

AP Biology Chapter 7 Exam

Name _____ date _____

1. ____ Metabolic pathways that release stored energy by breaking down complex molecules are known as
 - A) catabolic pathways.
 - B) anabolic pathways.
 - C) bioenergetic pathways.
 - D) endergonic pathways.

2. ____ In an oxidation-reduction reaction, the reducing agent
 - A) gains electrons and gains potential energy.
 - B) gains electrons and loses potential energy.
 - C) loses electrons and loses potential energy.
 - D) loses electrons and gains potential energy.

3. ____ As a result of an oxidation-reduction reaction the oxidizing agent
 - A) gains electrons and gains potential energy.
 - B) gains electrons and loses potential energy.
 - C) loses electrons and loses potential energy.
 - D) loses electrons and gains potential energy.

4. ____ As a result of the transfer of an electron from a less electronegative atom to a more electronegative atom,
 - A) the more electronegative atom is reduced, and energy is released.
 - B) the more electronegative atom is reduced, and energy is consumed.
 - C) the more electronegative atom is oxidized, and energy is consumed.
 - D) the more electronegative atom is oxidized, and energy is released.

5. ____ The complete reactions of cellular respiration in the presence of oxygen ($C_6H_{12}O_6 + 6 O_2 \rightarrow 6 CO_2 + 6 H_2O + \text{energy}$) result in which of the following?
 - A) oxidation of O_2 and reduction of H_2O
 - B) oxidation of $C_6H_{12}O_6$ and reduction of O_2
 - C) reduction of CO_2 and oxidation of O_2
 - D) reduction of $C_6H_{12}O_6$ and oxidation of CO_2

6. ____ Which of the following statements about NAD^+ is true?
 - A) NAD^+ is the source of electrons used in oxidative phosphorylation.
 - B) NAD^+ has more chemical energy than $NADH$.
 - C) NAD^+ is oxidized by the action of dehydrogenase enzymes.
 - D) NAD^+ is reduced to $NADH$ during glycolysis.

7. ____ In animal cells, glycolysis occurs in the
 - A) cytosol.
 - B) outer mitochondrial membrane.
 - C) inner mitochondrial membrane.
 - D) mitochondrial matrix.
 - E) nucleus.

8. ____ The ATP produced in glycolysis is generated by
- A) chemiosmosis.
 - B) electron transport.
 - C) photophosphorylation.
 - D) oxidative phosphorylation.
 - E) substrate-level phosphorylation.
9. ____ The ATP produced in the citric acid cycle is generated by
- A) chemiosmosis.
 - B) electron transport.
 - C) photophosphorylation.
 - D) oxidative phosphorylation.
 - E) substrate-level phosphorylation.
10. ____ The oxygen consumed during cellular respiration is involved directly in which process or event?
- A) glycolysis
 - B) accepting electrons at the end of the electron transport chain
 - C) the citric acid cycle
 - D) the oxidation of pyruvate to acetyl CoA
 - E) the phosphorylation of ADP to form ATP
11. ____ The complete oxidation of glucose in aerobic respiration occurs through which of the following sequence of metabolic reactions?
- A) glucose → citric acid cycle → glycolysis → pyruvate oxidation → electron transport chain
 - B) glucose → pyruvate oxidation → glycolysis → electron transport chain → citric acid cycle
 - C) glucose → glycolysis → pyruvate oxidation → citric acid cycle → electron transport chain
 - D) glucose → glycolysis → citric acid cycle → pyruvate oxidation → electron transport chain
 - E) glucose → pyruvate oxidation → citric acid cycle → glycolysis → electron transport chain
12. ____ During glycolysis, when each molecule of glucose is catabolized to two molecules of pyruvate, most of the potential energy contained in glucose is
- A) transferred to ADP, forming ATP.
 - B) released as heat.
 - C) retained in the two pyruvates.
 - D) stored in the NADH produced.
13. ____ Starting with one molecule of glucose, the energy-containing products of glycolysis are
- A) 2 NAD⁺, 2 pyruvate, and 2 ATP.
 - B) 2 NADH, 2 pyruvate, and 2 ATP.
 - C) 2 FADH₂, 2 pyruvate, and 4 ATP.
 - D) 6 CO₂, 2 pyruvate, and 2 ATP.
 - E) 6 CO₂, 2 pyruvate, and 30 ATP.
14. ____ In the complete reactions of aerobic respiration, the energy for the majority of ATP synthesis is provided by
- A) transfer of electrons from organic molecules to acetyl CoA.
 - B) high-energy phosphate bonds from organic molecule intermediates in the citric acid cycle.
 - C) splitting water to produce oxygen.
 - D) a proton gradient across the mitochondrial inner membrane.
 - E) the production of carbon dioxide and oxygen in the electron transport chain.

15. ____ What is the source of the oxygen used to form water in the complete reactions of cellular respiration?
- A) carbon dioxide (CO₂)
 - B) glucose (C₆H₁₂O₆)
 - C) pyruvate (C₃H₃O₃⁻)
 - D) molecular oxygen (O₂)
16. ____ In chemiosmosis, what is the most direct source of energy that is used to convert ADP + P_i to ATP?
- A) energy released as electrons flow through the electron transport system
 - B) energy released from substrate-level phosphorylation
 - C) energy released from dehydration synthesis reactions
 - D) energy released from movement of protons down their electrochemical gradient through ATP synthase
17. ____ In liver cells, the inner mitochondrial membranes are about five times the area of the outer mitochondrial membranes. What purpose must this serve?
- A) It increases the surface area for glycolysis.
 - B) It increases the surface area for the citric acid cycle.
 - C) It increases the surface area for oxidative phosphorylation.
 - D) It increases the surface area for substrate-level phosphorylation.
18. ____ Which of the following occur(s) in the cytosol of a eukaryotic cell?
- A) glycolysis and fermentation
 - B) fermentation and chemiosmosis
 - C) oxidation of pyruvate to acetyl CoA
 - D) citric acid cycle
 - E) oxidative phosphorylation
19. ____ Which of the following occur(s) in mitochondria?
- A) glycolysis and fermentation
 - B) fermentation and chemiosmosis
 - C) glycolysis and oxidation of pyruvate to acetyl CoA
 - D) oxidation of pyruvate to acetyl CoA and the citric acid cycle
 - E) fermentation and oxidative phosphorylation
20. ____ Which metabolic pathway is common to both cellular respiration and fermentation?
- A) the oxidation of pyruvate to acetyl CoA
 - B) the citric acid cycle
 - C) oxidative phosphorylation
 - D) glycolysis
 - E) chemiosmosis
21. ____ Yeast cells grown anaerobically can obtain energy by fermentation, which results in the production of
- A) ATP, NADH, and pyruvate.
 - B) ATP and lactate.
 - C) ATP, CO₂, and lactate.
 - D) ATP, CO₂, and ethanol.
 - E) ATP, CO₂, and acetyl CoA.

22. ____ Why is glycolysis considered to be one of the first metabolic pathways to have evolved?
- It produces much less ATP than does oxidative phosphorylation.
 - It does not involve organelles or specialized structures, does not require oxygen, and is present in most organisms.
 - It is found in prokaryotic cells but not in eukaryotic cells.
 - It relies on chemiosmosis, which is a metabolic mechanism present only in prokaryotic cells.
23. ____ A mutation in yeast makes it unable to convert pyruvate to ethanol. How will this mutation affect these yeast cells?
- The mutant yeast will produce lactate under anaerobic conditions.
 - The mutant yeast will be unable to grow anaerobically.
 - The mutant yeast will be unable to grow aerobically.
 - The mutant yeast will grow anaerobically only when provided glucose.
 - The mutant yeast will be unable to metabolize glucose.
24. ____ During intense exercise, as skeletal muscle cells switch to fermentation, the human body will increase its catabolism of
- fats only.
 - carbohydrates only.
 - proteins only.
 - fats, carbohydrates, and proteins.
 - fats and proteins only.

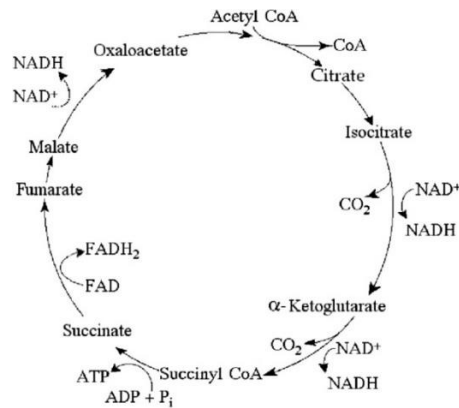
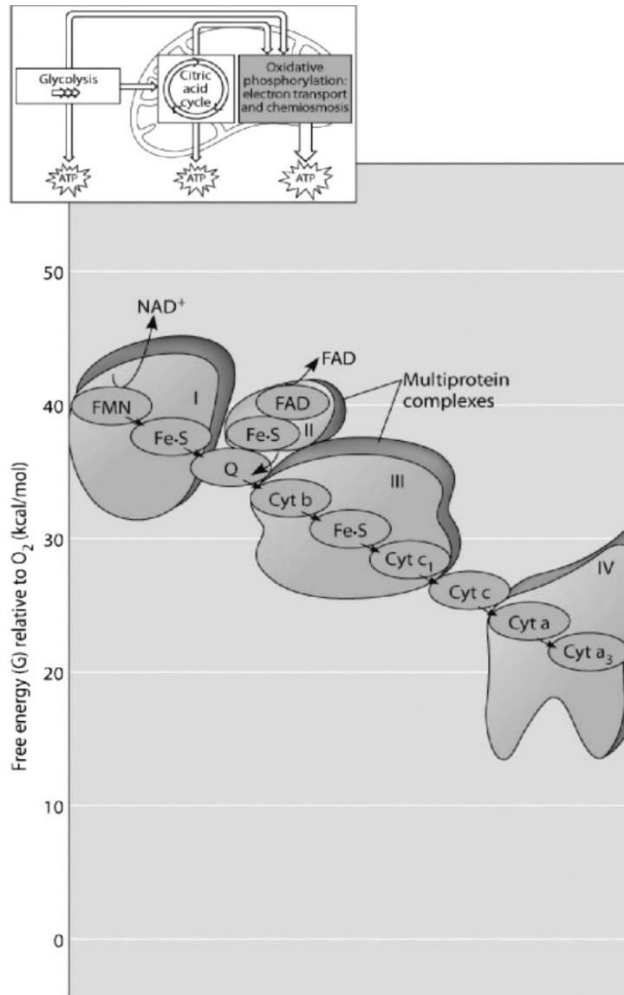


Figure 7.1

25. ____ Starting with one molecule of isocitrate and ending with fumarate, how many ATP molecules can be made through substrate-level phosphorylation (see Figure 7.1)?
- 1
 - 2
 - 11
 - 12
26. ____ For each mole of glucose (C₆H₁₂O₆) completely oxidized by cellular respiration, how many moles of CO₂ are released in the citric acid cycle (see Figure 7.1)?
- 2
 - 3
 - 4
 - 6
 - 12

27. ____ For each molecule of glucose that is metabolized by glycolysis and the citric acid cycle (see Figure 7.1), what is the total number of NADH + FADH₂ molecules produced?

- A) 4
- B) 5
- C) 6
- D) 10
- E) 12



28. ____ Figure 7.2 shows the electron transport chain. Which of the following is initially added to the chain with the highest free energy?

- A) oxygen
- B) FADH₂
- C) NADH
- D) CO₂
- E) water

29. ____ Which of the following is an accurate description of the events that occur along the electron transport chain depicted in Figure 7.2?

- A) ATP is generated directly at three points in the pathway.
- B) Electron transfer is directly coupled to chemiosmosis.
- C) Each electron transfer between carriers results in oxidation of one carrier and reduction of another.
- D) The potential energy of electrons increases at each step in the pathway.

