

BIOL-8 Exam 01

Modules 01-07: Exploring Life Science through Mitosis

Date: Tuesday, February 17, 2026

Time: 5:30 PM - 8:40 PM

Total Points: 100

Part A: Multiple Choice (50 points)

Choose the best answer for each question. Each question is worth 2 points.

Module 01: Exploring Life Science

1. Which of the following is NOT a characteristic of all living organisms?
2. A) Ability to reproduce
3. B) Made of cells
4. C) Ability to photosynthesize
5. D) Response to stimuli
6. The correct order of biological organization from smallest to largest is:
7. A) Cell → Tissue → Organ → Organ System → Organism
8. B) Tissue → Cell → Organ → Organ System → Organism
9. C) Cell → Organ → Tissue → Organ System → Organism
10. D) Organ → Tissue → Cell → Organ System → Organism
11. In the scientific method, a testable explanation for an observation is called a:
12. A) Theory
13. B) Hypothesis
14. C) Law

15. D) Conclusion

Module 02: Chemistry of Life

1. Which type of bond involves the sharing of electrons between atoms?
2. A) Ionic bond
3. B) Covalent bond
4. C) Hydrogen bond
5. D) Metallic bond
6. Water's ability to resist temperature changes is due to its:
7. A) Low specific heat
8. B) High specific heat
9. C) Low density
10. D) Nonpolar nature
11. A solution with a pH of 3 is:
12. A) Neutral
13. B) Slightly basic
14. C) Strongly acidic
15. D) Strongly basic
16. Which element is the backbone of all organic molecules?
17. A) Oxygen
18. B) Hydrogen
19. C) Carbon
20. D) Nitrogen

Module 03: Biomolecules

1. The building blocks of proteins are:
2. A) Nucleotides

- 3. B) Fatty acids
- 4. C) Monosaccharides
- 5. D) Amino acids
- 6. Which reaction joins monomers together by removing a water molecule?
 - 7. A) Hydrolysis
 - 8. B) Dehydration synthesis
 - 9. C) Oxidation
 - 10. D) Reduction
- 11. What type of bond holds amino acids together in a protein?
 - A) Ionic bond
 - B) Peptide bond
 - C) Hydrogen bond
 - D) Disulfide bond
- 12. The primary function of carbohydrates in living organisms is:
 - A) Long-term energy storage
 - B) Quick energy and structural support
 - C) Catalyzing reactions
 - D) Storing genetic information

Module 04: Cellular Function

- 1. Which organelle is responsible for producing ATP in eukaryotic cells?
 - A) Ribosome
 - B) Golgi apparatus
 - C) Mitochondrion
 - D) Lysosome

2. Which structure is found in plant cells but NOT in animal cells?

- A) Mitochondria
- B) Ribosomes
- C) Cell wall
- D) Nucleus

3. The endosymbiotic theory explains the origin of:

- A) The nucleus and ribosomes
- B) Mitochondria and chloroplasts
- C) The cell wall and vacuoles
- D) Cilia and flagella

4. The rough endoplasmic reticulum is "rough" because it has:

- A) Mitochondria attached
- B) Ribosomes attached
- C) Golgi vesicles attached
- D) A textured membrane

Module 05: Membranes

1. The fluid mosaic model describes:

- A) How cells divide
- B) The structure of the cell membrane
- C) How proteins are made
- D) The arrangement of organelles

2. Which type of transport requires NO cellular energy?

- A) Active transport
- B) Endocytosis
- C) Passive transport
- D) Exocytosis

3. A red blood cell placed in a hypertonic solution will:

- A) Swell and burst
- B) Shrink
- C) Remain unchanged
- D) Double in size

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

- A) Simple diffusion
- B) Facilitated diffusion
- C) Active transport
- D) Osmosis

Module 06: Metabolism

1. The molecule that serves as the main energy currency of cells is:

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

2. Enzymes speed up reactions by:

- A) Increasing the temperature
- B) Lowering the activation energy
- C) Changing the equilibrium
- D) Adding more substrate

3. In cellular respiration, the final electron acceptor is:

- A) Carbon dioxide
- B) Water
- C) Oxygen
- D) Glucose

4. When oxygen is not available, cells may switch to:

- A) Photosynthesis
- B) Fermentation
- C) Dehydration synthesis
- D) Hydrolysis

Module 07: Mitosis

1. During which phase of the cell cycle is DNA replicated?

- A) G1 phase
- B) S phase
- C) G2 phase
- D) M phase

2. In which phase of mitosis do chromosomes line up at the cell's equator?

- A) Prophase
- B) Metaphase
- C) Anaphase
- D) Telophase

Part B: Short Answer (30 points)

Answer each question in 2-4 sentences. Each question is worth 5 points.

1. Explain the difference between a hypothesis and a theory in science.
2. Describe how the properties of water (high specific heat, cohesion, solvent properties) make it essential for life.
3. Compare and contrast carbohydrates and lipids in terms of their structure and function.
4. Explain how the structure of the cell membrane allows it to be selectively permeable.

5. Describe the role of enzymes in metabolism and explain how temperature affects enzyme activity.
 6. Explain the importance of cell cycle checkpoints in preventing cancer.
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Part C: Essay Questions (20 points)

Choose ONE of the following essay questions. Write a well-organized response of at least one page.

Option A: Trace the path of a protein from its synthesis to its secretion from the cell. Include all organelles involved and describe what happens at each step.

Option B: Compare and contrast cellular respiration and fermentation. Include the locations where each occurs, the inputs and outputs, and the ATP yield of each process. Explain when and why cells might use fermentation instead of cellular respiration.

End of Exam 01