Name _____ Date _____ Class _____

Energy Flow in Ecosystems

This section explains the different roles that organisms play in the movement of energy through an ecosystem. The section also describes how organisms in the different roles interact to form food chains and food webs.

Use Target Reading Skills

After you read the section, reread the paragraphs that contain definitions of Key Terms. Use all the information you have learned to write meaningful sentences using Key Terms.

Energy Roles

Match the energy role with its definition.

Energy Role	Definition
____ **1.** producer	**a.** Organism that breaks down wastes and dead organisms
____ **2.** consumer	**b.** Organism that obtains energy by feeding on other organisms
____ **3.** decomposer	**c.** Organism that can make its own food

4. What types of organisms are producers?

_____

_____

5. Is the following sentence true or false? Energy enters all ecosystems as sunlight. _____

6. Is the following sentence true or false? Producers are the source of all the food in an ecosystem. _____

7. List two major groups of decomposers.

a. _____ **b.** _____

8. Complete the compare/contrast table.

Types of Consumers	
Type of Consumer	**Type of Food**
	Only plants
Carnivore	
	Both plants and animals
	Dead organisms

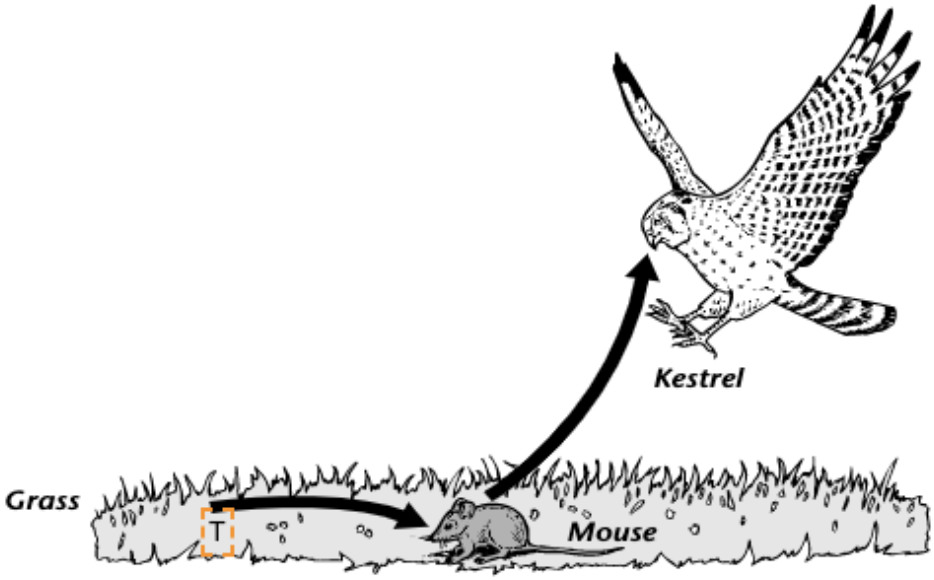
Energy Flow in Ecosystems *(continued)*

9. Is the following sentence true or false? Decomposers return raw materials to the environment. _____

Food Chains and Food Webs

10. A series of events in which one organism eats another and obtains energy is called a(n) _____.

11. Label the producer and the first-level and second-level consumers in the food chain illustrated below.



12. The many overlapping food chains in an ecosystem make up a(n) _____.

13. Circle the letter of each sentence that is true about a food web.

a. Producers are at the top of the food web.

b. All first-level consumers are carnivores.

c. Second-level consumers may be carnivores or omnivores.

d. An organism may play more than one role in a food web.

Energy Pyramids

14. What does an energy pyramid show?

_____

_____

15. Circle the letter of each sentence that is true about an energy pyramid.

a. The greatest amount of energy is available at the producer level.

b. At each level of the pyramid, there is more energy available.

c. About half the energy at one level is transferred to the next.

d. Most food webs have only three or four feeding levels.

16. Why are there usually few organisms at the top of a food web?

_____

_____

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Energy Flow in Ecosystems

Key Concepts

- What energy roles do organisms play in an ecosystem?
- How does energy move through an ecosystem?
- How much energy is available at each level of an energy pyramid?

An organism's energy role is determined by how it obtains energy and how it interacts with the other living things in its ecosystem. **Each of the organisms in an ecosystem fills the energy role of producer, consumer, or decomposer.**

Plants, algae, and some bacteria can carry out photosynthesis. In this process, the organism uses the sun's energy to turn water and carbon dioxide into sugar molecules. An organism that can make its own food is a **producer.** Producers are the source of all the food in an ecosystem.

Other organisms cannot make their own food. They depend on producers for food and energy. An organism that obtains energy by feeding on other organisms is a **consumer.** Consumers are classified by what they eat. Consumers that eat only plants are called **herbivores.** Consumers that eat only animals are called **carnivores.** A consumer that eats both plants and animals is called an **omnivore.** A **scavenger** is a carnivore that feeds on the bodies of dead organisms. An organism may play more than one role in an ecosystem.

Organisms that break down wastes and dead organisms and return the raw materials to the environment are called **decomposers.** As decomposers obtain energy for their own needs, they return simple molecules to the environment to be used again by other organisms.

The movement of energy through an ecosystem can be shown in diagrams called food chains and food webs. A **food chain** is a series of events in which one organism eats another and obtains energy. The first organism in a food chain is always a producer. The second organism, called a first-level consumer, eats the producer. The next consumer, called a second-level consumer, eats the first-level consumer. A food chain shows just one possible path of energy through an ecosystem.

Most producers and consumers are part of many food chains. A more realistic way to show the flow of energy through an ecosystem is a food web. A **food web** consists of the many overlapping food chains in an ecosystem.

When an organism makes its own food or eats other organisms, it obtains energy. The organism uses most of this energy for its own life processes. Only some of the energy will be available to the next organism in the food web. A diagram called an **energy pyramid** shows the amount of energy that moves from one feeding level to another in a food web. **The most energy is available at the producer level of the pyramid. As you move up the pyramid, each level has less available energy than at the level below.** In general, only about 10 percent of the energy at one level of a food web is transferred to the next higher level. For this reason, most food webs have only three or four feeding levels, with few organisms at the highest level in a food web.

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Food Webs at Hydrothermal Vents

Deep below the ocean's surface are strange ecosystems called hydrothermal vents. Here, heated water rises up through cracks in the ocean floor. The water contains minerals from Earth's interior. No sunlight ever reaches these vents. No plants or algae live there. The table below lists the organisms found at hydrothermal vents.

Life at a Hydrothermal Vent

Organisms	Obtain food energy from...
Shrimp	Bacteria in the water
Crabs	Remains of other organisms
Giant clams	Bacteria in the water
Bacteria	Make their own food from chemicals in the water
Giant tube worms	Bacteria living inside their bodies

Use the information in the table to respond to the following items.

1. Which organisms are the producers at hydrothermal vents?

   _____

2. Which organisms are first-level consumers?

   _____

3. What type of consumer are the crabs?

   _____

4. In the space below, draw the food web at a hydrothermal vent. Label each organism to identify its energy role in the ecosystem.

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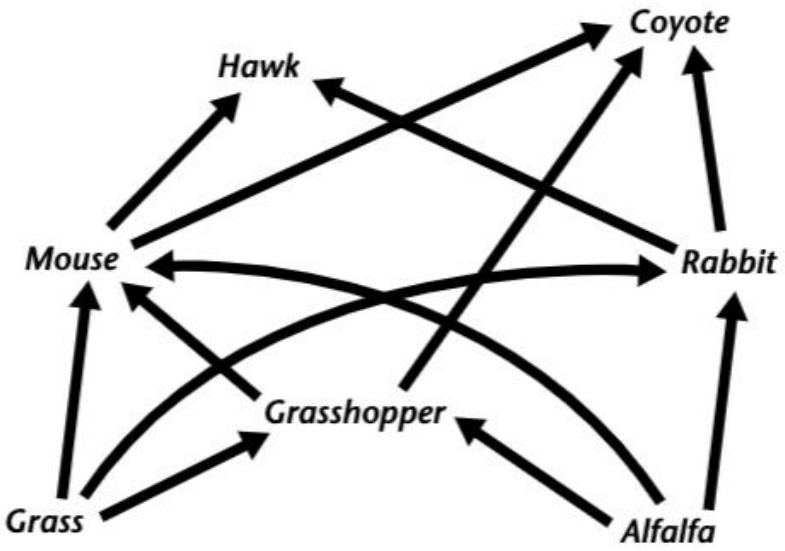
Energy Flow in Ecosystems

Understanding Main Ideas

Answer the following questions on a separate sheet of paper.



1. Which organism in the food web above is sometimes a first-level consumer and sometimes a second-level consumer? Explain.
2. Choose one food chain in the web. Name all the organisms in that chain. Start with the producer and end with the top-level consumer.
3. Draw an energy pyramid for the food chain you chose. Label the pyramid to tell how much food energy is available at each level.

Building Vocabulary

On a separate sheet of paper, write the term that fits each definition below.

4. Organisms that make their own food
5. Organisms that obtain energy by feeding on other organisms
6. Organisms that break down wastes and dead organisms and return the raw materials to the environment
7. Consumers that eat only animals
8. Consumers that eat only plants
9. Consumers that eat both plants and animals
10. Consumers that feed on the bodies of dead organisms