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.
Answer: A

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.
Answer: C

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.
Answer: A

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.
Answer: A

5. ____ The complete reactions of cellular respiration in the presence of oxygen ($C_6H_{12}O_6 + 6\ O_2 \rightarrow 6\ CO_2 + 6\ H_2O$ + 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
Answer: B

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.
Answer: D

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

8. ____ The ATP produced in glycolysis is generated by
A) chemiosmosis.
B) electron transport.
C) photophosphorylation.
D) oxidative phosphorylation.
E) substrate-level phosphorylation.
Answer: E

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.
Answer: E

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
Answer: B

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
Answer: C

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.
Answer: C

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 $FADH_2$, 2 pyruvate, and 4 ATP.
D) 6 CO_2, 2 pyruvate, and 2 ATP.
E) 6 CO_2, 2 pyruvate, and 30 ATP.
Answer: B

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.
Answer: D

15. ____ What is the source of the oxygen used to form water in the complete reactions of cellular respiration?
A) carbon dioxide (CO_2)
B) glucose ($C_6H_{12}O_6$)
C) pyruvate ($C_3H_3O_3^-$)
D) molecular oxygen (O_2)
Answer: D

16. ____ In chemiosmosis, what is the most direct source of energy that is used to convert ADP + $\textcircled{P}_i$ 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
Answer: D

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.
Answer: C

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
Answer: A

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
Answer: D

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
Answer: D

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, CO_2, and lactate.
D) ATP, CO_2, and ethanol.
E) ATP, CO_2, and acetyl CoA.
Answer: D

22. ____ Why is glycolysis considered to be one of the first metabolic pathways to have evolved?
A) It produces much less ATP than does oxidative phosphorylation.
B) It does not involve organelles or specialized structures, does not require oxygen, and is present in most organisms.
C) It is found in prokaryotic cells but not in eukaryotic cells.
D) It relies on chemiosmosis, which is a metabolic mechanism present only in prokaryotic cells.
Answer: B

23. ____ A mutation in yeast makes it unable to convert pyruvate to ethanol. How will this mutation affect these yeast cells?
A) The mutant yeast will produce lactate under anaerobic conditions.
B) The mutant yeast will be unable to grow anaerobically.
C) The mutant yeast will be unable to grow aerobically.
D) The mutant yeast will grow anaerobically only when provided glucose.
E) The mutant yeast will be unable to metabolize glucose.
Answer: B

24. ____ During intense exercise, as skeletal muscle cells switch to fermentation, the human body will increase its catabolism of
A) fats only.
B) carbohydrates only.
C) proteins only.
D) fats, carbohydrates, and proteins.
E) fats and proteins only.
Answer: B

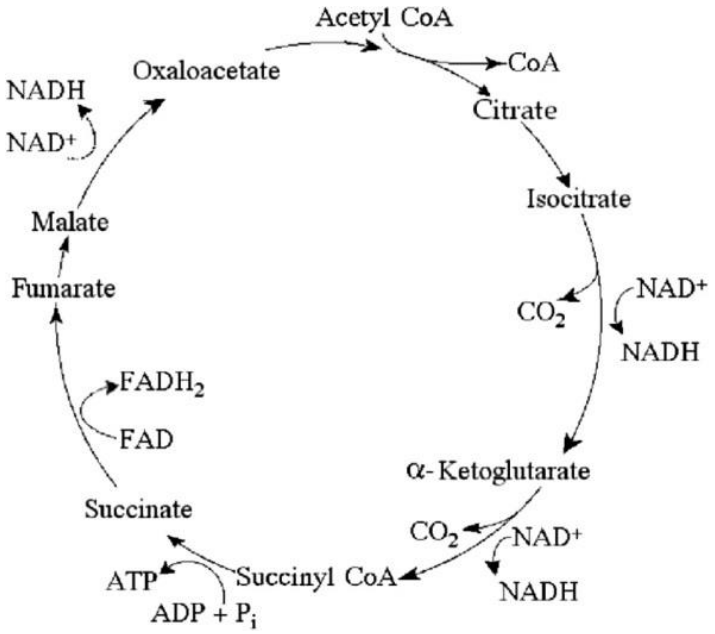


Figure 7.1

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)?

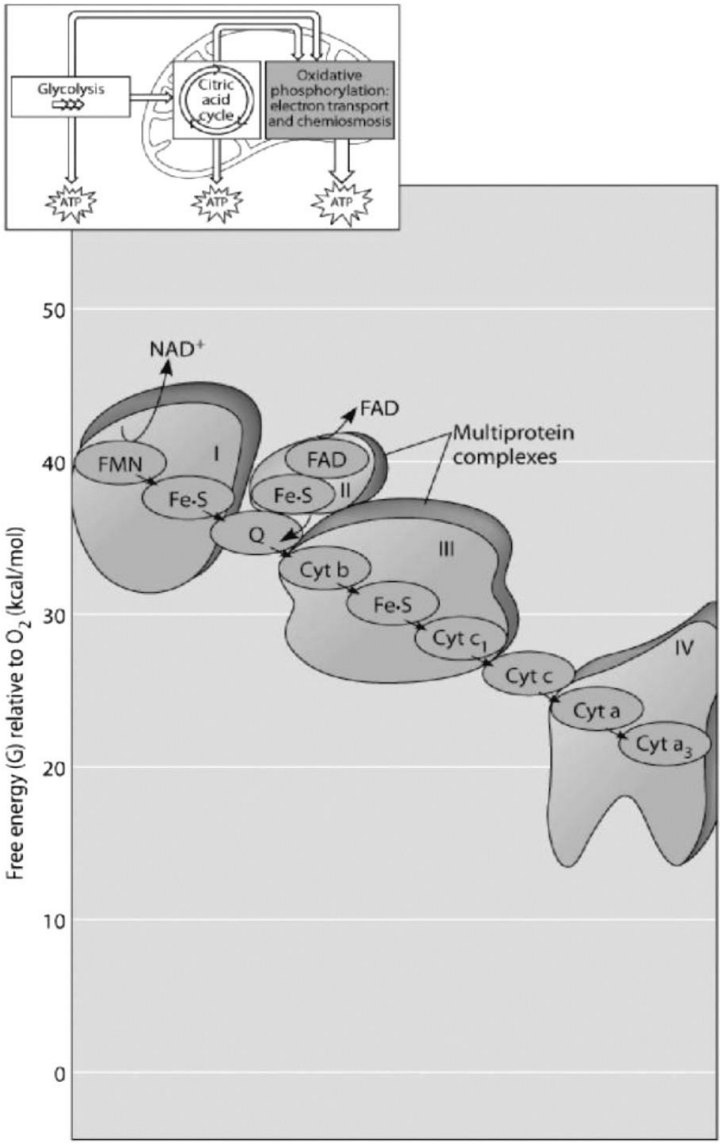
A) 1
B) 2
C) 11
D) 12
Answer: A

26. ____ For each mole of glucose ($C_6H_{12}O_6$) completely oxidized by cellular respiration, how many moles of CO_2 are released in the citric acid cycle (see Figure 7.1)?

A) 2
B) 3
C) 4
D) 6
E) 12
Answer: C

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 + $FADH_2$ molecules produced?

A) 4
B) 5
C) 6
D) 10
E) 12
Answer: E



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) $FADH_2$
C) NADH
D) CO_2
E) water
Answer: C

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.
Answer: C

30. ____ Which of the protein complexes labeled with Roman numerals in Figure 7.2 will transfer electrons to O_2?
A) complex I
B) complex II
C) complex III
D) complex IV
E) All of the complexes can transfer electrons to O_2.
Answer: D

31. ____ The *immediate* energy source that drives ATP synthesis by ATP synthase during oxidative phosphorylation is the
A) oxidation of glucose and other organic compounds.
B) flow of electrons down the electron transport chain.
C) H^+ concentration gradient across the membrane holding ATP synthase.
D) transfer of phosphate to ADP.
Answer: C

32. ____ Which metabolic pathway is common to both fermentation and cellular respiration of a glucose molecule?
A) the citric acid cycle
B) the electron transport chain
C) glycolysis
D) reduction of pyruvate to lactate
Answer: C

33. ____ The final electron acceptor of the electron transport chain that functions in aerobic oxidative phosphorylation is
A) oxygen.
B) water.
C) NAD^+.
D) pyruvate.
Answer: A

34. ____ What is the oxidizing agent in the following reaction?
$Pyruvate + NADH + H^+ \rightarrow Lactate + NAD^+$
A) oxygen
B) NADH
C) lactate
D) pyruvate
Answer: D

35. ____ Most CO_2 from catabolism is released during
A) glycolysis.
B) the citric acid cycle.
C) lactate fermentation.
D) electron transport.
Answer: B