

CHAPTER 6 STUDY GUIDE

THE FLOW OF ENERGY

Section 6.1 Energy for Cells

In your textbook, read about ATP.

Use each of the terms below just once to complete the passage:

released
exergonic

endergonic
ATP

phosphate
work

linked
hydrolysis

energy
adenosine

In order for organisms to carry out life processes their cells need (1)_____. Energy available to do (2)_____ is called free energy. Chemical reactions that require free energy are called (3)_____ reactions. The free energy required for these reactions must come from energy-releasing reactions called (4)_____ reactions. These two types of reactions must be (5)_____ together for a cell to function. In cells, most of the free energy needed involves a molecule called (6)_____. It can be represented as A-P-P-P where the A stands for (7)_____ and -P-P-P represents three bonded (8)_____ groups. When the bond between two phosphate groups is broken, energy is (9)_____. One type of energy-releasing reaction involving ATP is a(n) (10)_____ reaction.

Use the equation below to answer the following questions.



11. What is used to form the chemical bond between glucose and fructose?

12. Is energy released when ATP is converted to ADP? What type of reaction is this?

13. What is the name of the disaccharide produced by this reaction?

14. Is energy required to form the disaccharide? What type of reaction is it?

15. What is the main energy link between exergonic and endergonic reactions?

THE FLOW OF ENERGY

Section 6.1 Energy for Cells continued

In your textbook, read about respiration with oxygen and anaerobic processes.

Circle the letter of the choice that is the best response or that best completes the statement.

16. Which food molecule is used as an energy source?
 a. adenosine b. glucose c. ADP d. inorganic phosphate
17. Oxygen is used to carry out cellular respiration, a process that is
 a. aerobic. b. anaerobic. c. diffusion. d. osmosis.
18. During aerobic respiration the energy from glucose is used to produce
 a. oxygen. b. sucrose. c. enzymes. d. ATP.
19. Anaerobic processes take place in the absence of
 a. glucose. b. ADP. c. ATP. d. oxygen.
20. Which of these categories includes organisms that carry out only anaerobic processes?
 a. bacteria b. animals c. plants d. insects
21. Lactic acid fermentation and alcoholic fermentation are both
 a. aerobic. b. anaerobic. c. endergonic. d. photosynthetic.
22. During strenuous exercise, lactic acid fermentation begins because the muscle cells are not getting enough
 a. glucose. b. water. c. oxygen. d. ATP.
23. Which process produces the most ATP molecules per molecule of glucose?
 a. lactic acid fermentation b. aerobic respiration
 c. alcoholic fermentation d. light reactions

Complete the table by checking the correct column(s) for each statement.

Statement	Type of Process		
	Aerobic Respiration	Fermentation	
		Lactic Acid	Alcoholic
24. It requires oxygen.			
25. It does not require oxygen.			
26. It requires energy input from 2 ATP.			
27. It can produce a net of 36 ATP.			
28. It produces a net of 2 ATP.			
29. It is important in baking and brewing.			
30. It causes the pain of muscle fatigue.			

THE FLOW OF ENERGY

Section 6.2 Photosynthesis

In your textbook, read about light and chlorophyll and other pigments.

Determine if the statement is true. If it is not, rewrite the italicized part to make it true.

1. Light is a form of *chemical* energy. _____
2. The distance between one wave crest and the next wave crest is called *frequency*.

3. The mixture of wavelengths of radiant energy that is visible to humans is called *white* light.

4. The range of colors that makes up white light is called the *bright-line* spectrum.

5. *Violet* light has the longest wavelength of the visible spectrum. _____
6. *Yellow* light has the shortest wavelength of the visible spectrum. _____
7. A leaf looks green because it reflects *green* light. _____
8. The *lighter* the object, the greater the amount of light that is absorbed. _____
9. When an object absorbs light, the light energy is usually changed to *heat*. _____
10. In photosynthesis, producers store chemical energy in organic *elements*. _____

Complete the table by checking the correct column(s) for each description.

Description	Chlorophyll	Carotenoid
11. Absorbs light energy		
12. Absorbs mostly blue and green wavelengths of light		
13. Gives producers their green color		
14. Reflects green and yellow wavelengths of light		
15. Found in chloroplasts		
16. Becomes visible in fall foliage		

THE FLOW OF ENERGY

Section 6.2 Photosynthesis continued

In your textbook, read about photosynthesis and the light reactions.

Answer the following questions.

17. In what organisms does photosynthesis occur?
18. In green plants, what is the organelle in which photosynthesis takes place? Is this organelle located in every cell of the plant?
19. Overall, is the set of reactions known as photosynthesis endergonic or exergonic? What is the basic source of energy required for its occurrence?

Circle the letter of the choice that is the best response or that best completes the statement.

20. In the light reactions of photosynthesis, light energy is converted into
a. chemical energy. b. electrical energy. c. nuclear energy. d. activation energy. ,
21. The internal membranes found in chloroplasts are called
a. plasma. b. nuclear. c. thylakoid. d. carotenoid.
22. Two types of pigments embedded in the membranes of the chloroplasts are
a. grana and thylakoid. b. chlorophyll and carotenoid.
c. chlorophyll and grana. d. carotenoid and grana.
23. Part of the thylakoid membranes are arranged in stacks called
a. grana. b. chlorophyll. c. carotenoid. d. stroma.
24. The fluid around the thylakoids is called
a. grana. b. chlorophyll. c. carotenoid. d. stroma.
25. In the light reactions of photosynthesis, energy from sunlight becomes stored as chemical energy in the bonds of
a. DNA. b. RNA. c. ATP. d. ADP.
26. During the light reactions, which molecule is split?
a. CO₂ b. C₆H₁₂O₆ c. H₂O d. ATP
27. The oxygen released during photosynthesis comes from
a. CO₂ b. C₆H₁₂O₆ c. H₂O d. ATP.

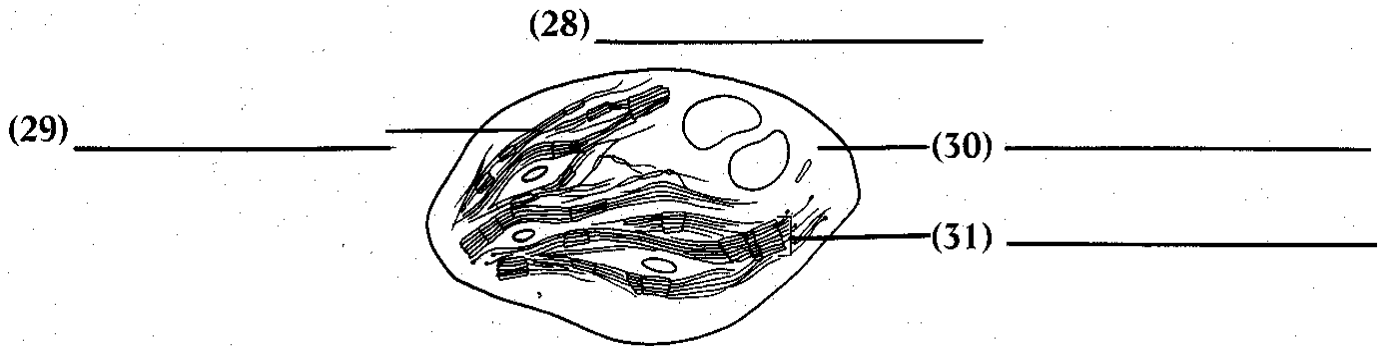
THE FLOW OF ENERGY

Section 6.2 Photosynthesis continued

In your textbook, read about the Calvin cycle and energy relationships.

Write a title for the diagram and then label its parts. Use these choices:

grana stroma thylakoid membrane chloroplast



Determine if the statement is true. If it is not, rewrite the italicized part to make it true.

32. *Thylakoid* membranes are the site of the light reactions.

33. The fluid part of the chloroplast is called the *grana*.

34. The Calvin cycle takes place in the *stroma*.

35. In the Calvin cycle, *carbon dioxide* from the air and hydrogen atoms from the light reactions are used to make molecules of sugar.

36. *Three-carbon* sugar molecules are produced in the Calvin cycle.

37. *Amino acid* molecules are joined to form starch and cellulose.

Complete the table by checking the correct column for each example.

Example	Photosynthesis	Respiration
38. An exergonic process		
39. Occurs in the chloroplasts		
40. Carbon dioxide and water are converted to sugar.		
Occurs continuously in the cells of producers and many consumers		
An endergonic process		
Sugars are broken down, making energy available to the cell.		

THE FLOW OF ENERGY

Chapter 6 Vocabulary

Review the new words in Chapter 6 of your textbook.

Match the definition in Column A with the correct term in Column B.

Column A

- _____ 1. yellow, orange, and red pigments in a chloroplast
- _____ 2. process of synthesizing sugars in photosynthesis
- _____ 3. breakdown of a glucose molecule into two lactic acid molecules
- _____ 4. fluid part of a chloroplast
- _____ 5. describes a chemical reaction that requires energy
- _____ 6. range of colors making up white light
- _____ 7. change of light energy into chemical energy
- _____ 8. distance between two successive wave crests
- _____ 9. processes taking place in the absence of oxygen
- _____ 10. describes a chemical reaction that releases energy
- _____ 11. breakdown of glucose into ethanol and carbon dioxide
- _____ 12. stacks of thylakoid membranes in a chloroplast
- _____ 13. describes respiration requiring oxygen
- _____ 14. breaks down to release free energy for cell activities
- _____ 15. produced when some wavelengths are absorbed by chlorophyll

Column B

- a. absorption spectrum
- b. ATP
- c. light reactions
- d. exergonic
- e. carotenoid
- f. grana
- g. visible spectrum
- h. lactic acid fermentation
- i. alcoholic fermentation
- j. Calvin cycle
- k. aerobic
- l. anaerobic
- m. wavelength
- n. stroma
- o. endergonic