BIOL-8 Practice Test 02

Modules 5-6: Membranes & Metabolism

Instructions: This practice test covers material from Modules 5 and 6. Answer all questions to the best of your ability.

Part A: Multiple Choice (25 questions)

Choose the best answer for each question.

Module 5: Membranes

1. The plasma membrane is described as a "fluid mosaic" because:

A) It is made entirely of phospholipids B) Proteins float and move within a flexible lipid bilayer C) It is rigid and tightly packed D) Water flows freely through it

2. The hydrophobic tails of phospholipids face:

A) Toward the extracellular fluid B) Toward the cytoplasm C) Toward each other, inside the bilayer D) Toward the membrane proteins

3. Cholesterol in the plasma membrane functions to:

A) Transport oxygen across the membrane B) Maintain membrane fluidity across temperature changes C) Act as a receptor for hormones D) Provide energy for active transport

4. Which type of membrane protein spans the entire lipid bilayer?

A) Peripheral protein B) Integral (transmembrane) protein C) Glycoprotein D) Channel protein only

5. Glycoproteins on the cell surface are important for:

A) ATP production B) Cell recognition and signaling C) DNA replication D) Lipid synthesis

6. A membrane is described as "selectively permeable" because it:

A) Allows all molecules to pass through freely B) Blocks all molecules from entering C) Allows some substances to cross but not others D) Only permits water molecules

7. Simple diffusion moves molecules:

A) Against their concentration gradient using ATP B) Down their concentration gradient without energy or proteins C) Through channel proteins only D) By vesicle transport

8. Facilitated diffusion differs from simple diffusion because it:

A) Requires ATP B) Moves molecules against the gradient C) Requires transport proteins D) Only moves water

9. Osmosis is best defined as the movement of:

A) Solute from high to low concentration B) Water across a selectively permeable membrane toward higher solute concentration C) Proteins through channel proteins D) Ions using ATP

10. A red blood cell placed in a hypotonic solution will:

A) Shrink (crenate) B) Remain unchanged C) Swell and possibly burst (lyse) D) Divide

11. A plant cell placed in a hypertonic solution will:

A) Swell and burst B) Undergo plasmolysis as water leaves C) Remain unchanged due to the cell wall D) Begin dividing

12. The sodium-potassium pump is an example of:

A) Passive transport B) Simple diffusion C) Active transport D) Osmosis

13. Which process involves the cell membrane engulfing a large particle?

A) Pinocytosis B) Exocytosis C) Phagocytosis D) Facilitated diffusion

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Module 6: Metabolism

14. Catabolic reactions:

A) Build complex molecules from simpler ones B) Break down complex molecules and release energy C) Require no enzymes D) Only occur in plants

15. The energy currency molecule of cells is:

A) DNA B) Glucose C) ATP D) NADH

16. Energy is stored in ATP in the:

A) Adenine base B) Ribose sugar C) Bonds between phosphate groups D) Hydrogen bonds

17. Enzymes speed up chemical reactions by:

A) Increasing the temperature B) Lowering the activation energy C) Changing the products formed D) Adding more substrate

18. The induced fit model describes how:

A) Substrates change shape permanently B) The enzyme's active site changes shape to fit the substrate C) Products inhibit the enzyme D) Enzymes are destroyed after one use

19. A noncompetitive inhibitor works by:

A) Binding to the active site B) Binding to a site other than the active site, changing enzyme shape C) Increasing substrate concentration D) Raising the pH

20. Feedback inhibition is when:

A) A substrate activates an enzyme B) The end product of a pathway inhibits an earlier enzyme C) Temperature increases enzyme activity D) Two enzymes compete for the same substrate

21. The overall equation for cellular respiration is:

A) $CO_2 + H_2O \rightarrow C_6H_{12}O_6 + O_2$ B) $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + ATP$ C) ATP → ADP + energy D) 2 pyruvate → ethanol + CO_2

22. Glycolysis occurs in the:

A) Mitochondria B) Nucleus C) Cytoplasm D) Cell membrane

23. The electron transport chain produces most of the cell's ATP and is located in the:

A) Cytoplasm B) Inner mitochondrial membrane C) Nucleus D) Ribosome

24. When oxygen is NOT available, cells can produce ATP through:

A) The citric acid cycle B) Oxidative phosphorylation C) Fermentation D) The electron transport chain

25. Aerobic respiration produces approximately how many ATP per glucose molecule?

A) 2 B) 4 C) 18 D) 36-38

Part B: Fill in the Blank (10 questions)

Write the correct term in the blank.

26. The two main components of the plasma membrane are phospholipids and _____.

27. Transport that requires no cellular energy is called _____ transport.

28. A solution with a higher solute concentration than the cell is called _____.

29. The process of a cell releasing materials using vesicles is called _____.

30. The type of endocytosis that takes in fluids and small dissolved molecules is called _____.

31. The sum of all chemical reactions in a cell is called _____.

32. Enzymes are biological _____ that speed up chemical reactions.

33. The three stages of cellular respiration are glycolysis, the citric acid cycle, and the _____.

34. In the absence of oxygen, muscle cells produce ATP and _____ through fermentation.

35. The role of oxygen in cellular respiration is to serve as the final _____ acceptor.

Part C: Short Answer (5 questions)

Answer each question in 2-3 complete sentences.

36. Compare and contrast passive transport and active transport. Give one example of each.

37. Explain what happens to an animal cell in each type of solution: isotonic, hypertonic, and hypotonic.

38. Describe how enzymes work, including the role of the active site. What happens when an enzyme is denatured?

39. Outline the three main stages of cellular respiration, including where each occurs and what each produces.

40. Compare lactic acid fermentation and alcoholic fermentation. Why does fermentation produce far less ATP than aerobic respiration?

End of Practice Test 02