

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. This test is designed to help you prepare for the second exam.

Part A: Multiple Choice (30 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) Glycolipid

- 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 to pass

7. Simple diffusion moves molecules:

- A) Against their concentration gradient using ATP
- B) Down their concentration gradient without energy or transport 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 their concentration gradient
- C) Requires transport proteins (channels or carriers)
- 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 the cell
- 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 solid particle?

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

14. A hospital patient receives an IV of normal saline (0.9% NaCl), which is isotonic to blood cells. What would happen if pure water were used instead?

- A) Red blood cells would shrink B) Red blood cells would swell and burst C) Nothing — cells would remain the same D) Red blood cells would stop producing ATP

15. Aquaporins are channel proteins that specifically allow rapid movement of:

- A) Glucose B) Sodium ions C) Water D) Amino acids
-

Module 6: Metabolism

16. 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

17. Anabolic reactions:

- A) Break down molecules and release energy B) Build complex molecules from simpler ones, requiring energy C) Do not involve enzymes D) Produce ATP directly

18. The energy currency molecule of cells is:

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

19. Energy is stored in ATP in the:

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

20. Enzymes speed up chemical reactions by:

- A) Increasing the temperature of the cell B) Lowering the activation energy C) Changing the products formed D) Adding more substrate to the reaction

21. The induced fit model describes how:

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

22. A competitive inhibitor works by:

- A) Binding to a site away from the active site
- B) Binding directly to the active site, blocking the substrate
- C) Increasing the enzyme's temperature
- D) Permanently denaturing the enzyme

23. A noncompetitive inhibitor works by:

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

24. Feedback inhibition is when:

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

25. The overall equation for cellular respiration is:

- A) $\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2$
- B) $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + \text{ATP}$
- C) $\text{ATP} \rightarrow \text{ADP} + \text{energy}$
- D) 2 pyruvate \rightarrow ethanol + CO_2

26. Glycolysis occurs in the:

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

27. The citric acid cycle (Krebs cycle) takes place in the:

- A) Cytoplasm
- B) Mitochondrial matrix
- C) Inner mitochondrial membrane
- D) Nucleus

28. 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

29. 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

30. 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.

31. The two main components of the plasma membrane are phospholipids and _____.
 32. Transport that requires no cellular energy is called _____ transport.
 33. A solution with a higher solute concentration than the cell is called _____.
 34. The process of a cell releasing materials by fusing vesicles with the membrane is called _____.
 35. The type of endocytosis that takes in fluids and small dissolved molecules is called _____.
 36. The sum of all chemical reactions in a cell is called _____.
 37. Enzymes are biological _____ that speed up chemical reactions without being consumed.
 38. The three stages of cellular respiration are glycolysis, the citric acid cycle, and the _____.
 39. In the absence of oxygen, muscle cells produce ATP and _____ through fermentation.
 40. The role of oxygen in cellular respiration is to serve as the final _____ acceptor in the electron transport chain.
-

Part C: Short Answer (5 questions)

Answer each question in 2-4 complete sentences.

41. Compare and contrast passive transport and active transport. Include the role of ATP and give one specific example of each.

- 42.** Explain what happens to an animal cell in each type of solution: isotonic, hypertonic, and hypotonic. Use the terms "crenation" and "lysis" in your answer.
- 43.** Describe how enzymes work, including the role of the active site and the induced fit model. What happens when an enzyme is denatured?
- 44.** Outline the three main stages of cellular respiration. For each stage, state where it occurs and what it produces.

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

End of Practice Test 02