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Section 9–2 The Krebs Cycle and Electron Transport (pages 226–232)

Key Concepts

- What happens during the Krebs cycle?
- How are high-energy electrons used by the electron transport chain?

Introduction (page 226)

1. At the end of glycolysis, how much of the chemical energy in glucose is still unused?

_____

2. Because the final stages of cellular respiration require oxygen, they are said to be _____.

The Krebs Cycle (pages 226–227)

3. In the presence of oxygen, how is the pyruvic acid produced in glycolysis used?

_____

_____

4. What happens to pyruvic acid during the Krebs cycle? _____

_____

_____

5. Why is the Krebs cycle also known as the citric acid cycle? _____

_____

_____

6. When does the Krebs cycle begin? _____

_____

7. What happens to each of the 3 carbon atoms in pyruvic acid when it is broken down?

_____

_____

_____

8. What happens to the carbon dioxide produced in breaking down pyruvic acid?

_____

9. How is citric acid produced? _____

_____

_____

10. During the energy extraction part of the Krebs cycle, how many molecules of CO_2 are released? _____

11. What is the energy tally from 1 molecule of pyruvic acid during the Krebs cycle?

_____

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12. When electrons join NAD^+ and FAD during the Krebs cycle, what do they form?

_____

13. Why is the 4-carbon compound generated in the breakdown of citric acid the only permanent compound in the Krebs cycle? _____

_____

_____

Electron Transport (pages 228–229)

14. What is the electron transport chain? _____

_____

15. What does the electron transport chain use the high-energy electrons from the Krebs cycle for? _____

_____

16. How does the location of the electron transport chain differ in eukaryotes and prokaryotes? _____

_____

_____

_____

17. Where does the electron transport chain get the high-energy electrons that are passed down the chain? _____

_____

_____

18. Is the following sentence true or false? Hydrogen serves as the final electron acceptor of the electron transport chain. _____

19. What is the energy of the high-energy electrons used for every time 2 high-energy electrons move down the electron transport chain? _____

_____

20. What causes the H^+ ions in the intermembrane space to move through the channels in the membrane and out into the matrix? _____

_____

_____

_____

_____

_____

21. On average, how many ATP molecules are produced as each pair of high-energy electrons moves down the electron transport chain? _____

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22. Complete the flowchart about electron transport. (Review Figure 9–7 on page 228 of your textbook.)

High-energy electrons from NADH and $FADH_2$ are passed into and along the _____.

↓

The energy from the electrons moving down the chain is used to move H^+ ions across the _____.

↓

H^+ ions build up in the _____ space, making it _____ charged and making the matrix negatively charged.

↓

H^+ ions move through channels of _____ in the inner membrane.

↓

The ATP synthase uses the energy from the moving ions to combine ADP and phosphate, forming high-energy _____.

The Totals (page 229)

23. How many ATP molecules are formed during cellular respiration? _____

24. Why is more ATP generated from glucose in the presence of oxygen?

_____

_____

_____

_____

25. What happens to the energy of glucose that is not used to make ATP molecules?

_____

26. What are the final waste products of cellular respiration? _____

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Energy and Exercise (pages 230–231)

27. What are three sources of ATP a human body uses at the beginning of a race?

_____

_____

_____

28. When a runner needs quick energy for a short race, what source can supply enough ATP for about 90 seconds? _____

29. Why does a sprinter have an oxygen debt to repay after the race is over? _____

_____

_____

_____

30. A runner needs more energy for a longer race. How does the body generate the necessary ATP? _____

31. Why are aerobic forms of exercise so beneficial for weight control? _____

_____

_____

_____

Comparing Photosynthesis and Cellular Respiration (page 232)

32. If photosynthesis is the process that "deposits" energy in a "savings account," then what is cellular respiration? _____

_____

33. How are photosynthesis and cellular respiration opposite in terms of carbon dioxide?

_____

_____

34. How are photosynthesis and cellular respiration opposite in terms of oxygen?

_____

_____