PAST PAPERS

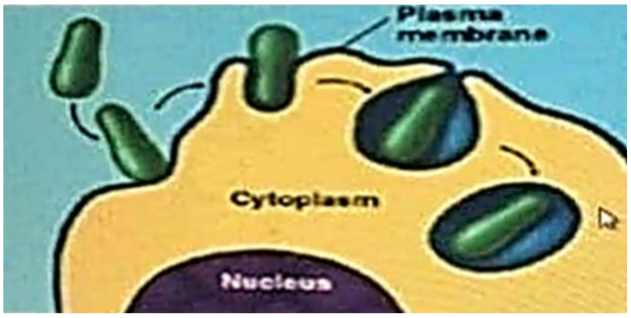
BIOLOGY

DONE BY: Ayat Nabil

قال تعالى: {وَفِي الْأَرْضِ آيَاتٌ لِلْمُوقِنِينَ * وَفِي أَنْفُسِكُمْ أَفَلَا تُبْصِرُونَ * وَفِي السَّمَاءِ رِزْقُكُمْ وَمَا تُوعَدُونَ * فَوَرَبِّ السَّمَاءِ وَالْأَرْضِ إِنَّهُ لَحَقٌّ مِثْلَ مَا أَنَّكُمْ تَنْطِقُونَ} [سورة الذاريات : 20-23]

CHAPTER 8

1. This prosses in the figure demonstrates



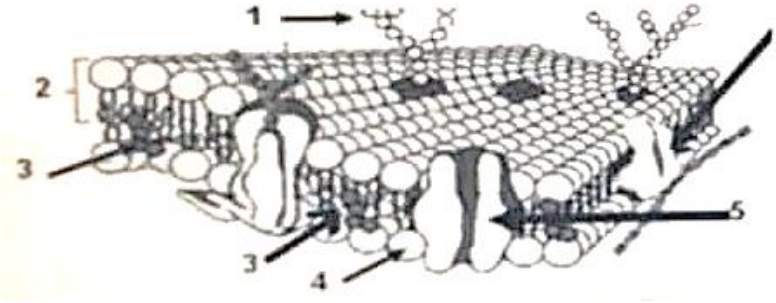
a) Pinocytosis
b) Phagocytosis
c) Receptor-mediated endocytosis
d) Photosynthesis
e) contractile vacuole active transport

2. What are the membrane structures that function in active transport?
a) Peripheral proteins
b) Carbohydrates
c) Receptor proteins
d) Carrier proteins
e) All of the above

3. Facilitated diffusion:
a) Requires either channel or carrier proteins
b) Occur down a concentration gradient
c) Require the hydrolysis of ATP
d) Occur in all cells
e) All of the above are correct except C

4. Which of the following is an electrogenic pump?
a) Na^+-K^+ pump
b) Glucose carrier
c) H^+ pump
d) All of the above
e) Only A and C

5. Which structure can function as aquaporin?



a) 1
b) 2
c) 3
d) 4
e) 5

6. In order for a protein to be an integral membrane protein it would have to be:
   a) Hydrophilic
   b) Hydrophobic
   c) Amphipathic, with at least one hydrophobic region
   d) Completely covered with phospholipids
   e) Exposed on only one surface of the membrane

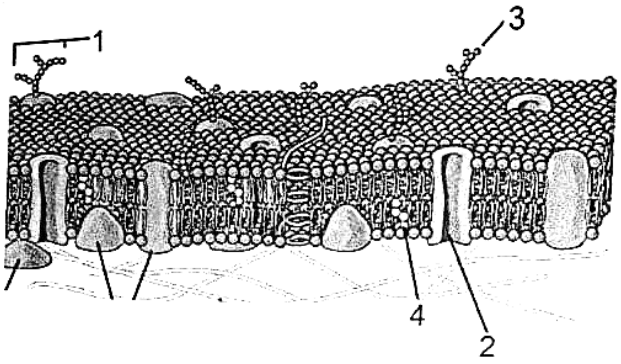
7. Which of the following types of molecules are the major structural components of the cell membrane?
   a) Phospholipids and cellulose
   b) Nucleic acids and proteins
   c) Phospholipids and proteins
   d) Proteins and cellulose
   e) Glycoproteins and cholesterol

8. Which of the following is true of integral membrane proteins?
   a) They lack tertiary structure
   b) They are loosely bound to the surface of the bilayer
   c) They are usually transmembrane proteins
   d) They are not mobile within the bilayer
   e) They serve only a structural role in membranes

9. The primary function of polysaccharides attached to the glycoproteins and glycolipids of animal cell membranes is
   a) To facilitate diffusion of molecules down their concentration gradients
   b) To actively transport molecules against their concentration gradients
   c) To maintain the integrity of a fluid mosaic membrane
   d) To maintain membrane fluidity at low temperatures
   e) To mediate cell-to-cell recognition

10. Water passes quickly through cell membrane because:
   a) It is small polar molecule
   b) Its movement is driven by ATP hydrolysis
   c) It moves through aquaporins
   d) The membrane bilayer is hydrophilic
   e) The membrane interior is hydrophobic

11. Which structure can function as aquaporin?



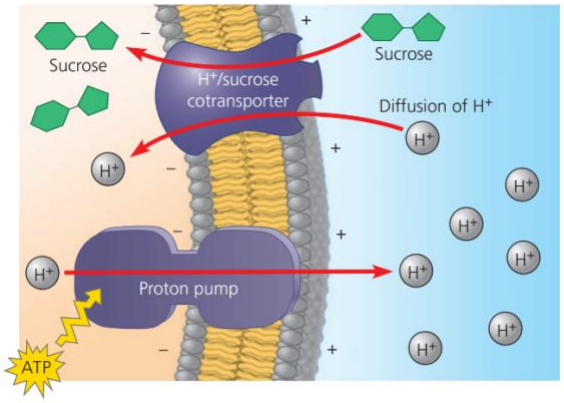
   a) 1
   b) 2
   c) 3
   d) 4
   e) None of the above

12. Which of the following statements correctly describes the normal tonicity conditions for typical plant and animal cells?
   a) The animal cell is in a hypotonic solution, and the plant cell is in an isotonic solution.
   b) The animal cell is in an isotonic solution, and the plant cell is in a hypertonic solution.
   c) The animal cell is in a hypertonic solution, and the plant cell is in an isotonic solution.
   d) The animal cell is in an isotonic solution, and the plant cell is in a hypotonic solution.
   e) The animal cell is in a hypertonic solution, and the plant cell is in a hypotonic solution.

13. Which of the following functions of membrane proteins involves surface carbohydrate?
    a) Cell-cell recognition
    b) Enzymatic activity
    c) Transport
    d) Tight junctions
    e) None of the above

14. What kinds of molecules pass through a cell membrane most easily?
    a) Large and hydrophobic
    b) Small and hydrophobic
    c) Large polar
    d) Ionic
    e) Monosaccharides such as glucose

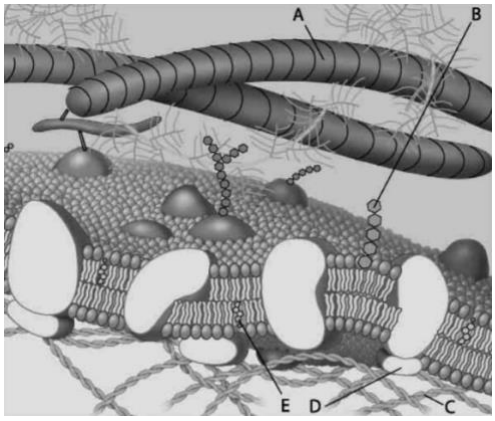
15. In the figure shown, a proton passes to the cytosol:



    a) Down its concentration gradient
    b) By simple diffusion
    c) Against its concentration gradient
    d) Down its electrochemical gradient
    e) None of the above

16. What is the voltage across a membrane called?
    a) Water potential
    b) Chemical gradient
    c) Membrane potential
    d) Osmotic potential
    e) Electrochemical gradient

According to the figure below, answer questions 17, 18 and 19:



17. Which component is the peripheral protein?
    a) A
    b) B
    c) C
    d) D
    e) E

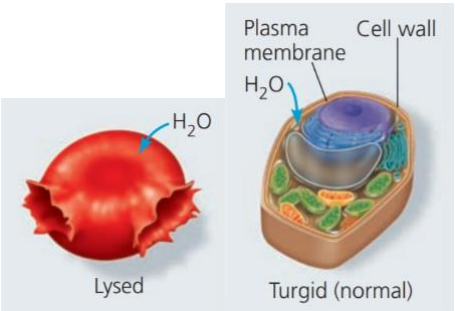
18. Which component is cholesterol?
    a) A
    b) B
    c) C
    d) D
    e) E

19. Which component is a glycolipid?
    a) A
    b) B
    c) C
    d) D
    e) E

20. Fluid mosaic model of the membrane proposed that
    a) Membranes are a phospholipid bilayer
    b) Membranes are a phospholipid bilayer between two layers of hydrophilic proteins
    c) Membranes are a single layer of phospholipids and proteins
    d) Membranes consist of protein molecules embedded in a fluid bilayer of phospholipids
    e) Membranes consist of a mosaic of polysaccharides and proteins

21. Which of the following is involved in engulfing of droplets contains dissolved materials?
    a) Phagocytosis
    b) Pinocytosis
    c) Receptor mediated endocytosis
    d) Exocytosis
    e) Facilitated diffusion

22. These cells can be found in:



    a) Hypertonic solution
    b) Hypotonic solution
    c) Isotonic solution
    d) None of the above
    e) All of the above

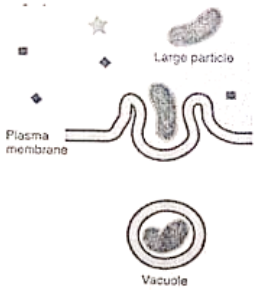
23. Which of the following is true about sodium potassium pump?
    a) It can pump 3 sodium ions out of the cell
    b) It can pump 2 potassium ions into the cell
    c) The pump powered by ATP
    d) The process is an active transport
    e) All of the above are true

24. “Co-transport” is:
    a) Coupling of uphill to a downhill one
    b) Using of ATP to transport materials against their concentration
    c) Using of ATP to transport materials down their concentration
    d) “Proton-sucrose” co-transporter is an example for this process
    e) Both A and D are correct

كن ابن من شئْتَ واكتسبْ أدباً .. يغنيك محموده عن النَّسبِ

إنَّ الفتى من يقولُ ها أنا ذا .. ليسَ الفتى من يقول كانَ أبي

25. The figure shows:



a) Phagocytosis
b) Pinocytosis
c) Receptor mediated endocytosis
d) Exocytosis
e) Facilitated diffusion

26. Ions diffuse across membranes through specific ion channels
a) Down their chemical gradients
b) Down their concentration gradients
c) Down the electrical gradients
d) Down their electrochemical gradients
e) Down the osmotic potential gradients

27. Water enters and leaves plant and animal cells by:
a) Pinocytosis
b) Simple diffusion
c) Osmosis
d) Co-transport
e) Bulk transport

28. Low density lipoproteins (LDL) enter cells by:
a) Pinocytosis
b) Phagocytosis
c) Active transport
d) Receptor mediated endocytosis
e) Passive transport

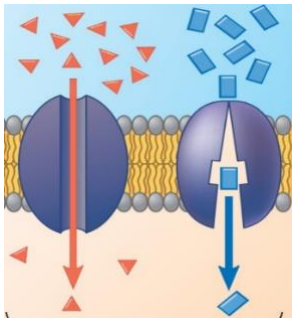
29. Nonpolar small hydrocarbons, CO_2, and O_2 cross the membrane by:
a) Simple diffusion
b) Active transport
c) Facilitated diffusion

d) Bulk transport
e) Co-transport

30. When plant cells are placed in hypertonic solution, they will
a) Lyse
b) Be turgid
c) Plasmolyze
d) Shrink
e) Be flaccid

31. The secretion of substances out of the cell through small vesicles is an example of:
a) Exocytosis
b) Pinocytosis
c) Endocytosis
d) Osmoregulation
e) Phagocytosis

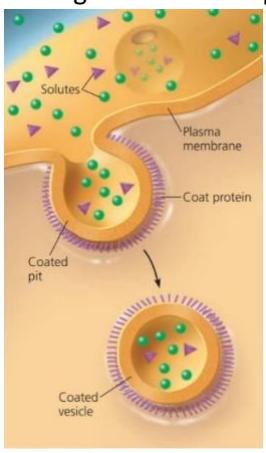
32. The figure shows:



a) Co-transport
b) Osmosis
c) Ion pump
d) Facilitated diffusion
e) Phagocytosis

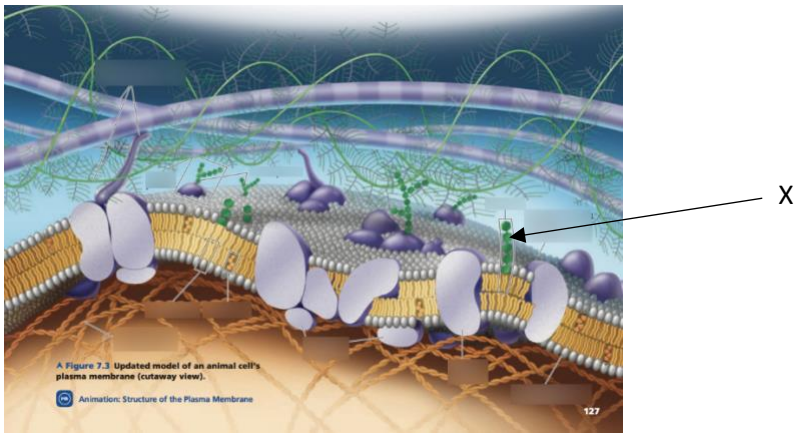
33. Channel proteins are required for:
a) Osmosis
b) Facilitated diffusion
c) Active transport
d) Phagocytosis
e) A and B are correct

34. This figure shows the prosses of:



a) Exocytosis
b) Phagocytosis
c) Pinocytosis
d) Receptor mediated endocytosis
e) Osmosis

35. The part pointed at (X) in the figure represents



a) Carbohydrate
b) Cholesterol
c) Phospholipid
d) Collagen fiber
e) Fatty acid

36. Which of the following is involved in the Na^+ passive transport across plasma membrane?
a) ATP
b) Electrical membrane potential (electrical force)

c) Gated channel proteins
d) Na^+ concentration gradient (chemical force)
e) B and D are correct

37. One of the functions of cholesterol in animal cell membrane is to:
a) Store energy
b) Maintain membrane fluidity
c) Speed diffusion
d) Phosphorylate ADP
e) None of the above

ANSWERS

1	b	**14**	b	**27**	c
2	d	**15**	a	**28**	d
3	e	**16**	c	**29**	a
4	e	**17**	d	**30**	c
5	e	**18**	e	**31**	a
6	c	**19**	b	**32**	d
7	c	**20**	d	**33**	e
8	c	**21**	b	**34**	c
9	e	**22**	b	**35**	a
10	c	**23**	e	**36**	e
11	b	**24**	e	**37**	b
12	d	**25**	a		
13	a	**26**	d		

تلمّح فجر الأجر يَهُن ظلام التكليف
-ابن الجوزي-

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

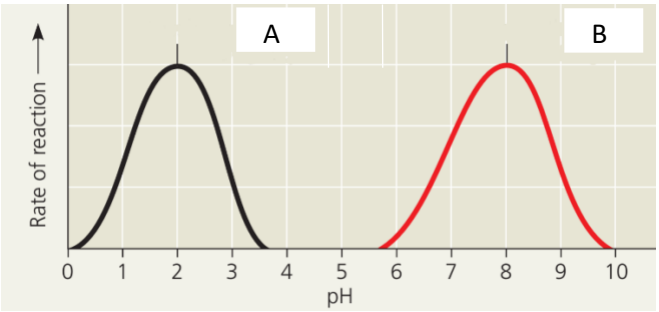
5. The transfer of free energy from exergonic pathways to endergonic pathways is best called:
   a) Feedback inhibition
   b) ATP cycle
   c) Energy coupling
   d) Cooperativity
   e) None of the above

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

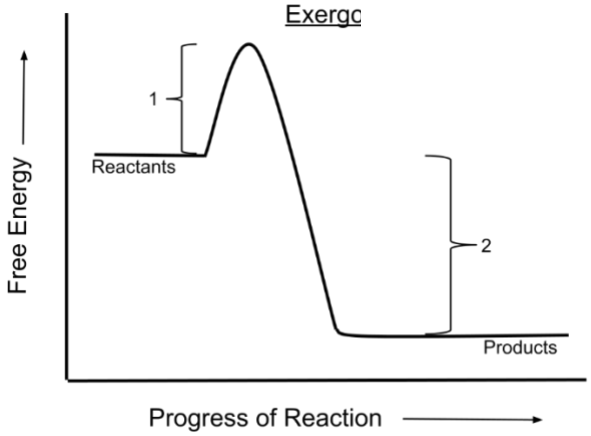
15. The mechanism in which the end product of a metabolic pathway inhibits an earlier step in the pathway is most precisely described as:
    a) Metabolic inhibition
    b) Feedback inhibition
    c) Allosteric inhibition
    d) Non-cooperative inhibition
    e) Reversible inhibition

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

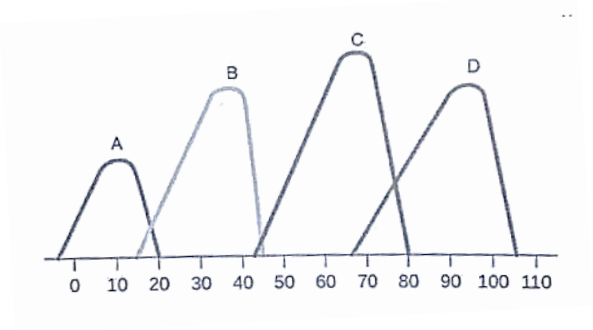
27. Increasing the substrate concentration in an enzymatic reaction could overcome which of the following?
    a) Denaturization of the enzyme
    b) Allosteric inhibition
    c) Competitive inhibition
    d) Saturation of the enzyme activity
    e) Insufficient cofactors

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?



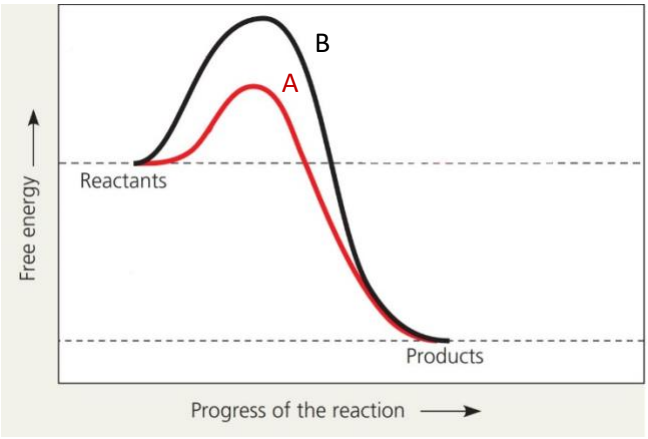
a) A
b) B
c) C
d) D
e) None of the above

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

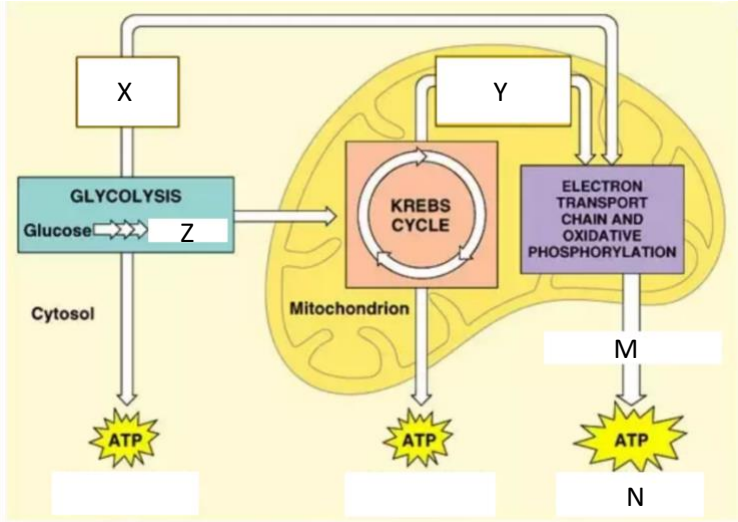
بقدر ما تتعنى .. تنال ما تتمنى

{ 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:

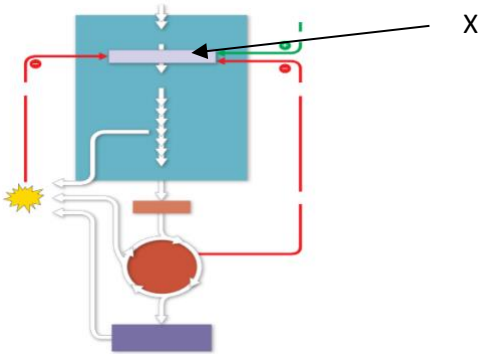


a) 3 acetyl CoA molecules
b) 2 pyruvate molecules
c) 3 oxaloacetate molecules
d) Citrate
e) Fructose bisphosphate

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

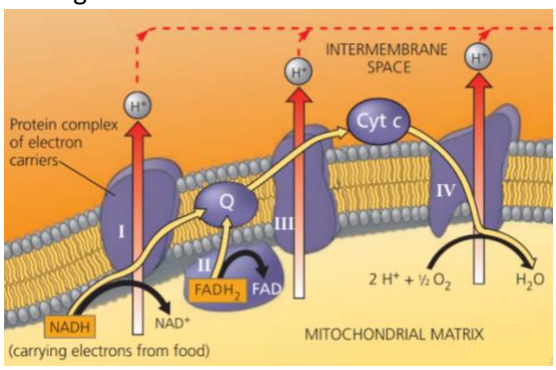
21. How many electrons are needed to pass the electron transport chain of the mitochondria for the formation of one molecule of water?
    a) 1
    b) 2
    c) 4
    d) 6
    e) 2 from NADH and 1 from $FADH_2$

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:



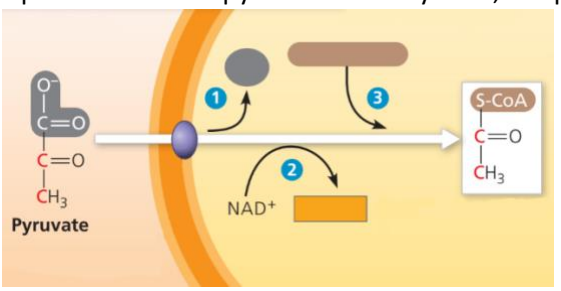
    a) Chemiosmosis
    b) Substrate level phosphorylation
    c) Electrochemical gradient
    d) Oxidative phosphorylation
    e) Electron transport chain creating a proton motive force

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]