Cell Respiration and Photosynthesis Study Guide

Multiple Choice
Identify the letter of the choice that best completes the statement or answers the question.

____ 1. Which of the following is an autotroph?
a. mushroom
b. dog
c. monkey
d. tree

____ 2. Which of the following is NOT an example of a heterotroph?
a. mushroom
b. leopard
c. grass
d. human

____ 3. Energy is released from ATP when
a. a phosphate group is added.
b. adenine bonds to ribose.
c. ATP is exposed to sunlight.
d. a phosphate group is removed.

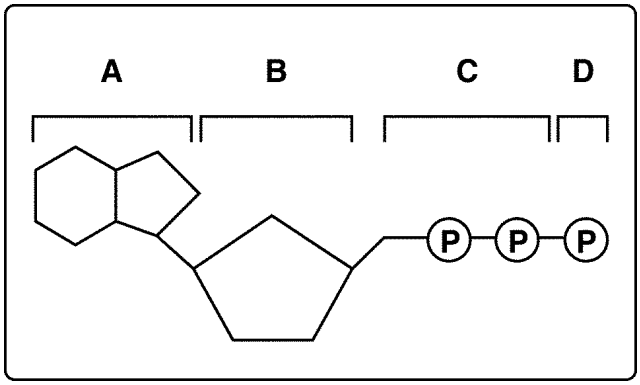


Figure 8–1

____ 4. Look at Figure 8-1. All of the following are parts of an ADP molecule EXCEPT
a. structure A.
b. structure B.
c. structure C.
d. structure D.

____ 5. Which structures shown in Figure 8-1 make up an ATP molecule?
a. A and B
b. A, B, and C
c. A, B, C, and D
d. C and D

____ 6. Which of the following are used in the overall reactions for photosynthesis?
a. carbon dioxide
b. water
c. light
d. all of the above

____ 7. Most plants appear green because chlorophyll
a. does not absorb green light.
b. reflects violet light.
c. absorbs green light.
d. none of the above

____ 8. A granum is a(an)
a. stack of chloroplasts.
b. stack of thylakoids.
c. membrane enclosing a thylakoid.
d. photosynthetic pigment molecule.

____ 9. The light-collecting units of a chloroplast are the
a. electron carriers.
b. photosystems.
c. stroma.
d. high-energy sugars.

____

10. What are the products of the light-dependent reactions?
    a. oxygen gas
    b. ATP
    c. NADPH
    d. all of the above

____ 11. The Calvin cycle takes place in the
    a. stroma.
    b. photosystems.
    c. thylakoid membranes.
    d. chlorophyll molecules.

____ 12. If carbon dioxide is removed from a plant's environment, what would you expect to happen to its production of high-energy sugars?
    a. More sugars will be produced.
    b. No sugars will be produced.
    c. The same number of sugars will be produced but without carbon dioxide.
    d. Carbon dioxide does not affect the production of high-energy sugars in plants.

____ 13. If you continue to increase the intensity of light that a plant receives, what happens?
    a. The rate of photosynthesis increases with light intensity.
    b. The rate of photosynthesis decreases with light intensity.
    c. The rate of photosynthesis increases and then levels off.
    d. The rate of photosynthesis does not change.

Completion

Complete each sentence or statement.

14. Photosynthesis requires light, water, carbon dioxide, and _____.
15. If you separate the pigments found in a typical plant cell's chloroplasts, you will find _____, orange, and red pigments.
16. Thylakoids are a(an) _____ color because they contain chlorophyll.
17. In many plants, the rate of photosynthesis _____ when the weather becomes very cold.

Short Answer

18. How do heterotrophs obtain energy?

19. What is ATP, and when is energy released from it?

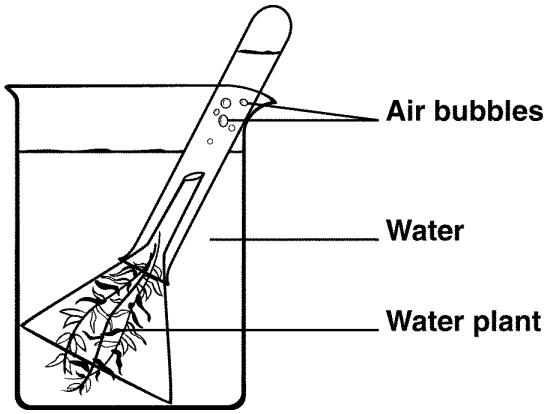
20. Write the overall equation for photosynthesis in both symbols and words.

22. What does the Calvin cycle do?

Other

USING SCIENCE SKILLS

A student prepared two beakers with identical sprigs of a water plant as shown below. She placed one beaker in the shade and the other beaker beside a fluorescent lamp. She then systematically changed the distance of the beaker from the lamp. She counted the bubbles given off by each sprig of the water plant. Shown here is the graph of the data for the beaker she placed in the light.



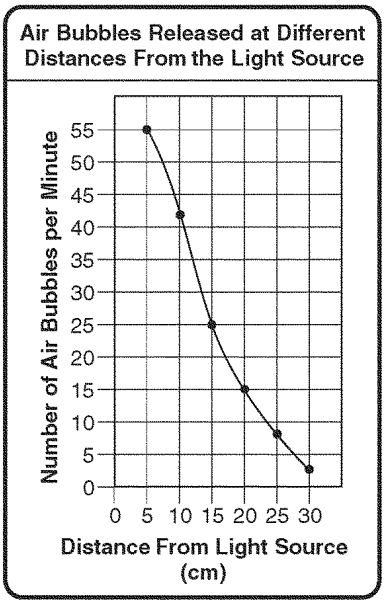


Figure 8-3

28. **Applying Concepts** Look at Figure 8-3. If the student later tested the air bubbles collected in the test tube, what would she find they are made of? How do you know?

29. **Using Tables and Graphs** Look at the graph in Figure 8-3. At what distance from the light source was the greatest number of bubbles produced?

30. **Analyzing Data** Look at the graph in Figure 8-3. What do the student's data show?

31. **Predicting** If the lamp was placed closer than 5 centimeters from the water plant, would the plant give off many more bubbles? Why or why not?

Cell Respiration And Photosynthesis Study Guide

Multiple Choice
Identify the letter of the choice that best completes the statement or answers the question.

____ 1. Which of the following is NOT a stage of cellular respiration?
a. fermentation
b. electron transport
c. glycolysis
d. Krebs cycle

____ 2. What are the reactants in the equation for cellular respiration?
a. oxygen and lactic acid
b. carbon dioxide and water
c. glucose and oxygen
d. water and glucose

____ 3. The starting molecule for glycolysis is
a. ADP.
b. pyruvic acid.
c. citric acid.
d. glucose.

____ 4. One cause of muscle soreness is
a. alcoholic fermentation.
b. glycolysis.
c. lactic acid fermentation.
d. the Krebs cycle.

____ 5. Which process is used to produce beer and wine?
a. lactic acid fermentation
b. glycolysis
c. alcoholic fermentation
d. the Krebs cycle

____ 6. The conversion of pyruvic acid into lactic acid requires
a. alcohol.
b. oxygen.
c. ATP.
d. NADH.

____ 7. Which organism is NOT likely to carry out cellular respiration?
a. tree
b. mushroom
c. anaerobic bacterium
d. tiger

____ 8. During one turn, the Krebs cycle produces
a. oxygen.
b. lactic acid.
c. electron carriers.
d. glucose.

____ 9. Which of the following passes high-energy electrons into the electron transport chain?
a. NADH and FADH2
b. ATP and ADP
c. citric acid
d. acetyl-CoA

____ 10. Cellular respiration uses one molecule of glucose to produce
a. 2 ATP molecules.
b. 34 ATP molecules.
c. 36 ATP molecules.
d. 38 ATP molecules.

____ 11. Breathing heavily after running a race is your body's way of
a. making more citric acid.
b. repaying an oxygen debt.
c. restarting glycolysis.
d. recharging the electron transport chain.

____ 12. All of the following are sources of energy during exercise EXCEPT
a. stored ATP.
b. alcoholic fermentation.
c. lactic acid fermentation.
d. cellular respiration.

____ 13. Which process does NOT release energy from glucose?
a. glycolysis
b. photosynthesis
c. fermentation
d. cellular respiration

14. Photosynthesis is to chloroplasts as cellular respiration is to
    a. chloroplasts.
    b. cytoplasm.
    c. mitochondria.
    d. nucleus.

____ 15. Plants cannot release energy from glucose using
    a. glycolysis.
    b. photosynthesis.
    c. the Krebs cycle.
    d. cellular respiration.

Completion

Complete each sentence or statement.

16. Cellular respiration occurs only in the presence of _____.

17. Without oxygen, a cell can extract a net gain of only _____ molecules of ATP from each glucose molecule.

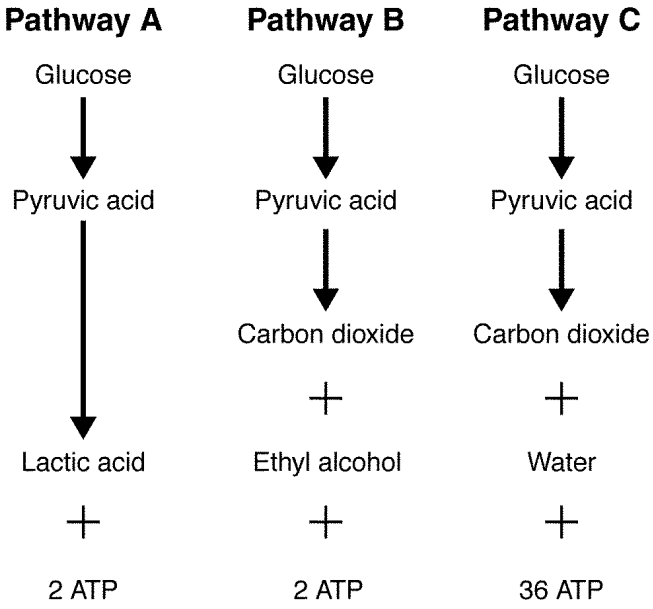


Figure 9–1

18. The pathway labeled B in Figure 9-1 is called _____ fermentation.

19. In Figure 9-1, only the pathway labeled _____ requires oxygen.

20. A high level of lactic acid in the blood is a sign that _____ fermentation has occurred.

Short Answer

21. List the three main stages of cellular respiration in order. Where does each stage take place in the cell?

22. What are the two types of fermentation? How do their products differ?
    Draw their structural formulas (honors question)

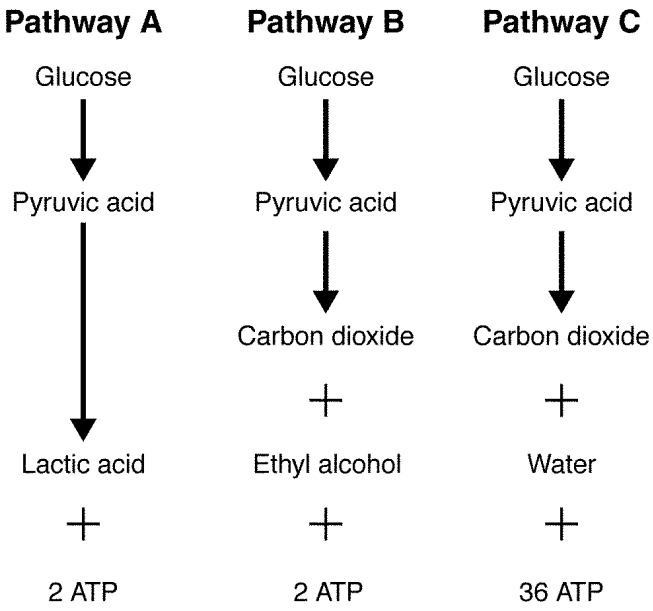


Figure 9–1

23. Based on Figure 9-1, which type of fermentation does NOT give off carbon dioxide? Explain your answer.
24. What role does oxygen play in the electron transport chain?
25. What three sources of ATP does your body use during a long aerobic exercise session?

Essay

26. List the main events of glycolysis. How many ATP molecules are produced and consumed by glycolysis? What effect does the presence of oxygen have on the events that follow glycolysis?

27. Compare lactic acid fermentation with alcoholic fermentation. Where does each process occur? What are the products of each process?

28. Identify the electron carriers of cellular respiration. Discuss the relationship between the electron carriers and the electron transport chain.

29. Explain how high-energy electrons are used by the electron transport chain.

30. Which pathways does the body use to release energy during exercise? Discuss these pathways in terms of a footrace.

Other

USING SCIENCE SKILLS

A scientist set up a respiration chamber as shown in Figure 9-2. She placed a mouse in flask B. Into flasks A, C, and D, she poured distilled water mixed with the acid-base indicator phenolphthalein. In the presence of CO_2, phenolphthalein turns from pink to clear. She allowed the mouse to stay in the chamber for about an hour.

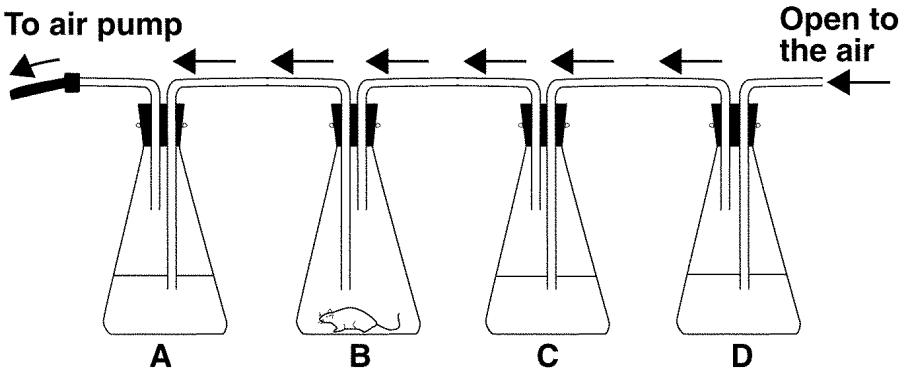


Figure 9–2

31. **Inferring** Write the equation for cellular respiration. Based on this equation and the setup shown in Figure 9-2, what substance(s) would you expect the mouse in flask B to give off?

32. **Interpreting Graphics** Based on Figure 9-2, how will the scientist be able to detect whether the mouse is carrying out cellular respiration?

33. **Applying Concepts** Assume that the scientist set up an identical respiration chamber, except that in this setup she placed a cricket in flask B instead of a mouse. At the end of one hour, she measured the amount of CO_2 given off by the cricket and the mouse. A small amount of CO_2 had been given off by the mouse, but little to no CO_2 had been given off by the cricket. Is the cricket undergoing cellular respiration? Explain these results.

34. **Predicting** Assume that the scientist set up an identical respiration chamber, except that in this setup she placed a mouse that had been exercising on a hamster wheel. Then, the scientist measured the amount of CO2 given off by both mice at the end of 15 minutes. Predict which setup produced the most CO2. Explain your answer.

35. **Interpreting Graphics** What will the mouse require to carry out cellular respiration? Look at the flasks in Figure 9-2. Describe the flow of materials through the flasks. Will the mouse receive fresh air so that it can survive?

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Multiple Choice
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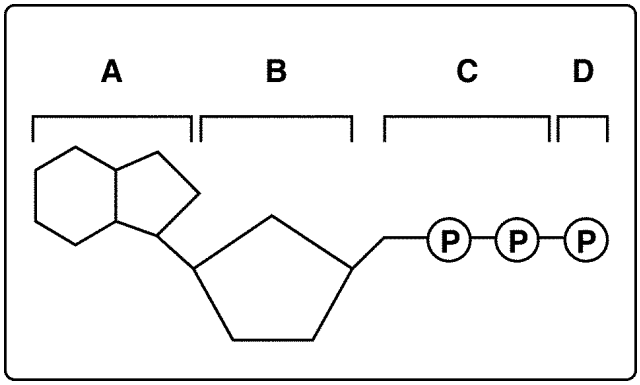

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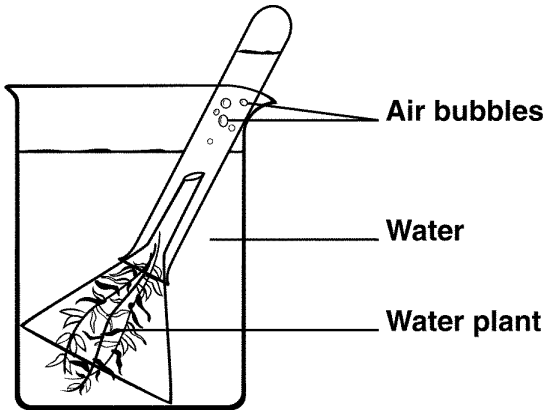

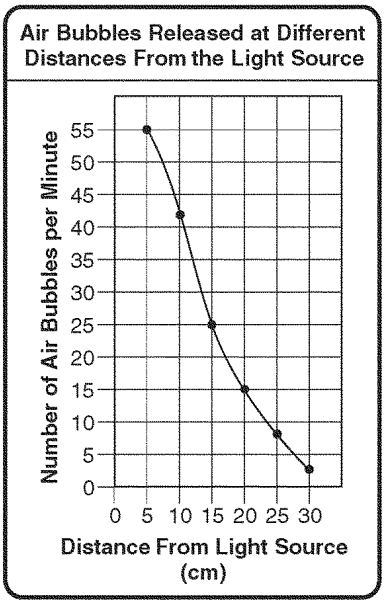

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Completion

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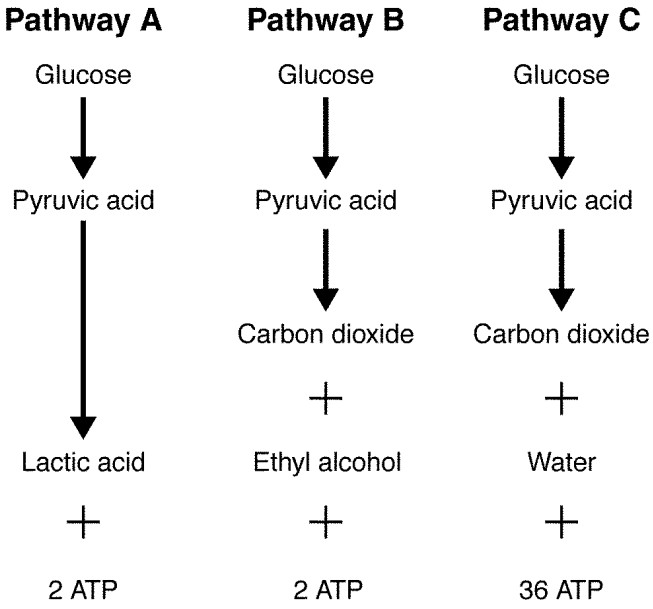

Figure 9–1

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19. In Figure 9-1, only the pathway labeled _____ requires oxygen.

20. A high level of lactic acid in the blood is a sign that _____ fermentation has occurred.

Short Answer

21. List the three main stages of cellular respiration in order. Where does each stage take place in the cell?

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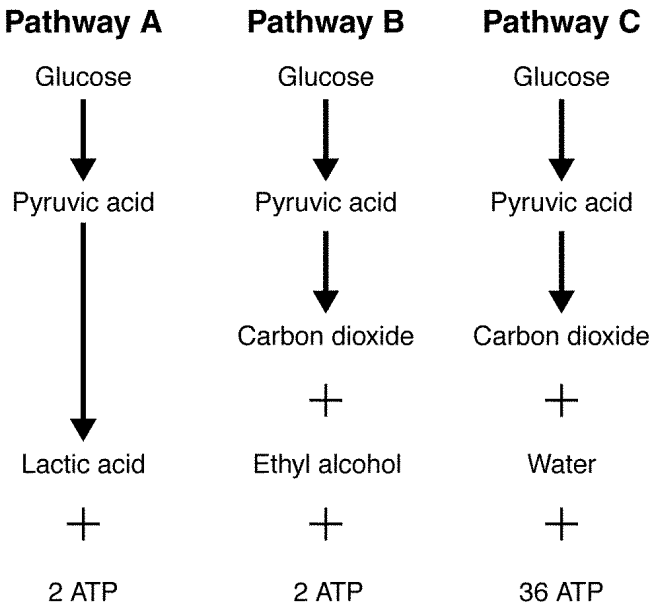

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Essay

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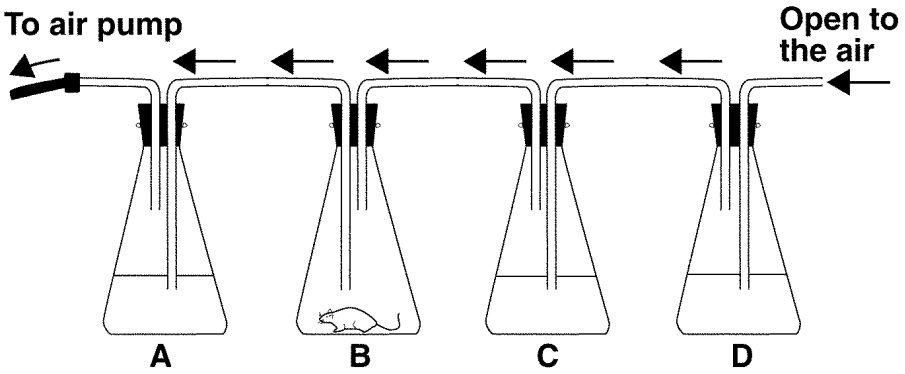

Figure 9–2

31. **Inferring** Write the equation for cellular respiration. Based on this equation and the setup shown in Figure 9-2, what substance(s) would you expect the mouse in flask B to give off?

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34. **Predicting** Assume that the scientist set up an identical respiration chamber, except that in this setup she placed a mouse that had been exercising on a hamster wheel. Then, the scientist measured the amount of CO_2 given off by both mice at the end of 15 minutes. Predict which setup produced the most CO_2. Explain your answer.

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