

Chapter 8

Photosynthesis

Section 8-1 Energy and Life (pages 201-203)

This section explains where plants get the energy they need to produce food. It also describes the role of the chemical compound ATP in cellular activities.

Autotrophs and Heterotrophs (page 201)

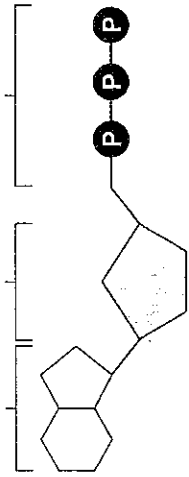
1. Where does the energy of food originally come from? _____
2. Complete the table of types of organisms.

TYPES OF ORGANISMS

| Type | Description | Examples |
|------|---|----------|
| | Organisms that make their own food | |
| | Organisms that obtain energy from the food they eat | |

Chemical Energy and ATP (pages 202-203)

3. What is one of the principal chemical compounds that living things use to store energy? _____
4. How is ATP different from ADP? _____
5. Label each part of the ATP molecule illustrated below.



6. When a cell has energy available, how can it store small amounts of that energy? _____
7. When is the energy stored in ATP released? _____

Skills Worksheet

Vocabulary Review

Write the correct term from the list below in the space next to its definition.

- ~~aerobic~~ heterotrophs
- ~~anaerobic~~ Krebs cycle
- autotrophs photosynthesis
- Calvin cycle pigment
- carbon dioxide fixation thylakoids
- carotenoids

1. the process by which light energy is converted to chemical energy _____
2. organisms that use energy from sunlight or inorganic substances to make organic compounds _____
3. organisms that get energy by consuming food _____
4. the process by which cells harvest energy from food _____
5. a substance that absorbs light _____
6. the primary pigment involved in photosynthesis _____
7. absorb wavelengths of light different from those absorbed by chlorophyll _____
8. the series of molecules down which excited electrons are passed in a thylakoid membrane _____
9. the transfer of carbon dioxide to organic compounds _____
10. a series of enzyme-assisted chemical reactions that produces a three-carbon sugar molecule _____
11. a process that requires oxygen _____
12. a process that does not require oxygen _____
13. the process by which glucose is broken down to pyruvate _____
14. a series of enzyme-assisted chemical reactions following glycolysis that produces carbon dioxide _____
15. the recycling of NAD⁺ under anaerobic conditions _____
16. disk-shaped structures inside chloroplasts _____

Name _____ Date _____
Class _____

Chapter 8, Photosynthesis (continued)

7. Photosynthesis uses the energy of sunlight to convert water and carbon dioxide into oxygen and high-energy _____.

Light and Pigments (page 207)

8. What does photosynthesis require in addition to water and carbon dioxide? _____

9. Plants gather the sun's energy with light-absorbing molecules called _____.

10. What is the principal pigment of plants? _____

11. Circle the letter of the regions of the visible spectrum in which chlorophyll absorbs light very well.

- a. blue region
- b. green region
- c. red region
- d. yellow region

Reading Skill Practice

By looking at illustrations in textbooks, you can help yourself remember better what you have read. Look carefully at Figure 8-4 on page 206. What important ideas does this illustration communicate? Do your work on a separate sheet of paper.

Section 8-3 The Reactions of Photosynthesis (pages 208-214)

This section explains what happens inside chloroplasts during the process of photosynthesis.

Inside a Chloroplast (page 208)

1. Chloroplasts contain saclike photosynthetic membranes called _____.

2. What is a granum? _____

3. The region outside the thylakoid membranes in the chloroplasts is called the _____.

4. What are the two stages of photosynthesis called?

- a. _____
- b. _____

Name _____ Date _____
Class _____

8. For what purpose do the characteristics of ATP make it exceptionally useful to all types of cells? _____

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

- a. _____
- b. _____

ATP and Glucose (page 203)

10. Why is it efficient for cells to keep only a small supply of ATP on hand? _____

11. Circle the letter of where cells get the energy to regenerate ATP.

- a. ADP
- b. phosphates
- c. carbohydrates
- d. organelles

Section 8-2 Photosynthesis: An Overview (pages 204-207)

This section describes what important experiments revealed about how plants grow. It also introduces the overall equation for photosynthesis and explains the roles light and chlorophyll have in the process.

Introduction (page 204)

1. What occurs in the process of photosynthesis? _____

Investigating Photosynthesis (pages 204-206)

2. What did Jan van Helmont conclude from his experiment? _____

3. Circle the letter of the substance produced by the mint plant in Joseph Priestley's experiment.

- a. carbon dioxide
- b. water
- c. air
- d. oxygen

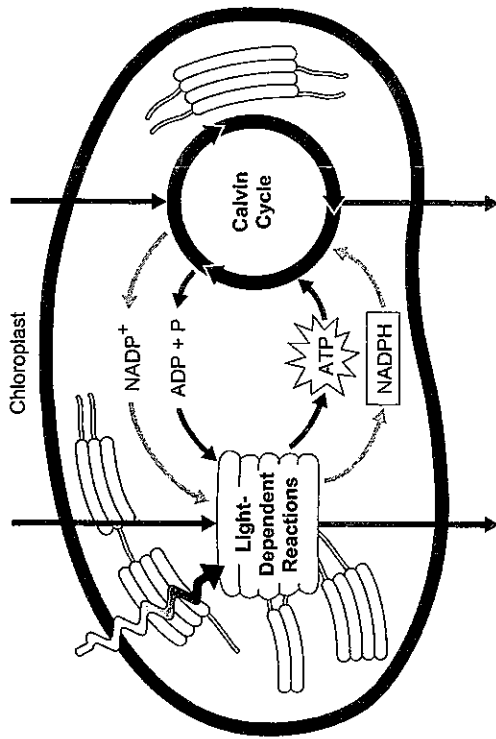
4. What did Jan Ingenhousz show? _____

The Photosynthesis Equation (page 206)

5. Write the overall equation for photosynthesis using words.

6. Write the overall equation for photosynthesis using chemical formulas. _____

5. Complete the illustration of the overview of photosynthesis by writing the products and the reactants of the process, as well as the energy source that excites the electrons.



NADPH (page 209)

6. When sunlight excites electrons in chlorophyll, how do the electrons change? _____

7. What is a carrier molecule? _____

8. Circle the letter of the carrier molecule involved in photosynthesis.

- a. H₂O
- b. NADP⁺
- c. CO₂
- d. O₂

9. How does NADP⁺ become NADPH? _____

Chapter 8, Photosynthesis (continued)

Light-Dependent Reactions (pages 210-211)

10. Circle the letter of each sentence that is true about the light-dependent reactions.

- a. They convert ADP into ATP.
- b. They produce oxygen gas.
- c. They convert oxygen into carbon dioxide.
- d. They convert NADP⁺ into NADPH.

11. Where do the light-dependent reactions take place? _____

12. Circle the letter of each sentence that is true about the light-dependent reactions.

- a. High-energy electrons move through the electron transport chain from photosystem II to photosystem I.
- b. Photosynthesis begins when pigments in photosystem I absorb light.
- c. The difference in charges across the thylakoid membrane provides the energy to make ATP.
- d. Pigments in photosystem I use energy from light to reenergize electrons.

13. How does ATP synthase produce ATP? _____

The Calvin Cycle (pages 212-213)

14. What does the Calvin cycle use to produce high-energy sugars? _____

15. Why are the reactions of the Calvin cycle also called the light-independent reactions? _____

16. Circle the letter of each statement that is true about the Calvin cycle.

- a. The main products of the Calvin cycle are six carbon dioxide molecules.
- b. Carbon dioxide molecules enter the Calvin cycle from the atmosphere.
- c. Energy from ATP and high-energy electrons from NADPH are used to convert 3-carbon molecules into similar 3-carbon molecules.
- d. The Calvin cycle uses six molecules of carbon dioxide to produce a single 6-carbon sugar molecule.