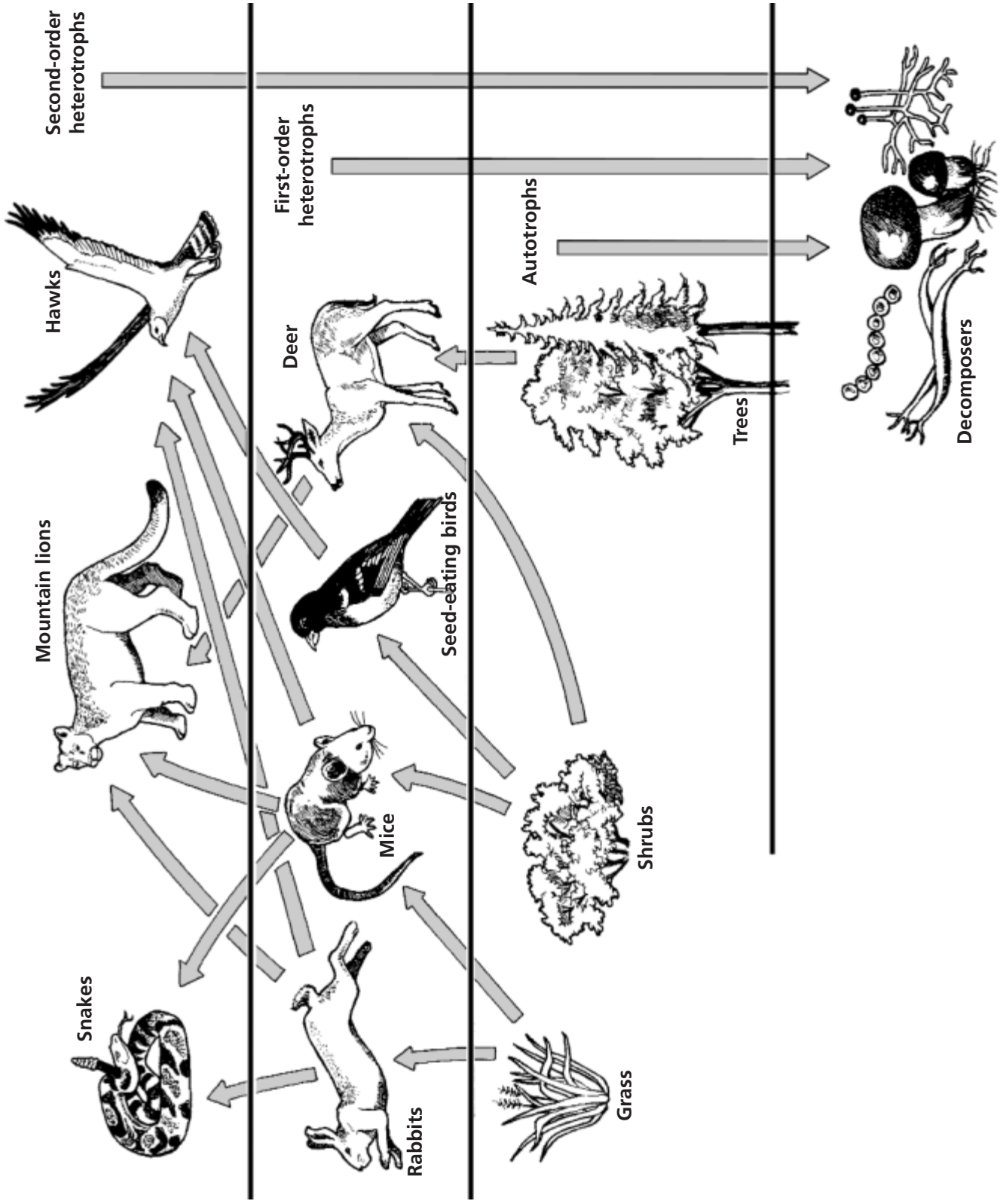
Master 1

Basic Concepts

# A Food Web

*Use with Chapter 2, Section 2.2*



Name Date Class

Worksheet 1

# A Food Web

Basic Concepts

*Use with Chapter 2, Section 2.2*

**1.** At which level of the food web is the supply of energy the greatest? Explain.

**2.** Which feeding relationship do first–order heterotrophs have in common?

**3.** Which feeding relationship do second–order heterotrophs have in common?

**4.** Explain why plants are called autotrophs.

**5.** Food webs and food chains both involve multiple trophic levels. How do they differ?

**6.** Use the transparency to describe a food chain that includes a mountain lion and a shrub.

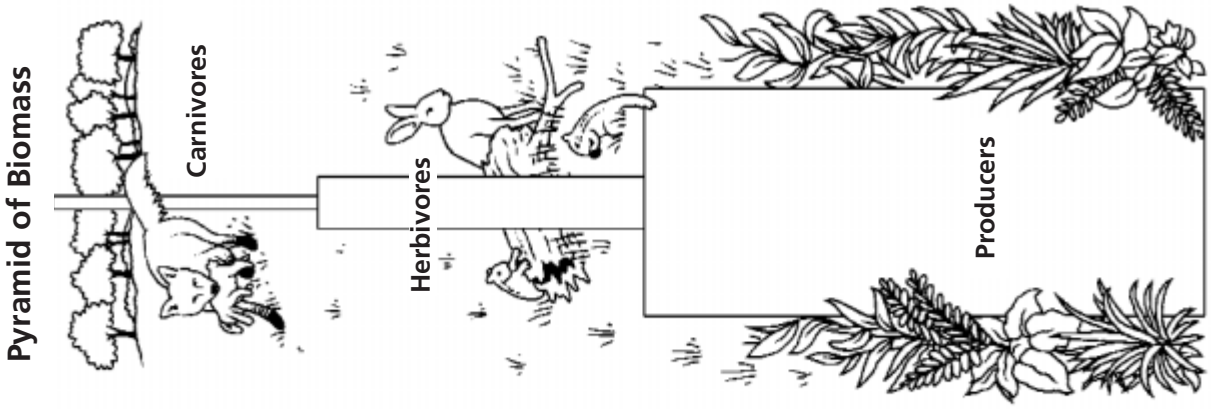
**7.** How might the organisms pictured in the food web be affected if most of the mouse population was destroyed by disease?

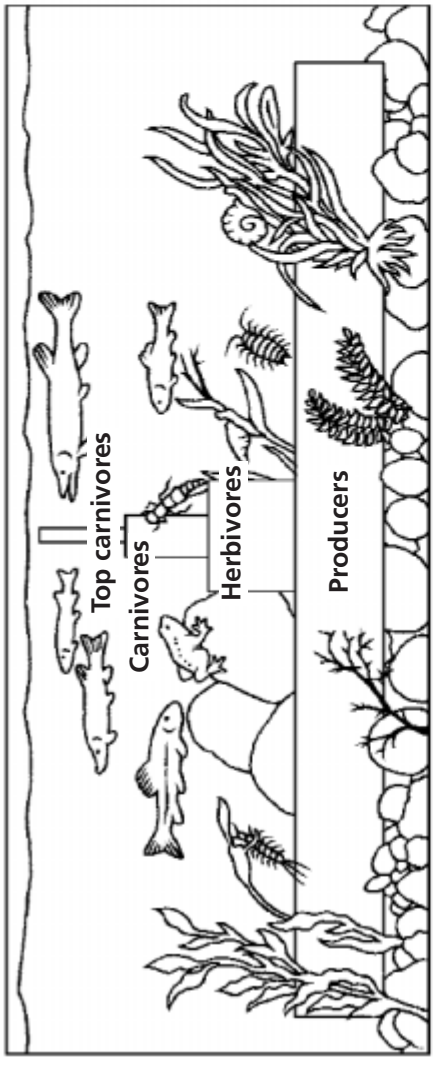
Master 2

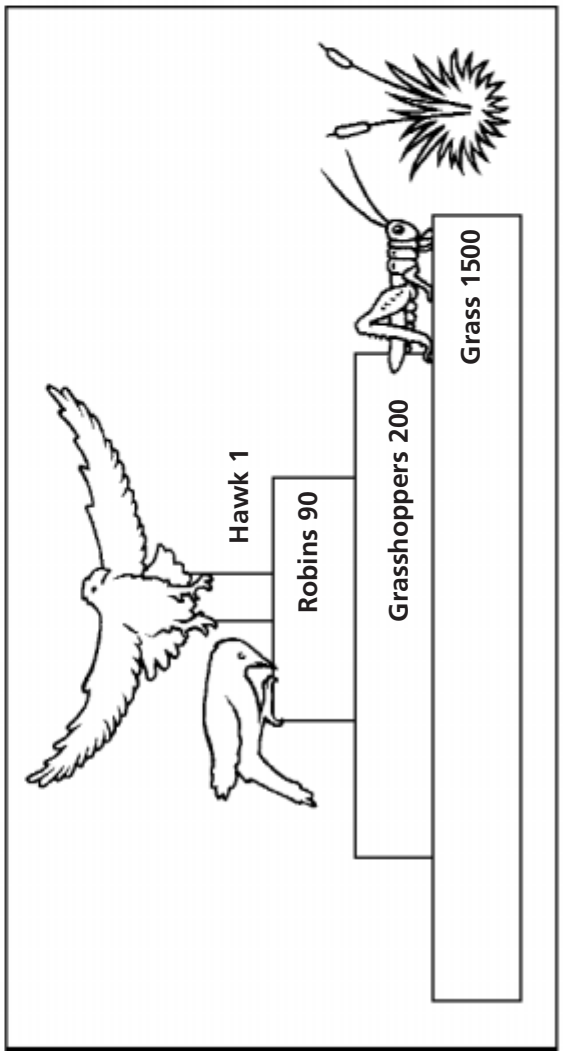
Basic Concepts

# Ecological Pyramids

*Use with Chapter 2, Section 2.2*



Name Date Class

Worksheet 2

# Ecological Pyramids

Basic Concepts

*Use with Chapter 2, Section 2.2*

**1.** What is the source of energy for all of the ecological pyramids shown in the transparency?

**2.** In general, what kind of organism makes up the base of the pyramid of energy? Provide some specific examples.

**3.** Examine the pyramid of energy shown in the transparency. Explain why only about 10% of the energy available at one trophic level is transferred to the next higher trophic level.

**4.** How is the energy loss from one trophic level to the next reflected in the pyramid of numbers shown in the transparency?

**5.** Suppose an ecosystem has a greater number of individual herbivores than individual producers. How would this affect the shape of the ecosystem's pyramid of numbers?

**6.** What quantity does a pyramid of biomass express?

**7.** Explain how biomass is calculated.

# 1 ■ A Food Web

***Use with Chapter 2, Section 2.2***

## Purpose

- To illustrate the complex feeding relationships by which matter and energy move through an ecosystem

## Teaching Suggestions

- Have students identify the individual food chains that make up the food web shown in the transparency. Remind them that autotrophs are also called producers.
- Discuss biotic and abiotic factors in the environment that might disrupt a food web.
- Ask students to describe the possible consequences if one or two of the organisms were eliminated from the food web.

## Extension: Making a Model

- Have students research the plants and animals that live in a particular ecosystem, such as a desert or forest, and then draw a model food web that includes as many of those organisms as possible.

## Answers to Student Worksheet

1. The supply of energy is greatest at the level of the autotrophs. The autotrophs are the most numerous organisms and get energy directly from the sun.
2. They all are herbivores, or plant-eating animals.
3. They all are carnivores, or meat-eating animals.
4. Plants produce their own food by the process of photosynthesis. Therefore, they are called autotrophs.
5. A food chain depicts a single sequence of feeding relationships. A food web represents a network of interrelated food chains.
6. The mountain lion might feed on a deer, which has fed on shrubs, which in turn depend on decomposers, such as fungi or bacteria, to recycle nutrients from dead organisms.
7. Other first-order heterotrophs, such as birds, rabbits, and deer, would have more food. All the second-order heterotrophs pictured would experience increased competition for the food sources that remained, and those food sources might become depleted sooner than if the web had remained intact.

# 2 ■ Ecological Pyramids

***Use with Chapter 2, Section 2.2***

## Purpose

- To provide models depicting mass and energy distributions in an ecosystem

## Teaching Suggestions

- Have students discuss the similarities and differences among the three pyramids shown in the transparency.
- Create a scenario in which a specific human activity or event—such as an oil spill or overuse of a pesticide—affects one or more of the pyramids. Ask students to discuss the effects of the activity or event on the pyramids.

## Extension: Making a Model

- Have students make a pyramid of energy, a pyramid of numbers, or a pyramid of biomass for populations of organisms found in a desert, tropical rain forest, or some other type of ecosystem.

## Answers to Student Worksheet

1. The source of energy is the sun.
2. producers such as grasses, trees, and algae
3. Organisms fail to obtain all the food available in the lower trophic level. Of the food that is consumed, only some is digested. Some of the energy in the digested food is used by the organisms for metabolism, thus making the energy unavailable to the organisms at the next higher level. Much of the lost energy is in the form of heat.
4. Each higher trophic level in the pyramid of energy tends to have a smaller number of organisms, showing that the energy available to successive levels diminishes.
5. The pyramid would be inverted; the top level would be wider than the bottom.
6. the weight of living materials at each trophic level
7. The average weight of a species at a tropic level is determined and then multiplied by the estimated number of organisms within the population at that level.