Chapter 9 Cellular Respiration

Section 9–1 Chemical Pathways (pages 221–225)

This section explains what cellular respiration is. It also describes what happens during glycolysis and describes two types of fermentation.

Chemical Energy and Food (page 221)
1. What is a calorie? ____________________________

2. How many calories make up 1 Calorie? ______________

3. Cellular respiration begins with a pathway called ____________________.

4. Is the following sentence true or false? Glycolysis releases a great amount of energy. ______________

Overview of Cellular Respiration (page 222)
5. What is cellular respiration? ____________________________

6. What is the equation for cellular respiration, using chemical formulas?

7. What would be the problem if cellular respiration took place in just one step?

8. Label the three main stages of cellular respiration on the illustration of the complete process.
9. Where does glycolysis take place? It takes place in the cytoplasm.

10. Where do the Krebs cycle and electron transport take place? Inside the mitochondria.

**Glycolysis (page 223)**

11. What is glycolysis? It is the process in which one molecule of glucose is broken in half, producing two molecules of pyruvic acid, a 3-carbon compound.

12. How does the cell get glycolysis going? It uses the energy of 2 molecules of ATP.

13. If the cell uses 2 ATP molecules at the beginning of glycolysis, how does it end up with a net gain of 2 ATP molecules? When glycolysis is complete, 4 ATP molecules have been produced.

14. What is NAD⁺? It is the electron carrier nicotinamide adenine dinucleotide.

15. What is the function of NAD⁺ in glycolysis? One of the reactions of glycolysis removes 4 high-energy electrons and passes them to NAD⁺, which becomes NADH and holds the electrons until they can be transferred to other molecules.

16. Why can glycolysis supply energy to cells when oxygen is not available? It does not require oxygen.

17. What problem does a cell have when it generates large amounts of ATP from glycolysis? In just a few seconds, all of the cell's available NAD⁺ are filled with electrons.

**Fermentation (pages 224–225)**

18. What is fermentation? It is a process that releases energy from food molecules by producing ATP in the absence of oxygen.

19. How does fermentation allow glycolysis to continue? Fermentation produces a steady supply of ATP.

20. Because fermentation does not require oxygen, it is said to be anaerobic.
21. What are the two main types of fermentation?
   a. _______________________________  b. _______________________________

22. What organisms use alcoholic fermentation? _______________________________

23. What is the equation for alcoholic fermentation after glycolysis?

   ______________________________________________________________________

24. What happens to the small amount of alcohol produced in alcoholic fermentation during the baking of bread? _______________________________

25. What does lactic acid fermentation convert into lactic acid? _______________________________

26. What is the equation for lactic acid fermentation after glycolysis?

   ______________________________________________________________________

27. During rapid exercise, how do your muscle cells produce ATP? _______________________________

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Reading Skill Practice

When you read about complex topics, writing an outline can help you organize and understand the material. Outline Section 9–1 by using the headings and subheadings as topics and subtopics and then writing the most important details under each topic. Do your work on a separate sheet of paper.