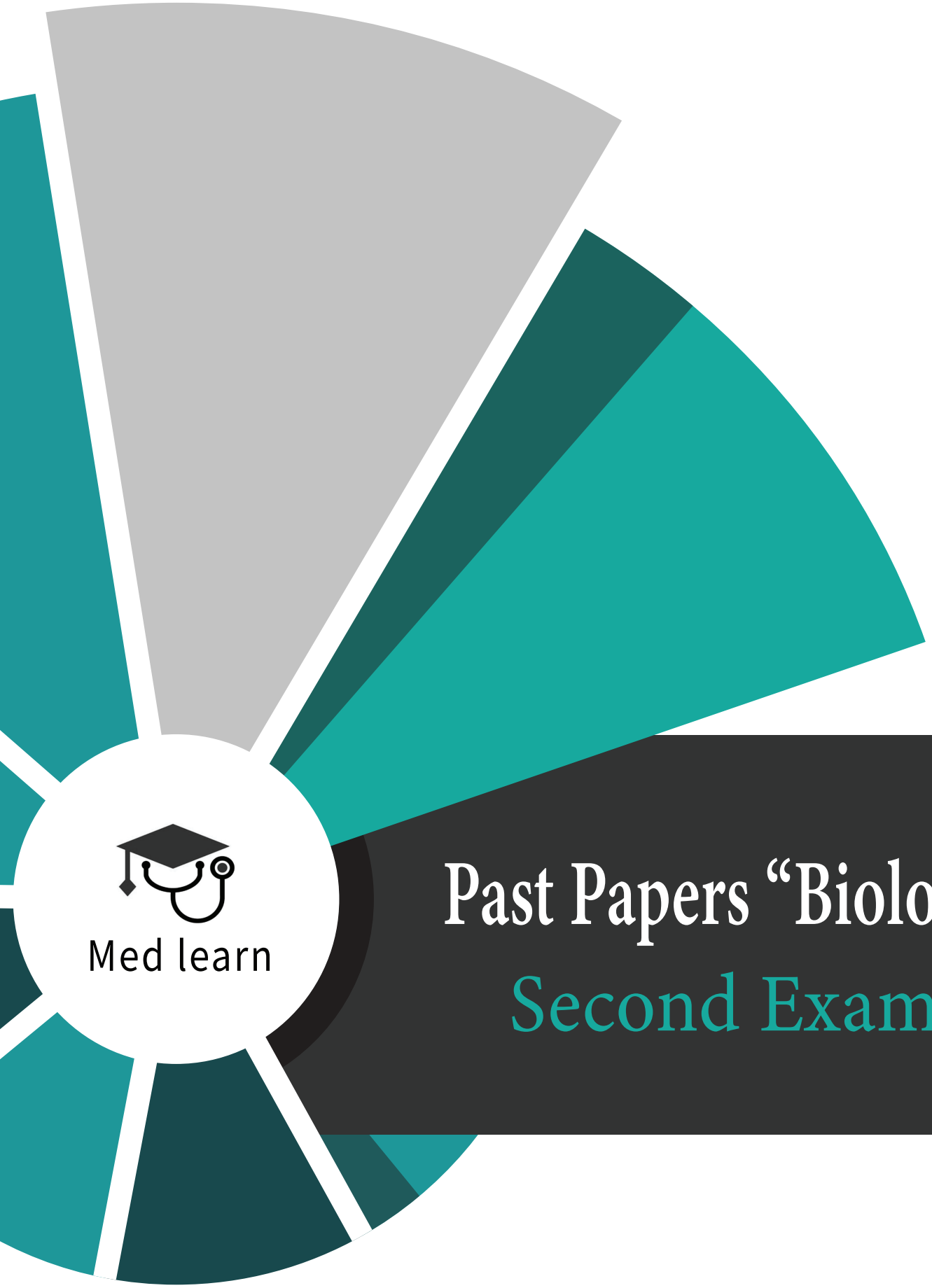
Dr.Ahmad Al-Qawasmi



Past Papers "Biology"

Second Exam

Chapter 6

1. A negative delta G for a chemical processes indicates:

A. the reaction is exergonic
B. the products of the chemical process store less energy than the reactants
C. the reaction can happen spontaneously
D. the reaction can proceed without an input of energy
E. all of the above is correct

Answer: E

2. In a spontaneous change:

A. The free energy of a system decrease
B. The system becomes move stable
C. The released free energy can be harnessed to do work
D. Always move toward equilibrium
E. All above are correct

Answer: E

3. In Exergonic reactions, energy is

A. transformed into light
B. used
C. either released or used
D. transformed into heat
E. released

Answer: E

4. Enzymes catalyze chemical reactions by…

A. adding heat to the system
B. reacting with substrate to form new products
C. increasing activation energy
D. decreasing activation energy
E. decreasing free energy

Answer: D

5. The active site of an enzyme is the region that..

A. Binds to a noncompetitive inhibitor
B. Binds to an allosteric inhibitor
C. Binds to an allosteric activator
D. Binds to a heme group
E. Binds to substrate(s)

Answer: E

6. catabolic pathways…

A. Provide the cell with energy, primarily in the form of ATP to work
B. Are endergonic
C. Combine molecules into more energy-rich molecules
D. Are non-spontaneous
E. Don’t need enzyme catalyst

Answer: A

7. Which of the followings is FALSE about exergonic reactions?

A. They are spontaneous
B. They are energy releasing
C. They have negative delta G
D. They are mostly catabolic
E. The products have higher total energy than reactants

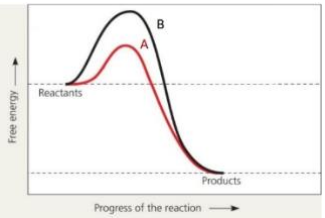
Answer: E

8. Coenzymes are usually…

A. inorganic cofactors
B. Organic cofactors
C. Vitamins
D. allosteric regulators
E. both B and C are correct

Answer: E

9. Which of the following represents an un-catalyzed reaction?



A. A
B. B

Answer: B

10. The minimum amount of energy needed for a reaction is known as:

A. Entropy
B. Activation energy
C. endothermic level
D. Equilibrium point
E. Free energy

Answer: B

11. Which of the following is not a product of hydrolysis of ATP?

A. ADP
B. Energy
C. Pi (inorganic phosphate)
D. Amino acids
E. ADP and Pi

Answer: D

12. Reactant capable of interacting to form products in a chemical reaction must first overcome a thermodynamic barrier known as the reaction's:

A. Entropy
B. Activation energy
C. Endothermic level
D. Equilibrium point
E. Free energy

Answer: B

13. The transfer of free energy from exergonic path ways to endergonic pathways is best called:

A. Feedback inhibition
B. ATP cycle
C. Energy coupling
D. Cooperatively
E. None of the above

Answer: C

14. Which of the following is (are) true for anabolic pathways?

A. They do not depend on enzymes
B. They are usually highly spontaneous chemical reactions
C. They consume energy to build up polymers from monomers
D. They release energy as they degrade polymers to monomers
E. They consume energy to decrease the entropy of the organism and its environment

Answer: C

15. Which term most precisely describes the cellular process of breaking down large molecules into smaller ones?

A. Catalysis
B. Metabolism
C. Anabolism
D. Dehydration
E. Catabolism

Answer: E

16. Some bacteria are metabolically active in hot springs because:

A. They are able to maintain a lower internal temperature
B. High temperatures make catalysis unnecessary
C. Their enzymes have high optimal temperatures
D. Their enzymes are completely insensitive to temperature
E. They use molecules other than proteins or RNAs as their main catalysts

Answer: C

17. Increasing the substrate concentration in an enzymatic reaction could overcome which of the following?

A. Denaturization of the enzyme
B. Allosteric inhibition
C. Competitive inhibition
D. Saturation of the enzyme activity
E. Insufficient cofactors

Answer: C

18. The enzyme can speed the chemical reaction by:

A. Speeding the movement of molecules
B. Lowering the activation energy
C. Increasing the number of substrate molecules
D. All of the above
E. None of the above

Answer: B

19. Why is ATP an important molecule in metabolism?

A. Its hydrolysis provides an input of free energy for exergonic reactions.
B. It provides energy coupling between exergonic and endergonic reactions
C. Its terminal phosphate group contains a strong covalent bond that, when hydrolyzed, releases free energy.
D. Its terminal phosphate bond has higher energy than the other two.
E. It is one of the four building blocks for DNA synthesis

Answer: B

20. Which of the following is most similar in structure to ATP?

A. A pentose sugar
B. ADNA nucleotide
C. An RNA nucleotide
D. An amino acid with three phosphate groups attached
E. A phospholipid

Answer: C

21. How does a non-competitive inhibitor decrease the rate of an enzyme reaction?

A. By binding at the active site of the enzyme
B. By changing the shape of the enzyme's active site
C. By changing the free energy change of the reaction
D. By acting as a coenzyme for the reaction
E. By decreasing the activation energy of the reaction

Answer: B

22. The mechanism in which the end product of a metabolic path way inhibits an earlier step in the pathway is most precisely described as:

A. Metabolic inhibition
B. Feedback inhibition
C. Allosteric inhibition
D. Non-cooperative inhibition
E. Reversible inhibition

Answer: B

23. In the cell, coupling reactions need the use of:

A. Amino acids
B. Light
C. Sugars
D. Fatty acids
E. ATP

Answer: E

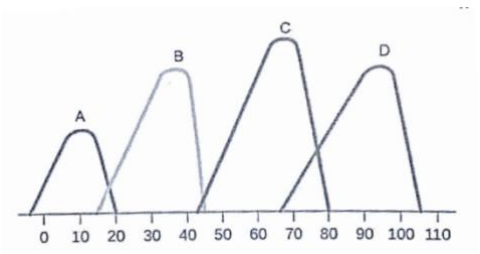
24. If an enzyme is added to a solution where its substrate and product are in equilibrium, what will occur?

A. Additional product will be formed
B. Additional substrate will be formed
C. The reaction will change from endergonic to exergonic
D. The free energy of the system will change
E. Nothing; the reaction will stay at equilibrium

Answer: E

25. Which of the following curves represent optimal temperature of a human enzyme?

A. A
B. B
C. C
D. D
E. None of the above



Answer: B

26. During a laboratory experiment, you discover that an enzyme-catalyzed reaction has a Delta G of -20 kcal/mol. If you double the amount of enzyme in the reaction, what will be the Delta G for the new reaction?

A. 40 kcal/mol
B. -20 kcal/mol
C. 0 kcal/mol
D. +20 kcal/mol
E. +40 kcal/mol

Answer: B

27. Induced fit results from binding of _____ to an enzyme

A. Vitamins
B. Non-competitive inhibitor
C. Specific substrate molecule
D. b and c
E. None of the above

Answer: C

28. If an enzyme in solution is saturated with substrate, the most effective way to obtain a faster yield of products is to:

A. Add more of the enzyme
B. Heat the solution to 90C
C. Add more substrate
D. Add an allosteric inhibitor
E. Add a noncompetitive inhibitor

Answer: A

29. Allosteric inhibitors act as:

A. Competitive inhibitors
B. Coenzymes
C. Non-competitive inhibitors
D. Cofactors
E. Either competitive or non-competitive inhibitors

Answer: C

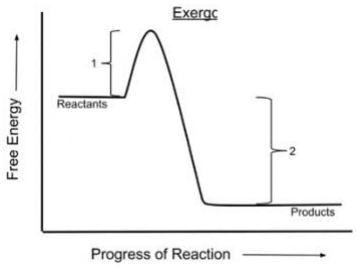
30. Allosteric enzyme regulation is usually associated with:

A. Lack of cooperatively
B. Feedback inhibition
C. Activating activity
D. An enzyme with more than one subunit
E. The need for cofactors

Answer: D

31. This reaction could be an

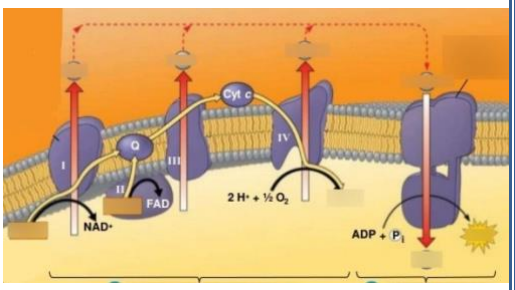
A. Endergonic
B. Exergonic



Answer: B

Chapter 10

32. The figure shows:



F. Chemiosmosis
G. Substrate level phosphorylation
H. Electrochemical gradient
I. Oxidative phosphorylation
J. Electron transport chain creating a proton motive force

Answer: D

33. What is correct about the electron transport chain in anaerobic respiration?

F. Can use oxygen as a final electron acceptor
G. Occurs in aerobic bacteria
H. Occurs in some prokaryotes
I. It is the fermentation of glucose
J. B and C are correct

Answer: C

34. Which of the following statements describes the results of this reaction?

$$C_6H_{12}O_6 + 6\ O_2 \rightarrow 6\ CO_2 + 6\ H_2O + Energy$$

A. $C_6H_{12}O_6$ is oxidized and O_2 is reduced
B. O_2 is oxidized and H_2O is reduced
C. CO_2 is reduced and O_2 is oxidized
D. $C_6H_{12}O_6$ is reduced and CO_2 is oxidized
E. O_2 is reduced and CO_2 is oxidized

Answer: A

35. In alcohol fermentation, NAD^+ is regenerated from NADH by:

A. Reduction of acetaldehyde into ethanol
B. Oxidation of pyruvate to acetyl CoA
C. Reduction of pyruvate to lactate
D. Oxidation of ethanol to acetyl CoA
E. Reduction of ethanol to pyruvate

Answer: A

36. What is the purpose of beta oxidation?

A. Breaking down of glucose into 2 pyruvate molecules
B. Breaking down of fatty acids into two carbon fragments
C. Converting of glucose to fatty acid
D. Converting of fatty acid to protein
E. None of the above

Answer: B

37. In cellular respiration, energy flows in the sequence:

A. Glucose - NAD+- electron transport chain -ATP
B. Glucose - NADH - electron transport chain - proton motive force – ATP
C. Glucose - NADH - electron transport chain- O2
D. NADH - glucose - pyruvate - Krebs cycle - H2O
E. Pyruvate - Acetyl CoA- Flavoprotein – ADP

Answer: B

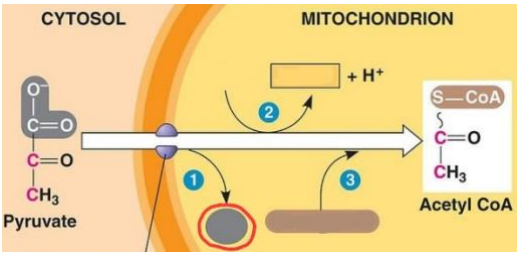
38. Which of the following statements correctly describes the activity of Phosphofructokinase?

A. It is inhibited by AMP
B. It is activated by ATP
C. it is activated by Citrate
D. It catalyzes the conversion of fructose into fructose 6-phosphate
E. It is inhibited by citrate

Answer: E

39. Upon oxidation of pyruvate to acety CoA, the product compound No 1 in the red circle :

A. NADH
B. Coenzyme A
C. Acetate
D. acetyl coenzyme A
E. carbon dioxide



Answer: E

40. In addtion to ATP, what are the end products of glycolysis?

A. CO_2 and H_2O
B. CO_2 and pyruvate
C. H_2O, NADH and pyruvate
D. CO_2 and NADH
E. H_2O, $FADH_2$ and citrate

Answer: C

41. Carbon dioxide (CO_2) is released during which of the following stages of cellular respiration?

A. Glycolysis and the oxidation of pyruvate to acetyl CoA
B. Oxidation of pyruvate to acetyl CoA and the citric acid cycle
C. The citric acid cycle and oxidative phosphorylation
D. Oxidative phosphorylation and fermentation
E. Fermentation and glycolysis

Answer: B

42. Almost all of the oxygen (O_2) consumed in breathing is converted to:

A. acetyl-CoA
B. water
C. Carbon dioxide (CO_2)
D. ATP and NADH
E. Pyruvate

Answer: B

43. The starting molecule in the citric acid cycle that reacts with Acetyl CoA and is regenerated at the end of the cycle:

A. Succinate
B. Fumarate
C. Alpha-ketoglutarate
D. Oxaloacetate
E. Pyruvate

Answer: D

44. During aerobic respiration Which of the following directly donates electrons to the electron transport chain at the lowest energy level?

A. ATP
B. NADH
C. ADP + Pi
D. $FADH_2$
E. FADH

Answer: D

45. The reactions of Fermentation function to regenerate ..... molecules to be used in glycolysis

A. NAD^+
B. ATP
C. Pyruvic acid
D. NADH
E. Glucose

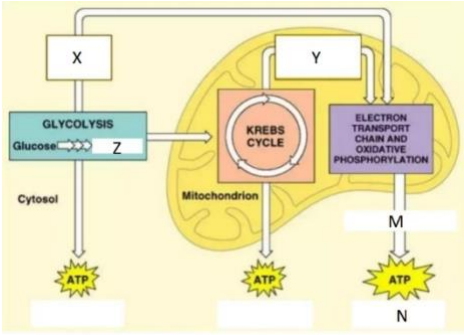
Answer: A

46. In cellular respiration , 90 percent of ATP is produced by...

A. glycolysis
B. oxidative phosphorylation
C. Photophosphorylation
D. Substrate -level phosohorytstion
E. Pyruvate oxidation

Answer: B

47. In the figure, the product Z is:



A. 3 acetyl CoA molecules
B. 2 pyruvate molecules
C. 3 oxaloacetate molecules
D. Citrate
E. Fructose bisphosphate

Answer: B

48. Where does glycolysis take place in eukaryotic cells?

A. Mitochondrial matrix
B. Mitochondrial outer membrane
C. Mitochondrial inner membrane
D. Mitochondrial intermembrane space
E. Cytosol

Answer: E

49. The primary role of SO_4 ions in anaerobic cellular respiration is to:

A. Combine with carbon, forming CO_2
B. Yield energy in the form of ATP as it is passed down the chain
C. Act as a final acceptor for electrons and hydrogen
D. Combine with lactate, forming pyruvate
E. Combine with pyruvate, forming alcohol

Answer: C

50. Production of ATP direct transfer of phosphate group from an organic substrate to ADP by enzymes is called:

A. Oxidative phosphorylation
B. Substrate-level phosphorylation
C. Photophosphorylation
D. B-Oxidation
E. Deamination

Answer: B

51. Which of the following is true about (Phosphofructokinase enzyme)?

A. It is the "Pacemaker" of cellular respiration
B. It is inhibited by Citrate
C. It is inhibited by ATP
D. It is stimulated by AMP
E. All of the above are correct

Answer: E

52. In electron transport chain, NADH passes its electrons to:

A. Ubiquinone (Q)
B. Cytochrome c
C. Cytochrome a3
D. Flavin mononucleotide (FMN)
E. Cytochrome a

Answer: D

53. 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. Synthesis of acetyl CoA from pyruvate
E. Reduction of pyruvate to lactate

Answer: C

54. Where is ATP synthase located in the mitochondrion?

A. Cytosol
B. Electron transport chain
C. Outer membrane
D. Inner membrane
E. Mitochondrial matrix

Answer: D

55. 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 allows for an increased rate of glycolysis
B. It increases the surface for substrate-level phosphorylation
C. It allows for an increased rate of the citric acid cycle
D. It increases the surface for oxidative phosphorylation
E. It increases the area for glycogen storage

Answer: D

56. When a molecule of NAD^+ (nicotinamide adenine dinucleotide) gains a hydrogen atom, the molecule becomes:

A. Dehydrogenated
B. Oxidized
C. Reduced
D. Redoxed
E. Hydrolyzed

Answer: C

57. When a glucose molecule loses a hydrogen atom as the result of an oxidation-reduction reaction, the molecule becomes:

A. Hydrolyzed
B. Hydrogenated
C. Oxidized
D. Reduced
E. An oxidizing agent

Answer: C

58. Energy released by the electron transport chain is used to pump H^+ into which location in eukaryotic cells?

A. Cytosol
B. Mitochondrial outer membrane
C. Mitochondrial inner membrane
D. Mitochondrial intermembrane space
E. Mitochondrial matrix

Answer: D

59. How does pyruvate enter the mitochondrion?

A. Active transport
B. Diffusion
C. Facilitated diffusion
D. Through a channel
E. Through a pore

Answer: A

60. The number of NADH molecules produced from oxidation of one pyruvate to acetyl CoA and further oxidation in Kreps cycle is:

A. 3 NADH
B. 6 NADH
C. 4 NADH
D. 8 NADH
E. None of the above

Answer: C

61. 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
E. Six molecules of ATP are used, and six molecules of ATP are produced

Answer: B

62. The molecule that directly passes electrons to oxygen in the electron transport chain in mitochondria is:

A. Flavoprotein
B. CoQ (Ubiquinone)
C. Cytochrome C
D. Cytochrome a3
E. Iron sulphur protein

Answer: D

63. Which of the following factors control the cellular respiration?

A. Intracellular ATP amount
B. Intracellular AMP amount
C. Citrate amount
D. Only a and b
E. All of the above

Answer: E

64. Before amino acids can enter into glycolysis and TCA cycle, their amino group must be removed by a process called:

A. Decarboxylation
B. Dehydrogenation
C. Carboxylation
D. Deamination
E. Immunization

Answer: D

65. Carbohydrates and fats are considered high energy food because:

A. They have a lot of oxygen atoms
B. They have no nitrogen in their makeup
C. They can have short carbon skeletons
D. They have a lot of electrons associated with hydrogen
E. They are easily reduced

Answer: D

66. How many electrons are needed to pass the electron transport chain of the mitochondria for the formation of one molecule of water?

A. 1
B. 2
C. 4
D. 6
E. 2 from NADH and 1 from $FADH_2$

Answer: B

67. Which process in eukaryotic cells will proceed normally whether oxygen (O_2) is present or absent?

A. Electron transport
B. Glycolysis
C. The citric acid cycle
D. Oxidative phosphorylation
E. Chemiosmosis

Answer: B

68. The energy responsible for ATP production during cellular respiration:

A. Heat energy
B. Light energy
C. Food
D. Proton motive force
E. None of the above

Answer: D

69. Chemiosmosis ATP synthesis (oxidative phosphorylation) occurs in:

A. All respiring cells, both prokaryotic and eukaryotic, using oxygen or other electron acceptors
B. All cells, but only in the presence of oxygen
C. Only in mitochondria, using either oxygen or other electron acceptors
D. Only in eukaryotic cells, in the presence of oxygen
E. Only in prokaryotic cells, in absence of oxygen

Answer: A