Module 1: Biology - The Study of Life

Keys to Success & Study Guide

Learning Objectives

By the end of this module, you should be able to: 1. **Identify** and explain the six fundamental characteristics shared by all living organisms. 2. **Order** the levels of biological organization from atom to biosphere. 3. **Differentiate** between the three domains of life and the kingdoms within Eukarya. 4. **Apply** the scientific method to hypothetical scenarios, distinguishing between hypothesis, theory, and law. 5. **Explain** the flow of energy and cycling of nutrients in various ecosystems.

Key Terminology Checklist

Define these terms in your own words to ensure mastery. - [ ] **Homeostasis**: Maintenance of stable internal conditions. - [ ] **Metabolism**: All chemical reactions involved in maintaining the living state of the cells and the organism. - [ ] **Binomial Nomenclature**: The two-part naming system (Genus species). - [ ] **Prokaryote vs. Eukaryote**: Cells without a nucleus vs. cells with a nucleus. - [ ] **Autotroph vs. Heterotroph**: Self-feeders vs. other-feeders. - [ ] **Natural Selection**: The process by which organisms better adapted to their environment tend to survive and produce more offspring.

Concept Check

1. The Nature of Life

- **Question**: What are the 6 characteristics of life?
- **Deep Dive**: If you found a mysterious slime on a rock, what tests would you run to determine if it is "alive" according to biological standards? (Think: reproduction, energy use, response to stimuli, etc.)

2. The Hierarchy of Life

- **Question**: What are the levels of biological organization?
- **Deep Dive**: How does a **Community** differ from an **Ecosystem**? (Hint: Does one include non-living factors like rain and rocks?)

3. Energy & Evolution

- **Question**: How can deer shape the natural selection of plant leaves?
- **Deep Dive**: This is an example of an evolutionary pressure. Explain how the deer acting as a predator causes the plant population to change over generations. Is this change intentional by the plant?

4. The Science of Biology

- **Question**: What is the difference between a scientific theory and a scientific law?
- **Deep Dive**: A **Law** predicts *what* happens (descriptive). A **Theory** proposes *why* it happens (explanatory). Gravity is a law (things fall). Gravity is also a theory (curvature of spacetime). In Biology, Evolution is a **Theory** because it provides a comprehensive explanation for the diversity of life, supported by massive evidence.

Study Tips

- **Mnemonics work!** Create a sentence to remember the classification order (Domain, Kingdom, Phylum, Class, Order, Family, Genus, Species).
    - *Example*: "Dear King Philip Came Over For Good Soup."
- **Visualize the Ladder**: When studying biological organization, draw it out as a ladder or a pyramid. Visuals help cement the hierarchy better than lists.
- **Latin Roots**: Many biological terms come from Latin/Greek.
    - *Bio* = Life
    - *Logy* = Study of
    - *Homeo* = Same/Steady
    - *Stasis* = State