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Section 5-1

**What Affects Population Size?**


A population is a group of organisms belonging to a single species that lives in a given area. Imagine that each of the three different colors of paper clips that you have in an envelope represents a different species of organisms.

Working with a partner and using the envelopes of paper clips that you both have, answer the following questions.

Go to Section: **1** **2** **3** [Go online](#) 

**Biology** Prentice Hall Interest Grabber *continued* © Pearson Education, Inc., publishing as Pearson Prentice Hall. All rights reserved. **ANSWERS**  
Section 5-1

1. How many populations of organisms do you have in your envelope? In your partner's envelope?
2. Choose one of the populations in one of the envelopes. How might this population grow in size?
3. How might this same population decrease in size?

Go to Section: **1** **2** **3** [Go online](#) 

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 Section 5-1

**5-1 How Populations Grow**

- A. Characteristics of Populations
- B. Population Growth
- C. Exponential Growth
- D. Logistic Growth

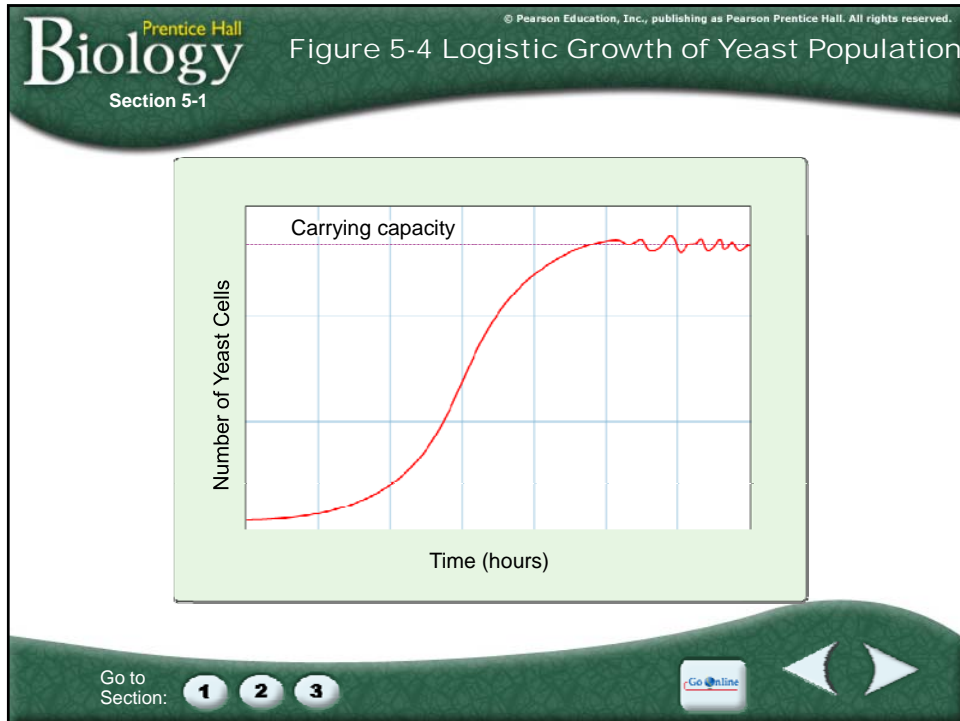
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    graph TD
      PG[Population Growth] -- can be --> EG[Exponential growth]
      PG -- can be --> LG[Logistic growth]
      EG -- characterized by --> NLG[No limits on growth]
      EG -- characterized by --> UR[Unlimited resources]
      EG -- characterized by --> CGR[Constant growth rate]
      EG -- represented by --> JSC[J-shaped curve]
      LG -- characterized by --> LIG[Limits on growth]
      LIG -- cause a --> FGR[Falling growth rate]
      LG -- represented by --> SSC[S-shaped curve]
    
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Section 5-2

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**Name That Resource!**

A situation that causes the growth of a population to decrease is called a limiting factor. Some limiting factors depend on the size of the population. Other limiting factors affect all populations in similar ways, regardless of the population size.

Go to Section: **1** **2** **3**

Go online

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 Section 5-2

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Interest Grabber *continued*

ANSWERS

1. Imagine a small island that has a population of five rabbits. How might each of the following factors affect the rabbit population?
  - a. climate
  - b. food supply
  - c. predation
2. Now imagine another small island that has a population of 500 rabbits. How would the same factors affect this population?
3. Which of the factors depend on population size? Which factors do not depend on population size?

Go to Section: **1** **2** **3**

Go online



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 Section 5-2

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Section Outline

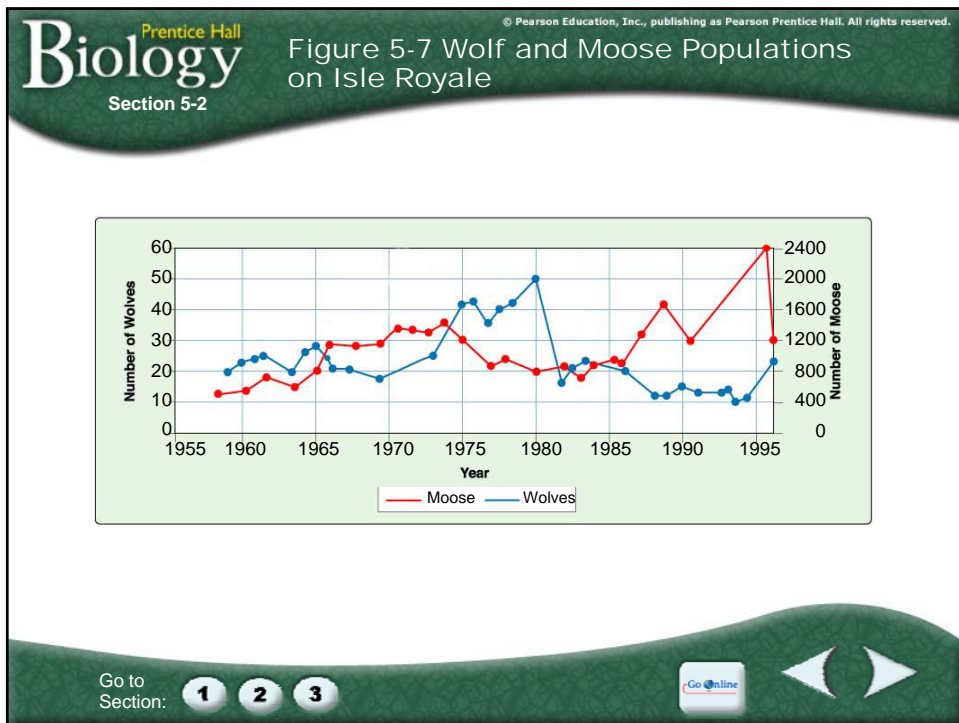
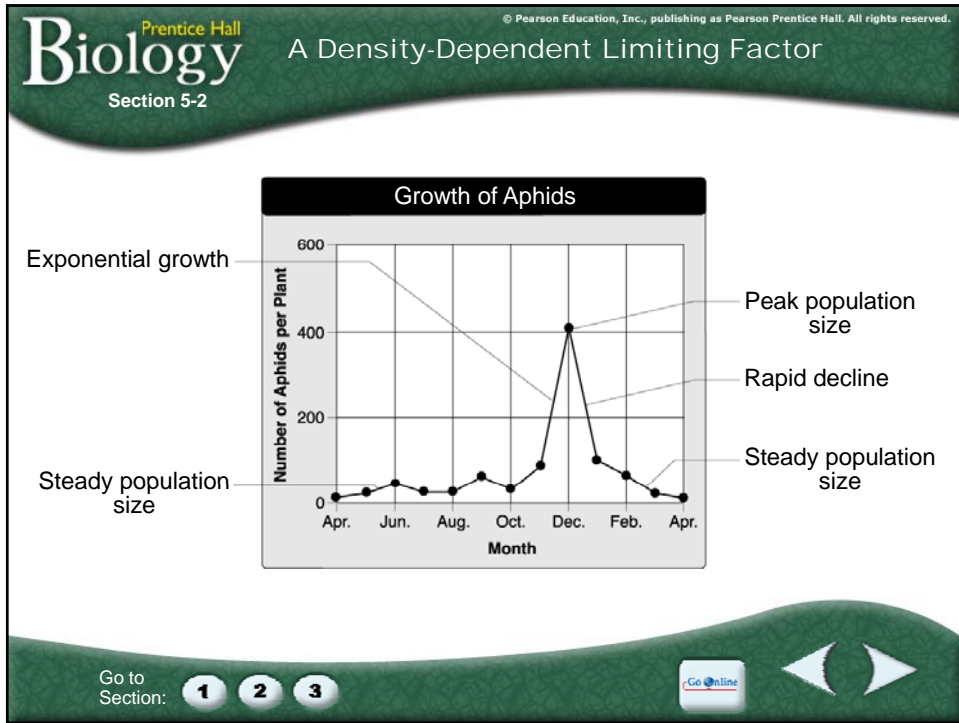
**5-2 Limits to Growth**

- A. Limiting Factors
- B. Density-Dependent Factors
  1. Competition
  2. Predation
  3. Parasitism and Disease
- C. Density-Independent Factors

Go to Section: **1** **2** **3**

Go online





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 Section 5-3

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**How Fast Are We Growing?**

Until about 500 years ago, the world's human population remained fairly stable. Then, as advances in medicine, agriculture, and technology occurred, the human population began growing very rapidly. Today, the world's human population is greater than 6 billion people, and it continues to grow, but at a slower rate.

Go to Section: **1** **2** **3**

Go online



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 Section 5-3

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Interest Grabber *continued*

**ANSWERS**

1. The human population is increasing by about 1.4 percent each year. Assume that the population is 6 billion (6,000,000,000). How large will the population be in one year?
2. If the human population continues to grow at a rate of 1.4 percent per year, the population would double in size (to 12 billion people) in only 51 years! What effect might this increase in population have on the environment and on other people?

Go to Section: **1** **2** **3**

Go online



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 Section 5-3

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Section Outline

**5-3 Human Population Growth**

- A. Historical Overview
- B. Patterns of Population Growth
  - 1. The Demographic Transition
  - 2. Age Structure
- C. Future Population Growth

Go to Section: **1** **2** **3**

Go online

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 Section 5-3

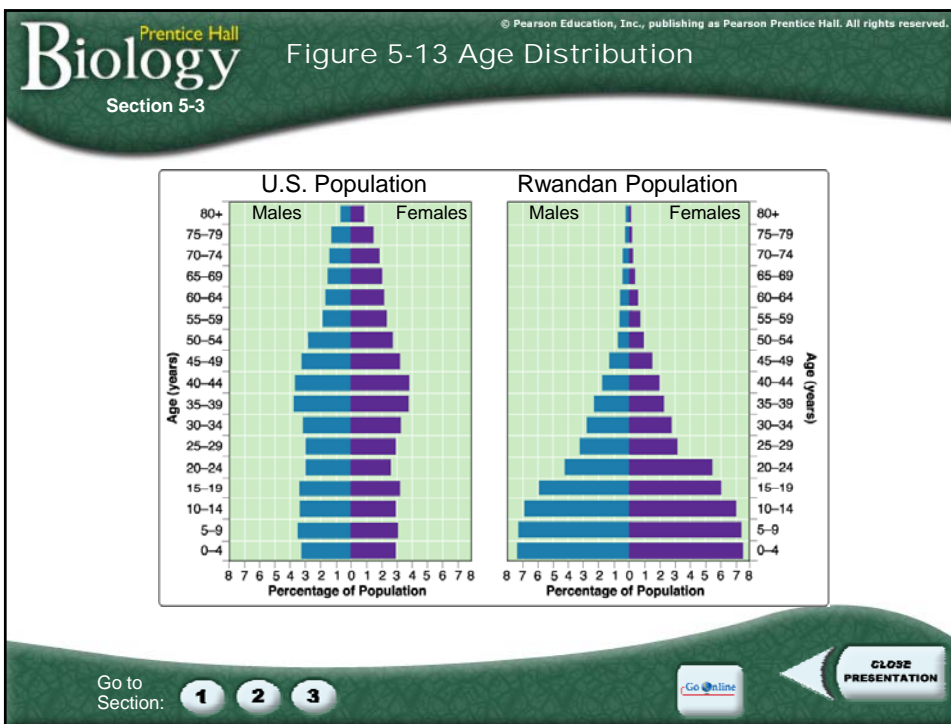
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Human Population Growth

Year	Population (Billions)
10,000 BC	~0.01
9,000 BC	~0.02
8,000 BC	~0.05
7,000 BC	~0.08
6,000 BC	~0.1
5,000 BC	~0.15
4,000 BC	~0.2
3,000 BC	~0.3
2,000 BC	~0.4
1,000 BC	~0.5
0	~0.6
1,000 AD	~0.7
2,000 AD	~1.0

Go to Section: **1** **2** **3**

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**Go Online** PHSchool.com [Links from the authors on the gray wolf](#)  
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**SciLinks** For links on populations, go to [www.SciLinks.org](http://www.SciLinks.org) and enter the Web Code as follows: cbn-2051.  
 For links on population growth, go to [www.SciLinks.org](http://www.SciLinks.org) and enter the Web Code as follows: cbn-2053.

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- How many populations of organisms do you have in your envelope? In your partner's envelope?  
Each envelope represents a community of organisms, and each color of paper clip in each envelope represents a single population. Therefore, each student should have three populations represented.
- Choose one of the populations in one of the envelopes. How might this population grow in size?  
The population (some paper clips) could reproduce, or some could move from the partner's envelope into the other envelope (immigration).
- How might this same population decrease in size?  
The population (some paper clips) could be thrown away (death), or some could move from the partner's envelope into the other envelope (emigration).

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- Imagine a small island that has a population of five rabbits. How might each of the following factors affect the rabbit population?  
a. climate    b. food supply    c. predation  
All of these factors could limit this population. The food supply would have to dwindle substantially in order for it to affect only five rabbits. One predator could wipe out the entire population of five rabbits.
- Now imagine another small island that has a population of 500 rabbits. How would the same factors affect this population?  
Predation and the availability of food will have more of an effect on this population than the smaller one because there are more rabbits to be preyed upon and to compete for the food.
- Which of the factors depend on population size? Which factors do not depend on population size?  
The factors that depend on population size include the competition for food and predation. The factor that does not depend on population size is climate.

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1. The human population is increasing by about 1.4 percent each year. Assume that the population is 6 billion (6,000,000,000). How large will the population be in one year?  
 $6,000,000,000 \times 0.014 = 84,000,000$  people will be added in one year, so the population would be 6.08 billion in one year.
2. If the human population continues to grow at a rate of 1.4 percent per year, the population would double in size (to 12 billion people) in only 51 years! What effect might this increase in population have on the environment and on other people?  
Students might suggest that this increase in the population would increase the need for roads, medicines, food, and all necessary resources. In addition, people would be living in more crowded areas, and pollution would increase because there would be more vehicles on the roads.

