*Student:* _____

1. An anaerobic process does NOT require
   A. water.
   B. oxygen.
   C. energy.
   D. phosphate.

2. Aerobic cellular respiration requires the use of
   A. $N_2$.
   B. $O_2$.
   C. $H_2$.
   D. $H_2O$.

3. ____ is NOT a product of the Kreb cycle.
   A. Pyruvic acid
   B. ATP
   C. $NADH_2$ and $FADH_2$
   D. $CO_2$

4. ____ is NOT a stage of cellular respiration.
   A. The Krebs cycle
   B. The electron transport system
   C. The Calvin cycle
   D. Glycolysis

5. Oxygen is NOT necessary for
   A. anaerobic cellular respiration.
   B. aerobic cellular respiration.
   C. electron transport system.
   D. All require oxygen.

6. A reaction that requires oxygen is called
   A. aerobic.
   B. synthesis.
   C. phosphorylation.
   D. anaerobic.

7. The end product of glycolysis is
   A. ketone.
   B. alcohol.
   C. pyruvic acid.
   D. lactic acid.

8. Your cells most readily obtain energy from
   A. $C_6H_{12}O_6$.
   B. Glyceraldehyde-3-phosphate.
   C. ATP.
   D. $NADH_2$.

9. The total (**gross**) number of ATPs produced from glycolysis is estimated to be
   A. thirty-six.
   B. thirty-four.
   C. two.
   D. four.

10. During glycolysis, a six-carbon sugar is converted to
    A. three two-carbon sugars.
    B. glucose.
    C. two pyruvic acid molecules.
    D. a disaccharide.

11. In glycolysis, the **net** profit of ATP from one six-carbon sugar is
    A. one.
    B. two.
    C. three.
    D. four.

12. Glucose + $NAD^+$ + ADP + P → NADH + Pyruvic Acid + ATP. This formula represents
    A. the Krebs cycle.
    B. photosynthesis.
    C. glycolysis.
    D. the light-dependent reactions.

13. Conversion of a six-carbon carbohydrate to two pyruvic acid molecules with accompanying reactions that release ATP and hydrogen atoms is called
    A. glycolysis.
    B. Krebs cycle.
    C. electron transport system.
    D. carbon fixation.

14. Chemosynthesis is
    A. a form of photosynthesis.
    B. a way some autotrophs make organic matter.
    C. a product of the Krebs cycle.
    D. present only in animals.

15. A form of metabolism used by prokaryotic organisms is
    A. chemosynthesis.
    B. photosynthesis.
    C. anaerobic respiration.
    D. All of these answers are correct.

16. The Krebs cycle requires
    A. a four-carbon acid.
    B. coenzyme A (CoA).
    C. an acetyl group (2C).
    D. All of these answers are true.

17. The Krebs cycle produces
    A. carbon dioxide.
    B. phosphate.
    C. acetyl.
    D. CoA.

18. Acetyl can be produced directly from
    A. CoA.
    B. glucose.
    C. proteins.
    D. pyruvic acid.

19. Acetyl is used during
    A. the Krebs cycle.
    B. the electron transport system.
    C. glycolysis.
    D. fermentation.

20. Hydrogens are combined with oxygen at the completion of
    A. glycolysis.
    B. fermentation.
    C. the Krebs cycle.
    D. the electron transport system.

21. The first material to enter the Krebs cycle is
    A. oxygen.
    B. glucose.
    C. acetyl-CoA.
    D. citric acid.

22. The Krebs cycle releases
    A. carbon.
    B. ADP.
    C. hydrogen.
    D. phosphate.

23. CoA transports
    A. pyruvic acid.
    B. acetyl.
    C. oxygen.
    D. glucose.

24. In the electron transport system, hydrogen ultimately combines with
    A. carbohydrates.
    B. phosphate.
    C. oxygen.
    D. water.

25. The largest amount of energy is obtained from
    A. the Krebs cycle.
    B. glycolysis.
    C. fermentation.
    D. the electron transport system.

26. ATP is produced by
    A. the electron transport system.
    B. The Krebs cycle.
    C. glycolysis.
    D. All of the choices are correct.

27. In the electron transport system, the final hydrogen (electron) acceptor is
    A. oxygen.
    B. ATP.
    C. acetyl.
    D. NAD.

28. In comparing aerobic and anaerobic cellular respiration, how much more effective is aerobic cellular respiration in net energy release?
    A. 18 times (36 ATP:2 ATP)
    B. 20 times (40 ATP:2 ATP)
    C. 2 times (4 ATP:2 ATP)
    D. 17 times (34 ATP:2 ATP)

29. If you have a molecule of table sugar, which consists of **two** six-carbon simple sugars hooked together, what is the maximum net ATP gain you could expect from aerobic cellular respiration?
    A. 36 ATP
    B. 72 ATP
    C. 4 ATP
    D. 23 ATP

30. If **no** oxygen is present, the electron transport system
    A. stops.
    B. accelerates.
    C. produces ethyl alcohol.
    D. obtains oxygen from available water.

31. The result of the complete breakdown of glucose during aerobic cellular respiration in eukaryotic cells will yield a net gain of
    A. two ATP.
    B. four ATP.
    C. thirty-six ATP.
    D. forty-two ATP.

32. In eukaryotic cells, the hydrogens that go through the **electron transport system** from one sugar (glucose) molecule produce
    A. six ATPs.
    B. eight ATPs.
    C. seventy-six ATPs.
    D. thirty-two ATPs.

33. Lactic acid is formed by combining
    A. pyruvic acid and hydrogen.
    B. $CO_2$ and hydrogen.
    C. ethyl alcohol and hydrogen.
    D. pyruvic acid and oxygen.

34. In fermentation,
    A. hydrogen combines with pyruvic acid.
    B. pyruvic acid is changed to an amino acid.
    C. sugar is changed to acetyl.
    D. pyruvic acid is converted to hydrogen.

35. The relationship between lactic acid and pyruvic acid is that
    A. lactic acid is formed only in milk.
    B. lactic acid is formed from pyruvic acid in fermentation.
    C. one has phosphate and the other doesn't.
    D. one is twice as big (6 carbons) as the other (3 carbons).

36. In fermentation, yeast produces
    A. ethyl alcohol.
    B. oxygen.
    C. hydrogen.
    D. All of these answers are true.

37. Complete this equation:

    Pyruvic Acid + Hydrogen → Carbon Dioxide + ____.
    A. Oxygen
    B. Acetyl
    C. Ethyl alcohol
    D. Light

38. When an amino acid is converted to a keto acid, it
    A. gains nitrogen.
    B. becomes a fatty acid.
    C. loses nitrogen.
    D. becomes a pyruvic acid.

39. In the metabolism of a fatty acid to obtain energy, one of the first steps is that the fatty acid is broken down to
    A. acetyl.
    B. glycerol.
    C. glyceraldehyde-3-phosphate.
    D. a keto acid.

40. In converting carbohydrates into fats, acetyl molecules are combined to form
    A. amino acid.
    B. glycerol.
    C. fatty acid.
    D. keto acid.

41. In the interconversion of foods, which would be the simplest conversion?
    A. protein to fats
    B. fats to energy
    C. carbohydrates to glyceraldehyde-3-phosphate
    D. amino acids to energy

42. Oxygen is **required** for _____ to take place.
    A. the electron transfer system
    B. light-dependent reactions
    C. light-independent reactions
    D. glycolysis

43. Carbohydrates can be converted into
    A. glycerol.
    B. fatty acids.
    C. amino acids.
    D. All of these answers are true.

44. Which of the following metabolic processes involves enzymes located in the membranes of mitochondria?
    A. glycolysis
    B. Krebs cycle
    C. electron transport system
    D. All of these answers are correct.

45. All of the following molecules can be stored by cells of your body for later use **except**
    A. carbohydrates.
    B. fats.
    C. proteins.
    D. None of these molecules can be stored.

46. Before fats can be metabolized in aerobic cellular respiration they must be converted to
    A. simple sugars.
    B. fatty acids and glycerol.
    C. amino acids.
    D. fatty acids and amino acids.

47. Complex carbohydrates are digested to
    A. simple sugars.
    B. amino acids.
    C. proteins.
    D. fatty acids.

48. Fats are digested to form
    A. amino acids and energy.
    B. fats.
    C. fatty acids and glycerol.
    D. simple sugars.

49. The digestion of a protein results in
    A. sugars.
    B. enzymes.
    C. amino acids.
    D. the formation of peptide bonds.

50. When a carbohydrate is digested, what is the product?
    A. energy
    B. simple sugars
    C. amino groups
    D. glycerol and fatty acids

51. Glycolysis takes place in the
    A. mitochondria.
    B. cytoplasm.
    C. grana.
    D. stroma.

52. Organisms able to make food molecules from inorganic materials and sun energy are
    A. autotrophs.
    B. aerobic.
    C. anaerobic.
    D. heterotrophs.

53. Aerobic cellular respiration differs from anaerobic cellular respiration in that
    A. anaerobic cellular respiration only takes place in plants.
    B. aerobic cellular respiration takes place in mitochondria.
    C. anaerobic cellular respiration produces more ATP.
    D. aerobic cellular respiration only uses glycolysis.

54. Which of the following processes produces the most ATP?
    A. glycolysis
    B. Krebs cycle
    C. electron transport system
    D. anaerobic cellular respiration

55. Which one of the following is NOT required for aerobic cellular respiration to take place?
    A. enzymes
    B. NAD
    C. oxygen
    D. carbon dioxide

56. Aerobic cellular respiration takes place in
    A. both plants and animals.
    B. animals but not plants.
    C. plants but not animals.
    D. bacteria only.

57. Aerobic cellular respiration differs from anaerobic respiration in that
    A. aerobic cellular respiration only takes place in plants.
    B. anaerobic cellular respiration requires the presence of mitochondria.
    C. aerobic cellular respiration produces more ATP.
    D. anaerobic cellular respiration only uses the electron transport system.

58. What is happening here? "W" represents any molecule and $e^-$ represents an electron.
    $W \rightarrow W^+ + e^-$
    A. oxidation of W
    B. reduction of W
    C. hydrolysis of W
    D. None of these choices is correct.

59. The following ($C_6 \rightarrow 2\ C_3$) best represents
    A. glycolysis.
    B. Krebs cycle.
    C. electron transport system.
    D. All of these choices are correct.

60. The following ($C_2 \rightarrow CO_2 + H^+ + e^-$) represents
    A. glycolysis.
    B. Krebs cycle
    C. electron transport system.
    D. None of these choices is correct.

61. The following list of products is from which portion of aerobic cellular respiration?
    8 $NAD^+$ 32 ATP 4 FAD 12 $H_2O$
    A. glycolysis
    B. Krebs cycle
    C. electron transport system
    D. fermentation

62. Which contains the greatest amount of potential energy?
    A. $C_6H_{12}O_6$ (glucose)
    B. $C_{48}H_{82}O_{41}$ (complex carbohydrate)
    C. $CH_3CH_2COOH$ (pyruvic acid)
    D. $CO_2$ (carbon dioxide)

63. Which process takes place **outside** of cells?
    A. aerobic cellular respiration
    B. anaerobic cellular respiration
    C. light-dependent reactions
    D. digestion

64. "OUCH!! My muscles are really sore! I've been exercising at such a frantic rate that . . ."
    A. my muscle cells have shifted into anaerobic metabolism and I'm making lactic acid that causes them to ache.
    B. I'm producing lactic acid that, once I slow down, will make its way back to my liver where it will be converted back into glucose.
    C. I need to get more $O_2$ to my muscle cells.
    D. All of these choices are true.

65. Which of the following would NOT be synthesized during anaerobic cellular respiration from pyruvic acid?
    A. ethyl alcohol and $CO_2$
    B. lactic acid
    C. acetyl
    D. acetic acid

66. **Without** oxygen in a eukaryotic aerobic cell,
    A. glycolysis will stop.
    B. the Krebs cycle will speed up.
    C. the mitochondria will shut down.
    D. proteins will be spared.

67. $CO_2$ is produced
    A. when acetyl is formed.
    B. during the Krebs cycle.
    C. inside mitochondria.
    D. All of the choices are correct.

68. The rate of alcohol absorption depends on
    A. the amount of food in the stomach.
    B. drugs taken with the alcohol.
    C. the amount of strenuous physical exercise.
    D. All of the choices are correct.

69. Which symptom best indicates anaerobic cellular respiration in human muscle cells?
    A. pain
    B. sweating
    C. redness
    D. cooling of the skin

70. Which is true of cheese?
    A. It is the result of aerobic fermentation.
    B. It contains lactic acid.
    C. It is spoiled milk.
    D. All of the above are correct.

# 6 Key

1. An anaerobic process does NOT require
   A. water.
   **B.** oxygen.
   C. energy.
   D. phosphate.

*Blooms Level: Remember*
*Enger - Chapter 06 #1*
*Learning Outcome: Explain the role of oxygen in aerobic respiration.*
*Section: 06.01*
*Topic: Cellular Respiration*

2. Aerobic cellular respiration requires the use of
   A. $N_2$.
   **B.** $O_2$.
   C. $H_2$.
   D. $H_2O$.

*Blooms Level: Remember*
*Enger - Chapter 06 #2*
*Learning Outcome: Explain the role of oxygen in aerobic respiration.*
*Section: 06.01*
*Topic: Cellular Respiration*

3. ____ is NOT a product of the Kreb cycle.
   **A.** Pyruvic acid
   B. ATP
   C. $NADH_2$ and $FADH_2$
   D. $CO_2$

*Blooms Level: Remember*
*Enger - Chapter 06 #3*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.02*
*Topic: Cellular Respiration*

4. ____ is NOT a stage of cellular respiration.
   A. The Krebs cycle
   B. The electron transport system
   **C.** The Calvin cycle
   D. Glycolysis

*Blooms Level: Remember*
*Enger - Chapter 06 #4*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.02*
*Topic: Cellular Respiration*

5. Oxygen is NOT necessary for
   **A.** anaerobic cellular respiration.
   B. aerobic cellular respiration.
   C. electron transport system.
   D. All require oxygen.

*Blooms Level: Remember*
*Enger - Chapter 06 #5*
*Learning Outcome: Explain the role of oxygen in aerobic respiration.*
*Section: 06.01*
*Topic: Cellular Respiration*

6. A reaction that requires oxygen is called
   **A.** aerobic.
   B. synthesis.
   C. phosphorylation.
   D. anaerobic.

*Blooms Level: Remember*
*Enger - Chapter 06 #6*
*Learning Outcome: Explain the role of oxygen in aerobic respiration.*
*Section: 06.01*
*Topic: Cellular Respiration*

7. The end product of glycolysis is
A. ketone.
B. alcohol.
**C.** pyruvic acid.
D. lactic acid.

*Blooms Level: Remember*
*Enger - Chapter 06 #7*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

8. Your cells most readily obtain energy from
A. $C_6H_{12}O_6$.
B. Glyceraldehyde-3-phosphate.
**C.** ATP.
D. $NADH_2$.

*Blooms Level: Understand*
*Enger - Chapter 06 #8*
*Learning Outcome: Describe the differences between autotrophs and heterotrophs.*
*Section: 06.01*
*Topic: Cellular Respiration*

9. The total (**gross**) number of ATPs produced from glycolysis is estimated to be
A. thirty-six.
B. thirty-four.
C. two.
**D.** four.

*Blooms Level: Understand*
*Enger - Chapter 06 #9*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.04*
*Topic: Cellular Respiration*

10. During glycolysis, a six-carbon sugar is converted to
A. three two-carbon sugars.
B. glucose.
**C.** two pyruvic acid molecules.
D. a disaccharide.

*Blooms Level: Understand*
*Enger - Chapter 06 #10*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

11. In glycolysis, the **net** profit of ATP from one six-carbon sugar is
A. one.
**B.** two.
C. three.
D. four.

*Blooms Level: Understand*
*Enger - Chapter 06 #11*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

12. Glucose + $NAD^+$ + ADP + P → NADH + Pyruvic Acid + ATP. This formula represents
A. the Krebs cycle.
B. photosynthesis.
**C.** glycolysis.
D. the light-dependent reactions.

*Blooms Level: Evaluate*
*Enger - Chapter 06 #12*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

13. Conversion of a six-carbon carbohydrate to two pyruvic acid molecules with accompanying reactions that release ATP and hydrogen atoms is called
**A.** glycolysis.
B. Krebs cycle.
C. electron transport system.
D. carbon fixation.

*Blooms Level: Understand*
*Enger - Chapter 06 #13*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

14. Chemosynthesis is
A. a form of photosynthesis.
**B.** a way some autotrophs make organic matter.
C. a product of the Krebs cycle.
D. present only in animals.

*Blooms Level: Remember*
*Enger - Chapter 06 #14*
*Learning Outcome: List the sources of energy used by chemosynthetic and photosynthetic organisms.*
*Section: 06.01*
*Topic: Cellular Respiration*

15. A form of metabolism used by prokaryotic organisms is
A. chemosynthesis.
B. photosynthesis.
C. anaerobic respiration.
**D.** All of these answers are correct.

*Blooms Level: Remember*
*Enger - Chapter 06 #15*
*Learning Outcome: List the sources of energy used by chemosynthetic and photosynthetic organisms.*
*Section: 06.01*
*Topic: Cellular Respiration*

16. The Krebs cycle requires
A. a four-carbon acid.
B. coenzyme A (CoA).
C. an acetyl group (2C).
**D.** All of these answers are true.

*Blooms Level: Understand*
*Enger - Chapter 06 #16*
*Learning Outcome: List the sources of energy used by chemosynthetic and photosynthetic organisms.*
*Section: 06.03*
*Topic: Cellular Respiration*

17. The Krebs cycle produces
**A.** carbon dioxide.
B. phosphate.
C. acetyl.
D. CoA.

*Blooms Level: Remember*
*Enger - Chapter 06 #17*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

18. Acetyl can be produced directly from
A. CoA.
B. glucose.
C. proteins.
**D.** pyruvic acid.

*Blooms Level: Understand*
*Enger - Chapter 06 #18*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

19. Acetyl is used during
**A.** the Krebs cycle.
B. the electron transport system.
C. glycolysis.
D. fermentation.

*Blooms Level: Remember*
*Enger - Chapter 06 #19*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

20. Hydrogens are combined with oxygen at the completion of
A. glycolysis.
B. fermentation.
C. the Krebs cycle.
**D.** the electron transport system.

*Blooms Level: Remember*
*Enger - Chapter 06 #20*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

21. The first material to enter the Krebs cycle is
A. oxygen.
B. glucose.
**C.** acetyl-CoA.
D. citric acid.

*Blooms Level: Understand*
*Enger - Chapter 06 #21*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

22. The Krebs cycle releases
A. carbon.
B. ADP.
**C.** hydrogen.
D. phosphate.

*Blooms Level: Remember*
*Enger - Chapter 06 #22*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

23. CoA transports
A. pyruvic acid.
**B.** acetyl.
C. oxygen.
D. glucose.

*Blooms Level: Understand*
*Enger - Chapter 06 #23*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

24. In the electron transport system, hydrogen ultimately combines with
A. carbohydrates.
B. phosphate.
**C.** oxygen.
D. water.

*Blooms Level: Understand*
*Enger - Chapter 06 #24*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

25. The largest amount of energy is obtained from
A. the Krebs cycle.
B. glycolysis.
C. fermentation.
**D.** the electron transport system.

*Blooms Level: Remember*
*Enger - Chapter 06 #25*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

26. ATP is produced by
A. the electron transport system.
B. The Krebs cycle.
C. glycolysis.
**D.** All of the choices are correct.

*Blooms Level: Remember*
*Enger - Chapter 06 #26*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

27. In the electron transport system, the final hydrogen (electron) acceptor is
**A.** oxygen.
B. ATP.
C. acetyl.
D. NAD.

*Blooms Level: Remember*
*Enger - Chapter 06 #27*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

28. In comparing aerobic and anaerobic cellular respiration, how much more effective is aerobic cellular respiration in net energy release?
**A.** 18 times (36 ATP:2 ATP)
B. 20 times (40 ATP:2 ATP)
C. 2 times (4 ATP:2 ATP)
D. 17 times (34 ATP:2 ATP)

*Blooms Level: Analyze*
*Enger - Chapter 06 #28*
*Learning Outcome: Compare the biochemical pathways utilized and the energy yield of aerobic and anaerobic cellular respiration.*
*Section: 06.04*
*Section: 06.05*
*Topic: Cellular Respiration*

29. If you have a molecule of table sugar, which consists of **two** six-carbon simple sugars hooked together, what is the maximum net ATP gain you could expect from aerobic cellular respiration?
A. 36 ATP
**B.** 72 ATP
C. 4 ATP
D. 23 ATP

*Blooms Level: Analyze*
*Enger - Chapter 06 #29*
*Learning Outcome: Compare the biochemical pathways utilized and the energy yield of aerobic and anaerobic cellular respiration.*
*Section: 06.03*
*Topic: Cellular Respiration*

30. If **no** oxygen is present, the electron transport system
**A.** stops.
B. accelerates.
C. produces ethyl alcohol.
D. obtains oxygen from available water.

*Blooms Level: Understand*
*Enger - Chapter 06 #30*
*Learning Outcome: Explain the role of oxygen in aerobic respiration.*
*Section: 06.03*
*Topic: Cellular Respiration*

31. The result of the complete breakdown of glucose during aerobic cellular respiration in eukaryotic cells will yield a net gain of
A. two ATP.
B. four ATP.
**C.** thirty-six ATP.
D. forty-two ATP.

*Blooms Level: Understand*
*Enger - Chapter 06 #31*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

32. In eukaryotic cells, the hydrogens that go through the **electron transport system** from one sugar (glucose) molecule produce
A. six ATPs.
B. eight ATPs.
C. seventy-six ATPs.
**D.** thirty-two ATPs.

*Blooms Level: Understand*
*Enger - Chapter 06 #32*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

33. Lactic acid is formed by combining
**A.** pyruvic acid and hydrogen.
B. $CO_2$ and hydrogen.
C. ethyl alcohol and hydrogen.
D. pyruvic acid and oxygen.

*Blooms Level: Remember*
*Enger - Chapter 06 #33*
*Learning Outcome: Describe two variations of anaerobic respiration.*
*Section: 06.05*
*Topic: Cellular Respiration*

34. In fermentation,
**A.** hydrogen combines with pyruvic acid.
B. pyruvic acid is changed to an amino acid.
C. sugar is changed to acetyl.
D. pyruvic acid is converted to hydrogen.

*Blooms Level: Understand*
*Enger - Chapter 06 #34*
*Learning Outcome: Describe two variations of anaerobic respiration.*
*Section: 06.05*
*Topic: Cellular Respiration*

35. The relationship between lactic acid and pyruvic acid is that
A. lactic acid is formed only in milk.
**B.** lactic acid is formed from pyruvic acid in fermentation.
C. one has phosphate and the other doesn't.
D. one is twice as big (6 carbons) as the other (3 carbons).

*Blooms Level: Remember*
*Enger - Chapter 06 #35*
*Learning Outcome: Describe two variations of anaerobic respiration.*
*Section: 06.05*
*Topic: Cellular Respiration*

36. In fermentation, yeast produces
**A.** ethyl alcohol.
B. oxygen.
C. hydrogen.
D. All of these answers are true.

*Blooms Level: Remember*
*Enger - Chapter 06 #36*
*Learning Outcome: Describe two variations of anaerobic respiration.*
*Section: 06.05*
*Topic: Cellular Respiration*

37. Complete this equation:

Pyruvic Acid + Hydrogen → Carbon Dioxide + ____.

A. Oxygen
B. Acetyl
**C.** Ethyl alcohol
D. Light

*Blooms Level: Apply*
*Enger - Chapter 06 #37*
*Learning Outcome: Describe two variations of anaerobic respiration.*
*Section: 06.05*
*Topic: Cellular Respiration*

38. When an amino acid is converted to a keto acid, it

A. gains nitrogen.
B. becomes a fatty acid.
**C.** loses nitrogen.
D. becomes a pyruvic acid.

*Blooms Level: Understand*
*Enger - Chapter 06 #38*
*Learning Outcome: List subunits from fats and proteins that are metabolized by aerobic respiration.*
*Section: 06.06*
*Topic: Cellular Respiration*

39. In the metabolism of a fatty acid to obtain energy, one of the first steps is that the fatty acid is broken down to

**A.** acetyl.
B. glycerol.
C. glyceraldehyde-3-phosphate.
D. a keto acid.

*Blooms Level: Understand*
*Enger - Chapter 06 #39*
*Learning Outcome: List subunits from fats and proteins that are metabolized by aerobic respiration.*
*Section: 06.06*
*Topic: Cellular Respiration*

40. In converting carbohydrates into fats, acetyl molecules are combined to form

A. amino acid.
B. glycerol.
**C.** fatty acid.
D. keto acid.

*Blooms Level: Understand*
*Enger - Chapter 06 #40*
*Learning Outcome: Describe how energy is derived from fats and proteins.*
*Section: 06.06*
*Topic: Cellular Respiration*

41. In the interconversion of foods, which would be the simplest conversion?

A. protein to fats
B. fats to energy
**C.** carbohydrates to glyceraldehyde-3-phosphate
D. amino acids to energy

*Blooms Level: Evaluate*
*Enger - Chapter 06 #41*
*Learning Outcome: Describe how energy is derived from fats and proteins.*
*Section: 06.06*
*Topic: Cellular Respiration*

42. Oxygen is **required** for _____ to take place.

**A.** the electron transfer system
B. light-dependent reactions
C. light-independent reactions
D. glycolysis

*Blooms Level: Remember*
*Enger - Chapter 06 #42*
*Learning Outcome: Explain the role of oxygen in aerobic respiration.*
*Section: 06.03*
*Topic: Cellular Respiration*

43. Carbohydrates can be converted into
A. glycerol.
B. fatty acids.
C. amino acids.
**D.** All of these answers are true.

*Blooms Level: Remember*
*Enger - Chapter 06 #43*
*Learning Outcome: List subunits from fats and proteins that are metabolized by aerobic respiration.*
*Section: 06.06*
*Topic: Cellular Respiration*

44. Which of the following metabolic processes involves enzymes located in the membranes of mitochondria?
A. glycolysis
B. Krebs cycle
**C.** electron transport system
D. All of these answers are correct.

*Blooms Level: Understand*
*Enger - Chapter 06 #44*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

45. All of the following molecules can be stored by cells of your body for later use **except**
A. carbohydrates.
B. fats.
**C.** proteins.
D. None of these molecules can be stored.

*Blooms Level: Remember*
*Enger - Chapter 06 #45*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

46. Before fats can be metabolized in aerobic cellular respiration they must be converted to
A. simple sugars.
**B.** fatty acids and glycerol.
C. amino acids.
D. fatty acids and amino acids.

*Blooms Level: Understand*
*Enger - Chapter 06 #46*
*Learning Outcome: Describe how energy is derived from fats and proteins.*
*Section: 06.06*
*Topic: Cellular Respiration*

47. Complex carbohydrates are digested to
**A.** simple sugars.
B. amino acids.
C. proteins.
D. fatty acids.

*Blooms Level: Understand*
*Enger - Chapter 06 #47*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

48. Fats are digested to form
A. amino acids and energy.
B. fats.
**C.** fatty acids and glycerol.
D. simple sugars.

*Blooms Level: Understand*
*Enger - Chapter 06 #48*
*Learning Outcome: Describe how energy is derived from fats and proteins.*
*Section: 06.06*
*Topic: Cellular Respiration*

49. The digestion of a protein results in
A. sugars.
B. enzymes.
**C.** amino acids.
D. the formation of peptide bonds.

*Blooms Level: Remember*
*Enger - Chapter 06 #49*
*Learning Outcome: Describe how energy is derived from fats and proteins.*
*Section: 06.06*
*Topic: Cellular Respiration*

50. When a carbohydrate is digested, what is the product?
A. energy
**B.** simple sugars
C. amino groups
D. glycerol and fatty acids

*Blooms Level: Remember*
*Enger - Chapter 06 #50*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

51. Glycolysis takes place in the
A. mitochondria.
**B.** cytoplasm.
C. grana.
D. stroma.

*Blooms Level: Remember*
*Enger - Chapter 06 #51*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

52. Organisms able to make food molecules from inorganic materials and sun energy are
**A.** autotrophs.
B. aerobic.
C. anaerobic.
D. heterotrophs.

*Blooms Level: Remember*
*Enger - Chapter 06 #52*
*Learning Outcome: Describe the differences between autotrophs and heterotrophs.*
*Section: 06.01*
*Topic: Cellular Respiration*

53. Aerobic cellular respiration differs from anaerobic cellular respiration in that
A. anaerobic cellular respiration only takes place in plants.
**B.** aerobic cellular respiration takes place in mitochondria.
C. anaerobic cellular respiration produces more ATP.
D. aerobic cellular respiration only uses glycolysis.

*Blooms Level: Understand*
*Enger - Chapter 06 #53*
*Learning Outcome: Compare the biochemical pathways utilized and the energy yield of aerobic and anaerobic cellular respiration.*
*Section: 06.01*
*Topic: Cellular Respiration*

54. Which of the following processes produces the most ATP?
A. glycolysis
B. Krebs cycle
**C.** electron transport system
D. anaerobic cellular respiration

*Blooms Level: Understand*
*Enger - Chapter 06 #54*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

55. Which one of the following is NOT required for aerobic cellular respiration to take place?
A. enzymes
B. NAD
C. oxygen
**D.** carbon dioxide

*Blooms Level: Understand*
*Enger - Chapter 06 #55*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

56. Aerobic cellular respiration takes place in
**A.** both plants and animals.
B. animals but not plants.
C. plants but not animals.
D. bacteria only.

*Blooms Level: Remember*
*Enger - Chapter 06 #56*
*Learning Outcome: Compare the biochemical pathways utilized and the energy yield of aerobic and anaerobic cellular respiration.*
*Section: 06.03*
*Topic: Cellular Respiration*

57. Aerobic cellular respiration differs from anaerobic respiration in that
A. aerobic cellular respiration only takes place in plants.
B. anaerobic cellular respiration requires the presence of mitochondria.
**C.** aerobic cellular respiration produces more ATP.
D. anaerobic cellular respiration only uses the electron transport system.

*Blooms Level: Analyze*
*Enger - Chapter 06 #57*
*Learning Outcome: Compare the biochemical pathways utilized and the energy yield of aerobic and anaerobic cellular respiration.*
*Section: 06.02*
*Topic: Cellular Respiration*

58. What is happening here? "W" represents any molecule and $e^-$ represents an electron.
$W \rightarrow W^+ + e^-$
**A.** oxidation of W
B. reduction of W
C. hydrolysis of W
D. None of these choices is correct.

*Blooms Level: Analyze*
*Enger - Chapter 06 #58*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

59. The following ($C_6 \rightarrow 2\ C_3$) best represents
**A.** glycolysis.
B. Krebs cycle.
C. electron transport system.
D. All of these choices are correct.

*Blooms Level: Remember*
*Enger - Chapter 06 #59*
*Learning Outcome: Compare the biochemical pathways utilized and the energy yield of aerobic and anaerobic cellular respiration.*
*Section: 06.03*
*Topic: Cellular Respiration*

60. The following ($C_2 \rightarrow CO_2 + H^+ + e^-$) represents
A. glycolysis.
**B.** Krebs cycle
C. electron transport system.
D. None of these choices is correct.

*Blooms Level: Analyze*
*Enger - Chapter 06 #60*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

61. The following list of products is from which portion of aerobic cellular respiration?
8 $NAD^+$ 32 ATP 4 FAD 12 $H_2O$
A. glycolysis
B. Krebs cycle
**C.** electron transport system
D. fermentation

*Blooms Level: Understand*
*Enger - Chapter 06 #61*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

62. Which contains the greatest amount of potential energy?
A. $C_6H_{12}O_6$ (glucose)
**B.** $C_{48}H_{82}O_{41}$ (complex carbohydrate)
C. $CH_3CH_2COOH$ (pyruvic acid)
D. $CO_2$ (carbon dioxide)

*Blooms Level: Evaluate*
*Enger - Chapter 06 #62*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

63. Which process takes place **outside** of cells?
A. aerobic cellular respiration
B. anaerobic cellular respiration
C. light-dependent reactions
**D.** digestion

*Blooms Level: Remember*
*Enger - Chapter 06 #63*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

64. "OUCH!! My muscles are really sore! I've been exercising at such a frantic rate that . . ."
A. my muscle cells have shifted into anaerobic metabolism and I'm making lactic acid that causes them to ache.
B. I'm producing lactic acid that, once I slow down, will make its way back to my liver where it will be converted back into glucose.
C. I need to get more $O_2$ to my muscle cells.
**D.** All of these choices are true.

*Blooms Level: Evaluate*
*Enger - Chapter 06 #64*
*Learning Outcome: Describe two variations of anaerobic respiration.*
*Section: 06.05*
*Topic: Cellular Respiration*

65. Which of the following would NOT be synthesized during anaerobic cellular respiration from pyruvic acid?
A. ethyl alcohol and $CO_2$
B. lactic acid
**C.** acetyl
D. acetic acid

*Blooms Level: Evaluate*
*Enger - Chapter 06 #65*
*Learning Outcome: Compare the biochemical pathways utilized and the energy yield of aerobic and anaerobic cellular respiration.*
*Section: 06.05*
*Topic: Cellular Respiration*

66. **Without** oxygen in a eukaryotic aerobic cell,
A. glycolysis will stop.
B. the Krebs cycle will speed up.
**C.** the mitochondria will shut down.
D. proteins will be spared.

*Blooms Level: Understand*
*Enger - Chapter 06 #66*
*Learning Outcome: Explain the role of oxygen in aerobic respiration.*
*Section: 06.05*
*Topic: Cellular Respiration*

67. $CO_2$ is produced
A. when acetyl is formed.
B. during the Krebs cycle.
C. inside mitochondria.
**D.** All of the choices are correct.

*Blooms Level: Understand*
*Enger - Chapter 06 #67*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.03*
*Topic: Cellular Respiration*

68. The rate of alcohol absorption depends on
A. the amount of food in the stomach.
B. drugs taken with the alcohol.
C. the amount of strenuous physical exercise.
**D.** All of the choices are correct.

*Blooms Level: Evaluate*
*Enger - Chapter 06 #68*
*Learning Outcome: Describe the reactants and products of glycolysis, the Krebs cycle, and the electron-transport system.*
*Section: 06.05*
*Topic: Cellular Respiration*

69. Which symptom best indicates anaerobic cellular respiration in human muscle cells?
**A.** pain
B. sweating
C. redness
D. cooling of the skin

*Blooms Level: Understand*
*Enger - Chapter 06 #69*
*Learning Outcome: Describe two variations of anaerobic respiration.*
*Section: 06.05*
*Topic: Cellular Respiration*

70. Which is true of cheese?
A. It is the result of aerobic fermentation.
**B.** It contains lactic acid.
C. It is spoiled milk.
D. All of the above are correct.

*Blooms Level: Evaluate*
*Enger - Chapter 06 #70*
*Learning Outcome: Describe two variations of anaerobic respiration.*
*Section: 06.05*
*Topic: Cellular Respiration*

# 6 Summary

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