

Module 4: Cells

Comprehension & Critical Thinking Questions

Part 1: Understanding Core Concepts

1. Cell Theory

- State the three fundamental tenets of **Cell Theory**.
- Why is the cell considered the basic unit of life?

2. Cell Types

- Create a Venn Diagram comparing **Prokaryotic** and **Eukaryotic** cells.
- Which domains of life are Prokaryotic? Which are Eukaryotic?

3. The Endomembrane System

- Trace the path of a protein from its production to its export from the cell. In your answer, include the roles of: **Nucleus**, **Ribosome**, **Rough ER**, **Transport Vesicle**, **Golgi Apparatus**, and **Cell Membrane**.

Part 2: Applying Biological Principles

1. Organelle Function

- **Analogy:** If a cell were a factory, what "job" corresponds to each organelle?
 - Mitochondria (Power Plant?)
 - Lysosome (Recycling Center?)
 - Nucleus (CEO?)
- Explain the biological justification for each analogy.

2. Plant vs. Animal Cells

- You are looking at a cell under a microscope. You see a rigid cell wall and green variety of organelles. Is this a plant or animal cell? Explain.

- Why do plants need a **Central Vacuole** while animals generally do not?

Part 3: Analyzing & Evaluating

1. Surface Area to Volume Ratio

- Why are cells microscopic? Analyze what happens to a cell's ability to transport nutrients and waste as it gets larger. (Hint: Volume increases faster than Surface Area).

2. Origins of Complexity

- Explain the **Endosymbiotic Theory**. What evidence suggests that Mitochondria and Chloroplasts were once independent bacterial cells? (Think about their DNA and membranes).