

BIOL-8 Practice Test 02 — Answer Key

Modules 5-6: Membranes & Metabolism

Part A: Multiple Choice Answers

Q	Answer	Explanation
1	B	Proteins float within a flexible phospholipid bilayer — the "fluid mosaic"
2	C	Hydrophobic tails face inward, away from water, toward each other
3	B	Cholesterol buffers membrane fluidity — prevents too rigid or too fluid
4	B	Integral (transmembrane) proteins span the entire bilayer
5	B	Glycoproteins serve as identification markers for cell recognition
6	C	Selectively permeable = allows some substances through but not others
7	B	Simple diffusion moves down the gradient, no energy, no proteins needed
8	C	Facilitated diffusion is passive but uses channel or carrier proteins
9	B	Osmosis = water movement toward higher solute concentration across a membrane
10	C	Hypotonic = less solute outside, water enters cell → swelling/lysis
11	B	Hypertonic = more solute outside, water leaves → plasmolysis in plant cells
12	C	Na^+ / K^+ pump uses ATP to move ions against their gradient = active transport
13	C	Phagocytosis = "cell eating," engulfing large particles
14	B	Catabolism breaks down molecules and releases energy
15	C	ATP (adenosine triphosphate) is the cell's energy currency
16	C	Energy stored in phosphate-phosphate bonds (phosphoanhydride bonds)
17	B	Enzymes lower activation energy, making reactions proceed faster
18	B	Induced fit = active site adjusts shape to bind substrate more tightly

Q	Answer	Explanation
19	B	Noncompetitive inhibitor binds elsewhere, distorting the active site
20	B	Feedback inhibition = end product shuts down an earlier enzyme in the pathway
21	B	$\text{Glucose} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O} + \text{ATP}$ (cellular respiration summary)
22	C	Glycolysis occurs in the cytoplasm (does not require mitochondria)
23	B	ETC is embedded in the inner mitochondrial membrane
24	C	Fermentation produces ATP without oxygen (anaerobic)
25	D	Aerobic respiration yields ~36-38 ATP per glucose

Part B: Fill in the Blank Answers

Q	Answer
26	proteins
27	passive
28	hypertonic
29	exocytosis
30	pinocytosis
31	metabolism
32	catalysts
33	electron transport chain
34	lactic acid
35	electron

Part C: Short Answer Key

36. Passive vs. Active Transport:

- Passive transport moves substances down their concentration gradient without energy (e.g., osmosis, simple diffusion, facilitated diffusion)
- Active transport moves substances against their concentration gradient and requires ATP (e.g., sodium-potassium pump, endocytosis)
- Key distinction: energy requirement and direction relative to gradient

37. Tonicity and Animal Cells:

- Isotonic solution: water moves in and out equally; cell maintains normal shape

- Hypertonic solution: water leaves the cell; cell shrinks (crenation)
- Hypotonic solution: water enters the cell; cell swells and may burst (lysis)

38. Enzyme Function and Denaturation:

- Enzymes have an active site that binds a specific substrate (induced fit model)
- They lower the activation energy needed for the reaction, speeding it up without being consumed
- Denaturation (from extreme heat or pH) unfolds the enzyme, distorting the active site so the substrate can no longer bind — the enzyme loses function

39. Three Stages of Cellular Respiration:

- Glycolysis (cytoplasm): splits glucose into 2 pyruvate molecules; produces 2 ATP and 2 NADH
- Citric acid cycle (mitochondrial matrix): breaks down pyruvate derivatives; produces 2 ATP, NADH, and FADH₂
- Electron transport chain (inner mitochondrial membrane): uses NADH and FADH₂ to produce ~32-34 ATP via chemiosmosis

40. Fermentation Comparison:

- Lactic acid fermentation: pyruvate → lactic acid; occurs in muscle cells during intense exercise
- Alcoholic fermentation: pyruvate → ethanol + CO₂; occurs in yeast and some bacteria
- Both produce only 2 ATP per glucose (from glycolysis only) because without oxygen, the electron transport chain cannot run — that's where the vast majority (~34) of ATP would normally be produced

End of Answer Key