

How do interactions supply energy to ecosystems?

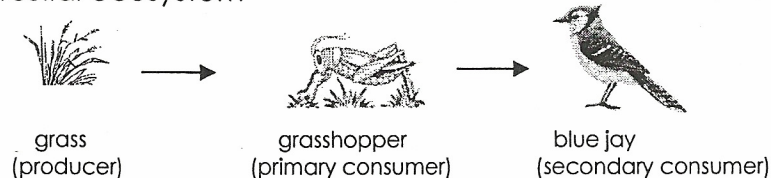
1. Photosynthesis stores energy, and cellular respiration releases energy.

- **P** _____ is a process in the cells of the plants, algae, and some bacteria that converts **l** _____ energy from the Sun into stored **c** _____ energy.
- The chemical energy is stored in energy-rich food compounds such as **g** _____, which is a type of sugar. During photosynthesis, plants also produce **o** _____ gas.
- **C** _____ is a process in the cells of most organisms that converts the energy stored in chemical compounds into usable energy.
- During cellular respiration, living things also produce **c** _____ (CO₂) gas and **w** _____ (H₂O) vapour.
- Photosynthesis and cellular respiration **b** _____ each other.

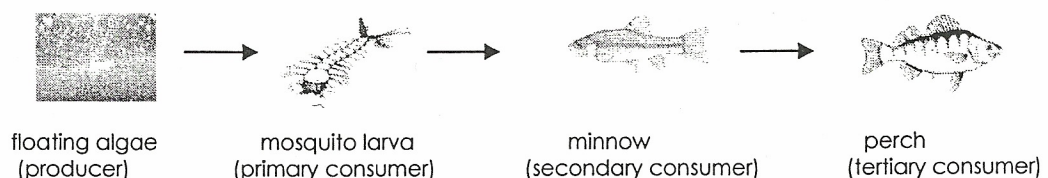
2. Producers transfer energy to consumers through food chains and food webs.

- **P** _____ are living things that make their own food to get the energy they need to live. Only green plants and some kinds of single-celled things can carry out photosynthesis.
- **C** _____ are living things that get the energy they need by eating producers or other consumers. Animals and most other kinds of living things are consumers.
- Those animals that feed directly on producers are called **h** _____. Animals that eat other animals are called **c** _____. Eventually a **t** _____ carnivore is established.
- Some animals that are both herbivores and carnivores are called **o** _____.
- Animals that feed on live organisms are called **p** _____. The organisms that are eaten are called **p** _____. Some organisms feed on dead organisms. These special consumers are called **s** _____.
- A **f** _____ is a model that describes how the energy that is stored in food is transferred from one living thing to another.
- Examples of food chains are as follows:

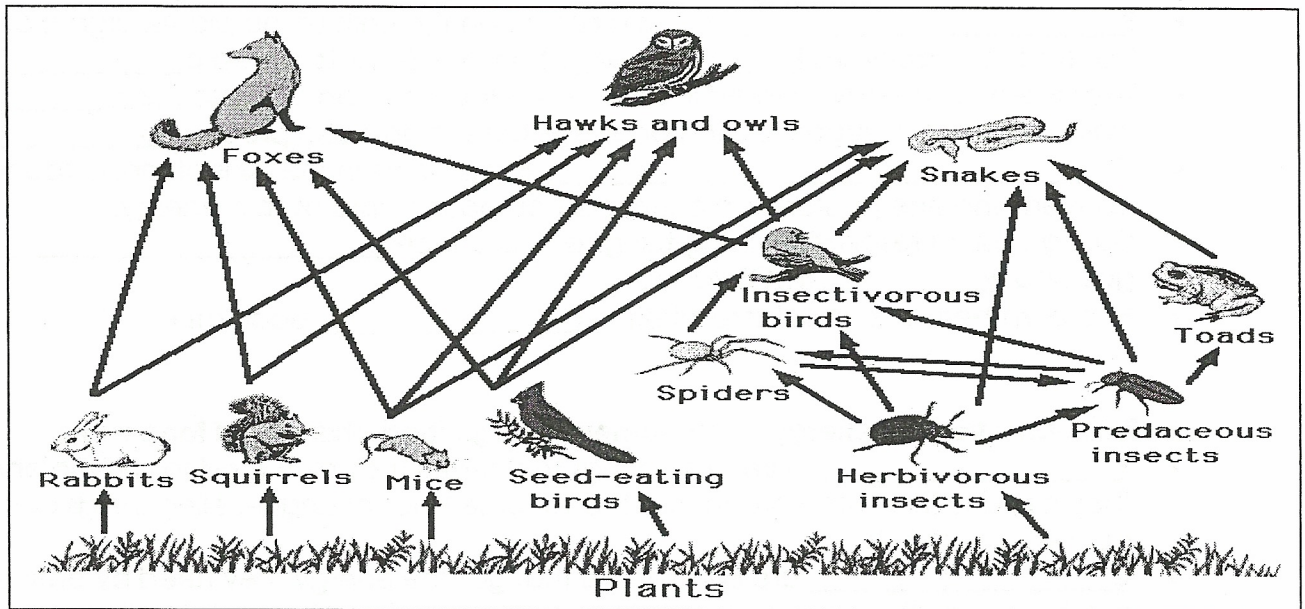
a) terrestrial ecosystem



b) aquatic ecosystem



- Food webs map many food chains. A food web is a model that describes how energy in an ecosystem is transferred through two or more food chains. It shows a network of interacting and overlapping (and weaving together 2 or more) food chains. As a result, a change in the number of one organism could affect several food chains within the food web. An example of a food web is shown below.



3. Interactions are needed for a constant flow of energy for living things.

- Only about 1 percent of the food energy for a producer is available to a consumer that eats it. Three reasons why this is the case:
 - Some of the original food energy has been used already to s support life functions, such as growth and cellular respiration.
 - Some energy is c converted into heat that is given off into the environment. This energy cannot be used by other living things.
 - Some energy is s lost in wastes (urine and feces) that are excreted into the environment. Bacteria, fungi, and other decomposers extract some of this energy, but most is lost to the environment as heat.

Homework (Practice & Homework Book): pages 16, 17, 18, 19

Name _____

Date _____

Topic
1.2
Summary

How do interactions supply energy to ecosystems?

Textbook pages 18–27

Before You Read

In this topic, you will explore how ecosystems get energy, and how living things interact to get energy from their food. What are the main differences between a food chain and a food web? Record your ideas below.

✓ Reading Check

1. What product from photosynthesis is used to fuel cellular respiration?

✓ Reading Check

2. Why do consumers further along a food chain receive less and less energy?

How does energy flow in an ecosystem?

The energy that living things depend on to live originally comes from the Sun. Green plants capture the light energy from the Sun and change the light energy into chemical energy in a process called **photosynthesis**. The chemical energy created is stored as sugar, or glucose. Oxygen is produced as well. Most living things on Earth use the oxygen to break down the glucose and release the stored energy. This breaking-down process is called cellular respiration. **Cellular respiration** also produces carbon dioxide. Plants then use carbon dioxide to carry out photosynthesis. Photosynthesis and cellular respiration work together as a cycle to sustain life. ✓

How do living things get their energy from food?

Living things that produce their own food are called **producers**. Producers such as green plants use photosynthesis to convert light energy into chemical energy. **Consumers** eat producers to obtain the energy they need to survive.

Ecologists use two different models to illustrate the flow of energy and feeding relationships in an ecosystem: food chains and food webs. **Food chains** show the flow of energy from plant to animal and from animal to animal. Plants are the producers; consumers eat the plants and other organisms. Interconnected food chains form a **food web**. Many animals are part of more than one food chain in an ecosystem because they eat or are eaten by several organisms.

Name _____

Date _____

Comprehension
Topic 1.2

Use with textbook pages 18–27.

Energy flow

Answer the questions below.

1. What happens to the light energy from the Sun during the process of photosynthesis?

2. What types of living things use photosynthesis to make their food?

3. What other forms of energy are produced from the chemical energy used during cellular respiration?

4. Which living things use the process of cellular respiration to release their stored energy?

5. How do producers make their food?

6. How do animals get the energy they need to live?

7. How does the flow of energy move through a food chain?

8. Give an example of how the change of one organism in a food chain could affect an entire food web.

9. What percentage of food energy is transferred between a producer and consumer?

Name _____

Date _____

**Applying
Knowledge**
Topic 1.2*Use with textbook pages 20–21.*

Photosynthesis and cellular respiration

Complete the following table to compare photosynthesis and cellular respiration.

	Photosynthesis	Cellular Respiration
1. How is energy changed during the process?		
2. What substances are used during the process?		
3. What substances are produced during the process?		
4. Write the word equation for the process.		
5. Give two examples of why the process is important.		
6. What types of living things use the process?		

Name _____

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**Interpreting
Illustrations**
Topic 1.2

Use with textbook pages 22–23.

Food chains and food webs

Use the diagrams to help you answer the questions.

Food Chain



red-tailed hawk



spotted frog



grasshopper



bunchgrass

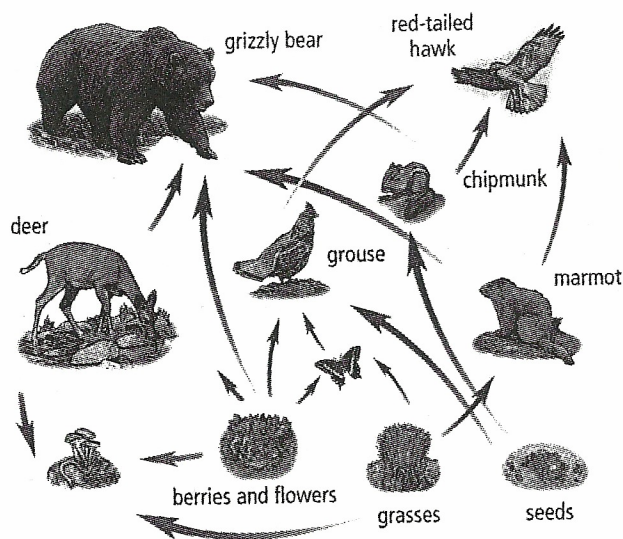
1. What is the producer in this food chain?

2. How does the producer obtain its energy?

3. What are the consumers in this food chain?

4. Draw lines to show the path of energy through this food chain. Show where heat energy is lost at various points in the food chain.

Food Web



5. What term describes a chipmunk that eats seeds or fruit?

6. How does the grizzly bear get energy to survive?

7. If the berries and flowers were removed from the food web, which animals would be affected?

Name _____

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Assessment
Topic 1.2

How do interactions supply energy to ecosystems?

Use with textbook pages 18–27.

Match each Term on the left with the best Descriptor on the right. Each Descriptor may be used only once.

Term	Descriptor
1. _____ cellular respiration	A. energy-rich food compound that stores chemical energy
2. _____ consumer	B. any living thing that gets the energy it needs by making its own food
3. _____ food chain	C. a model that describes how the energy that is stored in food is transferred from one living thing to another
4. _____ food web	D. a series of chemical changes that let living things release the energy stored in sugars to fuel all life functions
5. _____ glucose	E. to keep or keep going, as an action or a process
6. _____ photosynthesis	F. a series of chemical changes that let green plants capture the Sun's light energy and transform it into chemical energy
7. _____ producer	
8. _____ sustain	

G. a model that describes how energy in an ecosystem is transferred through two or more food chains

H. any living thing that gets the energy it needs by eating producers or other consumers.

9. Where does the energy stored in food originate?

10. What process do green plants use to make their own food?

11. What process is used by living things to release chemical energy stored in glucose?

12. What are the different ways that producers and consumers get the energy they need to live?
