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CHAPTER 6 TEST

PHOTOSYNTHESIS

MATCHING Write the correct letter in the blank before each numbered term.

_____ **1.** carotenoids

_____ **2.** ATP synthase

_____ **3.** photosystem

_____ **4.** PGAL

_____ **5.** RuBP

_____ **6.** visible spectrum

_____ **7.** chlorophylls

_____ **8.** biochemical pathway

a. adds phosphate group to ADP

b. absorb violet, blue, and red light

c. component colors of white light

d. series of linked chemical reactions

e. three-carbon molecule in Calvin cycle

f. absorb blue and green light

g. five-carbon carbohydrate in Calvin cycle

h. cluster of pigment molecules

TRUE-FALSE If a statement is true, write *T* in the blank. If a statement is false, write *F* in the blank, and then in the space provided, explain why the statement is false.

_____ **9.** Light of different wavelengths is different colors.

_____

_____ **10.** High-energy electrons move along the thylakoid membrane from photosystem I to photosystem II.

_____

_____ **11.** The oxygen atoms in the oxygen gas produced in photosynthesis come from carbon dioxide.

_____

_____ **12.** Compounds that can be produced from products of the Calvin cycle include amino acids, lipids, and carbohydrates.

_____

_____ **13.** C_4 plants differ from C_3 plants in that they do not use the Calvin cycle for carbon fixation.

_____

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MULTIPLE CHOICE **Write the letter of the most correct answer in the blank.**

_____ **14.** What product of the light reactions of photosynthesis is released and does not participate further in photosynthesis?

a. ATP **b.** NADPH **c.** H_2O **d.** O_2

_____ **15.** Where does the energy required for the Calvin cycle originate?

a. ATP and NADPH produced by the light reactions
b. O_2 produced by the light reactions
c. the sun's heat
d. photons of light

_____ **16.** Protons are moved into the thylakoid using energy from

a. ATP.
b. NADPH.
c. electrons in the transport chain.
d. the sun's heat.

_____ **17.** At the end of the photosystem I transport chain, electrons

a. combine with $NADP^+$ to form NADPH.
b. combine with ADP to form ATP.
c. are ejected out of the membrane, into the stroma.
d. enter photosystem II.

_____ **18.** Carbon atoms are fixed into organic compounds in

a. the Calvin cycle.
b. the light reactions.
c. electron transport chains.
d. photosystems I and II.

_____ **19.** To produce the same amount of carbohydrate, C_4 plants require less

a. ATP than C_3 plants.
b. carbon dioxide than C_3 plants.
c. water than C_3 plants.
d. RuBP than C_3 plants.

_____ **20.** Which of the following environmental factors will cause a rapid decline in the photosynthesis rate if the factor rises above a certain level?

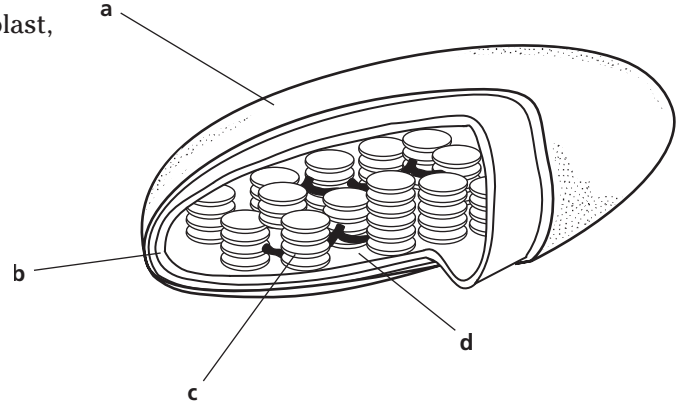
a. light intensity **b.** temperature **c.** carbon dioxide **d.** oxygen

_____ **21.** In the diagram below of a chloroplast, the light reactions would occur in area

a. *a.* **b.** *b.* **c.** *c.* **d.** *d.*

_____ **22.** In the diagram at right of a chloroplast, the reactions of the Calvin cycle would occur in area

a. *a.*
b. *b.*
c. *c.*
d. *d.*



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_____ **23.** Accessory pigments differ from chlorophyll *a* in that they

a. absorb all wavelengths of light.
b. absorb only yellow and orange light.
c. are not directly involved in the light reactions of photosynthesis.
d. have no function in photosynthesis.

SHORT ANSWER Answer the questions in the space provided.

24. Describe the internal structure and the external structure of a chloroplast.

25. What happens to the components of water molecules that are split during the light reactions of photosynthesis?

26. How is ATP formed in photosynthesis?

27. What is the fate of most of the PGAL molecules in the third step of the Calvin cycle? What happens to the remaining PGAL molecules?

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28. How do CAM plants differ from C_3 and C_4 plants? How does this difference allow CAM plants to exist in hot, dry conditions?

_____

_____

_____

29. Photosynthesis is said to be "saturated" at a certain level of CO_2. What does this mean?

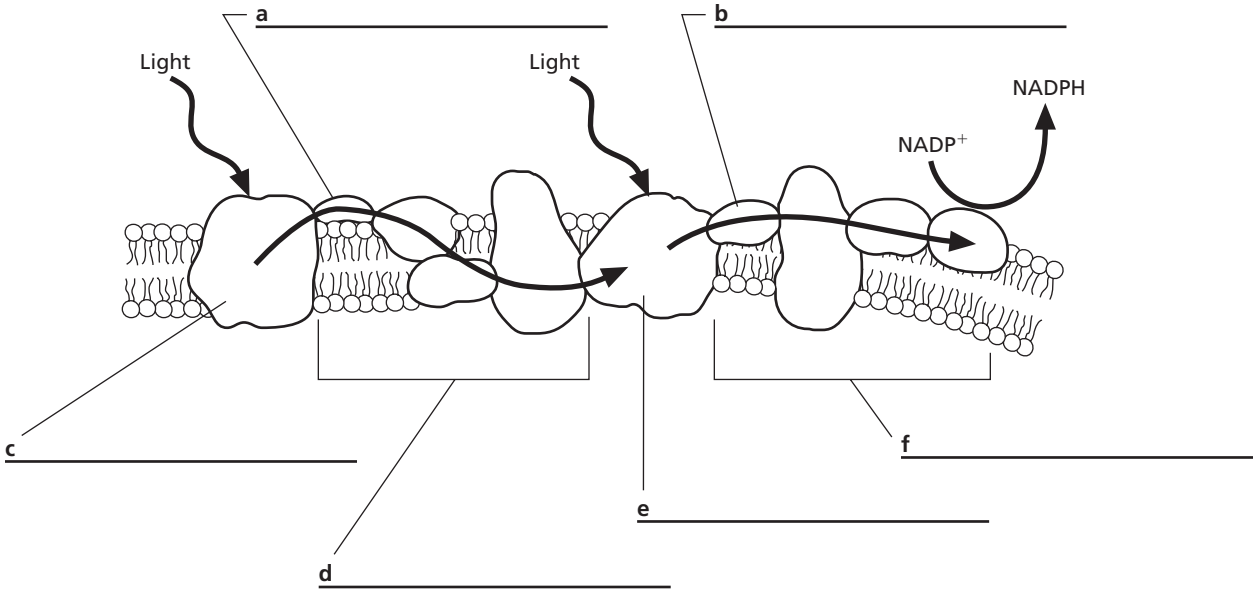
_____

_____

_____

DRAWING CONCLUSIONS Follow the directions given below.

30. The diagram below illustrates the site of the light reactions in the thylakoid membrane. Identify the primary electron acceptors, photosystem I, photosystem II, and the electron transport chains by writing the correct term in each blank. Then answer the question.



g. What structure that is found in the thylakoid membrane and is important to chemiosmosis is *not* shown in the diagram?

_____

25. Ink molecules at a high concentration in the water would move to an area of lower concentration by a process called diffusion.
26. Carrier proteins do not need to provide additional energy in facilitated diffusion because substances move down their concentration gradients.
27. Ions cross the cell membrane by passing through proteins known as ion channels.
28. During a cycle of the sodium-potassium pump, three sodium ions are actively transported out of the cell and two potassium ions are actively transported into the cell.
29. In endocytosis, cells ingest external substances by folding the cell membrane inward to form a vesicle. In exocytosis, cells release substances by the fusion of a vesicle with the cell membrane and the expulsion of the vesicle's contents into the extracellular environment.
30. a. endocytosis; b. diffusion through ion channels; c. passive diffusion; d. sodium-potassium pump; e. facilitated diffusion; f. exocytosis; g. endocytosis, sodium-potassium pump, and exocytosis

Chapter 6
Photosynthesis

1. f
2. a
3. h
4. e
5. g
6. c
7. b
8. d
9. T
10. F; the electrons move from photosystem II to photosystem I.
11. F; the oxygen atoms that are in the oxygen gas produced in photosynthesis come from water.
12. T
13. F; C_4 plants use the Calvin cycle for carbon fixation, but first they fix carbon dioxide into 4-carbon compounds.
14. d
15. a
16. c
17. a
18. a
19. b
20. b
21. c
22. d
23. c
24. Each chloroplast is surrounded by a pair of membranes. Inside the inner membrane is a system of membranes arranged as flattened sacs called thylakoids. Thylakoids are layered in stacks called grana, and they are surrounded by a solution called the stroma.
25. Four electrons become available to replace those lost by chlorophyll molecules in photosystem II. Hydrogen ions remain inside the thylakoid, while oxygen diffuses out of the chloroplast.
26. Energy from electrons is used to pump a high concentration of protons into the thylakoid. These protons then flow into the stroma and down their concentration gradient, driving the conversion of ADP into ATP, which is catalyzed by ATP synthase.
27. Most of the PGAL is converted back into RuBP, but some PGAL is used to make organic compounds.
28. CAM plants take in carbon dioxide at night and release it into the Calvin cycle during the day. CAM plants lose less water than either C_3 or C_4 plants.
29. It means that the rate of photosynthesis cannot be increased by increasing the CO_2 concentration above a certain level.
30. a. primary electron acceptor; b. primary electron acceptor; c. photosystem II; d. electron transport chain; e. photosystem I; f. electron transport chain; g. ATP synthase

Chapter 7
Cellular Respiration

1. c
2. g
3. a
4. h
5. f
6. d
7. e
8. b
9. F; glucose molecules are converted into pyruvic acid molecules in the process of glycolysis.
10. F; yeasts produce alcohol and CO_2 in the process of alcoholic fermentation.
11. F; in cellular respiration, glycolysis precedes the Krebs cycle.
12. T
13. F; $FADH_2$ and NADH donate electrons to the electron transport chain.
14. a
15. d
16. d
17. b
18. c
19. a
20. c
21. a
22. c
23. d
24. Two ATP molecules are used in step one.
25. When muscle cells are involved in strenuous exercise and the body cannot supply them with oxygen rapidly enough to carry out aerobic respiration, lactic-acid fermentation will occur.
26. Much of the energy originally contained in glucose is held in pyruvic acid.
27. Oxaloacetic acid regenerates coenzyme A when it reacts with acetyl CoA to form citric acid in step one of the Krebs cycle. Coenzyme A is needed to begin the Krebs cycle again.
28. The electrons react with oxygen to form water.
29. the mitochondrial matrix; NADH and $FADH_2$
30. a. glycolysis; b. lactic acid fermentation; c. alcoholic fermentation; d. Krebs cycle; e. electron transport chain

Chapter 8
Cell Reproduction

1. e
2. g
3. h
4. a
5. d