BIOLOGY

Second 023

Q1: The transfer of energy from catabolic to anabolic processes is called:
A) Energy transfer
B) Energy transport
C) Energy consumption
D) Energy coupling
Answer: Energy coupling.
Explanation: Energy coupling refers to the use of energy released from catabolic reactions (breakdown of molecules) to drive anabolic reactions (synthesis of molecules).

Q2: An endergonic reaction:
A) Delta G negative
B) Spontaneous
C) Releases energy
D) The products have more energy than the reactants
Answer: The products have more energy than the reactants.
Explanation: In an endergonic reaction, the free energy change (Delta G) is positive, meaning the products have higher energy than the reactants.

Q3: The last electron acceptor in ethanol fermentation is:
A) Oxygen
B) Pyruvate
C) Acetaldehyde
D) NAD+
Answer: Acetaldehyde.
Explanation: In ethanol fermentation, acetaldehyde serves as the final electron acceptor, allowing NADH to be oxidized back to NAD+.

Q4: In cellular respiration, the four-carbon compound that reacts with acetyl CoA to form citrate is:
A) Malate
B) Fumarate
C) Succinate
D) Oxaloacetate
Answer: Oxaloacetate.
Explanation: Acetyl CoA combines with oxaloacetate to form citrate in the citric acid cycle.

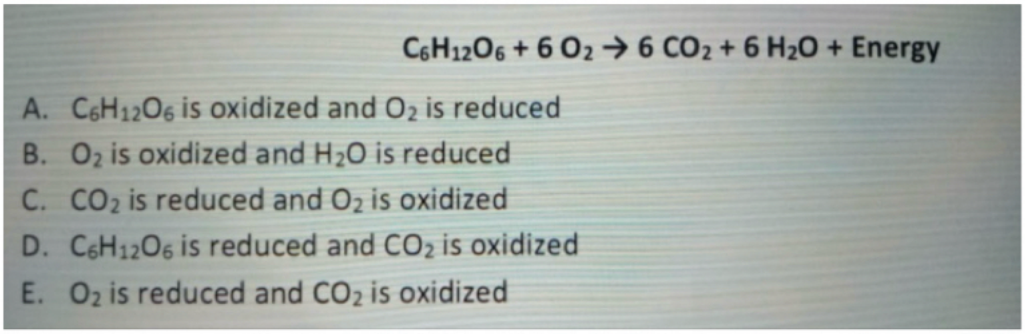
Q5: The correct sequence of cellular respiration is:
A) Glycolysis → Oxidation of pyruvate → Citric acid cycle
B) Glycolysis → Citric acid cycle → Oxidation of pyruvate
C) Oxidation of pyruvate → Citric acid cycle → Glycolysis
Answer: Glycolysis → Oxidation of pyruvate → Citric acid cycle.
Explanation: Glycolysis occurs first, followed by the oxidation of pyruvate, and then the citric acid cycle.

Q6: Choose the false statement:
Answer: NAD+ has more chemical energy than NADH.
Explanation: NADH is the reduced form of NAD+ and contains more energy due to the added electrons.

Q7: The active site of an enzyme is the region that:
A) Binds to substrate(s)
B) Binds to a heme group
C) Binds to an allosteric activator
D) Binds to an allosteric inhibitor
E) Binds to a noncompetitive inhibitor
Answer: Binds to substrate(s).
Explanation: The active site is specifically where substrates bind and undergo a chemical reaction.

Q8: Which of the following is NOT a product of glycolysis?
A) H+
B) NADH
C) FADH2
D) ATP
Answer: FADH2.
Explanation: FADH2 is produced in the citric acid cycle, not glycolysis.

Q9: Which of the following statements describes the results of this reaction?



Answer : A

Q10: How many carbon dioxide molecules are released when oxidizing 1 mole of glucose in glycolysis?
A) 0
B) 1
C) 2
D) 4
E) 6
Answer: 6.
Explanation: A complete oxidation of one mole of glucose (through glycolysis and the citric acid cycle) produces 6 CO2 molecules.

Q11: If NAD+ accepts hydrogen and an electron, it will be:
A) Reduced
B) Oxidized
C) Hydrolyzed
D) Hydrogenated
Answer: Reduced.
Explanation: When NAD+ accepts hydrogen and electrons, it becomes NADH, which is its reduced form.

Q12: Cooperativity is:
A) A substrate molecule binding to one active site in an enzyme triggers a shape change that increases activity at all active sites
B) A substrate molecule binding to one active site in an enzyme triggers a shape change that inhibits active sites in all subunits
C) Allosteric regulation binding to one active site in an enzyme triggers a shape change that increases activity in all subunits

Answer: A substrate molecule binding to one active site in an enzyme triggers a shape change that increases activity at all active sites.
Explanation: This process enhances the enzyme's ability to catalyze reactions when a substrate binds to it.

Q13: Which of the following is mobile?
A) Protein Complex I
B) Protein Complex II
C) Protein Complex III
D) Ubiquinone
E) Protein Complex IV
Answer: Ubiquinone.
Explanation: Ubiquinone (coenzyme Q) is a mobile electron carrier in the electron transport chain.

Q14: The pumping of proton ions from the mitochondrial matrix results in:
A) NAD+ reduction
B) NADH oxidation
C) Proton motive force in the intermembrane space
D) Proton motive force in the mitochondrial matrix
E) Transport of electrons
Answer: Proton motive force in the intermembrane space.
Explanation: This process creates an electrochemical gradient that drives ATP synthesis.

Q15: Oxidative phosphorylation occurs in:
A) Mitochondrial matrix
B) Inner membrane
C) Intermembrane space
D) Cytosol
E) Outer membrane
Answer: Inner membrane.
Explanation: Oxidative phosphorylation takes place across the inner mitochondrial membrane, where the electron transport chain is located.

Q16: How much CO_2 is produced from the oxidation of one pyruvate?
A) 1
B) 2
C) 3

D) 4
E) 6
Answer: 1.
Explanation: Each pyruvate molecule produces one CO_2 during its conversion to acetyl CoA.

Q17: What is the major redox reaction that occurs in glycolysis?
A) H_2O
B) NADH
C) $FADH_2$
D) ATP
E) Fructose-6-phosphate
Answer: NADH.
Explanation: The reduction of NAD+ to NADH is a key redox reaction in glycolysis.

Q18: NAD+ is reduced to NADH during glycolysis by:
Answer: Electrons coming from G3P.
Explanation: Glyceraldehyde-3-phosphate (G3P) donates electrons to NAD+, reducing it to NADH.

Q19: Organisms are:
A) Closed systems
B) Open systems
C) Large systems
D) Small systems
E) Free systems
Answer: Open systems.
Explanation: Organisms exchange energy and matter with their environment, classifying them as open systems.

Q20: Which enzyme is used in the reaction from fructose-6-phosphate to fructose-1,6-bisphosphate?
A) Phosphofructokinase
B) Phosphoglycerokinase
C) Glucose dehydrogenase
Answer: Phosphofructokinase.
Explanation: This enzyme catalyzes a key regulatory step in glycolysis.

Q21: Most of the components of the electron transport chain are made of:
A) Lipids
B) Proteins
C) Metals
Answer: Proteins.
Explanation: The electron transport chain is primarily composed of protein complexes that facilitate the transfer of electrons.

Q22: Oxygen that enters cellular respiration is converted to:
Answer: Water.
Explanation: In the final stages of cellular respiration, oxygen acts as the final electron acceptor and is reduced to form water.

Q23: Glycolysis regenerates ATP by:
Answer: Substrate-level phosphorylation.
Explanation: ATP is produced directly from the phosphorylation of ADP during glycolysis, without the need for oxidative phosphorylation.

Q24: Fermentation regenerates ATP by:
A) Substrate-level phosphorylation
B) Substrate-level dephosphorylation
C) Oxidative phosphorylation
Answer: Substrate-level phosphorylation.
Explanation: Fermentation relies on substrate-level phosphorylation to produce ATP in the absence of oxygen.

Q25: The citric acid cycle regenerates ATP by:
A) Substrate-level phosphorylation
B) Substrate-level dephosphorylation
C) Oxidative phosphorylation
Answer: Substrate-level phosphorylation.
Explanation: During the citric acid cycle, ATP (or GTP) is generated through substrate-level phosphorylation.

Q26: Which of the statements about NAD+ is false?
A) It contains nitrogen
B) It is the oxidized form of NADH
C) It has less energy than NADH

D) It donates electrons to the electron transport chain
Answer: It is the oxidized form of NADH.
Explanation: NAD+ is the oxidized form, while NADH is the reduced form.

Q27: The role of sulfate ion in anaerobic respiration is:
A) Accepts electrons at the end of the electron transport chain
B) Accepts electrons during the citric acid cycle
C) Donates electrons in the electron transport chain
Answer: Accepts electrons at the end of the electron transport chain.
Explanation: In some anaerobic organisms, sulfate serves as a terminal electron acceptor.

Q28: FADH2 donates its electrons in the electron transport chain to:
A) Protein complex I
B) Protein complex II
C) Protein complex III
D) Cyt c oxidase
Answer: Protein complex II.
Explanation: FADH2 transfers its electrons to complex II, unlike NADH, which donates to complex I.

Q29: Chemical work is defined as:
A) Pushing endergonic reactions that cannot occur spontaneously by themselves
B) Transporting sodium against the gradient
C) Beating cilia
D) Muscle contractions
Answer: Pushing endergonic reactions that cannot occur spontaneously by themselves.
Explanation: Chemical work involves facilitating reactions that require energy input to proceed.

Q30: What does FAD+ accept to become FADH2?
A) Electron and proton
B) 2 electrons and 1 proton
C) 2 electrons and 2 protons
Answer: 2 electrons and 2 protons.
Explanation: FAD+ is reduced to FADH2 by accepting two electrons and two protons.

Q31: To enter the citric acid cycle, acetyl-CoA binds to:
A) Citric acid
B) Oxaloacetate

C) Alpha-ketoglutarate
Answer: Oxaloacetate.
Explanation: Acetyl-CoA combines with oxaloacetate to initiate the citric acid cycle by forming citrate.

Q32: The active site of an enzyme is where the:
A) Noncompetitive inhibitors bind
B) Competitive inhibitors bind
C) Allosteric inhibitors bind
D) Substrate(s) bind
E) Both B and D
Answer: Substrate(s) bind.
Explanation: The active site is specifically designed for substrate binding, facilitating the enzymatic reaction.

Q33: Noncompetitive inhibitors inhibit the enzyme by:
A) Decreasing the activation energy
B) Binding to the active site
C) Changing the enzyme shape
Answer: Changing the enzyme shape.
Explanation: Noncompetitive inhibitors bind to sites other than the active site, altering the enzyme's shape and function.

Q34: Which of the following affects enzyme activity?
A) Temperature
B) pH
C) Competitive inhibition
D) Noncompetitive inhibition
E) All of the above
Answer: All of the above.
Explanation: All these factors can influence enzyme activity and reaction rates.

Q35: The immediate energy form that drives ATP synthesis by ATP synthase is:
A) Electron flow chain
B) Proton gradient across the mitochondrial membrane
Answer: Proton gradient across the mitochondrial membrane.
Explanation: The proton gradient created by the electron transport chain is used by ATP synthase to produce ATP.

Q36: Which of the following is true about NAD+?
A) It is reduced to NADH during glycolysis, pyruvate oxidation, and the citric acid cycle
B) It is oxidized by dehydrogenase
C) It donates electrons to the electron transport chain
D) Glycolysis can occur without it
Answer: It is reduced to NADH during glycolysis, pyruvate oxidation, and the citric acid cycle.
Explanation: NAD+ plays a crucial role in cellular respiration as an electron carrier.

Q37: A catabolic pathway:
A) Includes glycolysis and the citric acid cycle
B) Is an endergonic reaction
C) Is a non-spontaneous reaction
D) Does not need catalytic enzymes
Answer: Includes glycolysis and the citric acid cycle.
Explanation: Catabolic pathways break down molecules to release energy and include both glycolysis and the citric acid cycle.

Q38: If a certain reaction has Delta G = -200, which of the statements is true?
A) Products have less energy than reactants
B) Reactants have less energy than products
C) The reaction is endergonic
Answer: Products have less energy than reactants.
Explanation: A negative Delta G indicates that the reaction is exergonic, meaning the products have lower energy than the reactants.

Q39: Activation energy is defined as:
A) The energy needed to break reactant bonds
B) The energy needed to form product bonds
Answer: The energy needed to break reactant bonds.
Explanation: Activation energy is the energy required to initiate a chemical reaction by breaking the bonds in reactants.

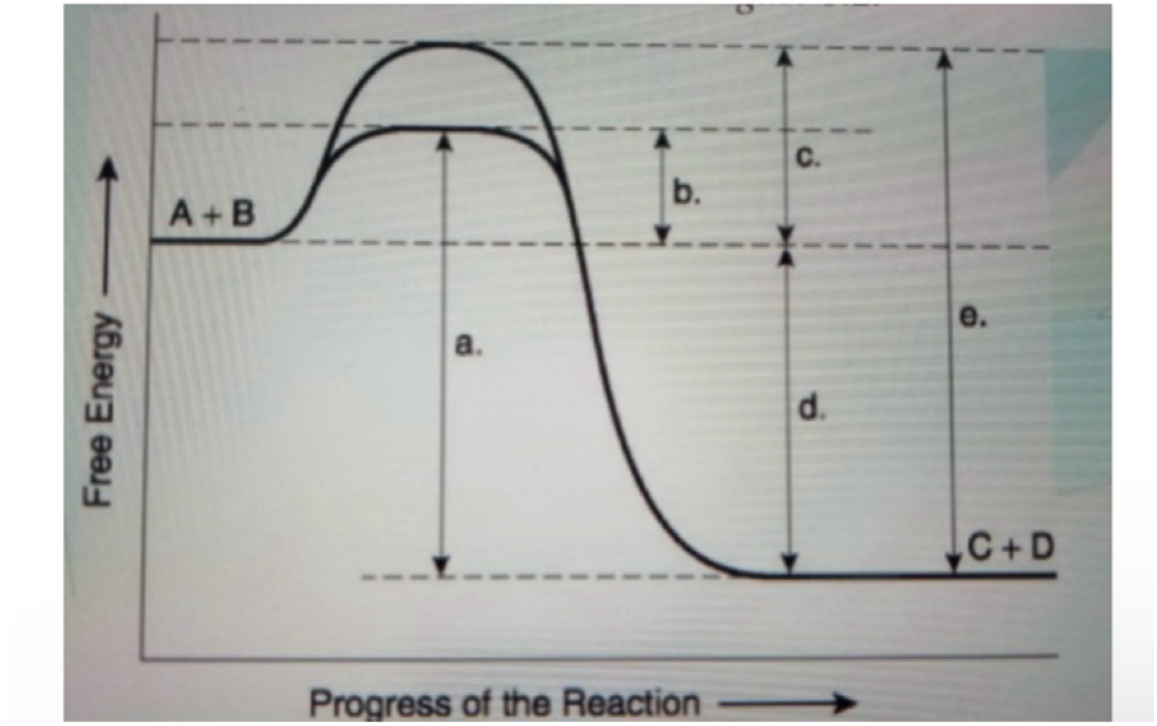
Q40: Glycolysis:
A) Splits glucose to pyruvate
B) Splits glucose to acetyl CoA
Answer: Splits glucose to pyruvate.
Explanation: Glycolysis converts glucose into two molecules of pyruvate.

Q41: Which stage of cellular respiration occurs outside the mitochondria?
A) Electron transport chain
B) Glycolysis
C) Oxidative phosphorylation
D) Pyruvate oxidation
Answer: Glycolysis.
Explanation: Glycolysis occurs in the cytoplasm, while the other stages take place in the mitochondria.

Q42: If a reaction has Delta G = -10, which of the following is true?
A) Exergonic reaction
B) Spontaneous reaction
C) Needs a catalyst
D) All of them
Answer: Exergonic reaction.
Explanation: A negative Delta G indicates that the reaction releases energy and is spontaneous; it may not necessarily need a catalyst.

Q43: Which of the following occurs in aerobic respiration, anaerobic respiration, and fermentation?
A) Glycolysis
B) Oxidative phosphorylation
Answer: Glycolysis.
Explanation: Glycolysis is the common pathway in all three processes, while oxidative phosphorylation is specific to aerobic respiration.

Q44) What type of reaction is this?



Answer : Exothermic Reactions

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Q) How many $FADH_2$ produce from one turn of citric acid cycle?

A)0

B)1

C)2

D)3

E)4

ANS: B

Q) How many electrons and protons respectively we need when FAD converted to FADH2?

A) 1,1
B) 1,2
C) 2,2
D) 2,1

ANS: c

Q)What is the enzyme that transforms fructose 6 phosphate to fructose 1,6 bisphosphate?
A)Hexokinase
B)Phosphoglucomutase
C)Phosphoglycerate kinase
D) Triose phosphate
E) Phosphofructokinase

ANS : E

Q) When the saturated state is achieved, how we can increase the rate of reactions ?

A) Add competitive inhibitors
B) Add more enzymes
C) Add noncompetitive inhibitors
D) Decrease temperature

ANS : B

Q) how enzymes increase the rate of the reaction ?

A) Decrease the free energy
B) Decrease reactant free energy
C) Decrease product free energy
D) Orienting substrate incorrectly
E) Decrease Ea barrier

ANS : E

Q) How many carbon in PYRUVATE molecule ?

A) 2
B) 3
C) 4
D) 5
E) 6

ANS : B

Q) What is the end product of glycolysis?

A) Glucose
B) PYRUVATE
C) DHAP
D) GA3p
E) Fructose

ANS : B

Part of cellular respiration that occurs out of mitochondria?

A) Glycolysis
B) Krebs cycle
C) Electron transport chain
D) Fermentation
E) A+B

ANS : A

Q) Cellular respiration can be summed up in the following reaction?

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

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

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

ANS :C

Q) process of cellular respiration can occur in aerobic and anaerobic condition?

A) Glycolysis
B) Krebs cycle
C) Electron transport chain
D) PYRUVATE dehydrogenase
E) A+ C

ANS : A

Q) Which of the following is false ?

A) Endergonic rxns consume energy
B) Exergonic rxns have negative delta G
C) Endergonic and exergonic need the same amount of energy
D) Exergonic release energy

ANS : c

Q) How many chemical step in glycolysis?

A) 7
B) 8
C) 9
D) 10
E) 11

ANS: D

Biology | second exam

Doctor 2021

1. in cellular respiration, the process that generates almost 90% of the ATP is.

A. de-phosphorylation
B. re-phosphorylation
C. substrate-level phosphorylation
D. phosphorylation
E. oxidative phosphorylation

2. What is ATP made from?

   A. adenosine + high energy electrons
   B. AMP + ALP
   C. ADP + phosphate
   D. Deoxy ribose and 3 phosphate groups
   E. None of choices are correct

3. The process oxidation of pyruvate to Acetyl Co-A, takes place... the citric acid cycle

A. While
B. After
C. All given choices are incorrect
D. All given choices are correct
E. Before

4. Coenzymes are nonorganic enzyme cofactors
A. True
B. False

5. In alcohol fermentation, NAD+ is regenerated from NADH by
   A. reduction of pyruvate to form lactate
   B. reduction of acetaldehyde to form ethanol
   C. reduction of ethanol to form pyruvate
   D. oxidation of pyruvate to form acetyl COA
   E. oxidation of acetaldehyde to form ethanol

6. Which of the following is FALSE about the using of proteins as fuel?
   A. Firstly, they must be digested to their building blocks amino acids
   B. Many of the amino acids are used by the organism to build new proteins
   C. The nitrogenous waste is excreted from the animal in the form of ammonia (NH3). urea, or other waste products
   D. After amino acids can feed into glycolysis or the citric acid cycle, their amino groups must be removed, a process called deamination
   E. All of the options are false

7. Glycolysis has……. steps, while citric acid cycle has …… steps

A. Ten, eight
B. Eight, ten
C. Ten,two
D. Two, ten
E. Ten,eight

8. In citric acid cycle, the Acetyl Co-A enters the cycle by reacting with

A. Citrate
B. Malonate
C. Succinate
D. Oxaloacetate
E. Alpha Keto-glutarate

9. In lactic acid fermentation, the final electron acceptor is
   A. Oxygen
   B. CO2
   C. Alcohol
   D. Sugar
   E. Pyruvate

10. What term is used to describe the transfer of free energy from exergonic reactions to endergonic pathways?

A. Feedback regulation
B. energy coupling
C. entropy
D. bioenergetics
E. cooperativity

11. Allosteric enzyme regulation is usually associated with
   A. The need for cofactors
   B. an enzyme with more than one subunit
   C. feeaback inhibition
   D. lack of cooperativity
   E. activating activity

1	E
2	C
3	E
4	B
5	B
6	D
7	A
8	D
9	E
10	B
11	B

Biology second- 020

Chapter 6

1. Which of the following statements is true concerning catabolic pathways?

A. They are spontaneous and do not need enzyme catalysis
B. They are endergonic
C. They supply energy, primarily in the form of ATP, for the cell's work
D. They combine molecules into more energy-rich molecules
E. They build up complex molecules such as protein from simpler compounds

Answer : C

2. The following can affect enzymatic activity, except:

A. Temperature
B. None of the choices
C. Feedback inhibition
D. Presence of coenzymes
E. Cooperativity

Answer : B

3. Altered amino acids at the active site, can result in novel enzyme activity.

True/ False

4. A catalyst is a chemical agent that speeds up a reaction without being consumed by the reaction.

True/ False

5. A chemical reaction that has a positive delta G is correctly described as:

A. Endergonic
B. Exothermic
C. Enthalpic
D. Exergonic
E. Spontaneous

Answer : A

6. Cooperativity is a form of allosteric regulation.

True/ False

7. Cells are always in equilibrium.

True/ False

8. Why is ATP an important molecule in metabolism?

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

Answer : A

9. Which of the following best describes the beta oxidation?

A. Catabolism of fatty acids
B. Catabolism of proteins
C. Catabolism of glucose
D. Anabolism of fatty acids
E. Anabolism of glucose

Answer : A

10. A solution of starch at room temperature does not readily decompose to form a solution of simple sugars because:

A. Starch hydrolysis is nonspontaneous
B. The starch solution has less free energy than the sugar solution
C. The hydrolysis of starch to sugar is endergonic
D. Starch cannot be hydrolyzed in the presence of so much water
E. The activation energy barrier for this reaction cannot be overcome

Answer : E

11. The reaction A+ B ——> C has a delta G of C= 15 kcal/ mol. How many ATP molecules are needed to provide the energy needed:

A. 15 ATP
B. 0 ATP
C. 2 ATP
D. 3 ATP
E. 1 ATP

Answer : C

12. An anabolic pathway in a cell releases free energy in a series of reactions.

True/ False

13. 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. Add more substrate
C. None of the choices
D. Heat the solution to 80 C°
E. Add a non competitive inhibitor

Answer : A

14. Cofactors are non protein enzyme helpers.

True/ False

15. ATP is composed of ribose, alanine and three phosphate groups

True/ False

16. The free energy change of a reaction tells us whether or not the reaction occurs spontaneously.

True/ False

17. The active site of an enzyme is the region that:

A. Binds non competitive inhibitors of the enzyme
B. Binds allosteric regulators of the enzyme
C. Is involved in the catalytic reaction of the enzyme
D. All of the options
E. Is inhibited by the presence of the coenzyme or a cofactor

Answer : C

18. Allosteric inhibitors act at :

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

Answer : A

19. ————— is when one substrate molecule primes an enzyme to act on additional substrate molecules more readily:

A. Catalysis
B. Cooperativity
C. Catabolism
D. Activation energy
E. Feedback inhibition

Answer : B

Chapter 10

40. In glycolysis a total of 4 ATP are formed after oxidation of one glucose molecule.

True/ False

41. Which of the following generates ATP by fermentation?

A. Substrate level phosphorylation
B. Aerobic respiration
C. Oxidative phosphorylation
D. Electron transport chain
E. Chemiosmosis
Answer : A

42. Kinases such as pyruvate kinase or hexokinase transfer:

A. ATP from the matrix to the intermembrane space
B. Electrons from NADH to gleceraldehyde
C. A phosphate group from a substrate to ADP or from ATP to a substrate
D. Gleceraldehyde 3- phosphate to 1,3 biphosphoglecerate during glycolysis
E. A phosphate group from ADP to ATP
Answer : C

43. In alcohol fermentation, NAD+ is regenerated from NADH through the reduction of pyruvate to form lactate.

True/ False

44. High level of citric acid inhibits phosphofructokinase. This is an example of:

A. Feedforward inhibition
B. The specificity of enzymes for their substrates
C. Feedback inhibition
D. Competitive inhibition
E. Non competitive inhibition
Answer : C

45. In electron transport chain FADH2 donates electrons to:

A. Iron sulfur within complex ll
B. Ubiquinone
C. Cytochrome C
D. Complex l
E. NADH

Answer : A

46. The products of the citric acid cycle include all of the following except:

A. ATP
B. NAD+
C. CO2
D. FADH2
E. GTP

Answer : B

47. During chemiosmosis in the mitochondria:

A. The electrons are transported from cytochrome to oxygen
B. Protons flow back from the intermembrane space to the matrix through the ATP synthase
C. Protons are pumped from the matrix to the intermembrane space
D. Electrons are transported from complex l to complex lll
E. The pH in the matrix increases

Answer : B

48. Oxidation of one NADH in the electron transport chain produces more H+ gradient than one FADH2 .

True/ False

49. In tricarboxylic acid cycle

A. Two FADH2 are produced per one glucose molecules
B. Succinate is combined to CO2 to produce FADH2
C. One acetyl CoA is oxidized to produce 3 CO2
D. One ATP is formed by oxidative phosphorylation
E. Acetyl CoA is combined with succinate to form citric acid

Answer : A

50. In electron transport chain FADH2 donates electrons to:

A. Ubiquinone
B. Iron sulfur with complex ll
C. NADH
D. Cytochrome C
E. Complex l
Answer : B

51. The partial degradation of sugars through alcohol fermentation produces CO2.

True/ False

52. The products of the citric acid cycle include all of the following except:

A. NAD+
B. FADH2
C. GTP
D. ATP
E. CO2
Answer : A

53. During aerobic respiration , electrons travel downhill in which sequence?

A. Food -> NADH -> electron transport chain-> oxygen
B. Food -> citric acid cycle-> ATP -> NAD+
C. Glucose-> ATP -> electron transport chain-> NADH
D. Food-> glycolysis-> citric acid cycle-> NADH-> ATP
E. Glucose-> pyruvate-> ATP-> oxygen

Answer : A

54. During glycolysis aldolase directly splits glucose 6-phosphate into two 3-carbon compounds.

True/ False

55. Electrons donated by one FADH2 molecule to the electron transport chain create proton motive force enough to to produce _____ ATP:

A. 30 or 32
B. 1
C. 4
D. 1.5
E. 6
Answer : D

56. The partial degradation of sugars through fermentation does not require on oxidizing agent .

True/ False

57. The enzyme that extracts electrons from food during cellular respirations is termed :

A. Isomerase
B. Aldolase
C. Enolase
D. Dehydrogenase
E. Kinase

Answer : D

58. Similar to oxidation of one glucose molecule, complete oxidation of two pyruvate molecules to CO_2 and H_2O yields up to 32 ATP

True/ False

59. The step of pyruvate oxidation to acetyl CoA in eukaryotic cells:

A. Occurs upon entering the matrix of the mitochondria across the inner membrane
B. Involves a kinase enzyme
C. Occurs if oxygen is present or not
D. Consumes NADH
E. Produces NAD^+ and CO_2

Answer : A

60. In alcohol fermentation, NAD^+ is regenerated from NADH through the oxidation of ethanol to acetyl CoA.

True/ False

61. In the mitochondrial electron transport chain, the final electron acceptor is :

A. O_2
B. CO_2
C. H_2O
D. Cytochrome a3
E. ADP

Answer : A

62. When muscles lack sufficient oxygen during intense exercises, which process will these muscles mainly use to regenerate ATP

A. Lactic acid fermentation
B. Only glycolysis, with NAD+ not utilized
C. The citric acid cycle
D. Alcohol fermentation
E. Chemiosmosis

Answer : A

63. In cellular respiration, beta oxidation involves:

A. Oxidation of pyruvate
B. Oxidation of glucose
C. Regulation of glycolysis
D. Breakdown of fatty acids
E. Production of alcohol

Answer : D

64. In cellular respiration 4 ATP (net) are produced by substrate level phosphorylation per one glucose molecule.

True/ False

65. Phosphofructokinase (PFK) catalyzes a regulatory step in cell respiration. PFK is stimulated by high level of which of the following molecules:

A. ATP and citrate
B. Citrate and CO2
C. ATP
D. Glucose and NAD+
E. AMP

Answer : E

66. In oxidative phosphorylation:

A. Protons are pumped from the matrix to the intermembrane space
B. Proton motive force forms around the inner membrane of the mitochondria
C. The electrons are transported to oxygen
D. All answers are correct
E. Electrons are transferred from NADH to complex l

Answer : D

67. The partial degradation of sugars through fermentation produces ATP without the use of oxygen.

True/ False

68. In alcohol fermentation, NAD+ is regenerated from NADH through the reduction of acetaldehyde to ethanol (ethyl alcohol)

True/ False

69. Some prokaryotes use anaerobic respiration to harvest more energy from sugar than fermentation can.

True/ False

70. During celllular respiration, the energy in glucose:

A. Is used to produce oxygen
B. Is released all at once
C. Becomes stored in molecules of CO2
D. Is released when electrons extracted from glucose flow in the electron transport chain
E. Is stored in citric acid in Krebs cycle

Answer : D

71. Complete oxidation of one acetyl CoA in Krebs cycle produces 1 ATP by substrate level phosphorylation.

True/ False

72. Which of the following will happen when the cell has high level of citrate

A. Inhibition of citrate synthase and the slowdown of Krebs cycle
B. Stimulation of phosphofructokinase and the speed up of Krebs cycle
C. High level of citrate does not affect cell respiration
D. Inhibition of citrate synthase and the slowdown of glycolysis
E. Inhibition of phosphofructokinase and the slowdown of glycolysis

Answer : E

73. The number of protons estimated to be pumped by the complexes of the electron transport chain when electrons are donated by one NADH molecule:

A. 14
B. 10
C. 2
D. 4
E. 6

Answer : B

74. When muscle becomes oxygen- deprived, muscle cells convert pyruvate to lactate. What happens to the lactate in the muscle cells?

A. It's converted to alcohol
B. It's taken to the liver and converted back to pyruvate
C. It's converted to NAD+
D. It reduces FADH2 to FAD+
E. It produces CO2 and water

Answer : B

75. The stator of the ATP synthase holds both the knob and the rod stationary (not rotating) during phosphorylation.

True/ False

76. The partial degradation of sugars through fermentation produces less that ATP than cellular respiration.

True/ False

77. The yield of ATP after complete oxidation of one acetyl CoA to CO2 and water is

A. 10
B. 18
C. 20
D. 24
E. 12

Answer : A

78. During glycolysis aldolase splits fructose 1,6 biphosphate into two 3- carbon compounds.

True/ False

79. In eukaryotic cells , the energy yield from the complete oxidation of one molecule of glucose:

A. Is always 32 ATP
B. Is always 10 protons
C. Is 30 or 38 ATP
D. Can vary depending on whether NADH from glycolysis passes electrons to NAD+ or FAD+
E. Is less than the yield from fermentation

Answer : D

80. In prokaryotic cells , enzymes for cellular respiration are located in mitochondria.

True/ False

81. Where is ATP synthase catalytic part located in the mitochondria?

A. Mitochondrial matrix
B. Intermembrane space
C. Electron transport chain
D. Inner membrane lipid core
E. Outer membrane

Answer : A

{ وَأَقِيمُوا الصَّلاةَ وَآتُوا الزَّكَاةَ وَمَا تُقَدِّمُوا لِأَنفُسِكُمْ مِنْ خَيْرٍ تَجِدُوهُ عِنْدَ اللَّهِ إِنَّ اللَّهَ بِمَا تَعْمَلُونَ بَصِيرٌ} [سورة البقرة: 110]

Second 018 & 019

CHAPTER 6

1. 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

2. 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

3. In exergonic reaction, energy is:
   a) Transformed into light
   b) Used
   c) Either released or used
   d) Transformed into heat
   e) Released

4. 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

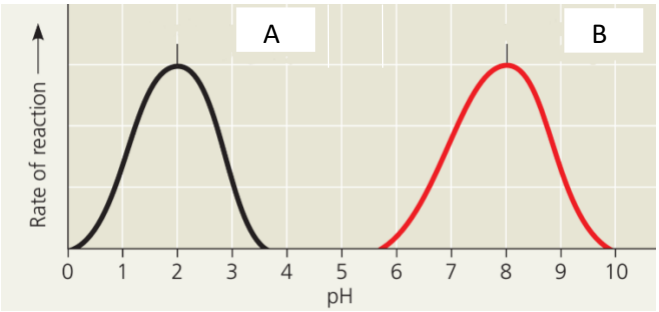
5. The transfer of free energy from exergonic pathways to endergonic pathways is best called:
   a) Feedback inhibition
   b) ATP cycle
   c) Energy coupling
   d) Cooperativity
   e) None of the above

6. Catabolic pathways:
   a) Provide the cell with energy, primarily in the form of ATP to do work
   b) Are endergonic
   c) Combine molecules into more energy-rich molecules
   d) Are nonspontaneous
   e) Do not need enzyme catalysis

7. 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.

8. 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

9. Which of the following represents a curve for an enzyme can be found in stomach? a) A, or b) B



10. A negative delta G for a chemical process indicates:
   a) A 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

11. A chemical reaction that has a positive delta G is correctly described as:
    a) Endergonic
    b) Spontaneous
    c) Endothermic
    d) Exergonic
    e) Both a and b are correct

12. Which of the following 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 the reactants

13. 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

14. 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

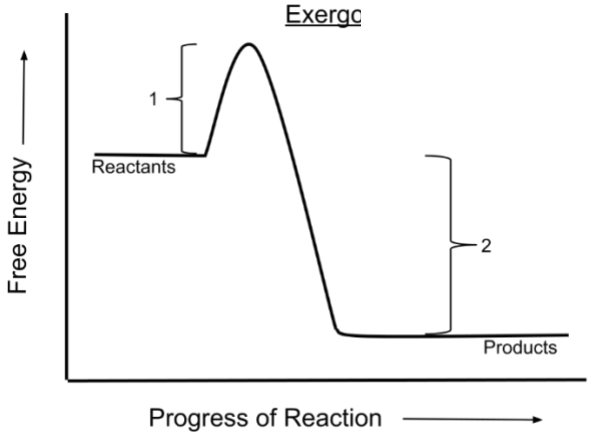
15. The mechanism in which the end product of a metabolic pathway inhibits an earlier step in the pathway is most precisely described as:
    a) Metabolic inhibition
    b) Feedback inhibition
    c) Allosteric inhibition
    d) Non-cooperative inhibition
    e) Reversible inhibition

البغيُ في الدُّنيا قصيرٌ عمره .. وإنْ احتمى بالجُندِ والأموالِ

ضَرب الرجال وهُم أسارى قَيدهم .. مِن شيمة الأوْغاد لا الأبطالِ

16. Enzymes catalyze chemical reactions by:
    a) Adding heat to the system
    b) Reacting with substrates to form new products
    c) Increasing activation energy
    d) Decreasing activation energy
    e) Decreasing free energy

17. This reaction could be an _____ (a) Endergonic/b) Exergonic).



18. Coenzymes are usually:
    a) Inorganic cofactors
    b) Organic factors
    c) Vitamins
    d) Allosteric regulators
    e) Both b and c are correct

19. Allosteric enzymes:
    a) Enzymes that are easily denatured
    b) Enzymes that are unable to be denatured
    c) Enzymes that can change its shape between active and inactive form
    d) Enzymes that can be only activated
    e) None of the above

20. In a spontaneous change:
    a) The free energy of a system decreases
    b) The system becomes more stable
    c) The released free energy can be harnessed to do work
    d) Always move away from equilibrium
    e) All of the above is true except D

21. During a laboratory experiment, you discover that an enzyme-catalyzed reaction has a ΔG of -20 kcal/mol. If you double the amount of enzyme in the reaction, what will be the ΔG for the new reaction?
    a) -40 kcal/mol
    b) -20 kcal/mol
    c) 0 kcal/mol
    d) +20 kcal/mol
    e) +40 kcal/mol

22. 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

23. 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 90^{o}C
    c) Add more substrate
    d) Add an allosteric inhibitor
    e) Add a noncompetitive inhibitor

24. Allosteric inhibitors act as:
    a) Competitive inhibitors
    b) Coenzymes
    c) Non-competitive inhibitors
    d) Cofactors
    e) Either competitive or non-competitive inhibitors

25. Allosteric enzyme regulation is usually associated with:
    a) Lack of cooperativity
    b) Feedback inhibition
    c) Activating activity
    d) An enzyme with more than one subunit
    e) The need for cofactors

26. Enzyme activity could be affected by:
    a) A competitive inhibitor
    b) Non-competitive inhibitor
    c) Allosteric activation
    d) Certain chemicals
    e) All of the above

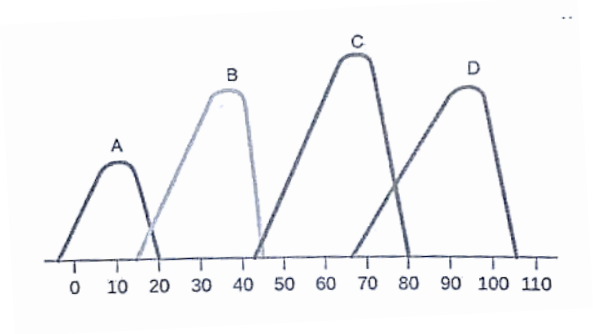
27. Increasing the substrate concentration in an enzymatic reaction could overcome which of the following?
    a) Denaturization of the enzyme
    b) Allosteric inhibition
    c) Competitive inhibition
    d) Saturation of the enzyme activity
    e) Insufficient cofactors

28. 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

29. 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.

30. Which of the following is most similar in structure to ATP?
    a) A pentose sugar
    b) A DNA nucleotide
    c) An RNA nucleotide
    d) An amino acid with three phosphate groups attached
    e) A phospholipid

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



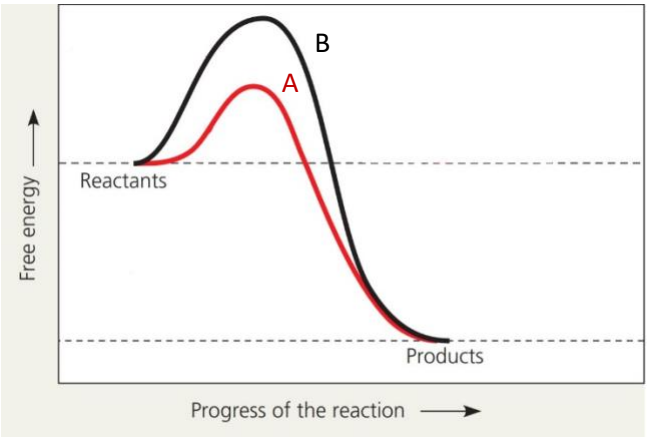
a) A
b) B
c) C
d) D
e) None of the above

32. In the cell, coupling reactions need the use of:
a) Amino acids
b) Light
c) Sugars
d) Fatty acids
e) ATP

33. 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

34. 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)

35. Which of the following represents an un-catalyzed reaction? a) A, or b) B



36. The nitrogenous base adenine is found in all members of which group?
    a) Proteins, triglycerides, and testosterone
    b) Proteins, ATP, and DNA
    c) ATP, RNA, and DNA
    d) Alpha glucose, ATP and DNA
    e) Proteins, carbohydrates, and ATP

ANSWERS

1	b	**13**	c	**25**	d
2	d	**14**	b	**26**	e
3	e	**15**	b	**27**	c
4	b	**16**	d	**28**	b
5	c	**17**	b	**29**	b
6	a	**18**	e	**30**	c
7	c	**19**	c	**31**	b
8	e	**20**	e	**32**	e
9	a	**21**	b	**33**	e
10	e	**22**	c	**34**	e
11	a	**23**	a	**35**	b
12	e	**24**	c	**36**	c

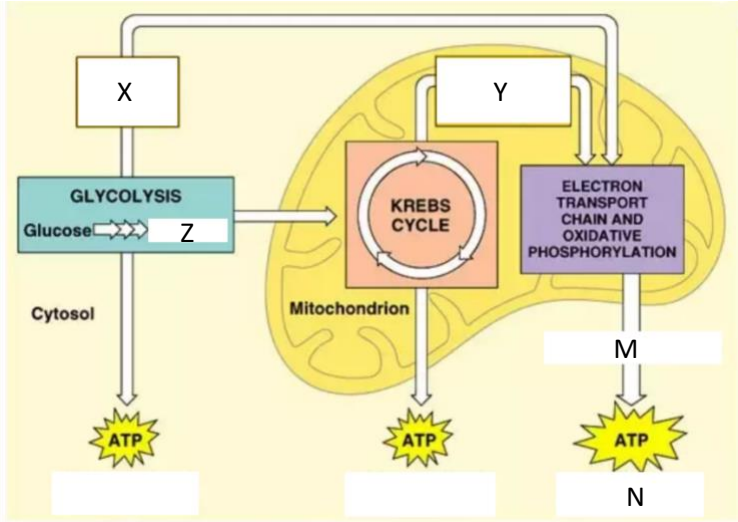
بقدر ما تتعنى .. تنال ما تتمنى

{ وَلَقَدْ آتَيْنَا دَاوُودَ وَسُلَيْمَانَ عِلْمًا ۖ وَقَالَا الْحَمْدُ لِلَّهِ الَّذِي فَضَّلَنَا عَلَىٰ كَثِيرٍ مِّنْ عِبَادِهِ الْمُؤْمِنِينَ} [سورة النمل: 15]

وفي الآية دليل على شرف العلم وإنافة محله وتقدم حملته وأهله ، وأن نعمة العلم من أجلّ النعم وأجزل القسم ، وأن من أوتيه فقد أوتي فضلا على كثير من عباد الله المؤمنين .

CHAPTER 10

1. In the figure, the product Z is:

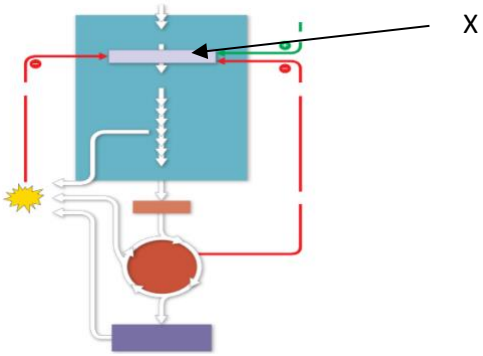


a) 3 acetyl CoA molecules
b) 2 pyruvate molecules
c) 3 oxaloacetate molecules
d) Citrate
e) Fructose bisphosphate

2. The starting molecule in the citric acid cycle that reacts with acetyl CoA and is regenerated at the end of the cycle is:
a) Succinate
b) Fumarate
c) Alpha ketoglutarate
d) Oxaloacetate
e) Pyruvate

3. 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

4. Which of the following statements correctly describes the activity of enzyme (X)?



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

5. 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

6. Chemiosmosis is described as an energy coupling mechanism that:
a) Phosphorylates any substrate molecule
b) Use the energy of proton gradient to drive chemical work
c) Inhibit electron transfer along electron transport chain
d) Creates proton motive force
e) Lowers the pH in the mitochondrial intermembrane space

7. 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

8. The ATP that made during glycolysis is generated by:
   a) Substrate level phosphorylation
   b) Electron transport
   c) Photophosphorylation
   d) Chemiosmosis
   e) Oxidation of NADH to NAD^+

9. When hydrogen ions are pumped from the mitochondrial matrix across inner membrane, the result is the:
   a) Formation of ATP
   b) Lowering pH of mitochondrial matrix
   c) Reduction of NAD^+
   d) Creation of proton motive force
   e) Loss of ATP

10. 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

11. Most of the CO_2 from the catabolism of glucose is released during:
   a) Chemiosmosis
   b) Glycolysis
   c) Electron transport
   d) The citric acid cycle
   e) Fermentation

12. 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

13. What is correct about the electron transport chain in anaerobic respiration?
    a) Can use oxygen as a final electron acceptor
    b) Occurs in aerobic bacteria
    c) Occurs in some prokaryotes
    d) It is the fermentation of glucose
    e) B and C are correct

14. 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

15. 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

16. In cellular respiration, energy flows in the sequence:
    a) Glucose - NAD^+ - electron transport chain – ATP
    b) Glucose - NADH - electron transport chain – proton motive force
    c) Glucose - NADH - electron transport chain – O_2
    d) NADH – glucose – pyruvate – Kreps cycle – H_2O
    e) Pyruvate – Acetyl CoA – Flavoprotein – ADP

17. 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

18. 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

19. 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

20. In cellular respiration, 90 percent of ATP is produced by:
    a) Glycolysis
    b) Oxidative phosphorylation
    c) Photophosphorylation
    d) Substrate-level phosphorylation
    e) Pyruvate oxidation

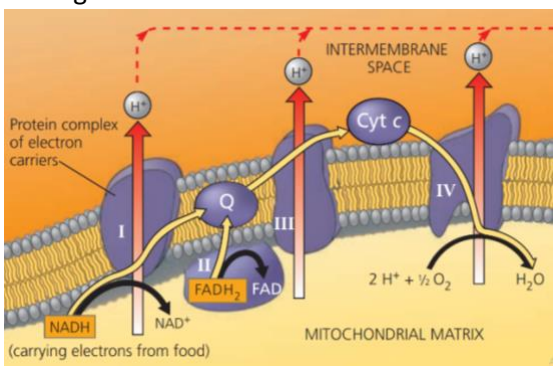
21. How many electrons are needed to pass the electron transport chain of the mitochondria for the formation of one molecule of water?
    a) 1
    b) 2
    c) 4
    d) 6
    e) 2 from NADH and 1 from $FADH_2$

22. How many ATP molecules produced if one glucose molecule is completely oxidized?
    a) 32
    b) 2
    c) 18
    d) 16
    e) 24

23. 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

24. 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

25. This figure shows:



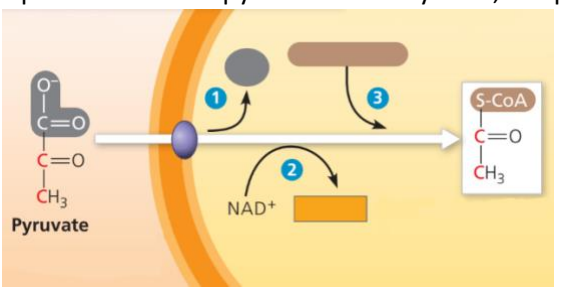
    a) Chemiosmosis
    b) Substrate level phosphorylation
    c) Electrochemical gradient
    d) Oxidative phosphorylation
    e) Electron transport chain creating a proton motive force

26. 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

27. The reaction of fermentation function to regenerate _____ molecules for use in glycolysis.
    a) NAD^+
    b) ATP
    c) Pyruvic acid
    d) NADH
    e) Glucose

أفنيتَ يا مسْكينُ عمركَ بالتأوُّه والحَزن
وقَعَدت مكتوف اليدينِ تقول حاربني الزَّمن
ما لم تقم بالعبء أنْتَ فمَن يقومُ به إذن

28. Upon oxidation of pyruvate to acetyl CoA, the product compound No. 1 in the gray circle is:



a) NADH
b) Coenzyme A
c) Acetate
d) Acetyl coenzyme A
e) Carbon dioxide

29. During respiration:
a) O_2 is oxidized and H_2O is reduced
b) CO_2 is reduced and O_2 is oxidized
c) $C_6H_{12}O_6$ is reduced and CO_2 is oxidized
d) $C_6H_{12}O_6$ is oxidized and O_2 is reduced
e) O_2 is reduced and CO_2 is oxidized

30. The final electron acceptor of the electron transport chain that functions in aerobic oxidative phosphorylation is:
a) Oxygen
b) Water
c) NAD^+
d) Pyruvate
e) ADP

31. The term glycolysis refers to:
a) Glucose synthesis
b) Glucose isomerization to fructose
c) Glucose phosphorylation
d) Glucose break down to pyruvate
e) Glucose polymerization into starch

32. 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

33. The mechanism by which electron transport chain is coupled to ATP production by means of proton gradient is called:
    a) Substrate level phosphorylation
    b) Oxidative phosphorylation
    c) Krebs cycle
    d) Chemiosmosis
    e) Calvin cycle

34. Where dose glycolysis take place in eukaryotic cells?
    a) Mitochondrial matrix
    b) Mitochondrial outer membrane
    c) Mitochondrial inner membrane
    d) Mitochondrial intermembrane space
    e) Cytosol

35. Where are the proteins of electron transport chain located?
    a) Cytosol
    b) Mitochondrial inner membrane
    c) Mitochondrial outer membrane
    d) Mitochondrial intermembrane space
    e) Mitochondrial matrix

36. 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

37. 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

38. In addition to ATP, what are the end products of glycolysis?
    a) CO_2 and H_2O
    b) CO_2 and pyruvate
    c) NADH, H_2O and pyruvate
    d) CO_2 and NADH
    e) H_2O, $FADH_2$ and citrate

39. In prokaryote, the respiratory electron transport chain is located in:
    a) Mitochondrial inner membrane
    b) Mitochondrial outer membrane
    c) Cytoplasm
    d) Plasma membrane
    e) In bacterial outer membrane

40. Almost 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

41. 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

42. The transport of pyruvate into mitochondria depends on the proton-motive force across the inner mitochondrial membrane. How does pyruvate enter the mitochondrion?
    a) Active transport
    b) Diffusion
    c) Facilitated diffusion
    d) Through a channel
    e) Through a pore

43. 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

44. 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

45. Beta oxidation is: (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

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

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

    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

47. 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

48. When a molecule of NAD^+ (nicotinamide adenine dinucleotide) gains a hydrogen atom (not a proton), the molecule becomes:
    a) Dehydrogenated
    b) Oxidized
    c) Reduced
    d) Redoxed
    e) Hydrolyzed

49. 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

50. Where is ATP synthase located in the mitochondrion?
    a) Cytosol
    b) Electron transport chain
    c) Outer membrane
    d) Inner membrane
    e) Mitochondrial matrix

51. 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

ANSWERS

1	b	**18**	b	**35**	b
2	d	**19**	b	**36**	d
3	b	**20**	b	**37**	b
4	e	**21**	b	**38**	c
5	e	**22**	a	**39**	d
6	b	**23**	d	**40**	b
7	d	**24**	d	**41**	c
8	a	**25**	e	**42**	a
9	d	**26**	e	**43**	d
10	a	**27**	a	**44**	b
11	d	**28**	e	**45**	b
12	d	**29**	d	**46**	a
13	c	**30**	a	**47**	c
14	a	**31**	d	**48**	c
15	b	**32**	c	**49**	d
16	b	**33**	b	**50**	d
17	d	**34**	e	**51**	c

أجمع عقلاءُ كل أمَّة على أنّ النعيم لا يُدرك بالنَّعيم
-إبراهيم الحربي-

{ فَتَبَسَّمَ ضَاحِكًا مِّن قَوْلِهَا وَقَالَ رَبِّ أَوْزِعْنِي أَنْ أَشْكُرَ نِعْمَتَكَ الَّتِي أَنْعَمْتَ عَلَيَّ وَعَلَىٰ وَالِدَيَّ وَأَنْ أَعْمَلَ صَالِحًا تَرْضَاهُ وَأَدْخِلْنِي بِرَحْمَتِكَ فِي عِبَادِكَ الصَّالِحِينَ} [سورة النمل: 19]