

SECTION
4.1

CHEMICAL ENERGY AND ATP
Study Guide

KEY CONCEPT

All cells need chemical energy.

VOCABULARY

ATP

ADP

chemosynthesis

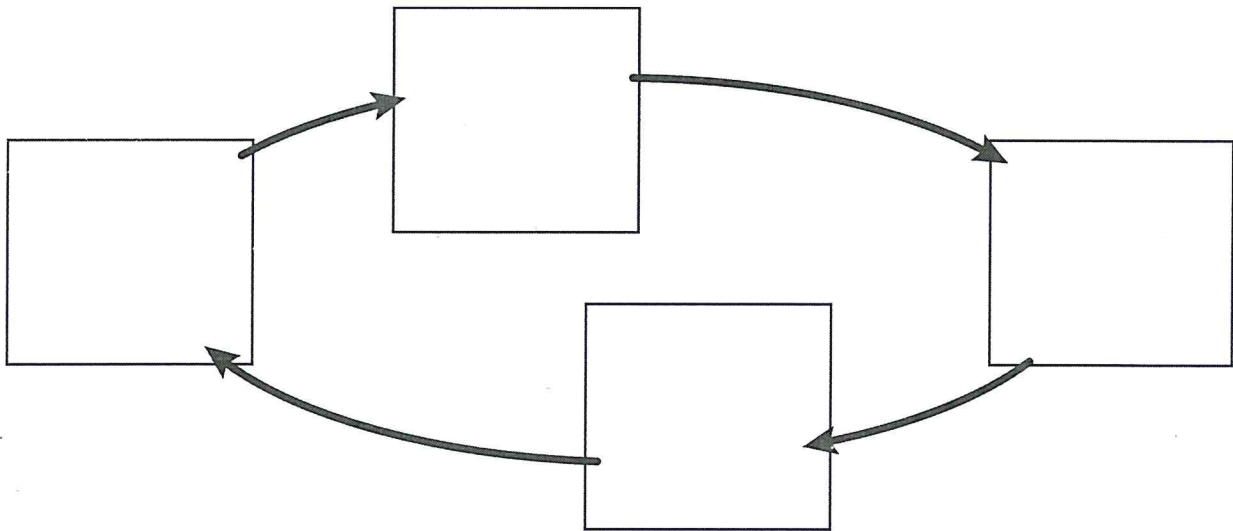
MAIN IDEA: The chemical energy used for most cell processes is carried by ATP.

1. What do all cells use for energy?

2. What is ATP?

3. What is the relationship between ATP and ADP?

Fill in the four parts of the cycle diagram below to take notes on the relationship between ATP and ADP.



Section 4.1 STUDY GUIDE CONTINUED

MAIN IDEA: Organisms break down carbon-based molecules to produce ATP.

Use the table below to organize your notes about the different types of molecules that are broken down to make ATP.

Type of Molecule	Role in ATP Production
Carbohydrates	4.
Lipids	5.
Proteins	6.

MAIN IDEA: A few types of organisms do not need sunlight and photosynthesis as a source of energy.

7. What is chemosynthesis?

Vocabulary Check

8. The prefix *tri-* means “three,” and the prefix *di-* means “two.” How do these prefixes tell you the difference between adenosine triphosphate (ATP) and adenosine diphosphate (ADP)?

9. The prefix *chemo-* means “chemical,” and *synthesis* comes from a Greek word that means “to put together.” How do these meanings tell you what chemosynthesis does?

SECTION

4.2

OVERVIEW OF PHOTOSYNTHESIS

Study Guide

KEY CONCEPT

The overall process of photosynthesis produces sugars that store chemical energy.

VOCABULARY

photosynthesis	light-dependent reactions
chlorophyll	light-independent reactions
thylakoid	

MAIN IDEA: Photosynthetic organisms are producers.

1. Why are some organisms called producers?

2. What is the function of photosynthesis?

3. What is chlorophyll?

MAIN IDEA: Photosynthesis in plants occurs in chloroplasts.

4. What are chloroplasts?

5. In which two parts of a chloroplast does photosynthesis take place?

6. What are thylakoids?

7. Write the chemical equation for the overall process of photosynthesis. Then explain what the equation means and identify the reactants, products, and the meaning of the several arrows.

8. What are the differences between the light-dependent reactions and the light-independent reactions?

Section 4.2 STUDY GUIDE CONTINUED

Use the space below to sketch and label a chloroplast. On the sketch, write the four steps of the photosynthesis process.

Vocabulary Check

9. The prefix *photo-* means “light,” and *synthesis* means “to put together.” How do those meanings tell you what happens during photosynthesis?

10. The prefix *chloro-* means “green,” and the suffix *-phyll* means “leaf.” How are these meanings related to chlorophyll?

11. The prefix *in-* means “not.” How does this meaning tell you which reactions in photosynthesis require light, and which reactions do not?

SECTION

4.4

OVERVIEW OF CELLULAR RESPIRATION

Study Guide**KEY CONCEPT**

The overall process of cellular respiration converts sugar into ATP using oxygen.

VOCABULARY

cellular respiration

aerobic

glycolysis

anaerobic

Krebs cycle

MAIN IDEA: Cellular respiration makes ATP by breaking down sugars.

1. What is cellular respiration?

2. Why is cellular respiration called an aerobic process?

3. Where does cellular respiration take place?

4. What happens during glycolysis?

MAIN IDEA: Cellular respiration is like a mirror image of photosynthesis.

5. In what two ways does cellular respiration seem to be the opposite of photosynthesis?

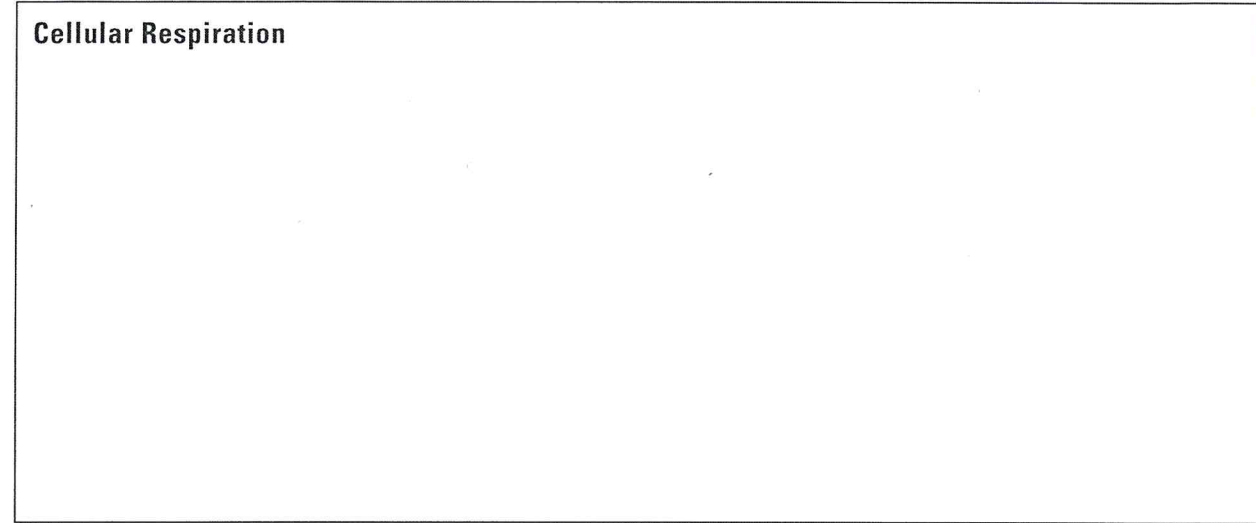
6. In which two parts of a mitochondrion does cellular respiration take place?

7. Write the chemical equation for the overall process of cellular respiration.

8. Explain what the equation means. Identify the reactants, products, and the meaning of the several arrows.

Section 4.4 STUDY GUIDE CONTINUED

Use the space below to sketch and label a mitochondrion. On the sketch, write the four steps of the cellular respiration process that occur in the mitochondrion.

Cellular Respiration**Vocabulary Check**

9. The prefix *glyco-* comes from a Greek word that means “sweet.” The suffix *-lysis* comes from a Greek word that means “to loosen.” How are the meanings of these word parts related to the meaning of *glycolysis*?

10. What does it mean to say that glycolysis is an anaerobic process?

11. What is the Krebs cycle?

SECTION
4.6FERMENTATION
Study Guide**KEY CONCEPT**

Fermentation allows the production of a small amount of ATP without oxygen.

VOCABULARY

fermentation
lactic acid

MAIN IDEA: Fermentation allows glycolysis to continue.

1. What is the importance of fermentation?

2. What is the function of fermentation?

3. When does fermentation take place in your muscle cells?

4. Why is fermentation an anaerobic process?

5. How is fermentation involved in the production of ATP?

In the space below, show and label the process of lactic acid fermentation.

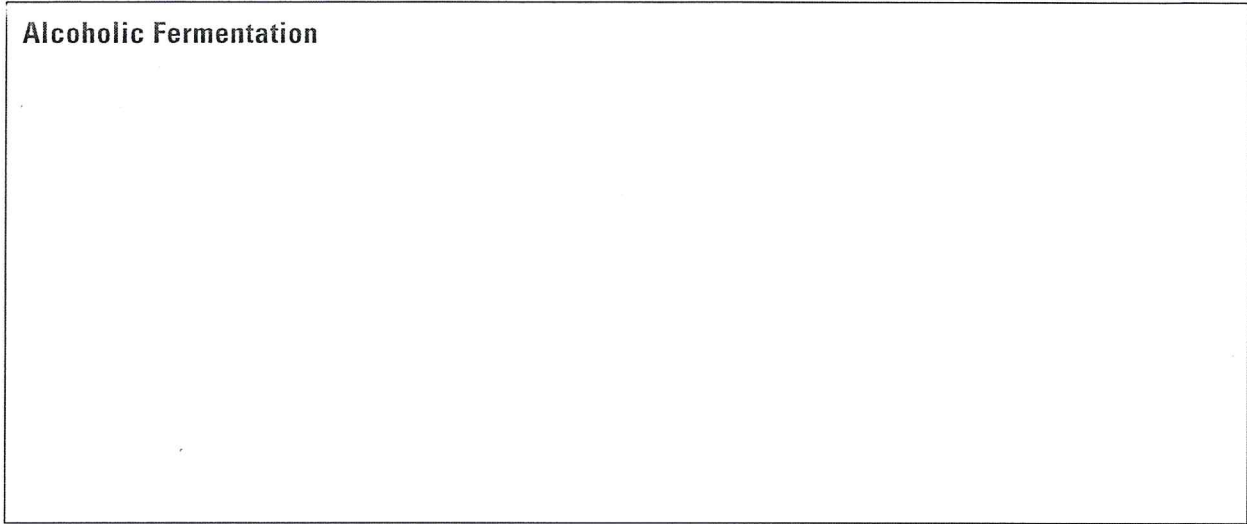
Lactic Acid Fermentation

STUDY GUIDE, CONTINUED

MAIN IDEA: Fermentation and its products are important in several ways.

In the space below, show and label the process of alcoholic fermentation.

Alcoholic Fermentation



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Cells and Energy

6. How are lactic acid fermentation and alcoholic fermentation similar? different?

7. Name one commercial use of lactic acid fermentation.

8. Name one commercial use of alcoholic fermentation.

Vocabulary Check

9. The term *fermentation* is based on a word that means “to bubble.” How is this meaning related to your understanding of the fermentation process?

10. What is lactic acid?

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SECTION
13.5CYCLING OF MATTER
Study Guide**KEY CONCEPT**

Matter cycles in and out of an ecosystem.

VOCABULARYhydrologic cycle
biogeochemical cycle
nitrogen fixation**MAIN IDEA:** Water cycles through the environment.

Fill in the chart with a description of each process that describes how water moves through an ecosystem in the hydrologic cycle.

Process	Description
1. precipitation	
2. evaporation	
3. transpiration	
4. condensation	

MAIN IDEA: Elements essential for life also cycle through ecosystems.

Complete the following sentences with the proper terms.

- Plants, animals, and most other organisms need _____ for cellular _____.
- Oxygen is released as a waste product by plants during the process of _____. Animals take in this oxygen and release it as _____ during the process of _____.
- In the carbon cycle, plants use energy from the Sun to convert _____ from the air into organic material that becomes a part of the plant's structure.

Name _____

Period _____

Date _____

Section 13.5 STUDY GUIDE CONTINUED

- 8. Carbon is released to the atmosphere as carbon dioxide when you breathe during the process of _____ or through the _____ of dead organisms.
- 9. _____, or the burning of fossil fuels, also adds carbon dioxide to the atmosphere.

10. What is nitrogen fixation?

11. List five steps that occur during the phosphorus cycle.

Vocabulary Check

Use the following word origins to answer the questions below.

Word Part	Meaning
bio-	life
chem-	chemical
geo-	earth
hydro-	water

12. What is a biogeochemical cycle?

13. What is the hydrologic cycle?

SECTION
13.2BIOTIC AND ABIOTIC FACTORS
Study Guide**KEY CONCEPT**

Every ecosystem includes both living and nonliving factors.

VOCABULARY

biotic	biodiversity
abiotic	keystone species

MAIN IDEA: An ecosystem includes both biotic and abiotic factors.

Use a word from the box below to complete the following sentences.

abiotic	animals	biotic
living	moisture	nonliving
plants	temperature	wind

- All ecosystems are made up of _____ and _____ components.
- _____ factors are living things, such as _____ or _____.
- _____ factors are nonliving things, such as _____, _____, or _____.

MAIN IDEA: Changing one factor in an ecosystem can affect many other factors.

- Describe what biodiversity means in your own words.

- What is the term for an organism that has an unusually large effect on its ecosystem?

- List a few reasons why a beaver is an example of a keystone species.

Section 13.2 STUDY GUIDE CONTINUED

Vocabulary Check

7. What is the difference between a biotic and an abiotic factor?

8. Take another look at the Visual Vocab on page 403. In architecture, a keystone is the stone at the center of an arch that holds the arch together. How does this definition relate to a keystone species?

Be Creative

In the box below, sketch a simple ecosystem and label the abiotic and biotic factors.



SECTION
13.3

ENERGY IN ECOSYSTEMS
Study Guide

KEY CONCEPT

Life in an ecosystem requires a source of energy.

VOCABULARY

producer	heterotroph
autotroph	chemosynthesis
consumer	

MAIN IDEA: Producers provide energy for other organisms in an ecosystem.

Complete the following sentences with the correct term.

autotrophs
consumers

eating
heterotrophs

nonliving
producers

- _____ are organisms that get their energy from _____ resources, meaning they make their own food. These organisms are also called _____.
- _____ are organisms that get their energy by _____ other organisms. These organisms are also called _____.

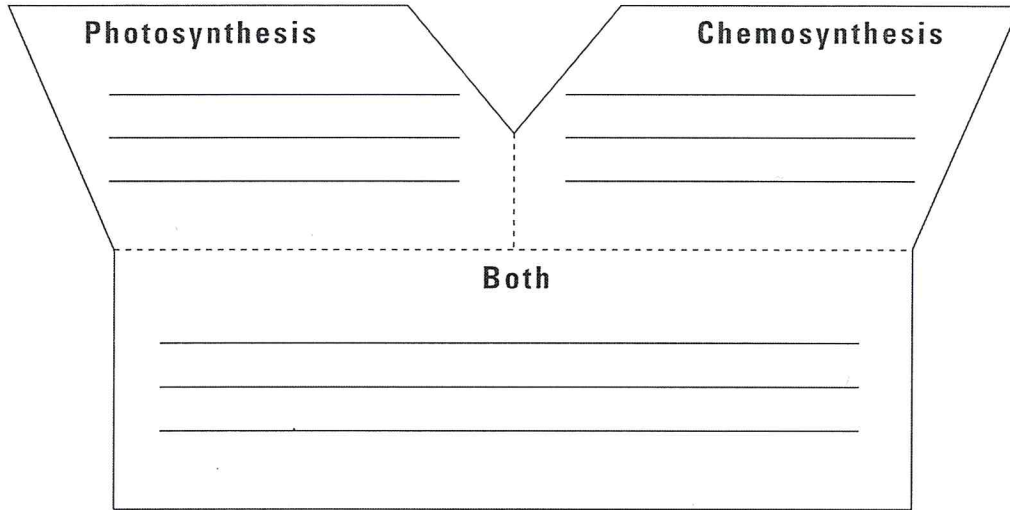
- Why are producers so important to an ecosystem?

- Why is the Sun important to both producers and consumers?

Section 13.3 STUDY GUIDE CONTINUED

MAIN IDEA: Almost all producers obtain energy from sunlight.

5. Complete the following Y-diagram to outline the similarities and differences between photosynthesis and chemosynthesis.



Vocabulary Check

Word Part	Meaning
auto-	self
hetero-	other
-troph	nourishment

Use the above word origins to explain the difference between an autotroph and a heterotroph.

7. The prefix *photo-* means “light” while the prefix *chemo-* means “chemical.” How do these word origins relate to the difference between photosynthesis and chemosynthesis?

8. What is the difference between a consumer and a producer?

SECTION
13.4

FOOD CHAINS AND FOOD WEBS

Study Guide**KEY CONCEPT**

Food chains and food webs model the flow of energy in an ecosystem.

VOCABULARY

food chain	decomposer
herbivore	specialist
carnivore	generalist
omnivore	trophic level
detritivore	food web

MAIN IDEA: A food chain is a model that shows a sequence of feeding relationships.

Complete the following sentence with the correct terms.

1. A food chain follows the connection between one _____ and a single chain of _____ within an _____.

Choose the correct term from the box below to fit each description.

carnivore	herbivore	secondary consumer
decomposer	omnivore	tertiary consumer
detritivore	primary consumer	trophic levels

2. I eat only plants. I am a(n) _____.
3. I eat only other animals. I am a(n) _____.
4. I eat both plants and animals. I am a(n) _____.
5. I eat dead organic matter. I am a(n) _____.
6. I break down organic matter into simpler compounds. I am a(n) _____.
7. I am the first consumer above the producer level. I am a(n) _____.
8. I am a carnivore that eats herbivores. I am a(n) _____.
9. I am a carnivore that eats other carnivores. I am a(n) _____.
10. The levels of nourishment in a food chain are called _____.

Section 13.4 STUDY GUIDE CONTINUED

MAIN IDEA: A food web shows a complex network of feeding relationships.

11. How is a food web different from a food chain?

12. What happens to energy at each link in a food web?

13. What type of organism provides the base of a food web?

Vocabulary Check

14. Use your knowledge of the words *special* and *general* to explain the diets of a specialist and a generalist.

15.

Word Part	Meaning
herba	vegetation
carnus	flesh
omnis	all

Use the word origins to explain the diets of each of the following consumers: herbivores, carnivores, and omnivores.

SECTION
13.6

PYRAMID MODELS
Study Guide

KEY CONCEPT

Pyramids model the distribution of energy and matter in an ecosystem.

VOCABULARY

biomass
energy pyramid

MAIN IDEA: An energy pyramid shows the distribution of energy among trophic levels.

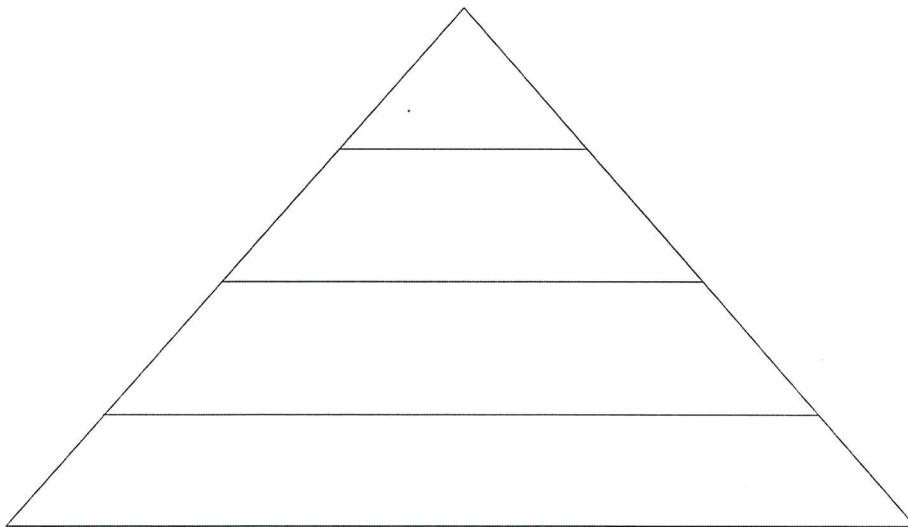
Complete the following sentences with the correct terms.

biomass

heat

waste

- The measure of the total dry mass of organisms in a given area is called _____.
- When a consumer incorporates the biomass of a producer into its own biomass, a large amount of energy is lost as _____ and _____.
- Label the four tiers of the energy pyramid with the correct trophic level (producers, primary consumers, secondary consumers, tertiary consumers).



Section 13.6 STUDY GUIDE CONTINUED

MAIN IDEA: Other pyramid models illustrate an ecosystem's biomass and distribution of organisms.

Write a description of each pyramid model.

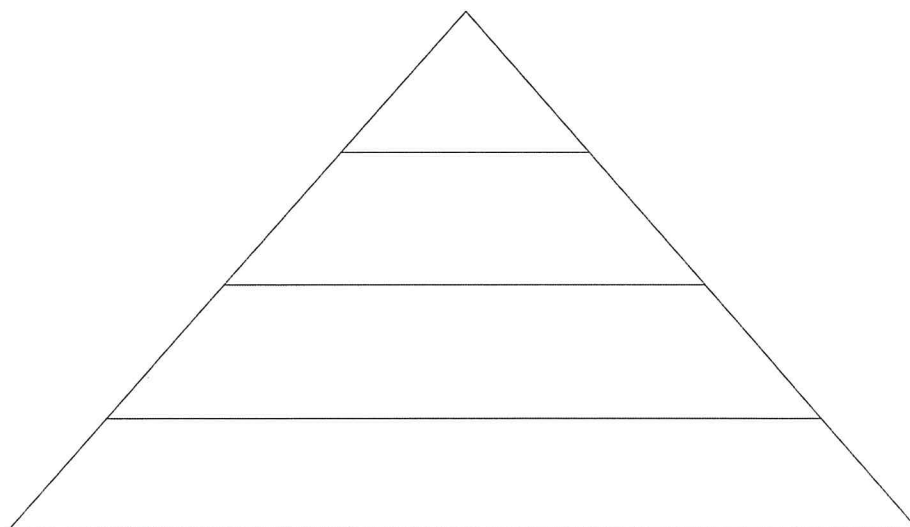
Model	Description
4. energy pyramid	
5. biomass pyramid	
6. pyramid of numbers	

Vocabulary Check

7. What is biomass?

Make an Energy Pyramid

8. Choose an ecosystem. Research what types of plants and animals live in your chosen ecosystem. Draw an energy pyramid that might exist within that ecosystem.



SECTION
14.2COMMUNITY INTERACTIONS
Study Guide**KEY CONCEPT**

Organisms interact as individuals and in populations.

VOCABULARY

competition	symbiosis	commensalism
predation	mutualism	parasitism

MAIN IDEA: Competition and predation are two important ways in which organisms interact.

Next to each situation described below, write whether it is an example of *interspecific* competition or *intraspecific* competition.

- _____ 1. Two squirrels race up a tree to reach a hidden pile of nuts.
- _____ 2. A hyena chases off a vulture to feast on an antelope carcass.
- _____ 3. Different species of shrubs and grasses on the forest floor compete for sunlight.
- _____ 4. Brown bears hunting for fish on a river's edge fight over space.
- _____ 5. Male big horn sheep butt heads violently in competition for mates.
6. Draw and label a sketch that represents an example of a predator-prey interaction.

Section 14.2 STUDY GUIDE CONTINUED

MAIN IDEA: Symbiosis is a close relationship between species.

7. For each type of symbiotic relationship, complete the chart with details about how each organism is impacted using the terms “Benefits,” “Harmed,” or “No impact.” For each situation, assume that Organism A initiates the relationship.

Symbiotic Relationship	Organism A	Organism B
mutualism		
commensalism		
parasitism		

8. How is parasitism similar to and different from predation?

9. What is the difference between endoparasites and ectoparasites?

Vocabulary Check

10. The term *symbiosis* comes from a Greek term which means “living together.” How does this word origin help to explain the definition of symbiosis?

11. Use your knowledge of the word “mutual” to write a definition for mutualism.

12. The word *commensalism* comes from the Latin *mensa*, meaning “table,” and *com-*, meaning “with.” If I come to your table to eat your food, I benefit but you don’t. Draw a sketch to show this meaning to help you remember it.

SECTION
14.4

POPULATION GROWTH PATTERNS

Study Guide**KEY CONCEPT**

Populations grow in predictable patterns.

VOCABULARY

immigration	logistic growth	density-dependent limiting factor
emigration	carrying capacity	density-independent limiting factor
exponential growth	population crash	

MAIN IDEA: Changes in a population's size are determined by immigration, births, emigration, and deaths.

Choose a word from the box below that best completes each sentence.

births	emigration	deaths	immigration
--------	------------	--------	-------------

- When resources are abundant in a particular area, individuals may move into the population of this area. This movement of individuals into a population from a different population is called _____.
- A very cold winter has left many deer in a population hungry and sick. By the end of the winter, this population will likely decrease because of _____.
- A deer population experiences growth when the rate of reproduction increases. This change in population size is due to _____.
- As humans move into their territory, many members of a deer population move away and join other herds. This movement of individuals out of a population into a new population is called _____.
- How does the availability of resources affect population growth?

Section 14.4 STUDY GUIDE CONTINUED

MAIN IDEA: Population growth is based on available resources.

- 6. In the space below, draw and label the two different types of population growth curves. Write a brief description next to each graph.

- 7. What type of population growth curve shows a carrying capacity?

- 8. What type of population growth is at risk for a population crash? Explain why.

MAIN IDEA: Ecological factors limit population growth.

- 8. List three examples of density-dependent limiting factors.

- 9. List three examples of density-independent limiting factors.

Vocabulary Check

Explain why each pair of words below are opposites.

- 10. emigrate/immigrate

- 11. density-dependent limiting factor/density-independent limiting factor

- 12. exponential growth/logistic growth
