1 What Is Life?

Key Concepts

- All living things have a cellular organization, contain similar chemicals, use energy, respond to their surroundings, grow and develop, and reproduce.
- Living things arise from living things through reproduction.
- All living things must satisfy their basic needs for water, food, living space, and stable internal conditions.

Key Terms

organism
cell
unicellular
multicellular
stimulus
response
development
spontaneous generation
autotroph
heterotroph
homeostasis

2 Classifying Organisms

Key Concepts

- Biologists use classification to organize living things into groups so that the organisms are easier to study.
- The more classification levels that two organisms share, the more characteristics they have in common.
- Organisms are placed into domains and kingdoms based on their cell type, their ability to make food, and the number of cells in their bodies.

Key Terms

classification
taxonomy
binomial nomenclature
genus
species
prokaryote
nucleus
eukaryote

3 Discovering Cells

Key Concepts

- Cells are the basic units of structure and function in living things.
- The cell theory states the following: All living things are composed of cells. Cells are the basic units of structure and function in living things. All cells are produced from other cells.
- The invention of the microscope enabled people to learn about cells. Light microscopes magnify an object by bending light. Electron microscopes use electrons instead of light.

Key Terms

cell
microscope
cell theory

4 Looking Inside Cells

Key Concepts

- A plant's cell wall protects and supports the cell. The cell membrane controls what substances come into and out of a cell.
- The nucleus directs the cell's activities.
- Mitochondria convert energy in food molecules to energy the cell can use.
- The endoplasmic reticulum carries materials throughout the cell.
- Ribosomes produce proteins.
- The Golgi bodies receive materials, package them, and distribute them.
- Chloroplasts capture energy from sunlight and use it to produce food for the cell.
- Vacuoles are the storage areas of cells.
- Lysosomes contain chemicals that break down certain materials in the cell.
- In many-celled organisms, cells are often organized into tissues, organs, and organ systems.

Key Terms

organelle
cell wall
cell membrane
cytoplasm
mitochondria
endoplasmic reticulum
ribosome
Golgi body
chloroplast
vacuole
lysosome

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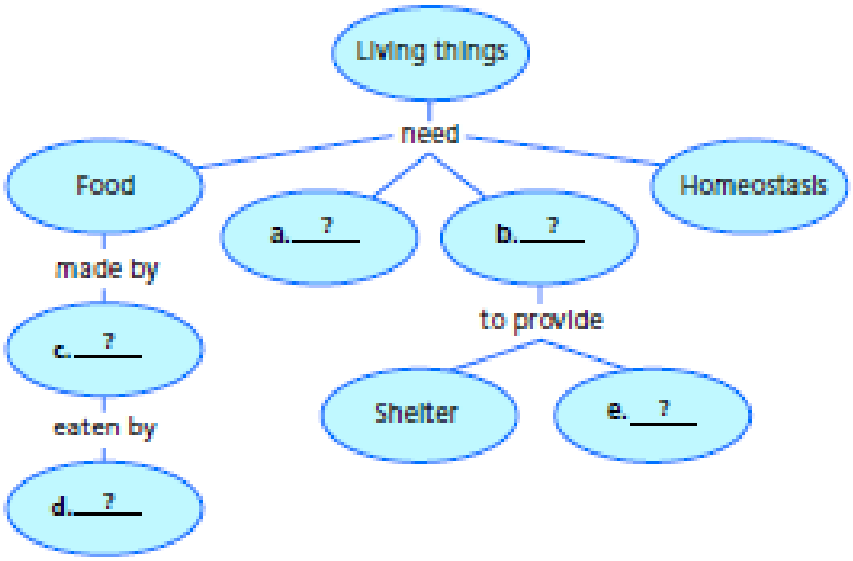
Organizing Information

Concept Mapping Copy the concept map about the needs of organisms onto a separate sheet of paper. Then complete it and add a title. (For more on Concept Mapping, see the Skills Handbook.)



Reviewing Key Terms

Choose the letter of the best answer.

1. The idea that life could spring from nonliving matter is called
   a. development.
   b. spontaneous generation.
   c. homeostasis.
   d. evolution.
2. The scientific study of how living things are classified is called
   a. development.
   b. biology.
   c. taxonomy.
   d. evolution.
3. A genus is divided into
   a. species. b. phyla.
   c. families. d. classes.
4. The basic units of structure in all living things are
   a. nuclei. b. organelles.
   c. tissues. d. cells.
5. In plant and animal cells, the control center of the cell is the
   a. chloroplast.
   b. cytoplasm.
   c. nucleus.
   d. Golgi body.

If the statement is true, write *true*. If it is false, change the underlined word or words to make the statement true.

6. Bacteria are <u>unicellular</u> organisms.
7. Linnaeus devised a system of naming organisms called <u>binomial nomenclature</u>.
8. The gray wolf, *Canis lupus*, and the red wolf, *Canis rufus*, belong to the same <u>species</u>.
9. Cells were discovered using <u>electron</u> microscopes.
10. <u>Ribosomes</u> produce proteins.

Writing in Science

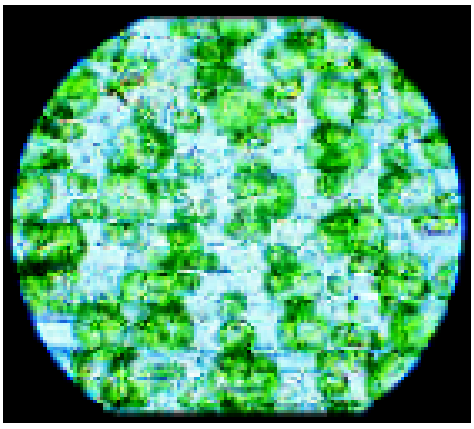
Dialogue A dialogue is a conversation. Write a dialogue that might have taken place between Schleiden and Schwann. The scientists should discuss their observations and conclusions.

Checking Concepts

11. Your friend thinks that plants are not alive because they do not move. How would you respond to your friend?
12. Describe how your pet, or a friend's pet, meets its needs as a living thing.
13. What are the advantages of identifying an organism by its scientific name?
14. What role did the microscope play in the development of the cell theory?
15. Describe the function of the cell wall.
16. Which organelles are called the "powerhouses" of the cell? Why are they given that name?
17. How are cells usually organized in large multicellular organisms?

Thinking Critically

18. **Applying Concepts** How do you know that a robot is not alive?
19. **Inferring** Which two of the following organisms are most closely related: *Entamoeba histolytica*, *Escherichia coli*, *Entamoeba coli*? Explain your answer.
20. **Applying Concepts** The photograph below has not been artificially colored. Do the cells in the photo come from a plant or an animal? Explain your answer.



21. **Classifying** If you were trying to classify an unfamiliar organism by looking at its cells, what could the cells tell you?

Applying Skills

Refer to the illustrations below to answer Questions 22–25.

A student designed the experiment pictured below to test how light affects the growth of plants.

22. **Controlling Variables** Is this a controlled experiment? If so, identify the manipulated variable. If not, why not?
23. **Developing Hypotheses** What hypothesis might this experiment be testing?
24. **Predicting** Based on what you know about plants, predict how each plant will change in two weeks.
25. **Designing Experiments** Design a controlled experiment to determine whether the amount of water that a plant receives affects its growth.

Lab zone Chapter Project

Performance Assessment Prepare a display presenting your conclusion about your mystery object. Describe the observations that helped you to reach your conclusion. Compare your ideas with those of other students. If necessary, defend your work.