Energetics Practice Test

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

_____ 1. Pyruvic acid is converted to ethyl alcohol and lactic acid during fermentation because organisms
   A. need to recycle NAD⁺ back to glycolysis.  B. produce ATP when pyruvate is converted to ethyl alcohol or lactic acid.  
   C. produce glucose when pyruvate is converted to ethyl alcohol or lactic acid.  D. produce oxygen when pyruvate is converted to ethyl alcohol or lactic acid.  E. produce water when pyruvate is converted to ethyl alcohol or lactic acid.

_____ 2. Which of the following chemical reactions will provide most of the energy to the hummingbird so it can beat its wings 40 - 80 times a second?
   A. ADP → AMP + P  B. ADP + P → ATP  C. ATP → ADP + P  D. ADP + AMP → ATP  
   E. AMP + P → ADP

_____ 3. The role of oxygen in cellular respiration is to
   A. combine with carbon atoms to form carbon dioxide.  B. allow glycolysis to continue.  C. act as the final electron acceptor.  D. aid in the transport of pyruvate into the mitochondria.  E. supply an energy molecule.

_____ 4. Which of the following is not a product of cellular respiration?
   A. ATP  B. carbon dioxide  C. oxygen  D. water  E. all are products

_____ 5. During the Calvin-Benson cycle, in the red Columbine plant, high-energy electrons from NADPH are transferred into a newly made 3-carbon compound. Eventually these electrons will end up as part of glucose molecules. What was the original source of these electrons in photosynthesis?
   A. NADP⁺  B. ATP  C. oxygen  D. water  E. carbon dioxide

_____ 6. A hummingbird is "drinking" nectar containing sugar from a red columbine flower. Arrange the following events to occur in the hummingbird in order from the first to last:

   1. Glucose sugar is converted to pyruvate.
   2. Energy from high-energy electrons is released from an electron transport chain. This energy is used to make ATP.
   3. The hummingbird exhales carbon dioxide and energy is primarily transferred to NADH.
   4. The hummingbird beats its wings 40 - 80 times a second.

   A. 1, 4, 3, 2  B. 2, 1, 3, 4  C. 1, 2, 3, 4  D. 2, 3, 4, 1  E. 1, 3, 2, 4

_____ 7. Choose the process that does not occur during the light-trapping phase of photosynthesis.
   A. Water is split.  B. ATP is produced.  C. NADPH is produced.  D. Oxygen is released.  E. Carbon dioxide is fixed.
8. The main purpose of fermentation reactions is to
   A. produce ATP. B. regenerate the electron carriers needed for glycolysis. C. produce the building blocks for biological molecules. D. prepare the pyruvate for the Krebs cycle. E. provide various products useful for man.

9. The primary energy carrier between the Krebs cycle and the electron transport system is
   A. carbon dioxide. B. NADH. C. NADPH. D. FaDH₂. E. ATP.

10. What process occurs in both the aerobic and anaerobic pathways?
    A. glycolysis B. Krebs cycle C. electron transport chain D. fermentation E. anaerobic processes

11. The chemical reactions associated with metabolism
    A. are energy absorbing. B. convert energy with 100% efficiency. C. are energy absorbing and energy releasing. D. are energy releasing. E. do not give off heat.

12. The majority of ATP produced in cellular respiration is produced during

13. Which of the following does not take place during the first of the two phases of photosynthesis?
    A. Light energy is absorbed by electrons in the chlorophyll. B. Water is split. C. ATP and electron carriers are formed. D. Carbon dioxide is fixed. E. Oxygen is released.

14. Which color of light has the least important role in photosynthesis?
    A. red B. green C. blue D. orange E. indigo

15. Hummingbirds break down (oxidize) glucose and other food molecules during cellular respiration. The carbon atoms in these organic molecules are released as _______ during the _______.
    A. glucose, Krebs cycle B. methane, Krebs cycle C. carbon dioxide, electron transport chain. D. carbon dioxide, Krebs cycle E. carbon dioxide, glycolysis

16. The most common energy-carrying molecule in the cell is
    A. AMP. B. ADP. C. ATP. D. adenine. E. DNA.

17. Almost all enzymes are

18. The active site of an enzyme
    A. binds the reactants of a chemical reaction. B. does not change shape during the reaction. C. is necessary for regulation of the enzyme activity. D. can bind many different reactants. E. only acts when it is unoccupied.
19. All enzymes act by
   A. breaking hydrogen bonds between molecules. B. lowering the activation energy of specific chemical reactions. C. breaking and forming ionic bonds between ions. D. allowing products to be changed during the chemical reactions. E. raising the activation energy of specific chemical reactions.

20. How many turns of the Krebs cycle are necessary to completely break down one molecule of glucose?
   A. 1 B. 2 C. 3 D. 4 E. 5

21. In photosynthesis, the light-dependent reactions
   A. can take place day or night. B. produce ADP and NADP⁺. C. are uncoupled from the light-independent reactions. D. lead to carbon fixation. E. produce ATP and NADPH.

22. A substrate
   A. fits into the active site of a specific enzyme. B. fits into the active site of another specific substrate. C. catalyzes a chemical reaction. D. is always a protein. E. lowers the energy of activation in a chemical reaction.

Matching

Match the following examples with the correct descriptive term.
A. glycolysis
B. krebs cycle
C. electron transport
D. light-dependent reactions
E. light-independent reactions
F. fermentation

23. Many of the molecules are intermediates in other pathways.

24. This process can lead to the production of ethanol.

25. Certain pigments play a role.

26. This process requires CO₂.

27. The majority of ATP from cellular respiration is produced during this process.

Match the following parts of cellular respiration with the appropriate description.
A. glucose is split into two molecules; produces two ATP
B. joins high energy electrons with oxygen and hydrogen to form water; produces much ATP
C. carbon dioxide is released
D. forms several electron carriers and much ATP

28. Krebs cycle

29. Glycolysis

30. Electron transport chain
Match the following processes with the correct number of ATP molecules produced.

A. 0  
B. 2  
C. 10  
D. 20  
E. 24  
F. 32

____ 31. Krebs cycle
____ 32. Lactic Acid fermentation
____ 33. Electron transport chain
____ 34. Glycolysis
____ 35. Alcoholic fermentation

Match the following examples with the correct process.

A. glycolysis  
B. Krebs cycle  
C. electron transport chain in the mitochondria  
D. light trapping phase of photosynthesis  
E. Calvin-Benson cycle  
F. fermentation

____ 36. Most of a cell's ATP is produced during this cellular process.
____ 37. Water is split and ATP and NADPH are produced.
____ 38. Glucose is oxidized to pyruvate.
____ 39. Two ATP are produced and NAD+ is recycled.
____ 40. Glucose is produced.
Energetics Practice Test
Answer Section

MULTIPLE CHOICE

1. ANS: A
2. ANS: C
3. ANS: C
4. ANS: C
5. ANS: D
6. ANS: E
7. ANS: E
8. ANS: B
9. ANS: B
10. ANS: A
11. ANS: C
12. ANS: C
13. ANS: D
14. ANS: B
15. ANS: D
16. ANS: C
17. ANS: B
18. ANS: A
19. ANS: B
20. ANS: B
21. ANS: E
22. ANS: A

MATCHING

23. ANS: B
24. ANS: F
25. ANS: D
26. ANS: E
27. ANS: C

28. ANS: C
29. ANS: A
30. ANS: B

31. ANS: B
32. ANS: B
33. ANS: F
34. ANS: B
35. ANS: B
36. ANS: C
37. ANS: D
38. ANS: A
39. ANS: F
40. ANS: E