BIOL-8 Practice Test 01 — Answer Key

Modules 1-6: Foundations of Human Biology

Part A: Multiple Choice Answers

Q	Answer	Explanation
1	C	All living things are made of cells
2	A	Cell → Tissue → Organ → Organ System → Organism
3	B	The independent variable is what the scientist changes
4	B	Theories are well-supported by many experiments
5	B	Homeostasis = maintaining a stable internal environment
6	B	Autotrophs make their own food
7	C	Atomic number = number of protons
8	B	Covalent bonds involve sharing electrons
9	C	Water is polar due to unequal electron sharing
10	B	Acids have pH less than 7
11	A	Carbon, Hydrogen, Oxygen, Nitrogen are most common
12	B	Hydrogen bonds give water its unique properties
13	B	Acids release H+ ions
14	B	Dehydration synthesis removes water to build polymers
15	C	Carbohydrates provide quick energy
16	B	Amino acids are protein monomers
17	B	Amino acid sequence determines protein shape/function
18	D	DNA and RNA are nucleic acids
19	B	Hydrolysis adds water to break polymers

Q	Answer	Explanation
20	B	Cell theory: cells come from pre-existing cells
21	C	Prokaryotes lack a membrane-bound nucleus
22	C	Mitochondria produce ATP
23	C	Ribosomes are the site of protein synthesis
24	C	Plant cells have cell walls; animal cells do not
25	D	Golgi apparatus packages and ships proteins
26	B	Fluid mosaic model describes membrane structure
27	C	Passive transport requires no energy
28	B	Pure water is hypotonic; cell swells and lyses
29	B	Osmosis = water movement across membrane
30	B	Facilitated diffusion uses proteins, no ATP
31	B	Na^+ /K^+ pump: 3 Na^+ out, 2 K^+ in
32	B	Hypertonic = cell loses water, shrinks
33	B	ATP is the energy currency of cells
34	B	Enzymes lower activation energy
35	C	Glycolysis occurs in the cytoplasm
36	C	Fermentation occurs without oxygen

Part B: Fill in the Blank Answers

Q	Answer
37	cell
38	nucleus
39	isotopes
40	basic (or alkaline)
41	monosaccharide (or simple sugar)
42	energy
43	ribosome
44	phospholipids
45	osmosis
46	hypertonic
47	ATP (adenosine triphosphate)
48	proteins

Part C: Short Answer Key

49. Characteristics of living things (any 3):

- Cellular organization (made of cells)
- Metabolism (use energy)
- Homeostasis (maintain internal stability)
- Growth and development
- Reproduction

- Response to stimuli
- Adaptation

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50. Ionic vs. Covalent bonds:

- Ionic bonds: electrons are **transferred** from one atom to another, forming ions (charged particles) that attract each other
- Covalent bonds: electrons are **shared** between atoms
- Example: NaCl (ionic); H_2O (covalent)

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51. Four biomolecules:

- **Carbohydrates** – quick energy (sugars, starches)
- **Lipids** – long-term energy, membranes
- **Proteins** – enzymes, structure, transport
- **Nucleic acids** – **store genetic information** (DNA and RNA)

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52. Prokaryotes vs. Eukaryotes:

Feature	Prokaryotes	Eukaryotes
Nucleus	No membrane-bound nucleus	Has nucleus
Organelles	No membrane-bound organelles	Has organelles (mitochondria, ER, etc.)
Size	Smaller (1-10 μm)	Larger (10-100 μm)
Examples	Bacteria, Archaea	Plants, Animals, Fungi, Protists

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53. Selective permeability and transport:

The membrane is "selectively permeable" because it allows some substances through while blocking others. The phospholipid bilayer blocks large/charged molecules but allows small nonpolar molecules.

- **Passive transport example:** Diffusion of O_2 across the membrane (no energy)
- **Active transport example:** Sodium-potassium pump (uses ATP to move ions against their gradient)

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54. Aerobic respiration vs. fermentation:

	Aerobic Respiration	**Fermentation**
Oxygen?	Yes	No
ATP yield	~36-38 ATP per glucose	2 ATP per glucose
Location	Cytoplasm + Mitochondria	Cytoplasm only

Fermentation is less efficient because:

1. It only uses glycolysis (no Krebs cycle or electron transport chain)
2. Most energy remains in the waste products (lactic acid or ethanol)

End of Answer Key