

Module 01: Exploring Life Science — Study Questions

Characteristics of Life

1. What are the seven characteristics that all living organisms share?
2. How would you determine whether a crystal that grows in size is living or non-living?
3. Why is maintaining homeostasis essential for survival?
4. How does a plant seedling demonstrate the characteristic of "response to stimuli"?

Scientific Method

1. What is the difference between a hypothesis and a theory?
2. If you wanted to test whether fertilizer helps plants grow taller, what would be your independent variable and dependent variable?
3. Why are control groups important in scientific experiments?
4. Describe a situation where an experiment might give inconclusive results. How could you redesign the experiment to get clearer answers?
5. A scientist notices that mice in one cage are more active than mice in another cage. Propose two different hypotheses that could explain this observation.

Levels of Biological Organization

1. Starting from an atom, list the levels of biological organization in order up to the biosphere.
2. At which level of organization would you study the heart, lungs, and blood vessels working together?

3. How does a single cell differ from a tissue?
4. Give an example of an ecosystem and identify the biotic and abiotic components within it.

Evolution and Adaptation

1. In your own words, explain what natural selection means.
2. How might a population of insects develop resistance to a pesticide over many generations?
3. Why is genetic variation within a population important for adaptation?
4. What evidence supports the idea that all living organisms share a common ancestor?

Integrative Thinking

1. How do the concepts of structure and function relate to each other in biology? Give a specific example.
2. Why is it important for biologists to study organisms at multiple levels of organization?
3. How does energy flow through living systems differ from the cycling of matter?
4. A new organism is discovered deep in the ocean near a thermal vent. What characteristics would you look for to confirm it is alive?
5. How does understanding the scientific method help you evaluate health claims you see in the news or online?