

Chapter 8 Photosynthesis **Section Review 8-1**

Reviewing Key Concepts

Short Answer *On the lines provided, answer the following questions.*

1. Where do autotrophs get energy to produce food?

2. How do living things use ATP?

3. How is one molecule of ATP formed from one molecule of ADP?

4. How does a change from ATP to ADP provide an organism with energy?

5. What are two ways in which cells use the energy provided by ATP?

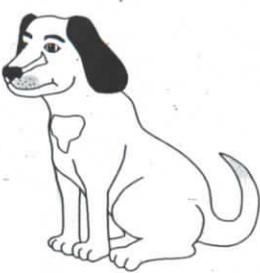
Reviewing Key Skills

6. **Comparing and Contrasting** What are the similarities between autotrophs and heterotrophs? What are the differences?

Classifying *On the line beneath each picture, classify the organism as either an autotroph or a heterotroph.*

7. 

8. 

9. 

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Chapter 8 Photosynthesis

Section Review 8-2

Reviewing Key Concepts

Matching Match each scientist with the appropriate experiment or conclusion. Write the letter of the correct scientist on the line provided. A letter may be used more than once.

- a. Priestley b. van Helmont c. Ingenhousz

- _____ 1. Plants need sunlight to produce oxygen.
- _____ 2. Plants gain most of their mass by taking in water.
- _____ 3. Using a candle and a jar, he observed that plants produce a substance that kept the candle burning.
- _____ 4. He measured the mass of the soil in which a plant grew.
- _____ 5. He observed plants exposed to light.

Short Answer On the lines provided, answer the following questions.

6. What is the overall equation for photosynthesis?

7. Explain how light energy affects a chlorophyll molecule.

Reviewing Key Skills

8. **Predicting** If a plant is kept under green-colored light for an extended period of time, what will happen to the plant's food production?

9. **Inferring** A plant that has a high amount of the orange pigment carotene would have leaves of what color? Explain your answer.

10. **Design an Experiment** Design an experiment to test the effects of air pollution on plants. Be sure to include a control.

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Chapter 8 Photosynthesis

Section Review 8-3

Reviewing Key Concepts

Completion *On the lines provided, complete the following sentences.*

1. The light-dependent reactions take place within the _____ membranes.
2. The light-independent reactions are also known as the _____.
3. The energy carriers _____ and _____ are produced during the light-dependent reactions.
4. In the light-dependent reactions, the gas _____ is produced.
5. High-energy sugars are produced during the _____ reactions.
6. The light-independent reactions take place in the _____.

Reviewing Key Skills

7. **Comparing and Contrasting** How are photosystem I and photosystem II similar? How are they different?

8. **Predicting** If there is no light coming into the chloroplasts, how will this affect the Calvin cycle?

9. **Applying Concepts** What effect does weather have on the process of photosynthesis?

10. **Applying Concepts** If you place a plant in a clear, sealed box, how could you use a measurement of the gases in the boxed air to measure the rate of photosynthesis? What gas would you measure?

Chapter 8 Photosynthesis **Enrichment**

The Electromagnetic Spectrum

Light is actually energy that is emitted from atoms. Atoms emit light in tiny packets of energy called photons. Photons move through space as electromagnetic waves, which are a form of energy with magnetic and electrical components. The electromagnetic waves that are visible to the human eye are called lightwaves.

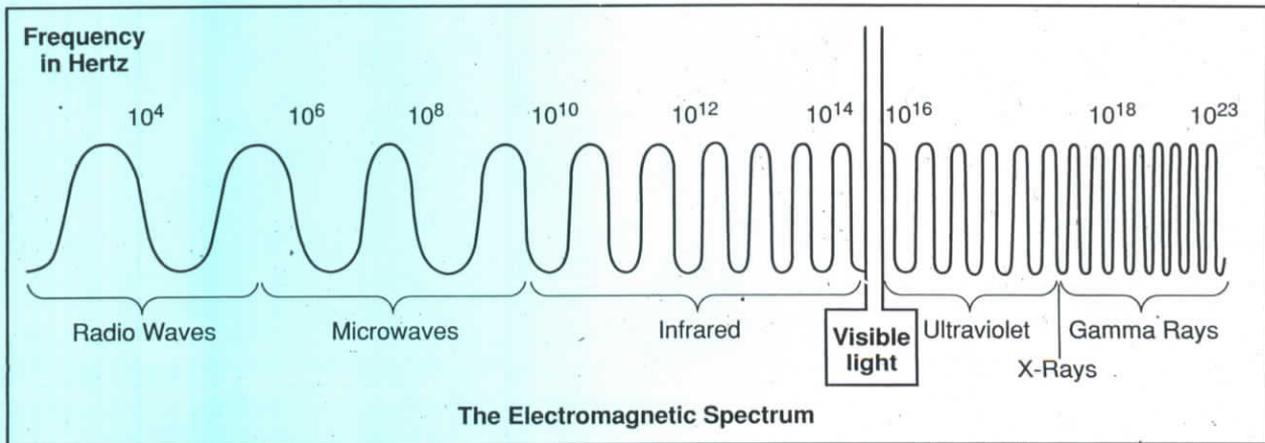
Light is only one kind of electromagnetic wave. You may be familiar with other kinds of electromagnetic waves, such as X-rays, microwaves, and radio waves. They are all radiated by vibrating electrons within atoms. The full range of electromagnetic waves is called the electromagnetic spectrum. The main differences between the types of electromagnetic waves are the frequency and wavelength of the radiation.

An illustration of the electromagnetic spectrum appears below. Notice that it is a continuous range of waves. As you move across the spectrum, the frequency and wavelength of the waves vary. All the waves in the electromagnetic spectrum travel through empty space at the same velocity: 299,792,458 m per second.

In the illustration, radio waves are at the left side of the spectrum. Radio waves include AM, FM, shortwave radio, television, and some kinds of radar. In the middle of the spectrum are microwaves and infrared waves. Microwaves include certain kinds of radar. At the right of the spectrum are visible light, ultraviolet light, X-rays, and gamma rays. Note that gamma rays have the highest frequencies in the electromagnetic spectrum.

The part of the electromagnetic spectrum that includes all the colors of light visible to the human eye is labeled "visible light." The waves to the left and right of visible light have frequencies too low or too high for the human eye to see. Therefore, people cannot see infrared or ultraviolet waves.

Visible light is produced by a radiation source, such as a star, a flame, or an incandescent light. A radiation source typically produces more than one frequency of electromagnetic wave. The various frequencies of visible light can be separated into a band of colors from red to violet when it passes through a prism.



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Evaluation Answer the following questions on a separate sheet of paper.

1. What kind of electromagnetic waves have the longest wavelength? Which ones have the shortest?
2. Bees can see higher frequencies of electromagnetic waves than humans can. What type of electromagnetic radiation do you think bees can see that humans cannot? Explain your answer.

Chapter 8 Photosynthesis **Chapter Vocabulary Review**

Defining Terms *On the lines provided, write a definition of each of the following terms.*

- 1. ATP _____

- 2. thylakoid _____

- 3. NADP⁺ _____

- 4. ATP synthase _____

- 5. Calvin cycle _____

Short Answer *On the lines provided, answer the following questions.*

- 6. What is the difference between an autotroph and a heterotroph?

- 7. In which part of photosynthesis is oxygen produced?

- 8. What is the relationship between pigments and chlorophyll?

- 9. How do the light-dependent reactions differ from the Calvin cycle?

- 10. What compounds are formed from carbon dioxide in the Calvin cycle?

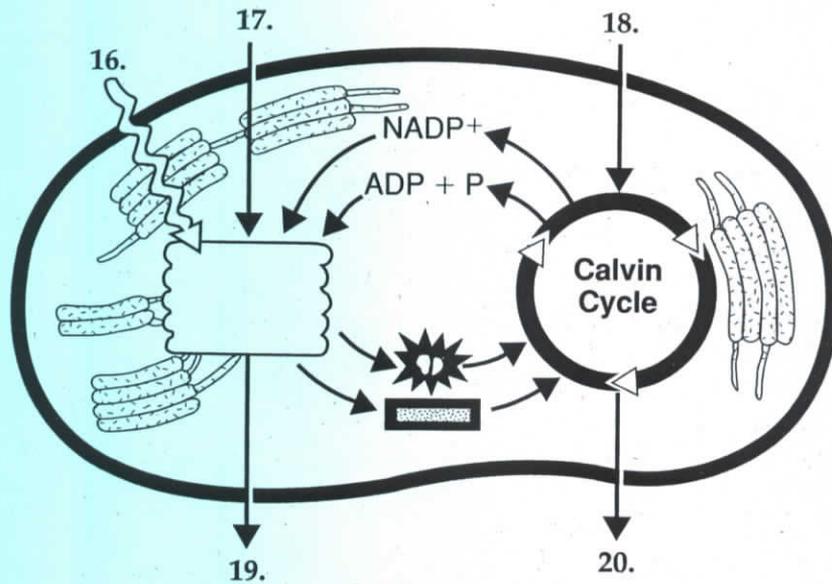
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Matching Match each term with its description below. Write the letter of the correct term on the line provided.

- a. chlorophyll
- b. stroma
- c. pigment
- d. photosynthesis
- e. light-dependent reactions

- _____ 11. molecule that absorbs light
- _____ 12. produce oxygen gas and convert ADP to ATP
- _____ 13. the region outside the thylakoid membranes
- _____ 14. principal pigment found in plants
- _____ 15. process by which autotrophs use sunlight to make high-energy sugars

Labeling Diagrams On the lines provided, write the names of the reactants and products for photosynthesis that correspond to the numbers in the diagram.



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- 16. _____
- 17. _____
- 18. _____
- 19. _____
- 20. _____

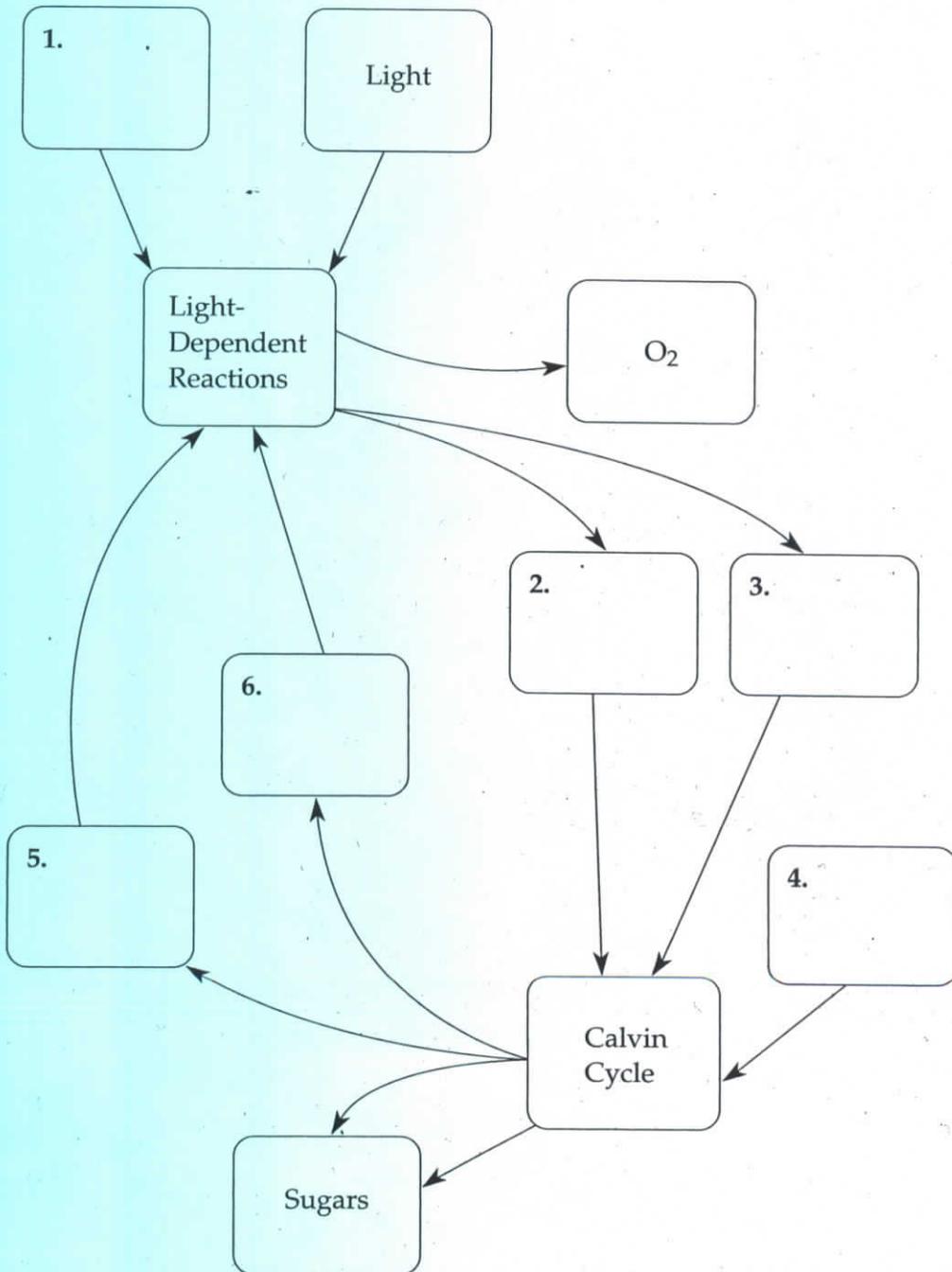
Chapter 8 Photosynthesis

Graphic Organizer

Flowchart

The following flowchart represents the reactions of photosynthesis. Fill in the missing information using the formulas listed below.

$NADP^+$ ATP ADP
 H_2O CO_2 $NADPH$



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