I. **Match the processes under column "A" to their main role listed under column "B" molecules to their biological roles.**

"A"	**"B"**
1. Glycolysis	A. Oxidize pyruvate and Produces NADH and CO2
2. Fermentation and CO2	B. Oxidize acetyl CoA and Produces ATP, NADH, FADH2
3. Link reaction	C. Splits glucose into two pyruvate molecules
4. The Krebs cycle	D. Regenerates NAD+ as pyruvate; is converted to ethanol or lactate
5. ETC to produce ATP	E. Uses a membrane system that contains cytochromes

II. Choose the best answer from the given alternative and write your answer on the space provided.

1. Which of the following statement is incorrect concerning oxidative phosphorylation?
   A. Reduced NAD is dehydrogenated by the NAD dehydrogenase complex,
   B. Reduced FAD is dehydrogenated by ubiquinone.
   C. Electrons from reduced FAD only operate two of the three proton pumps.
   D. Because of the action of the proton pumps, protons accumulate in the mitochondrial fluid matrix
2. Which of the following does NOT happen during the light - dependent reactions of photosynthesis?
   A. ATP is produced C. Oxygen is produced
   B. Glucose is produced D. NADPH is produced
3. The diffusion of hydrogen ions through the ATP synthase enzyme is called……
   A. Electron transport chain C. Active transport
   B. Chemiosmosis. D. Endocytosis
4. A cell whose cytoplasm has a concentration of 0.02 molar glucose is placed in a test tube of water containing 0.02 molar glucose. Assuming that glucose is not actively transported into the cell, which of the following

terms describes the tonicity of the external solution relative to the cytoplasm of the cell?

A. Turgid B. Hypertonic C. Hypotonic D. Isotonic

5. Cells in culture were supplied with radioactively-labeled oxygen gas. Which cell metabolite will show most radioactivity after a few minutes?

A. ATP B. CO_2 C. NADH D. H2O

6. How does chemiosmosis lead to ATP synthesis?
   A. H ion jump from the inner membrane to the outer membrane and out through ATP synthase.
   B. H ions diffuse from the intermembrane space to the matrix through ATP synthase.
   C. H ions are pumped from the matrix to the intermembrane space through ATP synthase.
   D. H ion diffuse from the intermembrane space to the stroma through ATPase
7. One bean plant is illuminated with green light and another bean plant of similar size and leaf area is illuminated with blue light. If all other conditions are identical, how will the photosynthetic rates of the plants most probably compare?
   A. Neither plant will carry on photosynthesis
   B. The plant under the blue light will carry on photosynthesis at a greater rate than the one under the green light.
   C. Photosynthesis will occur at the same rate in both plants.
   D. The plant under the green light will carry on photosynthesis at a greater rate than the one under the blue light.
8. The light reactions of photosynthesis occur in the _____, and the dark reactions occur in the _____ of the chloroplast respectively.
   A. Cytochromes, Stroma
   B. Thylakoid Membranes, Stroma
   C. Reaction Centers, Cytochromes
   D. Stroma, Cytochromes
9. The light-dependent reactions supply the Calvin cycle with
   A. ATP and CO_2
   B. NADPH and ATP
   C. NADPH and H_2O
   D. CO_2 and H_2O

10. Fermentation of glucose by yeast yields:

A. $2CO_2$, 2ATP & Lactic acid
C. $2CO_2$, 2ATP & Ethyl alcohol
B. 2ATP & Ethanol
D. 2ATP and Lactic acid

11. The two-carbon group from acetyl coenzyme A reacts with the four-carbon compound **oxaloacetate** to form……

A. Citrate B. Malate C. Fumarate D. Succinate

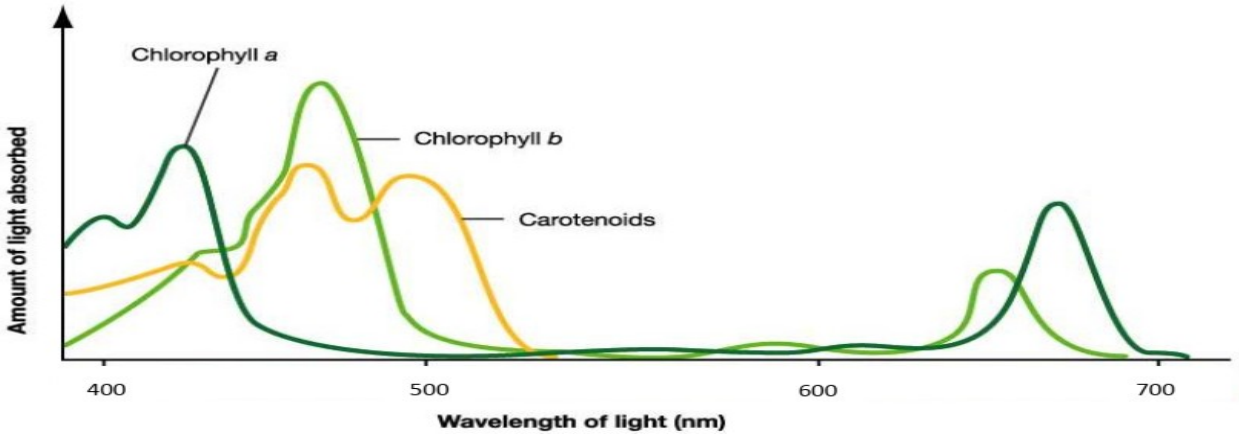
12. Which of the following is different from the other?

A. ATP synthase
C. cytochrome complex
B. reduced NAD dehydrogenase
D. ubiquinone

13. Which of the following is not product of fermentation by bacteria?

A. Acetic acid B. Propionic acid C. Lactic acid D. Alcohol

Using the graph of light absorbance by photosynthetic pigments found in plants, answer the following questions:



14. If all light from our sun shined at a wavelength of 425 nm, what plant pigment would work the best?

A. Chlorophyll a
C. Chlorophyll b
B. Carotenoids
D. No pigments work well at this wavelength of light.

15. How efficient would photosynthesis be if sunlight was only green (between 495 – 570 nm)?

A. Only one pigment works well at some of these wavelengths of light, so photosynthesis would not be as efficient in green light as in white light.
B. Since all three pigments work in green light, there would be a lot of oxygen and glucose produced.

C. Photosynthesis would be just as efficient in green light as in white light.

D. None of the above.

13. Potato slice that are immersed in fresh water for several hours become stiff and hard. Similar slice left in a salt solution become limp and soft. From this we can deduce that the cells of the Potato slice are

A. Hypotonic to both fresh water and the salt solution.

B. Hypertonic to both fresh water and the salt solution.

C. Hypertonic to fresh water but hypotonic to the salt solution.

D. Hypotonic to fresh water but hypertonic to the salt solution.

16. Which of the following is incorrect on reactions which takes place in link reaction?

A. Decarboxylation

B. Pyruvic oxidation

C. Dehydrogenation

D. acetyl CoA oxidation

17. If there is no oxygen present, the final reaction of oxidative phosphorylation

A. The electron transport chain comes to a halt

B. No protons are pumped and the action of ATP synthase also stops.

C. The Krebs cycle and the link reaction come to a halt as both NAD and FAD are required in their oxidized forms for the Krebs cycle to function.

D. Glycolysis cannot continue, it also requires NAD.

18. Which of the following statement explain Cori cycle?

A. Lactate, product of anaerobic respiration, can be used to regenerate glucose or be metabolized as an energy source by the liver

B. The ATP used in short-distance runs is nearly all generated anaerobically and produces lactate which join Cori cycle.

C. Fermentation is a much faster process and can produce a lot of ATP quickly.

D. All of the above

19. Which of the following statement is incorrect?

A. Lipids and proteins can also be used as respiratory substrates.

B. Glucose is the only respiratory substrate

C. The metabolism of proteins, lipids and carbohydrates ‘converges’ on the Krebs cycle

D. All of the above

20. Examples of processes requiring ATP include:

A. Simple diffusion and active transport

B. Active transport and facilitated diffusion

C. Conduction of nerve impulses and osmosis

D. Active transport and protein synthesis

21. The ATP synthase molecule produces ATP when:

A. Electrons turn the rotor to activate sites in the catalytic knob

B. Hydrogen ions spin the catalytic knob

C. Electrons spin the catalytic knob

D. Hydrogen ions turn the rotor to activate sites in the catalytic knob

22. ATP is an ideal energy transfer molecule in cells because it:

A. Releases energy in small amounts

B. Can move freely in, but not escape from, the cell

C. Releases energy quickly D. All of the above

23. Which of the following process take place during the Krebs cycle?

A. Oxidative phosphorylation C. Substrate-level phosphorylation

B. Electron transport D. The link reaction

24. Which of the following reaction take place in fermentation?

A. Oxidative phosphorylation does not take place C. NAD is reduced in glycolysis

B. Substrate-level phosphorylation does take place D. All of the above

25. Oxidative phosphorylation includes:

A. The electron transport chain and chemiosmosis C. The Krebs cycle and chemiosmosis

B. The electron transport chain and the Krebs cycle D. None of these

26. In the Krebs cycle:

A. Some ATP is made by oxidative phosphorylation

B. the four-carbon compound oxaloacetate is regenerated

C. ATP is used

D. the six-carbon compound citrate is split into two three carbon compounds

27. When compared with aerobic respiration, fermentation of glucose by yeast:

A. Yields less ATP per molecule of glucose C. produces lactate

B. produces more CO2 D. none of the above

28. Which of the following statements about aerobic respiration is correct?

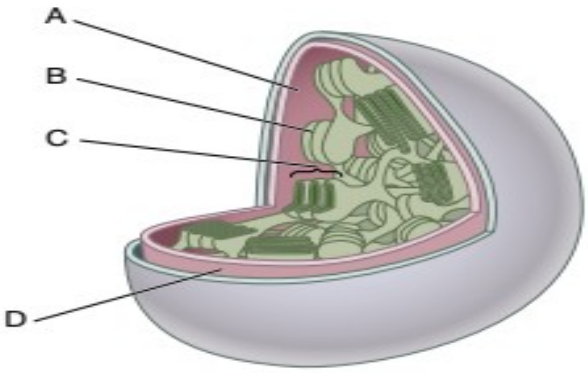
A. Glycolysis takes place in the matrix of the mitochondrion.

B. Carrier molecules of the electron transport chain exist on the outer membrane of the mitochondrion.

C. High concentration of hydrogen ions builds up in the matrix of the mitochondrion.

D. The Krebs cycle takes place in the matrix of the mitochondrion.

The following figure shows the structure of a chloroplast. Questions 29 and 30 relate to this diagram.



29. During the light-dependent reactions of photosynthesis, ATP is produced in the regions labeled____

A. A B. C C. A and B D. D

30. NADPH which is the product of light reaction moves from:

A. A to B B. B to A C. B to C D. C to A

31. What is the net ATP production by oxidative phosphorylation of 2NADH which produced during glycolysis?

A. 6 ATP B. 4 ATP C. 36 ATP D. 38 ATP

32. Of the following parts of a cell listed below, name the part that is common to plant cell, animal cell and a bacterial cell.

A. Chloroplast B. Cell membrane C. Cell wall D. Nucleus

33. 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.

34. What group and associated property make up the tails of the phospholipids of the plasma membrane?

A. Fatty acid groups; hydrophobic property

B. Phosphate groups; hydrophobic property

C. Fatty acid groups; hydrophilic property

D. Phosphate groups; hydrophilic property

35. A patient has had a serious accident and lost a lot of blood. In an attempt to replenish body fluids, distilled water, equal to the volume of blood lost, is transferred directly into one of his veins. What will be the most probable result of this transfusion?

A. It will have no unfavorable effect as long as the water is free of viruses and bacteria.

B. The patient's red blood cells will shrivel up because the blood fluid is hypotonic compared to the cells.

C. The patient's red blood cells will swell because the blood fluid is hypotonic compared to the cells.

D. The patient's red blood cells will shrivel up because the blood fluid is hypertonic compared to the cells.

36. Which plasma membrane component can be either found on the surface or embedded in the membrane structure?

A. Carbohydrate B. Protein C. Phospholipid D. Cholesterol

37. What are the membrane structures that function in active transport?

A. Peripheral proteins B. Cholesterol C. Carbohydrates D. Integral proteins

38. Glucose diffuses slowly through artificial phospholipid bilayers. The cells lining the small intestine, however, rapidly move large quantities of glucose from the glucose-rich food into their glucose-poor cytoplasm. Using this information, which transport mechanism is most probably functioning in the intestinal cells?

A. simple diffusion
C. active transport pumps
B. Phagocytosis
D. facilitated diffusion

39. You are working on a team that is designing a new drug. In order for this drug to work, it must enter the cytoplasm of specific target cells. Which of the following would be a factor that determines whether the molecule enters the cell?

A. blood or tissue type of the patient
B. non-polarity of the drug molecule
C. lack of charge on the drug molecule
D. similarity of the drug molecule to other molecules transported by the target cells

40. Who proposed that membranes are a phospholipid bilayer between two layers of hydrophilic proteins?

A. H. Davson and J. Danielli
C. I. Langmuir
B. S. Singer and G. Nicolson
D. Gorter and F. Grendel

41. Who proposed that the membrane is a mosaic of protein molecules bobbing in a fluid bilayer of phospholipids?

A. H. Davson and J. Danielli
C. S. Singer and G. Nicolson
B. I. Langmuir
D. E. Gorter and F. Grendel

42. According to the fluid mosaic model of cell membranes, which of the following is a true statement about membrane phospholipids?

A. They can move laterally along the plane of the membrane.
B. They frequently flip-flop from one side of the membrane to the other.
C. They have hydrophilic tails in the interior of the membrane.
D. They are free to depart from the membrane and dissolve in the surrounding solution.

43. When a membrane is freeze-fractured, the bilayer splits down the middle between the two layers of phospholipids. In an electron micrograph of a freeze-fractured membrane, the bumps seen on the fractured surface of the membrane are

A. Peripheral proteins.
C. carbohydrates
B. Phospholipids..
D. integral proteins.

44. Which of the following is a characteristic feature of a carrier protein in a plasma membrane?

A. It is a peripheral membrane protein.
B. It exhibits specificity for a particular type of molecule.
C. It requires the expenditure of cellular energy to function.
D. It works against diffusion

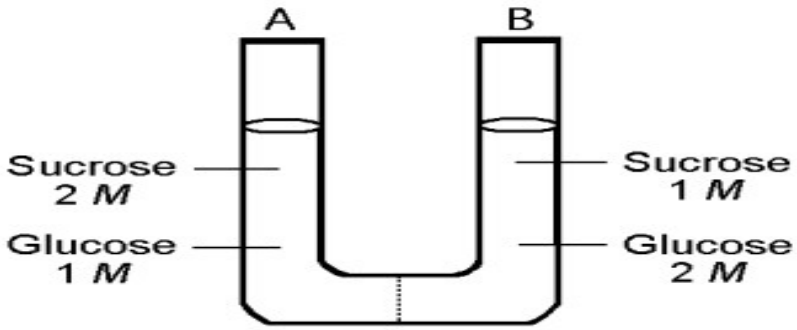
45. Which of the following would likely move through the lipid bilayer of a plasma membrane most rapidly?

A. CO2 B. An Amino Acid C. Glucose D. K+

46. Water passes quickly through cell membranes because

A. The bilayer is hydrophilic.
B. water movement is tied to ATP hydrolysis
C. It moves through hydrophobic channels.
D. It moves through aquaporins in the membrane.

47. The solutions in the two arms of this U-tube are separated by a membrane that is permeable to water and glucose but not to sucrose. Side A is half filled with a solution of 2 M sucrose and 1 M glucose. Side B is half filled with 1 M sucrose and 2 M glucose. Initially, the liquid levels on both sides are equal.



Initially, in terms of tonicity, the solution in side A with respect to that in si de B is

A. Hypotonic. B. Plasmolyzed. C. Isotonic. D. saturated.

48. After the system reaches equilibrium, what changes are observed?

A. The molarity of sucrose and glucose are equal on both sides.

B. The molarity of glucose is higher in side A than in side B.

C. The water level is higher in side A than in side B.

D. The water level is unchanged.