BIOL-8 Practice Test 01 — Answer Key

Modules 1-4: Foundations of Human Biology

Part A: Multiple Choice Answers

Q	Answer	Explanation
1	C	All living things have cellular organization — this is universal to life
2	A	Cell → Tissue → Organ → Organ System → Organism is the correct hierarchy
3	B	The independent variable is what the scientist deliberately changes
4	B	A theory is well-supported by extensive, repeated experimental evidence
5	B	Homeostasis = maintaining internal stability despite external changes
6	B	Sweating to reduce a fever is negative feedback — opposing the change to restore normal temp
7	B	Anatomy = structure; Physiology = function
8	B	The stomach is an organ (composed of multiple tissue types working together)
9	C	Atomic number = number of protons in the nucleus
10	B	Covalent bonds involve sharing electrons between atoms
11	C	Oxygen pulls shared electrons more strongly → unequal sharing → polarity
12	C	pH 3 is well below 7, making it strongly acidic
13	A	Carbon, Hydrogen, Oxygen, Nitrogen make up ~96% of living matter
14	B	Hydrogen bonds give water high specific heat — it resists temperature change
15	B	Buffers resist pH changes, keeping blood pH stable near 7.35-7.45
16	B	Isotopes = same element, different neutron count (e.g., Carbon-12 and Carbon-14)

Q	Answer	Explanation
17	B	Dehydration synthesis removes water to join monomers into polymers
18	C	Carbohydrates (glucose) are the body's preferred quick energy source
19	B	Amino acids are the monomers of proteins (20 different types)
20	B	The amino acid sequence dictates how the protein folds and what it does
21	D	DNA and RNA are nucleic acids built from nucleotide monomers
22	B	Hydrolysis (hydro = water, lysis = break) adds water to split polymers
23	B	Saturated fats have no C=C double bonds; they pack tightly → solid at room temp
24	B	Denaturation = loss of 3D shape (and function) due to extreme heat or pH
25	B	Cell theory: all living things are made of cells; all cells come from pre-existing cells
26	C	Prokaryotes lack a membrane-bound nucleus (pro = before, karyon = nucleus)
27	C	Mitochondria are the "powerhouse of the cell" — site of aerobic respiration
28	B	Ribosomes translate mRNA into proteins (protein synthesis)
29	C	Plant cells have a rigid cell wall made of cellulose; animal cells do not
30	C	Golgi receives proteins from the ER, modifies, sorts, and ships them in vesicles
31	C	Ribosomes attached to the ER surface give it the "rough" appearance
32	B	Endosymbiotic theory: mitochondria and chloroplasts were once independent prokaryotes

Part B: Fill in the Blank Answers

Q	Answer
33	cell
34	homeostasis
35	control
36	isotopes
37	basic (or alkaline)
38	monosaccharide (or simple sugar)
39	phospholipids
40	proteins
41	nucleus
42	lysosome

Part C: Short Answer Key

43. Four characteristics of living things (any four):

- **Cellular organization:** All living things are made of one or more cells
- **Metabolism:** All organisms carry out chemical reactions to obtain and use energy
- **Homeostasis:** Living things maintain a stable internal environment
- **Reproduction:** Organisms produce offspring (sexually or asexually)
- **Growth and development:** Organisms grow and develop according to genetic instructions
- **Response to stimuli:** Living things detect and respond to changes in their environment
- **Adaptation/Evolution:** Populations change over time through natural selection

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44. Ionic vs. Covalent Bonds:

- **Ionic bonds:** Electrons are **transferred** from one atom to another, creating oppositely charged ions that attract each other. Example: NaCl (sodium chloride) — sodium gives an electron to chlorine
- **Covalent bonds:** Electrons are **shared** between atoms. Example: H_2O (water) — oxygen shares electrons with two hydrogen atoms
- Ionic bonds typically form between metals and nonmetals; covalent bonds form between two nonmetals

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45. Four Biomolecules:

Biomolecule	Monomer	Primary Function
Carbohydrates	Monosaccharides (e.g., glucose)	Quick energy, structural support
Lipids	Fatty acids + glycerol	Long-term energy storage, cell membranes, insulation
Proteins	Amino acids	Enzymes, structural support, transport, immune defense
Nucleic acids	Nucleotides	Store and transmit genetic information (DNA and RNA)

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46. Prokaryotes vs. Eukaryotes (any three):

Feature	Prokaryotes	Eukaryotes
Nucleus	No membrane-bound nucleus	Has a true nucleus
Organelles	No membrane-bound organelles	Has mitochondria, ER, Golgi, etc.
Size	Smaller (typically 1-10 μm)	Larger (typically 10-100 μm)
DNA	Single circular chromosome	Multiple linear chromosomes
Examples	Bacteria, Archaea	Plants, Animals, Fungi, Protists

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47. Protein pathway from production to export:

1. **Nucleus:** DNA instructions (a gene) are transcribed into mRNA
2. **Ribosome on Rough ER:** mRNA is translated into a polypeptide chain; the protein enters the ER lumen where initial folding and quality control occur
3. **Golgi Apparatus:** The protein is further modified (e.g., sugar groups added), sorted, and packaged into transport vesicles
4. **Plasma Membrane:** Transport vesicles fuse with the membrane and release the protein outside the cell via exocytosis

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End of Answer Key