AP BIOLOGY: Chapter 7 Exam Review

Name _____

6. ____ When a glucose molecule loses a hydrogen atom as the result of an oxidation-reduction reaction, the glucose molecule becomes
A) hydrolyzed.
B) hydrogenated.
C) oxidized.
D) reduced.
E) an oxidizing agent.

11. ____ When a molecule of NAD^+ (nicotinamide adenine dinucleotide) gains a hydrogen atom (not a proton), the NAD^+ molecule becomes
A) dehydrogenated.
B) oxidized.
C) reduced.
D) redoxed.
E) hydrolyzed.

15. ____ In addition to ATP, what are the end products of glycolysis?
A) CO_2 and H_2O
B) CO_2 and pyruvate
C) NADH and pyruvate
D) CO_2 and NADH
E) H_2O, $FADH_2$, and citrate

17. ____ In glycolysis, for each molecule of glucose oxidized to pyruvate,
A) two molecules of ATP are used and two molecules of ATP are produced.
B) two molecules of ATP are used and four molecules of ATP are produced.
C) four molecules of ATP are used and two molecules of ATP are produced.
D) two molecules of ATP are used and six molecules of ATP are produced.

18. ____ How many carbon atoms are fed into the citric acid cycle as a result of the oxidation of one molecule of pyruvate?
A) 2
B) 4
C) 6
D) 8
E) 10

20. ____ The primary role of oxygen in cellular respiration is to
A) donate high energy electrons to the electron transport chain.
B) serve as an acceptor for released carbon, forming CO_2.
C) serve as an acceptor for electrons and hydrogen, forming water.
D) combine with acetyl CoA, forming pyruvate.

23. ____ Which of the following produces the most ATP when glucose ($C_6H_{12}O_6$) is completely oxidized to carbon dioxide (CO_2) and water?
A) glycolysis
B) fermentation
C) oxidation of pyruvate to acetyl CoA
D) citric acid cycle
E) oxidative phosphorylation (chemiosmosis)

24. ____ If a cell is able to synthesize 30 ATP molecules for each molecule of glucose completely oxidized to carbon dioxide and water, approximately how many ATP molecules can the cell synthesize for each molecule of pyruvate completely oxidized to carbon dioxide and water?
A) 2
B) 6
C) 14
D) 28
E) 60

26. ____ What carbon sources can yeast cells metabolize to make ATP from ADP under anaerobic conditions?
A) glucose
B) ethanol
C) pyruvate
D) lactic acid

30. ____ Which metabolic pathway requires a proton gradient?
A) the oxidation of pyruvate to acetyl CoA
B) the citric acid cycle
C) oxidative phosphorylation
D) glycolysis
E) fermentation

31. ____ The ATP made during fermentation is generated by which of the following?
A) the electron transport chain
B) substrate-level phosphorylation
C) chemiosmosis
D) oxidative phosphorylation
E) aerobic respiration

33. ____ In alcohol fermentation, NAD^+ is regenerated from NADH by
A) oxidation of ethanol to acetaldehyde.
B) oxidation of pyruvate to acetyl CoA.
C) reduction of pyruvate to lactate.
D) reduction of acetaldehyde to ethanol.
E) reduction of acetyl CoA to ethanol.

34. ____ Which one of the following is formed by the removal of a carbon (as CO_2) from a molecule of pyruvate?
A) lactate
B) glyceraldehyde-3-phosphate
C) oxaloacetate
D) acetyl CoA
E) citrate

35. ____ Which statement best supports the hypothesis that glycolysis is an ancient metabolic pathway that originated before the last universal common ancestor of life on Earth?
A) Glycolysis is widespread and is found in the domains Bacteria, Archaea, and Eukarya.
B) Glycolysis neither uses nor requires O_2.
C) Glycolysis is found in all eukaryotic cells.
D) The enzymes of glycolysis are found in the cytosol rather than in a membrane-enclosed organelle.
E) Ancient prokaryotic cells existed long before oxygen was present in Earth's atmosphere.

38. ____ What is the purpose of beta oxidation in respiration?
A) oxidation of glucose
B) oxidation of pyruvate
C) oxidation of proteins
D) oxidation of fatty acids

42. ____ If pyruvate oxidation is blocked, what will happen to the levels of oxaloacetate and citrate in the citric acid cycle shown in Figure 7.1?
A) There will be no change in the levels of oxaloacetate and citrate.
B) Oxaloacetate will decrease and citrate will accumulate.
C) Oxaloacetate will accumulate and citrate will decrease.
D) Both oxaloacetate and citrate will decrease.
E) Both oxaloacetate and citrate will accumulate.

43. ____ Starting with citrate, which of the following combinations of products would result from three acetyl CoA molecules entering the citric acid cycle (see Figure 7.1)?
A) 1 ATP, 2 CO_2, 3 NADH, and 1 $FADH_2$
B) 2 ATP, 2 CO_2, 3 NADH, and 3 $FADH_2$
C) 3 ATP, 3 CO_2, 3 NADH, and 3 $FADH_2$
D) 3 ATP, 6 CO_2, 9 NADH, and 3 $FADH_2$
E) 36 ATP, 6 CO_2, 6 NADH, and 6 $FADH_2$

48. ____ What happens at the end of the chain in Figure 7.2?
A) Two electrons combine with a proton and a molecule of NAD^+.
B) Two electrons combine with a molecule of oxygen and two hydrogen atoms.
C) Four electrons combine with a molecule of oxygen and four protons.
D) Four electrons combine with four hydrogen and two oxygen atoms.
E) One electron combines with a molecule of oxygen and a hydrogen atom.

49. ____ In the presence of oxygen, the three-carbon compound pyruvate can be catabolized in the citric acid cycle. First, however, the pyruvate (1) loses a carbon, (2) is oxidized to form a two-carbon compound, which (3) is covalently bound to coenzyme A. These three steps result in the formation of
A) acetyl CoA, CO_2, and ATP.
B) acetyl CoA, $FADH_2$, and CO_2.
C) acetyl CoA, NADH, H_2, and CO_2.
D) acetyl CoA, NADH, H^+, and CO_2.
E) acetyl CoA, NAD^+, ATP, and CO_2.

50. ____ An organism is discovered that thrives in both the presence and absence of oxygen in the air. Curiously, the consumption of sugar increases as oxygen is removed from the organism's environment, even though the organism does not gain much weight. This organism
A) is photosynthetic.
B) is a normal member of the animal kingdom.
C) must utilize a molecule other than oxygen to accept electrons from the electron transport chain.
D) is a facultative anaerobe.
E) is an obligate anaerobe.

51. ____ A man interested in losing weight and increasing his fitness followed a strict diet and exercise regimen for three months. Body fat analysis indicated that the man had lost 7 kg (about 15 pounds) of fat by following this exercise and diet program. What is the most likely form by which the fat left his body?
A) It was converted to heat, which was released to the environment.
B) It was released as CO_2 and H_2O.
C) It was converted to ATP, which weighs much less than fat.
D) It was broken down to amino acids and eliminated from the body.

52. ____ A young dog has never had much energy. He is brought to a veterinarian for help, and she decides to conduct several diagnostic tests. She discovers that the dog's mitochondria can use only fatty acids and amino acids for cellular respiration, and his cells produce more lactate than normal. Of the following, which is the best explanation of the dog's condition?
A) His mitochondria lack the transport protein that moves pyruvate across the outer mitochondrial membrane.
B) His cells cannot transport NADH from glycolysis into the mitochondria.
C) His cells contain something that inhibits oxygen use in his mitochondria.
D) His cells lack an essential enzyme in glycolysis so they cannot produce pyruvate.
E) His cells have a defective electron transport chain, so glucose goes to lactate instead of to acetyl CoA.

55. ____ In mitochondria, exergonic redox reactions
A) are the source of energy driving prokaryotic ATP synthesis.
B) provide the energy that establishes the proton gradient.
C) reduce carbon atoms to carbon dioxide.
D) are coupled via phosphorylated intermediates to endergonic processes.

58. ____ When electrons flow along the electron transport chains of mitochondria, which of the following changes occurs?
A) The pH of the matrix increases.
B) ATP synthase pumps protons by active transport.
C) The electrons gain free energy.
D) NAD^+ is oxidized.

60. ____ As H+ ions are moved from inside the mitochondrial membrane to the intermembrane space during electron transport, the solution in the intermembrane space becomes…
A) less acidic with higher potential energy
B) less acidic with lower potential energy
C) more acidic with higher potential energy
D) more acidic with lower potential energy