

# Study Guide

## CHAPTER 8

### Section 1: How Organisms Obtain Energy







In your textbook, read about how organisms obtain energy.

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

Column A	Column B
_____ 1. the idea that energy cannot be created or destroyed	A. energy
_____ 2. all the chemical reactions in a cell	B. thermodynamics
_____ 3. anabolic pathway that converts energy from the Sun to chemical energy for use by cells	C. first law of thermodynamics
_____ 4. ability to do work	D. second law of thermodynamics
_____ 5. series of chemical reactions in which the product of one reaction is the substrate for the next reaction	E. metabolism
_____ 6. biological molecule that provides chemical energy	F. photosynthesis
_____ 7. study of the flow and transformation of energy	G. cellular respiration
_____ 8. source of nearly all energy for life	H. metabolic pathway
_____ 9. catabolic pathway that breaks down organic molecules	I. adenosine triphosphate (ATP)
_____ 10. spontaneous increase in disorder, or entropy	J. sunlight

In your textbook, read about autotrophs and heterotrophs.

Refer to the illustrations. Use each of the terms below only once to complete the passage.

autotrophs	chemoautotrophs	Group A	Group B	heterotrophs
		<b>Group A</b>	<b>Group B</b>	
				
Mice	Seed-eating birds	Deer	Grass	Shrubs
				
				Trees

The group that makes their own food is (11) \_\_\_\_\_. The organisms in this group are called (12) \_\_\_\_\_. The group that must eat other organisms for food is (13) \_\_\_\_\_. The organisms in this group are called (14) \_\_\_\_\_. Some organisms get their energy from inorganic substances, such as hydrogen sulfide. These organisms are called (15) \_\_\_\_\_.

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**Section 2: Photosynthesis**

In your textbook, read about light reactions.

Number the following steps of light reactions in the order in which they occur.

- \_\_\_\_\_ 1. The energy lost by electrons as they pass through the electron transport chain is used to make ATP.
- \_\_\_\_\_ 2. The electrons pass from the chlorophyll to an electron transport chain.
- \_\_\_\_\_ 3. Sunlight strikes the chlorophyll molecules in the thylakoid membranes.
- \_\_\_\_\_ 4. NADP<sup>+</sup> molecules change to NADPH as they carry the electrons to the stroma of the chloroplast.
- \_\_\_\_\_ 5. Light energy is transferred to the chlorophyll's electrons.
- \_\_\_\_\_ 6. The electrons are passed down a second electron transport chain.

Refer to the graph. Respond to each statement.

7. Explain why there are usually several types of pigments present in chloroplasts.

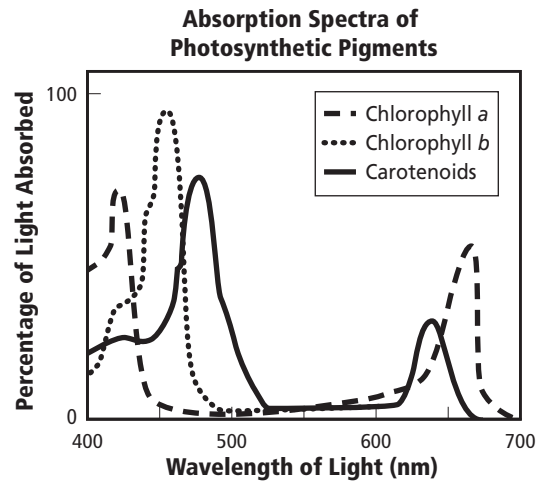
\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

8. State the name of the pigment that absorbs the most light at about 450 nm. \_\_\_\_\_



In your textbook, read about the Calvin cycle and alternative photosynthesis pathways.

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

Description	Calvin	C <sub>4</sub>	CAM
9. The second phase of photosynthesis, in which energy is stored in glucose			
10. Pathway(s) that help(s) plants photosynthesize while minimizing water loss			
11. Pathway that allows carbon dioxide to enter leaves only at night			
12. Light-independent reactions			
13. Uses the enzyme rubisco to convert carbon dioxide into molecules that can be used by the cell			
14. Type of plant found in hot, dry environments			

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**Section 3: Cellular Respiration**

In your textbook, read about cellular respiration and glycolysis.

Use each of the terms below only once to complete the passage.

- |         |            |              |                      |           |        |
|---------|------------|--------------|----------------------|-----------|--------|
| aerobic | anaerobic  | ATP          | cellular respiration | cytoplasm | energy |
| glucose | glycolysis | mitochondria | NADH                 | oxygen    |        |

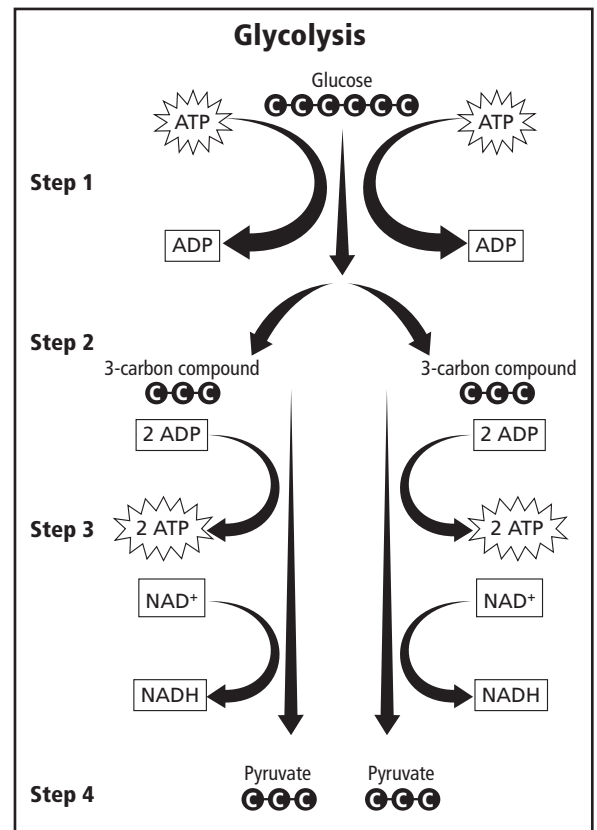
Organisms obtain energy in a process called (1) \_\_\_\_\_. This process harvests electrons from carbon compounds, such as (2) \_\_\_\_\_, and uses that energy to make (3) \_\_\_\_\_. ATP is used to provide (4) \_\_\_\_\_ for cells to do work. In (5) \_\_\_\_\_, glucose is broken down into pyruvate. Glycolysis is a(n) (6) \_\_\_\_\_ process because it does not require oxygen. Glycolysis takes place in the (7) \_\_\_\_\_. Two molecules of ATP and two molecules of (8) \_\_\_\_\_ are formed for every glucose molecule that is broken down. (9) \_\_\_\_\_ respiration takes place in the (10) \_\_\_\_\_. It is aerobic because the process requires (11) \_\_\_\_\_.

Refer to the diagram of glycolysis. Label the steps in the description to match the diagram.

12. Step \_\_\_\_\_. Each three-carbon compound is converted into a three-carbon pyruvate.
13. Step \_\_\_\_\_. A six-carbon compound is broken down into two three-carbon compounds.
14. Step \_\_\_\_\_. Phosphate groups from two ATP molecules are transferred to a glucose molecule.
15. Step \_\_\_\_\_. Two NADH molecules and four ATP molecules are produced.

Respond to each question.

16. **Interpret** How many total ATP molecules are produced from the glycolysis of one six-carbon glucose?  
\_\_\_\_\_
17. **Explain** Why is there a net gain of only two ATP molecules in the glycolysis of one six-carbon glucose?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



## Study Guide, Section 3: Cellular Respiration continued

In your textbook, read about the Krebs cycle, electron transport, and anaerobic respiration.

Refer to the diagram of cellular respiration. Respond to each question and statement.

- 18. Recall** What is the net yield of ATP produced by each of the circled processes in the diagram?

Glycolysis = \_\_\_\_\_ ATP

Krebs cycle = \_\_\_\_\_ ATP

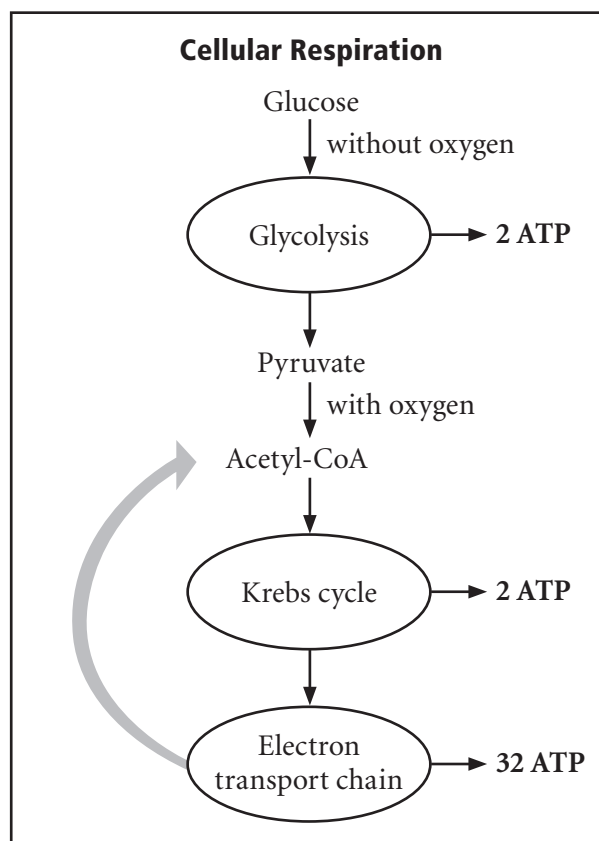
Electron transport chain = \_\_\_\_\_ ATP

- 19. Find** the total net yield of ATP from one molecule of glucose.

\_\_\_\_\_

- 20. Specify** Based on the diagram and your calculations, which process produces more energy—the anaerobic pathway or the aerobic pathway?

\_\_\_\_\_



For each statement below, write true or false.

- \_\_\_\_\_ 21. The anaerobic pathway that follows glycolysis in the absence of oxygen is fermentation.
- \_\_\_\_\_ 22. The hydrogen necessary in the electron transport chain comes from the splitting of carbon dioxide molecules.
- \_\_\_\_\_ 23. Cellular respiration in eukaryotes is slightly more efficient than in prokaryotes.
- \_\_\_\_\_ 24. The Krebs cycle is sometimes called the TCA cycle or the citric acid cycle.
- \_\_\_\_\_ 25. Fermentation occurs in the mitochondria.
- \_\_\_\_\_ 26. Skeletal muscle produces lactic acid when the body cannot supply enough oxygen.
- \_\_\_\_\_ 27. Alcohol fermentation is found in some bacteria and in humans.
- \_\_\_\_\_ 28. The two pyruvate molecules formed during glycolysis result in two Krebs cycles.
- \_\_\_\_\_ 29. Electron transport is the first step in the breakdown of glucose.