produce **nectar**. As bees, birds, and bats try to sip this nectar, they pick up pollen on their bodies. Then they land on the next flower. Some of the pollen rubs off. That flower can now produce seeds.

**pollen:** the male sex cell for plants  
**nectar:** a sweet liquid found in many flowers

---

In fact, animals pollinate about one-third of the world's crops. You can thank honeybees for one of every three bites of food you eat!

People help plants by spreading seeds in gardens and on farms. When people walk through a field, some seeds may hook on to their pants or a pet's fur. These seeds fall off in places where they will have more room to grow.

Animals depend on plants. Yet plants also depend on animals to help spread their pollen and seeds.

*How do you depend on plants?*

## Changes in Ecosystems

### Changes in Living Things

The living parts of an ecosystem may increase or decrease. Because of interdependence, a change in one living thing affects the other living things in that ecosystem.

For example, a herd of deer may grow and strip a forest of its plants. Then many of the plant-eaters there may starve and die. Next, the meat-eaters will have trouble finding food.

What if the hawks in a forest leave or die? Then the number of mice, squirrels, and rabbits there will rise. They will eat more grass and plants. Soon many of the plant-eaters in that forest will be hungry.

*How might the living parts of your ecosystem change?*

---

The number of plants in an ecosystem can increase, too. The wind may bring seeds from **non-native** plants such as kudzu. Kudzu grows very quickly. It crowds out other plants. Its thick leaves block sunlight from reaching other plants.

Kudzu also absorbs nutrients from the soil. That affects the growth of other plants. As these native plants struggle to grow, the animals that eat them suffer, too. Kudzu may provide food for a few animals. Yet it destroys plants that feed and shelter many other animals.

Because of interdependence, a change in plants can upset an ecosystem.



**non-native:** organisms that normally live somewhere else

---

## Changes in Nonliving Parts

Changes in nonliving parts directly affect the living parts. For example, too little rain for months or years can kill plants. That means less food for plant-eaters. In time, fewer plant-eaters mean fewer meat-eaters.

Too much rain can drown plants and animals. Flooding can destroy the food supply and shelter for the surviving animals.

What if the average temperature drops? Plants that need warmth might not survive. Temperatures may go up. Then other plants will struggle to grow. Either way, some plants will disappear. Animals that eat only certain plants might lose their food supply. Then they, too, will struggle to survive.

---

## Adapting to Changes

### Slow Changes

An ecosystem may change slowly. Let's say that every year an ecosystem receives a little less rain. Some of the plants might send their roots deeper. Some of the animals might be born with a thicker skin. It will help keep water from leaving their bodies. These survivors will produce seeds or young. Many of the new plants and animals will be able to survive with less water.

Plants or animals that cannot cope with a drier **climate** will die. Most will not produce seeds or young. In time, only plants and animals that can cope with less water will live here.

*How might the nonliving parts  
of your ecosystem change?*

**climate:** the average weather conditions of a place over a period of years

---

## Fast Changes

What if change happens quickly? In a month or two, a drought can kill many plants in an ecosystem. They will not have enough time to adapt.

Some of the animals there may move to a new ecosystem. Yet it may not have enough food for more plant-eaters or more meat-eaters.

Plants can move, too. Animals, wind, or water may pick up seeds in the dry ecosystem and carry them. Some of these seeds may sprout in a new ecosystem. They might help feed the animals there. They might also crowd out the plants that already grow there.

---

## Human Changes

People can cause both slow and fast changes. One example is **pollution**. Chemicals may wash into rivers and lakes. A few kinds of plants and animals may survive. Others may die or stop growing.

Burning gasoline and coal releases harmful gases into the air. These gases can form clouds of **acid rain**. It may harm or kill trees or plants.

Cutting down a forest destroys habitats. Some animals may move to a nearby forest. Yet many living things cannot move. The forest no longer provides the food or shelter they need. They may die before they can adapt.

*What other human actions can quickly change the conditions in an ecosystem?*

**pollution:** harmful substances that enter the environment  
**acid rain:** rain, snow, or sleet that has been made acidic by pollution in the air

---

Sometimes one plant or animal makes a change to survive. For example, during a drought, some berry bushes might stop producing fruit. Instead of berries, a bear might eat other fruit. When the berries grow again, the bear will eat them. This kind of change is called **accommodation**.

Some plants and animals require certain conditions. They are the most likely to die when their ecosystem changes. For example, giant pandas eat mostly bamboo. Bamboo forests are disappearing. So are the pandas.

When an ecosystem changes, some plants and animals can adapt. They will survive. Others cannot adapt and will die.

**accommodation:** a temporary change for survival

## Other Types of Organisms

Monerans, fungi, and protists are three large groups of living things that are different from plants and animals. Some are microorganisms so tiny that you cannot see them without a microscope. However, they greatly affect ecosystems.

### Monerans

Almost all monerans are one-celled microorganisms called **bacteria**. For example, bacteria called Salmonella are often found on eggs that have not been washed properly. They can make you really sick. Cooking kills these bacteria.

Yet certain kinds of bacteria can be helpful. Some live inside you. They help your body break down food so you can use nutrients in it. A certain type of bacteria turns milk into yogurt.

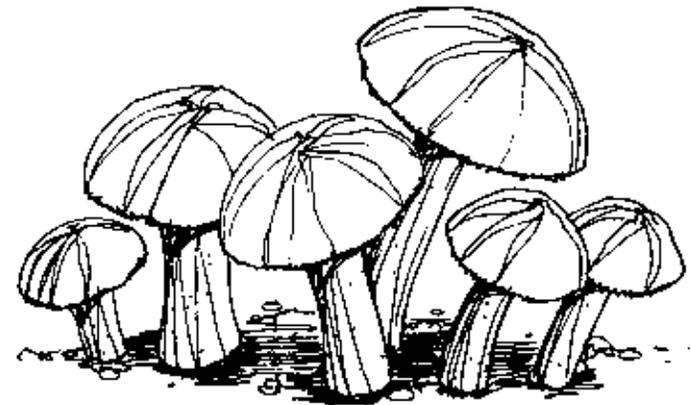
**bacteria:** a group of one-celled microorganisms; can be shaped like a sphere, a rod, or a spiral

---

### Fungi

Fungi are another group of organisms. (The singular of fungi is fungus.) Fungi include mushrooms, yeast, and molds. Like animals, fungi get their energy by eating plants and animals.

Some fungi are helpful. They get rid of dead plants and animals. They break them down and return their nutrients to the soil. Then plant roots can absorb those nutrients. Bakers use yeast to make bread. Many people enjoy eating mushrooms.



**fungi:** a group of microorganisms that get their energy by breaking down dead plants and animals

---

Other fungi can ruin crops. They can spoil food we intended to eat. Fungi cause disease, too. One is itchy athlete's foot. Yet fungi can also cure diseases. Penicillin, made from fruit mold, has saved millions of lives.

### **Protista**

A third group of organisms is called protista. Some tiny protists are like animals. They get their energy by eating other living things. A large group of protists is like plants. They can turn sunlight into energy. Billions of protists float on the ocean. They take carbon dioxide out of the air. They also produce most of the oxygen we breathe.

*Should we find ways to kill all bacteria and fungi? Why or why not?*

**protista:** a major group of organisms: some are plantlike and some behave like animals

---

Protists are food for tiny organisms. These organisms are then eaten by small fish. Small fish are eaten by bigger fish, and so on. Protists are the first link in every ocean food chain. Without them, we would have fewer fish to eat. We would also have less oxygen to breathe.

### **Linked Together**

You have read how living things are affected by the nonliving parts of their ecosystem. Animals also depend on plants. Many plants, in turn, depend on animals. The number and kinds of plants and animals in an ecosystem can change. Each change affects the other living things there. Living things are truly interdependent!

*Write a paragraph that summarizes what you learned in this book.*

---

## Glossary

**accommodation**—a temporary change for survival

**acid rain**—rain, snow, or sleet that has been made acidic by pollution in the air

**adapt**—to change as conditions change

**bacteria**—a group of one-celled microorganisms; can be shaped like a sphere, a rod, or a spiral

**climate**—the average weather conditions of a place over a period of years

**ecosystem**—a large community of living things and their environment; can include many different habitats

**fungi**—a group of microorganisms that get their energy by breaking down dead plants and animals

**habitat**—the place where a living thing can meet all of its needs

**hibernate**—to go into a very deep sleep-like state for a long while

**migrate**—to travel from one place to another and back again

**nectar**—a sweet liquid found in many flowers

**pollen**—the male sex cell for plants

**non-native**—organisms that normally live somewhere else

**pollution**—harmful substances that enter the environment

**prey**—an animal that is eaten by other animals; examples: mouse, rabbit, or bird

**protista**—a major group of organisms; some are plantlike and some behave like animals

---

## To Find Out More . . .

Want to learn more about interdependence in ecosystems?

### Try these books

*Animal Adaptations* by Elizabeth Rose. PowerKids Press, 2006.

*Changing Climate* by Sally Morgan. Franklin Watts, 2005.

*Climate Change* by Shelley Tanaka. Groundwork Books, 2006.

*How Do Animals Adapt?* by Bobbie Kalman. Crabtree, 2000.

*What Do Animals Do in Winter?* by Melvin and Gilda Berger. Ideals, 1995.

*What Is Migration?* by John Crossingham and Bobbie Kalman. Crabtree, 1997.

### Access these Web sites

Go to this site to learn more about different kinds of habitats.

[www.nationalgeographic.com/geographyaction/habitats/](http://www.nationalgeographic.com/geographyaction/habitats/)

Find out more about how animals adapt at the Online Learning Haven.

[www.learninghaven.com/science/articles/animals\\_and\\_adaptation.htm](http://www.learninghaven.com/science/articles/animals_and_adaptation.htm)

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ENGLISH-LANGUAGE ARTS • GRADE 4

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Structural Features of Informational Materials: 2.1
Comprehension and Analysis of Grade-Level-Appropriate Text: 2.2
Comprehension and Analysis of Grade-Level-Appropriate Text: 2.6

# English-language Arts Activities

## *Interdependence in Ecosystems*

Print pages 20–24 of this PDF for the reading activities.

# Use a Thesaurus

## TRY THE SKILL

A thesaurus lists synonyms for words. A synonym is a word that means the same, or almost the same, as another word.

As you write reports, a thesaurus can help you use a variety of words instead of repeating the same word over and over. However, you must pay attention to slight differences in the meanings of the synonyms.

For example, one thesaurus lists these synonyms for *walk*—*stroll*, *shuffle*, *march*, *limp*, *stomp*. The thesaurus explains the exact meaning of each synonym. Which synonyms do you think work best in these sentences?

1. The soldiers \_\_\_\_ in the parade.
2. The friends decided to \_\_\_\_ down to the pizza shop.

In the first sentence, *march* works best. That's what soldiers often do. In the second sentence, you might use *stroll*. *Shuffle* and *limp* suggest that the walker is tired or hurt. *Stomp* suggests anger. Good writers choose the best synonym for each sentence.

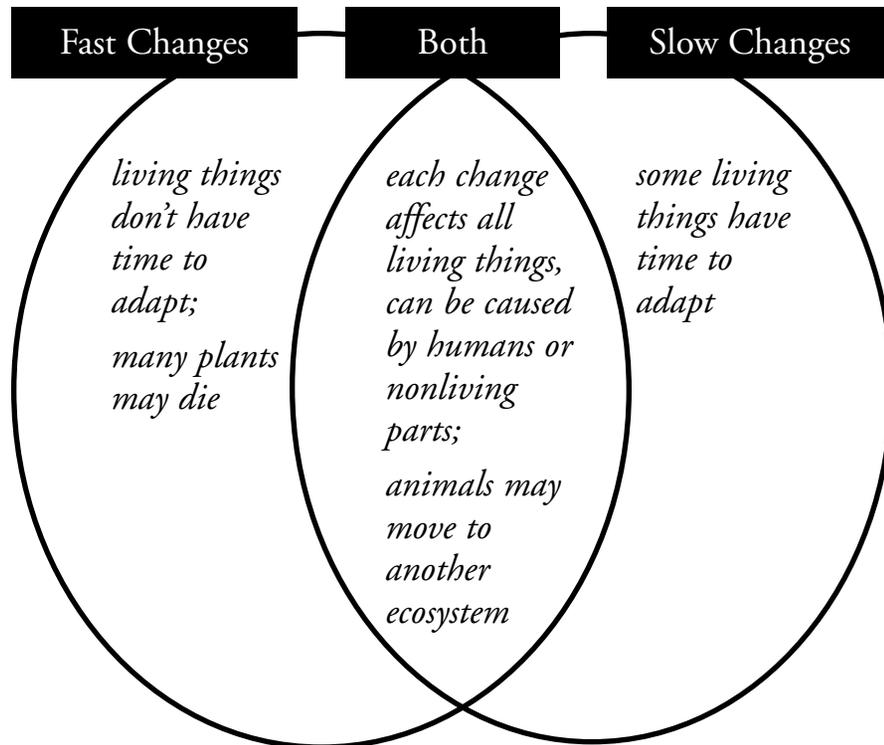
Find the underlined word in each sentence. Then decide which synonym would best replace that word. Look them up in a thesaurus or dictionary, if you wish.

1. During the winter, many animals cannot find enough food.  
Ⓐ locate   Ⓑ discover   Ⓒ uncover
2. Many flowers make nectar to attract birds, bees, and bats.  
Ⓐ build   Ⓑ produce   Ⓒ form
3. Plant roots take nutrients from the soil.  
Ⓐ grab   Ⓑ get   Ⓒ absorb
4. Some changes to an ecosystem are slow.  
Ⓐ creeping   Ⓑ gradual   Ⓒ delayed

# Compare and Contrast

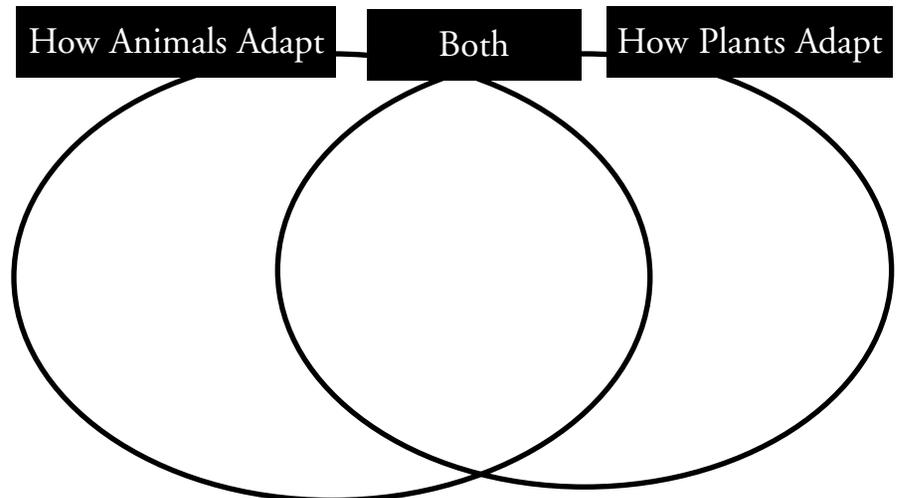
## TRY THE SKILL

When you compare two things, you tell how they are alike. When you contrast them, you tell how they are different. A Venn diagram uses overlapping circles to help you compare and contrast. This Venn diagram compares and contrasts slow and fast changes to an ecosystem.



Draw the Venn diagram shown below on the back of this page. Then compare and contrast how plants and animals adapt to changes in their ecosystem over time. Use the phrases in the box.

- those that can cope with the changes reproduce
- may move to another ecosystem
- may grow longer roots to reach water
- those that cannot cope with the changes die
- may grow thicker fur or feathers
- may migrate sooner or later than usual
- may grow a thicker covering to reduce water loss
- may change what they eat
- may grow closer to the ground to avoid cold winds



# Fact and Opinion

## TRY THE SKILL

A fact can be proved. For example, scientists can measure the thickness of the fat layer on polar bears. An opinion is what someone believes. For example, someone might write that polar bears are the fiercest predators in the Arctic. However, other people might disagree with this opinion.

Being able to tell facts from opinions makes you a better reader. Opinion sentences often have words such as *better*, *worse*, *should*, *difficult*, *toughest*, and *easy*. Here are more examples:

### Facts

Snakes and lizards have scales to help reduce water loss.  
Some desert animals do not drink water at all.

### Opinions

Hyenas are the best example of animals that hunt in packs.  
We should protect certain animals from predators.

Mark each statement below *F* for fact or *O* for opinion.

1. Most plants in very cold ecosystems are small. \_\_\_\_
2. The most interesting animals in the rain forest live in the trees. \_\_\_\_
3. Gray whales migrate from Alaska to warmer waters off Mexico. \_\_\_\_
4. The migration of gray whales is a fascinating journey. \_\_\_\_
5. Watching an eagle eat a fish is disgusting. \_\_\_\_
6. Eagles use their strong, sharp beaks to tear the fish apart. \_\_\_\_
7. The fish in the deepest part of the ocean come in amazing sizes and shapes. \_\_\_\_
8. Scientists should spend more time studying these fish. \_\_\_\_
9. Now write a fact and an opinion about how living things adapt to their ecosystems.

**Fact:** \_\_\_\_\_

\_\_\_\_\_

**Opinion:** \_\_\_\_\_

\_\_\_\_\_

# Evaluate New Information

## TRY THE SKILL

After you read new information, compare it to what you know and what you read before. In this way, you will increase your understanding of the world around you. For example, read this paragraph:

A herd of deer may grow and strip a forest of its plants. Then many of the plant-eaters there may starve and die. Next, the meat-eaters will have trouble finding food.

What if the hawks in a forest leave or die? Then the number of mice, squirrels, and rabbits there will rise. They will eat more grass and plants. Soon many of the plant-eaters in that forest will be hungry.

**This paragraph tells how an increase in deer and a decrease in hawks can both reduce the food supply for plant-eaters. Then answer this question: Are deer and hawks the only animals that can affect the plant supply in a forest? Think about what you know and what you have read. Couldn't too many rabbits or moose eat most of the plants in a forest? Couldn't a decrease in wolves or mountain lions cause an increase in the small animals there? Then those small animals would eat more of the plants. You can conclude that almost any change in the animals in an ecosystem could affect the plants growing there.**

Read this paragraph. Then shade the circle next to the correct conclusion.

The nonliving parts of a desert also limit the kinds of plants and animals that can live there. Few living things can survive with high heat and little water. Grasslands are cooler and wetter than deserts. Still, they do not get enough rain for trees. That's why they are called grasslands!

1. Which conclusions are correct?
  - (A) Grasslands receive more rain than deserts.
  - (B) The nonliving parts of grasslands do not limit the living things there.
  - (C) The nonliving parts of grasslands and deserts are much the same.
2. Which conclusions are correct?
  - (A) Most living things from grasslands could survive in a desert.
  - (B) More plants and animals live in grasslands than in deserts.
  - (C) The colder and wetter an ecosystem is, the more plants and animals that can live there.

# Answer Key

## Use a Thesaurus

1. A
2. B
3. C
4. B

## Compare and Contrast

### How Animals Adapt

may grow thicker fur or feathers  
may migrate sooner or later than usual  
may change what they eat

### How Plants Adapt

may grow longer roots to reach water  
may grow closer to the ground to avoid cold winds

### Both

those that can cope with the changes reproduce  
those that cannot cope with the changes die  
may move to another ecosystem  
may grow a thicker covering to reduce water loss

## Fact and Opinion

1. F
2. O
3. F
4. O
5. O
6. F
7. O
8. O
9. Possible fact: Adaptation helps animals survive.  
Possible opinion: Animals are more adaptable than people.

## Evaluate New Information

1. A
2. B