

Chapter 5 Populations

Section 5-1 How Populations Grow (pages 119-123)**Key Concepts**

- What characteristics are used to describe a population?
- What factors affect population size?
- What are exponential growth and logistic growth?

Characteristics of Populations (page 119)

1. What are the four main characteristics of a population?

- a. Geographic distribution c. Growth rate
 b. Density d. Age structure

2. What is a population's geographic distribution? It is the area inhabited by the population.

3. Another term for geographic distribution is range.

4. What is population density? It is the number of individuals per unit area.

Population Growth (page 120)

5. Circle the letter of each sentence that is true about populations.

- ☒ a. They can grow rapidly.
☒ b. They can decrease in size.
☒ c. They may stay the same size from year to year.
☐ d. They stay the same size until they disappear.

6. What three factors can affect population size?

- a. The number of births
 b. The number of deaths
 c. The number of individuals that enter or leave the population

7. If more individuals are born than die in any period of time, how will the population change? It will grow.

8. Complete the table about changes in population.

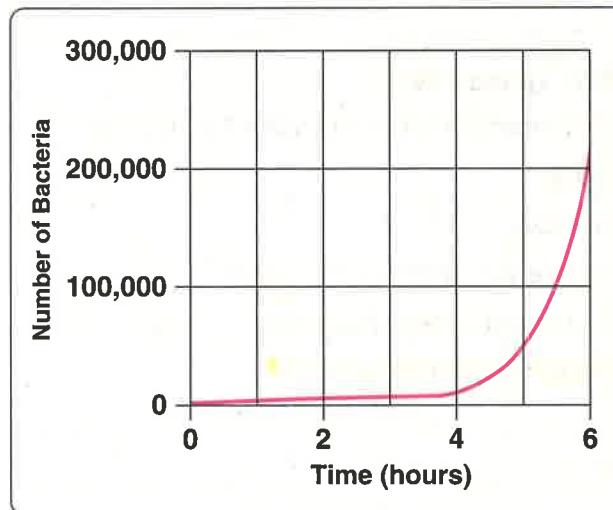
CHANGES IN POPULATION

Type of Change	Definition	Resulting Change in Size
<u>Immigration</u>	<u>The movement of individuals into an area</u>	<u>The population grows</u>
<u>Emigration</u>	<u>The movement of individuals out of an area</u>	<u>The population decreases</u>

9. What are two possible reasons individuals may immigrate into an area? Two possible reasons include searching for mates or searching for food.

Exponential Growth (page 121)

10. How will a population change if there is abundant space and food and if the population is protected from predators and disease? The population will multiply, and the population size will increase.
11. When does exponential growth occur? It occurs when individuals in a population reproduce at a constant rate.
12. What are three ways that a growth rate may be stated, or expressed? It may be stated as a doubling time, a birthrate per female, or a percentage of growth per year.
13. Under ideal conditions with unlimited resources, how will a population grow? Such a population will grow exponentially.
14. Complete the graph by drawing the characteristic shape of exponential population growth.

Exponential Growth of Bacterial Population

15. Is the following sentence true or false? Elephants never grow exponentially because their rate of reproduction is so slow. false

Logistic Growth (page 122)

16. Circle each sentence that is true about exponential growth.
- a. It continues until the organism covers the planet.
 - b. It continues at the same rate as resources become less available.
 - ☒ c. It does not continue in natural populations for very long.
 - d. It continues in natural populations until the birthrate increases.
17. When resources become less available, how does population growth change? It slows or stops.

18. When does logistic growth occur? It occurs when a population's growth slows or stops following a period of exponential growth.

19. Circle the letter of each instance when a population's growth will slow down.

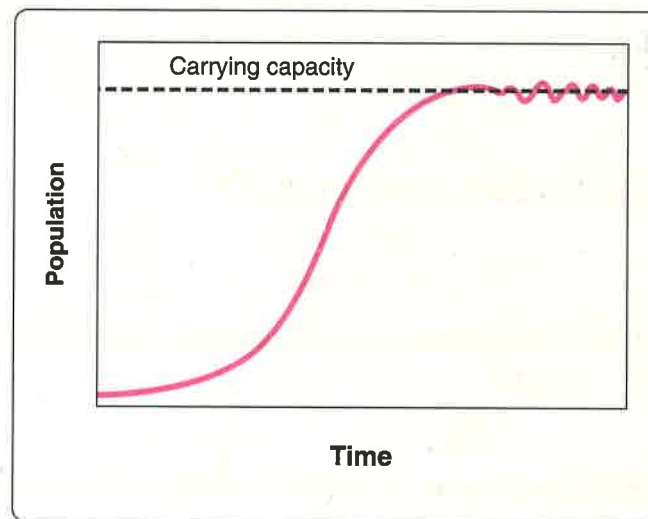
- ☒ a. The birthrate and death rate are the same.
- ☐ b. The birthrate is greater than the death rate.
- ☒ c. The rate of immigration is equal to the rate of emigration.
- ☐ d. The rate of emigration is less than the rate of immigration.

20. What is the carrying capacity of the environment for a particular species?

It is the largest number of individuals that the given environment can support.

21. Complete the graph by drawing the characteristic shape of logistic population growth.

Logistic Growth of a Population



Section 5-2 Limits to Growth (pages 124–127)



Key Concept

- What factors limit population growth?

Limiting Factors (pages 124–125)

1. What is a limiting factor? It is a factor that causes population growth to decrease.
2. A limiting nutrient is an example of a limiting factor.

Density-Dependent Factors (pages 125–126)

3. What is a density-dependent limiting factor? It is a limiting factor that depends on population size.
4. When do density-dependent factors become limiting? They become limiting only when the population density reaches a certain level.
5. When do density-dependent factors operate most strongly? They operate most strongly when a population is large and dense.
6. What are four density-dependent limiting factors?
 - a. Competition
 - b. Predation
 - c. Parasitism
 - d. Disease
7. When populations become crowded, what do organisms compete with one another for? They compete for food, water, space, sunlight, and other essentials of life.
8. The mechanism of population control in which a population is regulated by predation is called a(an) predator-prey relationship.
9. What are the prey and what are the predators in the predator-prey relationship on Isle Royale? The prey are moose, and the predators are wolves.
10. Why does the wolf population on Isle Royale decline following a decline in the moose population? The wolf population declines because there is less for the wolves to feed upon.
11. How are parasites like predators? Like predators, parasites take nourishment at the expense of their hosts, often weakening them and causing disease or death.

Density-Independent Factors (page 127)

12. A limiting factor that affects all populations in similar ways, regardless of population size, is called a(an) density-independent limiting factor.
13. What are examples of density-independent limiting factors? Examples include unusual weather, natural disasters, seasonal cycles, and certain human activities, such as damming rivers and clear-cutting forests.
14. Circle the letter of each sentence that is true about changes caused by density-independent factors.
- ☒ a. Most populations can adapt to a certain amount of change.
 - ☒ b. Periodic droughts can affect entire populations of grasses.
 - ☐ c. Populations never build up again after a crash in population size.
 - ☒ d. Major upsets in an ecosystem can lead to long-term declines in certain populations.
15. What is the characteristic response in the population size of many species to a density-independent limiting factor? The population size characteristically crashes.

Reading Skill Practice

A graph can help you understand comparisons of data at a glance. By looking carefully at a graph in a textbook, you can help yourself understand better what you have read. Look carefully at the graph in Figure 5-7 on page 126. What important concept does this graph communicate?

The graph shows that as the population of the predator increases, the population of the prey decreases, and vice versa. This cycle of predator and prey populations can be repeated indefinitely.

Section 5-3 Human Population Growth

(pages 129–132)



Key Concepts

- How has the size of the human population changed over time?
- Why do population growth rates differ in countries throughout the world?

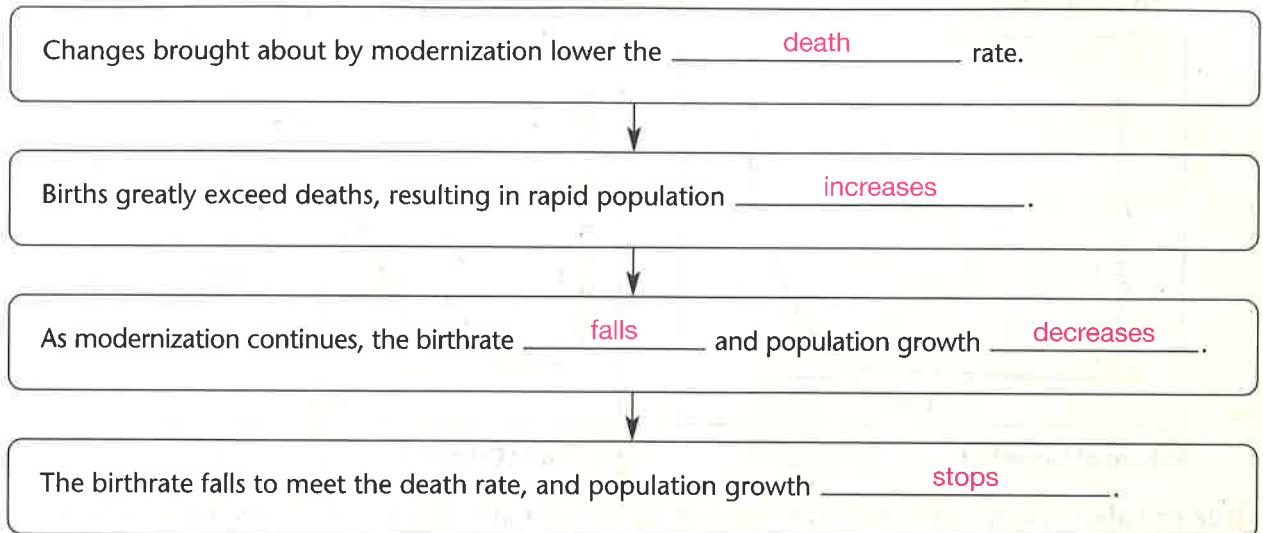
Historical Overview (page 129)

1. How does the size of the human population change with time? It tends to increase with time.
2. Why did the population grow slowly for most of human existence? Life was harsh, and limiting factors kept population sizes low.
3. Circle the letter of each reason why the human population began to grow more rapidly about 500 years ago.
 - a. Improved sanitation and health care reduced the death rate.
 - b. Industry made life easier and safer.
 - c. The world's food supply became more reliable.
 - d. Birthrates in most places remained low.

Patterns of Population Growth (pages 130–131)

4. Why can't the human population keep growing exponentially forever? Earth and its resources are limited.
5. What is demography? It is the scientific study of human populations.
6. What factors help predict why the populations of some countries grow faster than others? Factors include birthrates, death rates, and the age structure of the populations.
7. The hypothesis that explains why population growth has slowed dramatically in the United States, Japan, and much of Europe is called the demographic transition.
8. Throughout much of human history, what have been the levels of birthrates and death rates in human societies? Human societies have had high birthrates and equally high death rates.
9. What factors lower the death rate? Advances in nutrition, sanitation, and medicine lower the death rate.

10. Is the following sentence true or false? Population growth depends, in part, on how many people of different ages make up a given population. true
11. Complete the flowchart about the demographic transition.



12. Circle the letter of each sentence that is true about human population growth.

- a. The demographic transition is complete in China and India.
- ☒ b. The worldwide human population is still growing exponentially.
- ☒ c. Most people live in countries that have not yet completed the demographic transition.
- ☒ d. The demographic transition has happened in the United States.

13. What do age-structure diagrams graph? They graph the numbers of individuals in different age groups in the population.
14. What do the age structures of the United States and of Rwanda predict about the population growth of each country? The age structure in the United States predicts a slow but steady growth rate for the near future. The age structure in Rwanda predicts a population that will double in about 30 years.

Future Population Growth (page 132)

15. What may cause the growth rate of the world population to level off or even slow down? That may happen if countries that are currently growing rapidly move toward the demographic transition.
16. What do many ecologists suggest will happen if the growth in human population does not slow down? There could be serious damage to the environment as well as to the global economy.