Chapter 4

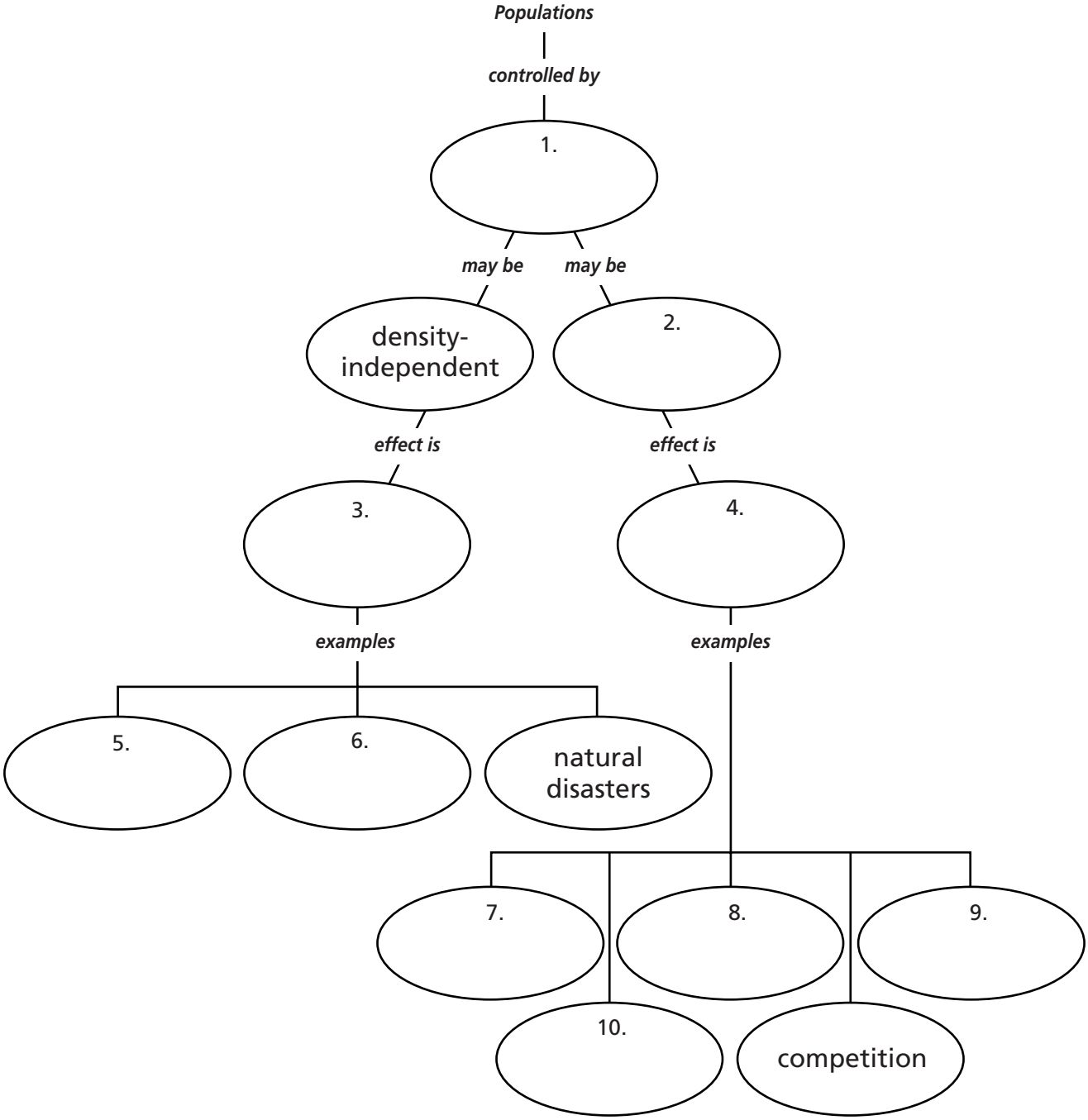
Population Biology

Concept Mapping

Use with Chapter 4, Section 4.1

Population Control

Complete the concept map on factors that control the sizes of populations. Use these words or phrases once: *temperature*, *density-dependent*, *disease*, *food supply*, *limiting factors*, *more intense as population increases*, *habitat disruption*, *parasitism*, *predation*, *same regardless of population size*.



Chapter 4

Population Biology

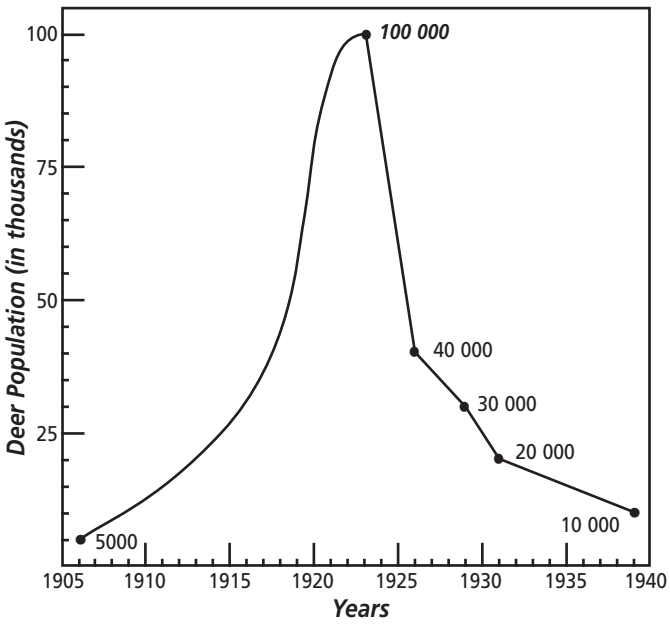
Critical Thinking

Use with Chapter 4, Section 4.1

The Effect of Predators on Prey Populations

Carrying capacity—the number of individuals of a species an area can support—is usually determined during the least favorable time of year, when cold weather or other factors reduce the availability of food and shelter. Field studies have shown that predators also help keep the size of a prey population within the carrying capacity of an area.

Dwindling Populations Early in the twentieth century, biologists and nature enthusiasts became concerned about dwindling populations of game animals in North America. In 1906, the 750 000-acre Kaibab Plateau in northern Arizona was set aside as a wildlife refuge. Deer hunting was forbidden. Predators—wolves, pumas, and coyotes—were trapped, hunted, and poisoned to reduce their numbers. Use data from the graph to answer the following questions.



1. Between the years 1907 and 1923, 11 wolves, 674 pumas, and 3000 coyotes were removed from the Kaibab Plateau. **a.** What was the increase in the deer population during that period? **b.** What factors may have contributed to the increase?

2. What was the percentage decrease in deer population
a. between the years 1923 and 1926? **b.** between 1923 and 1931? **c.** between 1923 and 1939?

3. By 1926, there were no more wolves on the Kaibab Plateau. Between 1923 and 1939, hunters continued to remove pumas and coyotes from the area. The rapid decline in the deer population during the 1920s was due to massive starvation during winter. The plateau had supplied enough food to support the growth of the deer population to 100 000. Why, then, did so many deer suddenly starve?

4. Biologists estimated that a deer population of about 30 000 would not have exceeded the carrying capacity of the Kaibab Plateau. Assuming the estimate is correct, why did the actual deer population decline below 30 000 during the 1930s?

Chapter 4

Population Biology

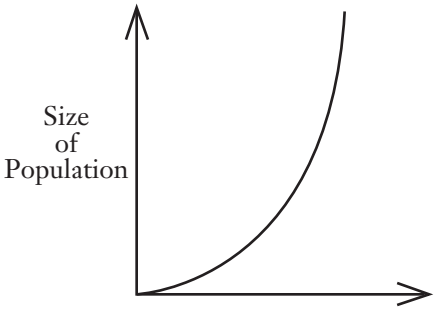
Reinforcement and Study Guide

Section 4.1 Population Dynamics

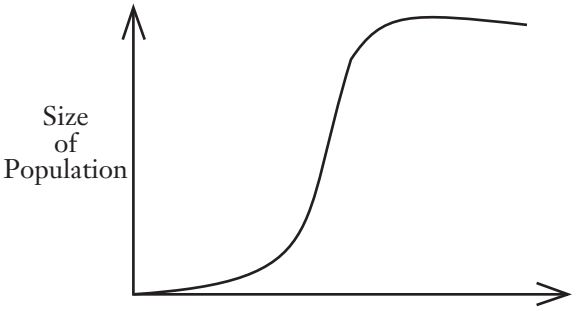
In your textbook, read about the principles of population growth.

Refer to Graphs A and B below. Answer the following questions.

Graph A



Graph B



1. What type of population growth is shown in Graph A? Explain this type of growth.

_____

_____

2. Which graph shows the most likely growth of a squirrel population living in a forest? _____

3. Which graph shows a population's growth under ideal conditions? _____

4. Why don't populations of organisms grow indefinitely?

_____

_____

_____

Use each of the terms below just once to complete the passage.

grows	**carrying capacity**	**below**	**births**
above	**under**	**deaths**	**exceed**

The number of organisms of one species that an environment can support is called its **(5)** _____ . If the number of organisms in a population is **(6)** _____ the environment's carrying capacity, births **(7)** _____ deaths and the population **(8)** _____ . If the number of organisms rises **(9)** _____ the carrying capacity of the environment, **(10)** _____ will exceed **(11)** _____ . This pattern will continue until the population is once again at or **(12)** _____ the carrying capacity.

Circle the letter of the choice that best completes the statement.

13. The most important factor that determines population growth is the organism's
- **a.** social pattern.
- **b.** carrying capacity.
- **c.** reproductive pattern.
- **d.** feeding pattern.

14. Organisms that follow a rapid life-history pattern
- **a.** have short life spans.
- **b.** have small bodies.
- **c.** reproduce early.
- **d.** all of the above

15. Organisms that follow a slow life-history pattern
- **a.** have small bodies.
- **b.** mature rapidly.
- **c.** reproduce slowly.
- **d.** all of the above

16. A limiting factor that has an increasing effect as population size increases is
- **a.** temperature.
- **b.** habitat disruption.
- **c.** drought.
- **d.** competition.

In your textbook, read about how organism interactions limit population size.

Answer the following.

17. The snowshoe hare is a primary source of food for the Canadian lynx. Explain how the lynx population size changes when the hare population increases.

18. Explain how the change in the lynx population size affects the hare population.

19. What is the relationship between the lynx and the hare called?

20. When does competition decrease the size of a population?

21. What can cause an organism to exhibit stress, and what symptoms of stress can lead to a decrease in population size?