

## Biology Chapter 8 Test: Cellular Energy

### True/False

*Indicate whether the statement is true or false.*

- \_\_\_\_\_ 1. During the light-independent reactions of photosynthesis, light energy is used to split water molecules generating protons and oxygen molecules.
- \_\_\_\_\_ 2. In the first step of the Calvin cycle called carbon fixation, three carbon dioxide molecules combine with six 5-carbon compounds to form twelve 3-carbon molecules called 3-phosphoglycerate.
- \_\_\_\_\_ 3. C<sub>4</sub> plants keep their stomata open during hot days to allow for sufficient uptake of carbon dioxide to minimize water loss.
- \_\_\_\_\_ 4. The first stage of cellular respiration, glycolysis, is an anaerobic process.
- \_\_\_\_\_ 5. Glycolysis generates two ATP and two pyruvate. Only a small amount of the energy from the glucose is contained in the pyruvate.
- \_\_\_\_\_ 6. It take three turns of the Krebs cycle to break down each glucose molecule.
- \_\_\_\_\_ 7. A prokaryote that grows and reproduces without oxygen is called aerobic.
- \_\_\_\_\_ 8. Alcohol fermentation is similar to lactic-acid fermentation in that NADH donates electrons during this reaction and NAD<sup>+</sup> is regenerated.

**Multiple Choice**

Identify the choice that best completes the statement or answers the question.

9. Which of the diagrams in Figure 8-1 show how energy is produced in a cell?

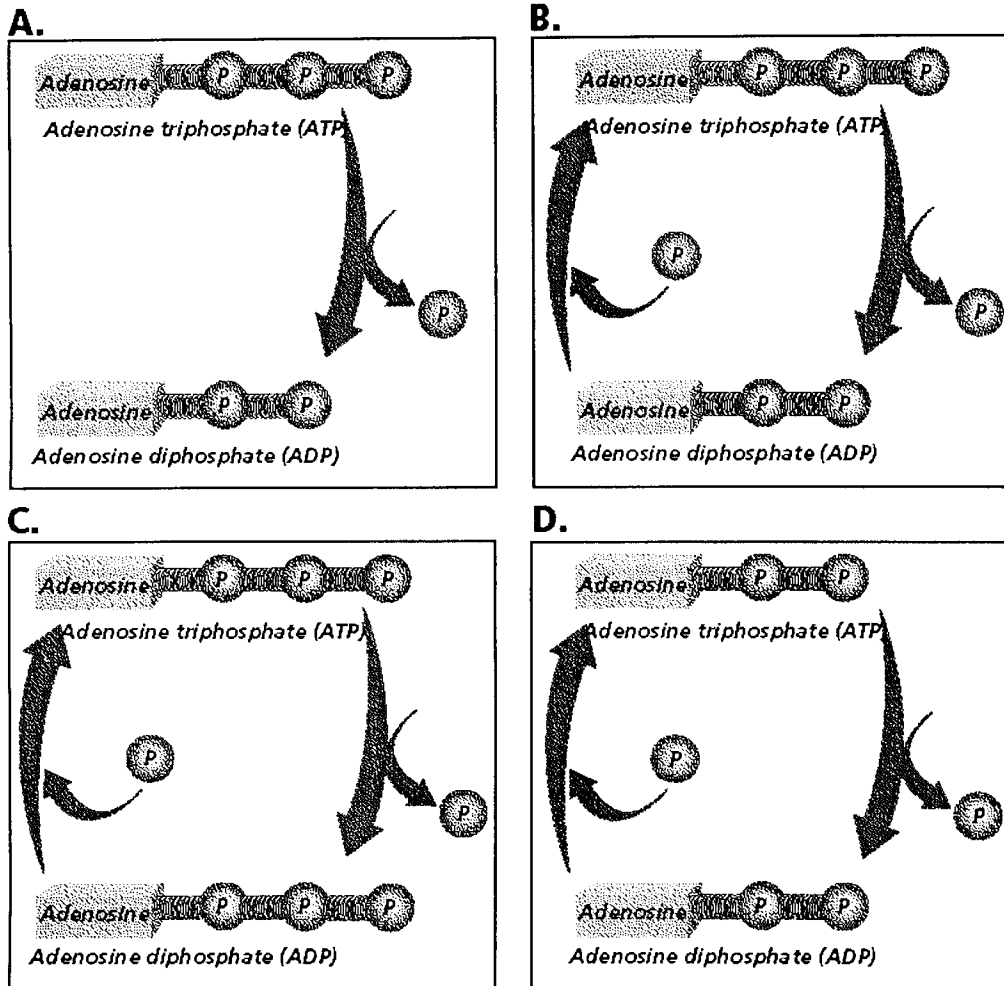


Figure 8-1

- a. A
- b. B

- c. C
- d. D

Name: \_\_\_\_\_

ID: A

10. Which of the processes shown in Figure 8-2 do not use a cell's energy?

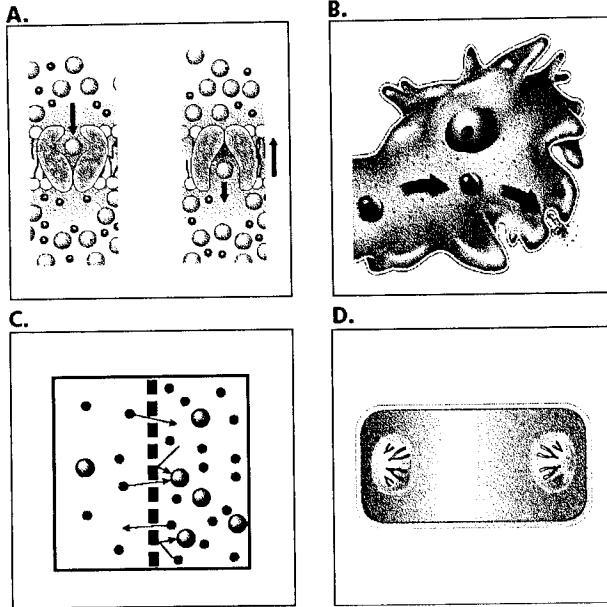


Figure 8-2

- a. A
- b. B
- c. C
- d. D

Name: \_\_\_\_\_

11. What is the main purpose of the cycle shown in Figure 8-3?

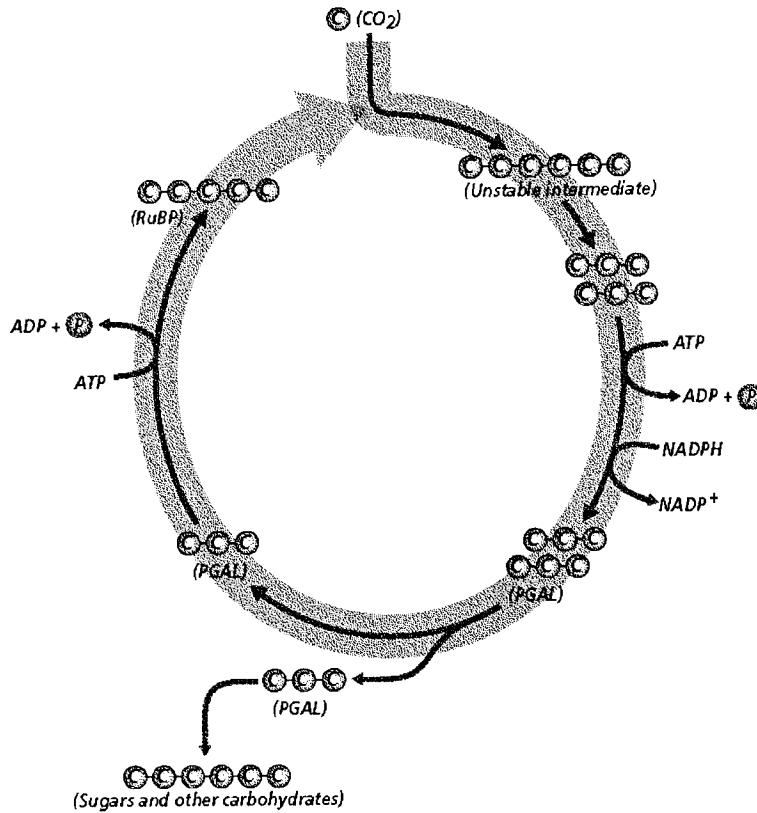


Figure 8-3

- a. sugar production
- b. destruction of CO<sub>2</sub>
- c. production of ADP
- d. production of NADP<sup>-</sup>

12. In which types of organisms does the process shown in Figure 8-4 take place?

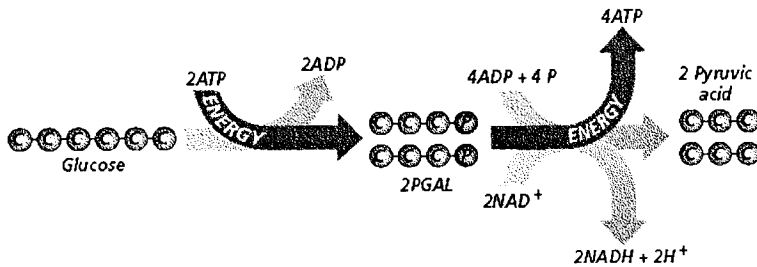


Figure 8-4

- a. plants only
- b. animals only
- c. neither plants nor animals
- d. both plants and animals

13. During photosynthesis light energy is converted to the energy in chemical bonds. What also happens according to the predictions of the second law of thermodynamics?
- chemical energy is converted to light energy
  - matter is lost in the process
  - heat is released in the process
  - the light and chemical energy are equal
14. What results from the removal of a phosphate group from ATP?
- the production of mechanical energy
  - the release of energy
  - the creation of energy
  - the absorption of energy by chlorophyll
15. The energy acquired in the light-dependent reactions is used in the light-independent reactions to build glucose molecules. How is this energy transferred from light-dependent to light-independent reactions?
- in the bonds of ATP and NADPH molecules
  - in the bonds of 5-carbon ribulose molecules
  - in the bonds of 3-carbon phosphoglycerate molecules
  - in the bonds of carbon dioxide molecules
16. Which of the following is an accurate description of how structure enhances function in the thylakoid?
- Thylakoid membranes have a large surface area that provides the space needed to hold large numbers of electron-transporting molecules.
  - Thylakoid membranes serve as an impermeable surface that prevents the flow of electrons into the stroma.
  - Thylakoid membranes can open and close depending on humidity to prevent evaporation from the cell.
  - Thylakoid membranes act as an oxygen barrier allowing the aerobic steps of photosynthesis to proceed.
17. If yellow, red, and orange pigments exist in the leaves of trees, why are leaves green except for in the autumn?
- Chlorophyll is the most abundant of all the pigments.
  - Chlorophyll molecules are the largest of the all pigment molecules.
  - Chlorophyll reproduces faster than the other pigments.
  - Green is the color of the spectrum most easily seen by humans.
18. Predict the photosynthetic pathway that might be used by a saguaro cactus.
- |                           |                           |
|---------------------------|---------------------------|
| a. C <sub>4</sub> pathway | c. C <sub>3</sub> pathway |
| b. CAM                    | d. nitrogen fixation      |
19. Which of the following are produced by reactions that take place in the thylakoids and are consumed by reactions in the stroma?
- |                             |                   |
|-----------------------------|-------------------|
| a. carbon dioxide and water | c. ATP and NADPH  |
| b. carbon dioxide and ATP   | d. ATP and oxygen |
20. When light strikes chlorophyll molecules, they lose electrons, which are ultimately replaced by which of the following?
- |   |                      |
|---|----------------------|
| a. splitting water into 2H <sup>+</sup> and O <sup>2-</sup> | c. oxidizing glucose |
| b. fixing carbon  | d. breaking down ATP |
21. The energy acquired in photosynthesis is used to make glucose. Where is the glucose made in plants?
- |                              |                            |
|------------------------------|----------------------------|
| a. in the thylakoid          | c. in the stroma           |
| b. in the thylakoid membrane | d. outside the chloroplast |

- \_\_\_\_\_ 22. The reactions of the Calvin cycle are not directly dependent on light, but they usually do not occur at night. Which of the following statements explains why not?
- The Calvin cycle depends on products of light reactions.
  - Carbon dioxide is not available at night.
  - It is too cold at night for reactions to take place.
  - Most plants do not make the 4-carbon compounds that would be needed for the Calvin cycle to occur at night.
- \_\_\_\_\_ 23. Where does the oxygen used in cellular respiration end up?
- |          |            |
|----------|------------|
| a. water | c. NADH    |
| b. ATP   | d. glucose |
- \_\_\_\_\_ 24. What is the role of oxygen in cellular respiration?
- It provides electrons for the electron transport chain.
  - It combines with carbon monoxide to form carbon dioxide.
  - It is needed for the production of light and heat.
  - It is the final electron acceptor for the electron transport chain.
- \_\_\_\_\_ 25. In what organisms does alcoholic fermentation take place?
- |                            |                |
|----------------------------|----------------|
| a. yeast and some bacteria | c. fruit flies |
| b. viruses                 | d. plants      |