



Life Science

Animals and Plants in Their Environment

Basic Level

Energy in Ecosystems

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FOR:

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•
Student Book

•
Assessments and
Reading Activities

Energy in Ecosystems

What roles do plants and animals play in their environments?

CORE CURRICULUM STATEMENTS

Plants and animals depend on each other and their physical environment.

Green plants are producers because they provide the basic food supply for themselves and animals.

All animals depend on plants. Some animals (predators) eat other animals (prey).

Animals that eat plants for food may in turn become food for other animals. This sequence is called a food chain.

Decomposers are living things that play a vital role in recycling nutrients.

Plants manufacture food by utilizing air, water, and energy from the Sun.

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Energy in Ecosystems

BL

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Green plants are producers because they provide the basic food supply for themselves and animals.

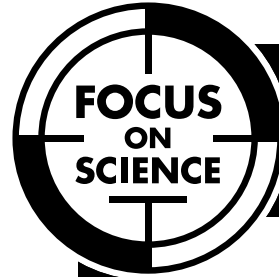
All animals depend on plants. Some animals (predators) eat other animals (prey).

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Linda Barr





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Curriculum materials for **your** content standards

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– Predict –

*What do you think you will
learn from this book?*

INTRODUCTION

Energy on the Move

Are you full of energy today? Living things need energy to live.

In this book, you'll learn how this energy starts with the sun. First, plants turn sunlight into food energy. Next, that energy flows from plants, to animals who eat plants, and then to more animals, including you.

CHAPTER 1

Plants and Sunlight

Plants make their own food. They use a process called **photosynthesis**. *Photo* means “light.” *Synthesis* means “put together.” During photosynthesis, plants use sunlight to put things together.

Sunlight is one type of light energy. Leaves trap this light energy. They use it to “put together” carbon dioxide from the air and water to make sugar. Plants use this sugar to live and grow.

Plants do not obtain their energy from the sun. They use the sun's energy to make their food.

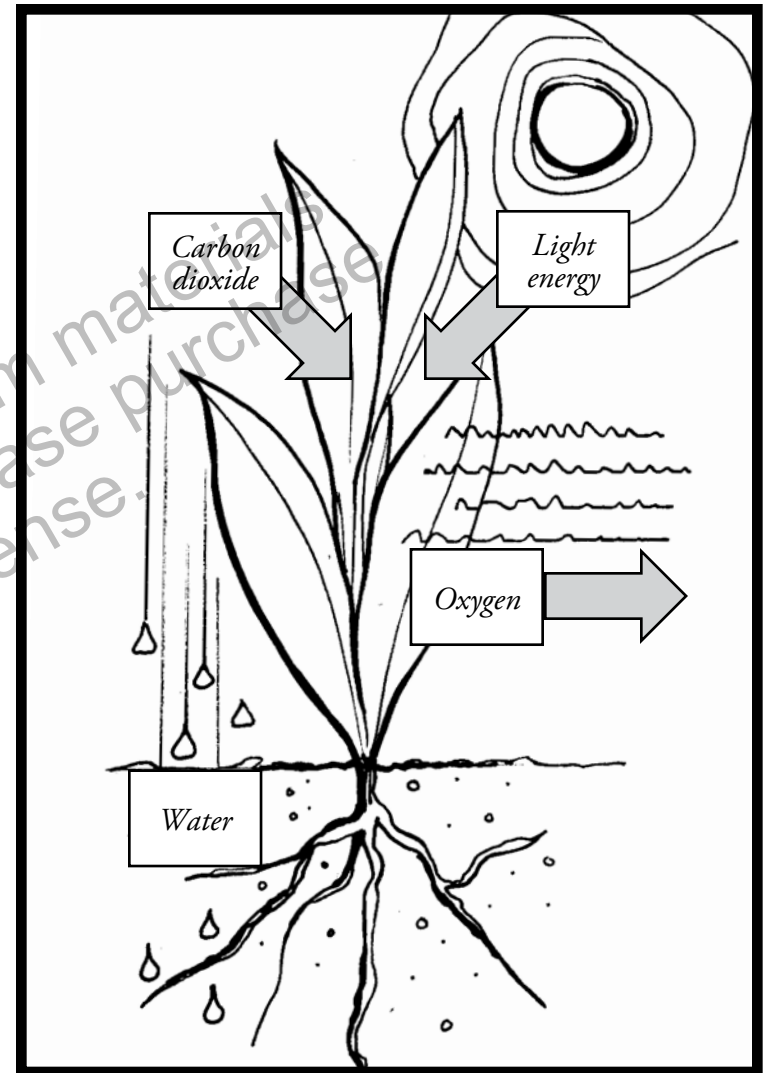
photosynthesis: the process by which plants use sunlight, carbon dioxide, and water to produce food energy

Plants are important to all animals, including us. When plants make food, they release oxygen. We need to breathe oxygen to survive.

Plants are also important to us as a source of food. We eat and make food from plants. We use this food to give our bodies energy to stay warm, move, and grow.

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Photosynthesis



Plants combine sunlight, carbon dioxide, and water to make food. As they make food, they release oxygen into the air. We need to breathe in oxygen to survive.

– Conclude –

If there were no plants, we would not have to worry about eating. Why not?

Classifying Consumers

Plants are **producers**. They produce, or make, their own food. Living things that cannot make their own food are **consumers**.

You and all other animals must eat, or consume, something to get energy to live. There are four types of consumers.

Herbivores

An herbivore is an animal that eats only producers (plants). *Herb* means “plant.” *Vor* means “to eat.” Herbivores include animals such as grasshoppers, rabbits, and deer.

producer: a living thing that makes its own food energy
consumer: a living thing that gets its energy by eating other living things

Carnivore

A carnivore is an animal that eats only other animals. *Carne* means “meat.” Wolves, hawks, and lions are carnivores.

Omnivore

Omnivores eat both plants and other animals. You are probably one of them. *Omni* means “all.” Other omnivores include bears and raccoons.

Decomposers

Decomposers help decay, or decompose, dead things. Mushrooms, buzzards, and worms are decomposers. They get their food and energy from dead things.

– Describe –

What would a meal for an omnivore be like?

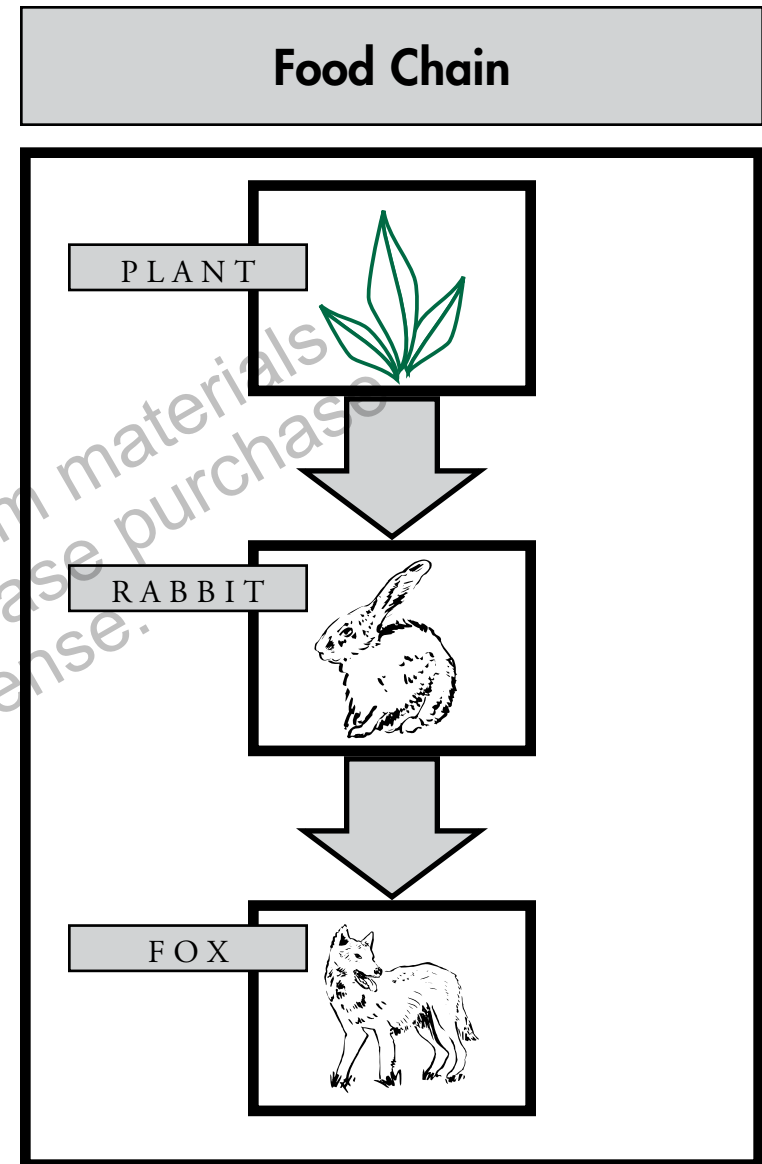
Food Chains and Food Webs

Plants use light energy to make food. The plant uses much of this energy to live. It stores the rest.

A rabbit eats the plant and gets the plant's stored energy. The rabbit uses much of this energy and stores the rest. A fox eats the rabbit and gets the rabbit's stored energy. The fox uses much of the energy and stores the rest.

Look at the food chain on the next page. It shows how energy flows through an **ecosystem**.

ecosystem: all living and nonliving things that live in a certain location



– Apply –
Describe a food chain that ends with you.

Food chains also exist in water. Ocean food chains begin with tiny, plant-like **organisms** floating on the water. Tiny consumers eat these organisms.

Then, small fish eat the tiny consumers. Large fish eat the small fish. An ocean food chain may end with a killer whale!

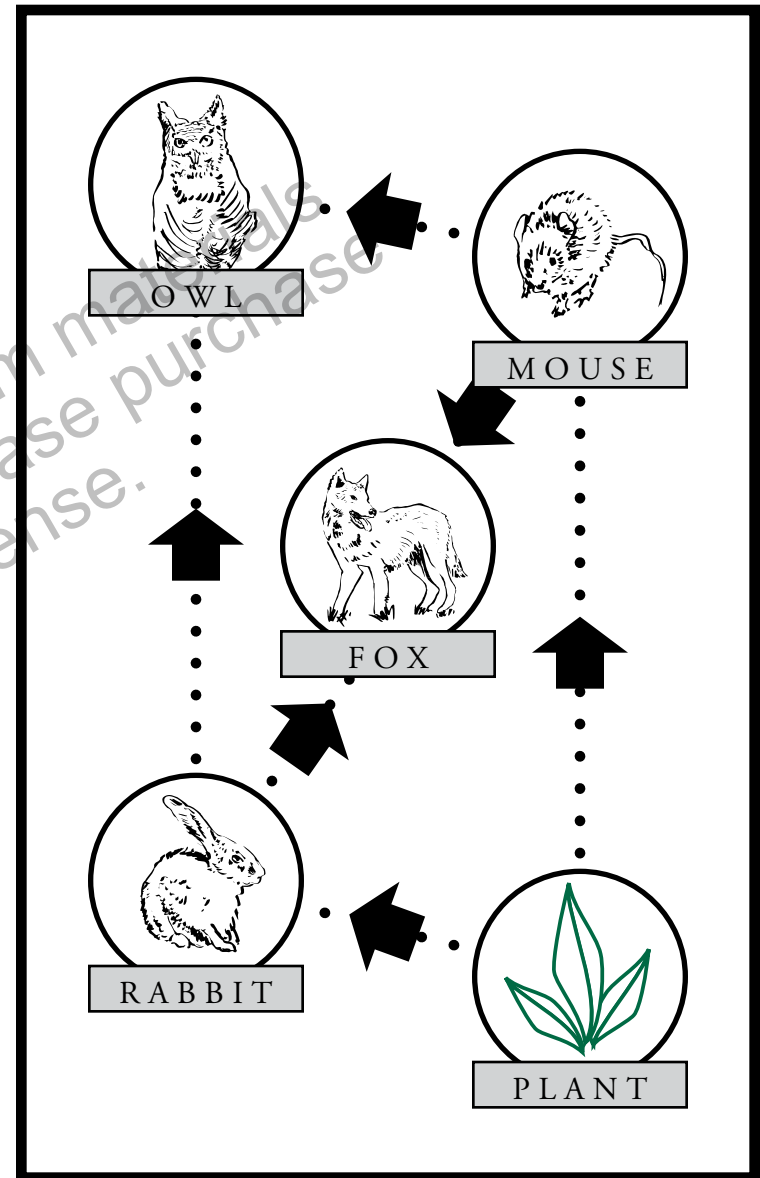
A food chain is only part of the story, however. A fox doesn't just eat rabbits. Most animals are part of several food chains. Together, these chains make a food web.

– Analyze –

How do you know that you are part of a food web?

organism: any living thing

Food Web



The Energy Pyramid

Energy flows through a food chain. Yet only a little of it reaches the last link in the chain. Each link uses most of the energy it receives to live, grow, move, and stay warm.

For example, a leaf receives energy from sunlight. It uses most of it. When a rabbit eats the leaf, it receives only a little energy from it. The rabbit must eat many leaves to get the energy it needs. A wolf must eat many rabbits to get enough energy to survive.

Food Webs

People are the top level of many food webs. For example, cows eat grass. Then we drink milk and eat meat from cows. The energy from sunlight is passed from the grass, to the cow, and then to us.

All of the energy that keeps us alive starts with plants. All of the energy stored in plants starts with sunlight. Without the sun, there would be no food.

– Infer –

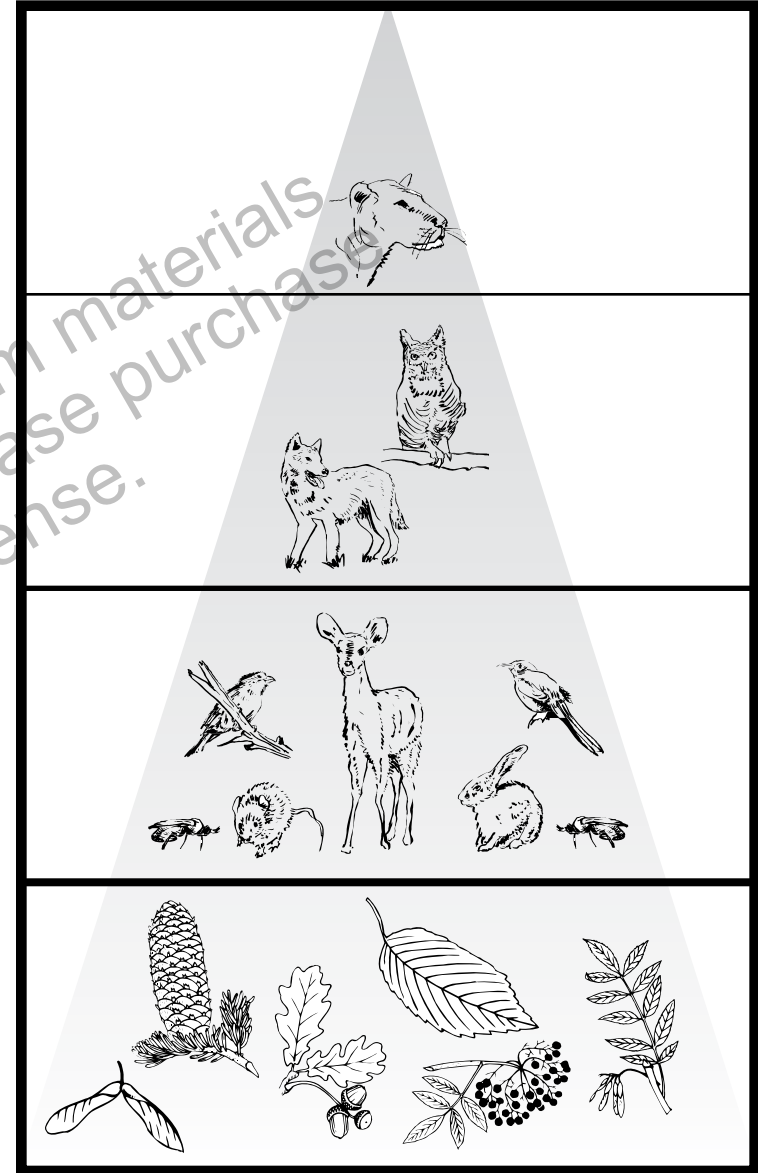
How can plants continue to grow when the sky is cloudy?

An energy pyramid shows the amount of energy passed along a food chain. Look at the forest energy pyramid on the next page. It takes many living things to support one cougar!

At the cold South Pole, an energy pyramid would start with millions of tiny, plant-like organisms. On the next level would be many fish that eat those plants. The third level might contain seals, penguins, and squids. At the top might be killer whales.

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Forest Energy Pyramid



– Infer –

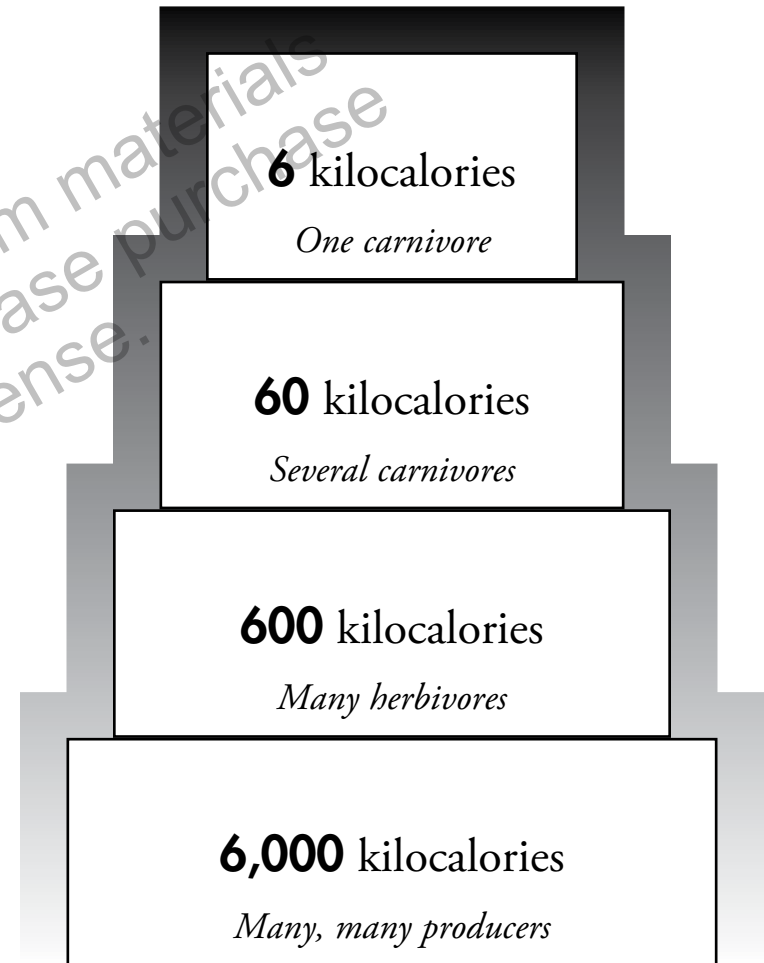
Why is an energy pyramid big at the bottom and small at the top?

All pyramids begin with the energy in plants. Yet each link uses much of that energy. Little energy is left by the fourth link. So most food chains have no more than four links. That's why we need sunlight to allow more plants to grow. Sunlight provides new energy to flow through food chains.

Look at the diagram on the next page. It shows how little energy is left at the top of a pyramid.

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A calorie is a measure of energy. A **kilocalorie** is 1,000 calories. You probably eat food containing 1.5 to 2 kilocalories each day.



kilocalorie: a measure of energy; equal to 1,000 calories

– Apply –
What would one energy pyramid on a farm look like?

Humans Affect Food Chains

For years, the chemical DDT was used to kill harmful insects. Millions of pounds of it were sprayed on crops. In time, scientists realized that DDT was also killing helpful insects, fish, and birds. DDT killed nearly all of the bald eagles. How?

DDT worked its way through the food chain. First, rain washed DDT off crops and into lakes. The amount of DDT in one large lake was very small, less than one drop.

However, algae in that lake absorbed the DDT. As small fish ate many plants, the amount of DDT in their bodies rose. As bigger fish ate many smaller fish, the amount of DDT in their bodies rose even higher.

Eagles ate many big fish. The high amounts of DDT in the eagles' bodies made their eggshells too thin. Few chicks hatched.

In 1972, DDT was banned in the United States. Other nations still use it.

– Apply –

Can you think of another example of how conclusions and ideas change as new knowledge is gained?

Glossary

consumer—a living thing that gets its energy by eating other living things

ecosystem—all living and nonliving things that live in a certain location

kilocalorie—a measure of energy; equal to 1,000 calories

photosynthesis—the process by which plants use sunlight, carbon dioxide, and water to produce food energy

organism—any living thing

producer—a living thing that makes its own food energy

To Find Out More . . .

Want to learn more about energy in ecosystems?

Try these books

Desert Food Chains by Louise Spilsbury. Heinemann, 2004.

Food Chains by Peter Riley. Franklin Watts, 1999.

Food Chains and Webs by Holly Wallace. Heinemann, 2006.

Learning About Food Chains and Food Webs with Graphic Organizers by Jonathan Kravetz. PowerKids Press, 2006.

Access these Web sites

You can learn more about food chains and the energy pyramid at this Web site. You can even create your own food web.

www.vtaide.com/png/foodchains.htm

This Flying Turtle Web site will tell you more about food chains, the energy pyramid, and the flow of energy through plants and animals.

www.ftexploring.com/me/me2.html

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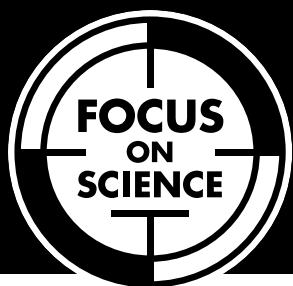
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Assessments

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Energy in Ecosystems

Print pages 24–28 of this PDF for the reading activities.

Check Understanding

Shade the circle next to the correct answer.

1. What is the role of herbivores in a food web?
 - Ⓐ Herbivores eat carnivores.
 - Ⓑ Herbivores use sunlight to make food.
 - Ⓒ Herbivores are a food source for carnivores.
 - Ⓓ Herbivores break down dead plants and animals.

2. Why do plant's leaves trap energy from sunlight?
 - Ⓐ To collect water.
 - Ⓑ To release carbon dioxide.
 - Ⓒ To make food for the plant.
 - Ⓓ To provide nutrients for the soil.

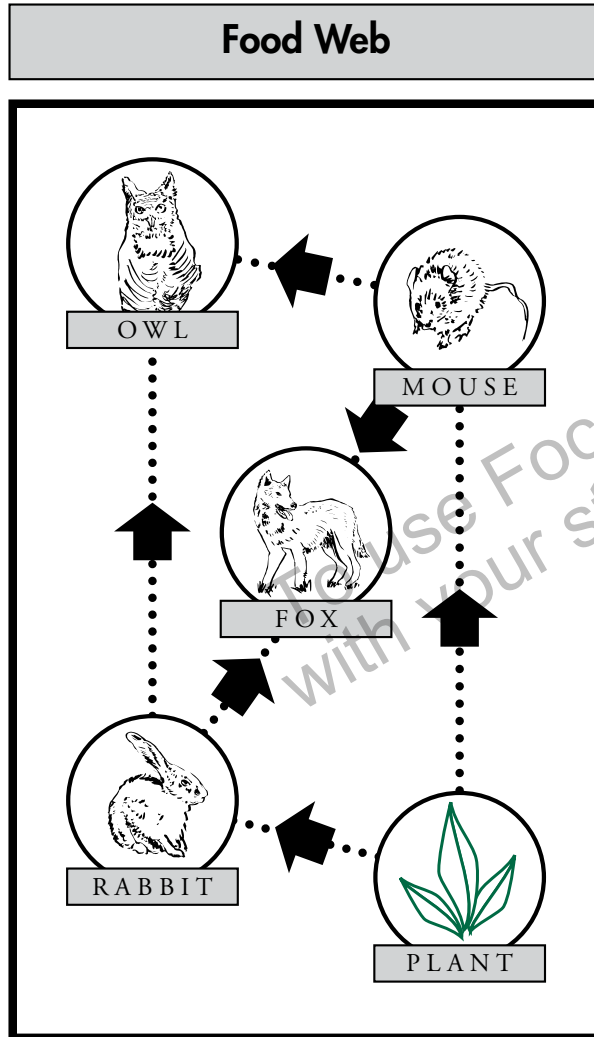
Draw your diagram in the box.

3. A rabbit eats a plant and gets the plant's stored energy. A fox eats the rabbit and gets the rabbit's stored energy. Draw a food chain diagram that illustrates this flow of energy. You may use words or pictures.



Check Understanding

Use the diagram below to answer questions 4 and 5.



Shade the circle next to the correct answer.

Note that question 4 has only three choices.

4. Which organism is not a predator in the food web?

- (A) plant
- (B) rabbit
- (C) fox

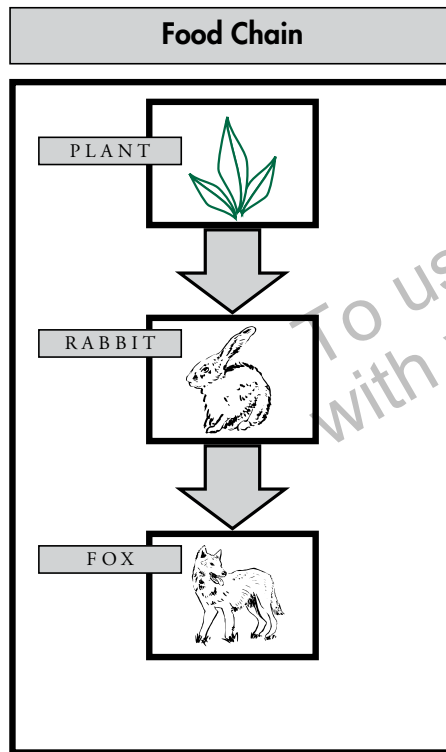
5. Identify a producer in this food web.

6. The role of a producer in the food web is to provide

- (A) water for plants
- (B) sunlight for animals
- (C) shelter for plants
- (D) nutrients for animals

Assessment Scoring Guidelines

1. Answer C is correct.
2. Answer C is correct. Answer A is a common misconception that plants absorb water through their leaves.
3. Student's responses should include all three organisms showing the correct flow of energy.



4. Answer A is correct.

5. plant

6. Answer D is correct.

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English Language Arts Activities

Energy in Ecosystems

Print pages 24–28 of this PDF for the reading activities.

Use Context Clues

TRY THE SKILL

When you read a new word, you may have many ways to figure out its meaning. For example, it might be defined on that page. Or the author might state the meaning in different words or offer a synonym (a word that means the same). Read this paragraph.

Decomposers help decay, or decompose, dead things. Mushrooms, buzzards, worms, and bacteria are decomposers. They get nutrients and energy from dead things. The “leftover” nutrients become part of the soil. Then producers can use them again.

What does *decay* mean?

One clue is the word *decompose*. In this paragraph, the author used the synonym *decompose* to help explain the meaning of *decay*. Decomposers get nutrients and energy from dead things. Decay, decompose, dead things—*decay* must mean “to rot”!

Read the sentence below from page 10.

Food chains show how energy flows through an ecosystem.

The word *ecosystem* is defined on page 10 and in the Glossary. Reread all of page 10 and this definition. Then explain what an ecosystem is. Give specific examples of the living things in one ecosystem. Name the ecosystem you are describing.

Prefixes

TRY THE SKILL

The three prefixes below have similar meanings:

dis- means “not or opposite.”
disrespect, disagree, dishonest

mis- means “not or wrong.”
misfortune, mistreat, miscount

un- means “not.”
unbeaten, uncertain, uneasy

Although the meanings of the prefixes are similar, you must use the correct prefix with each root word. You can say, “I am unhappy,” but not “I am mishappy” or “I am dishappy.” *Mishappy* and *dishappy* are not real words. *Un-* is the correct prefix to use with happy.

Read each sentence. Find the word with a line in front of it. Shade in the letter of the prefix that should be added to that word.

1. A food chain diagram is too simple. It can be ___leading.

- Ⓐ dis-
- Ⓑ mis-
- Ⓒ un-

2. We would be ___able to survive without the sun.

- Ⓐ dis-
- Ⓑ mis-
- Ⓒ un-

3. Living things would soon ___appear from Earth if there were no sunlight.

- Ⓐ dis-
- Ⓑ mis-
- Ⓒ un-

4. Some people ___understand the role of decomposers.

- Ⓐ dis-
- Ⓑ mis-
- Ⓒ un-

Read for a Purpose

TRY THE SKILL

Here are some of the main reasons for reading:

- to gain information or understanding
- to learn how to do something
- to be entertained

For example, you read this book to gain information. You learned how energy moves through ecosystems. You did not learn how to do something. The author hoped the content interested you, so you would be entertained. So the main reason you read this book was to gain information. A less important reason was to be entertained.

When you are choosing what to read, pay attention to titles. They can help you decide whether an article or book will fit your purpose in reading.

Read the list of titles. Then write the correct letters beside each purpose for reading.

- A. *Who Eats What? Food Chains and Food Webs*
- B. *Planting a Butterfly Garden*
- C. *My Dog, the Carnivore*
- D. *Dinosaurs to the Rescue: A Guide to Protecting Our Planet*
- E. *My Life at the Top of the Food Chain*
- F. *Coral Reef Food Chains*

1. Which two titles would you read for information?

2. Which two titles would you read to learn how to do something?

3. Which two titles would you read to be entertained?

Cause and Effect

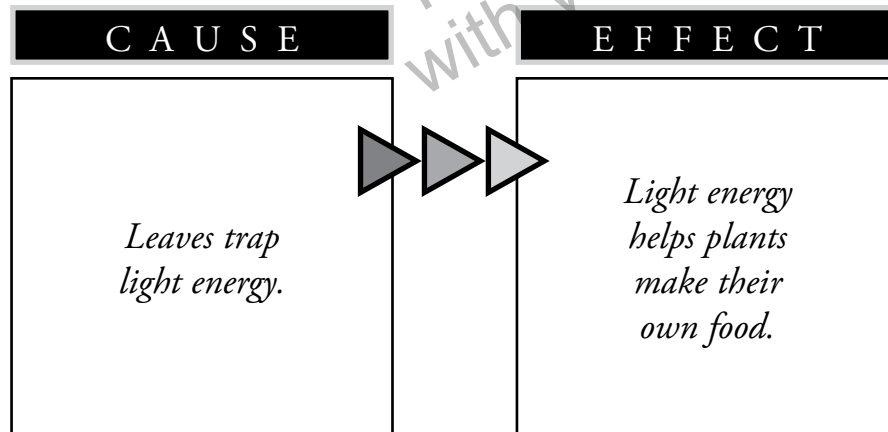
TRY THE SKILL

To find out an effect, you ask, “What happened?”
To find out a cause, you ask, “Why did that happen?”
Read this passage.

Sunlight is one type of light energy. Leaves trap this light energy. They use it to “put together” carbon dioxide from the air and water from the soil to make sugar. Plants use this sugar to live and grow.

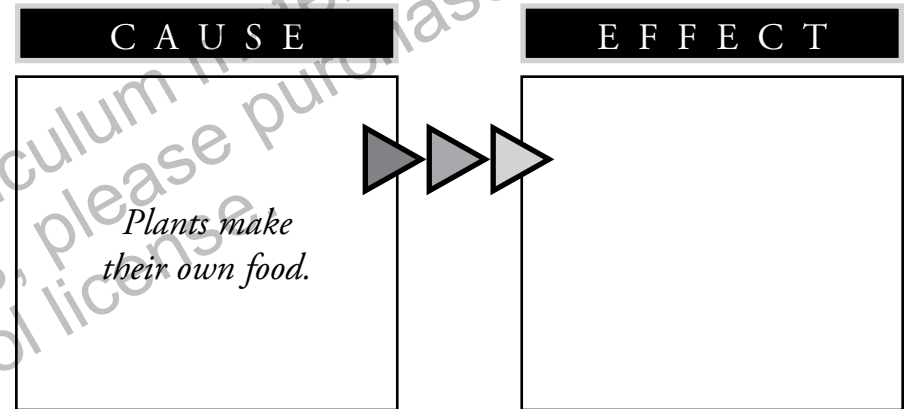
When an animal eats the plant, it gets the plant’s energy. The animal uses this energy to stay warm, move, and grow.

This graphic explains what happened.

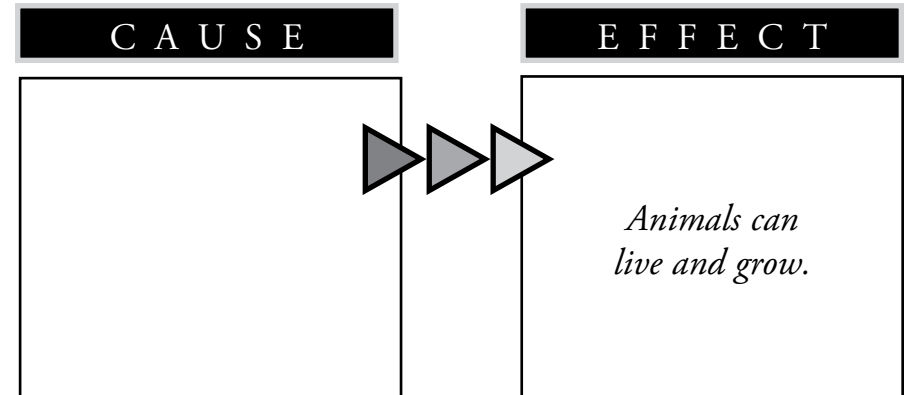


Read the passage again. Then complete each graphic below.

1. Add the effect to this graphic. Tell how making their own food affects plants.



2. Add the cause to this graphic. Tell why animals can live and grow.



Answer Key

Use Context Clues

Students should name one ecosystem and list the plants and animals in it. For example: a forest: trees, bushes, grasses; deer, rabbits, mice, squirrels, bears.

Prefixes

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

Read for a Purpose

1. A, F
2. B, D
3. C, E

Cause and Effect

1. Possible effect: Plants can live and grow.
2. Possible cause: Animals get energy by eating plants.

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