3 Assessment

3.1 What Is Ecology?

Understand Key Concepts

1. All of life on Earth exists in
   - **a.** an ecosystem.
   - **b.** a biome.
   - **c.** the biosphere.
   - **d.** ecology.

2. Which term describes a group of different species that live together in a defined area?
   - **a.** a population
   - **b.** a community
   - **c.** an ecosystem
   - **d.** a biosphere

3. Name the different levels of organization within the biosphere, from smallest to largest.

4. How do ecologists use modeling?

5. Give an example of how a biotic factor might influence the organisms in an ecosystem.

Think Critically

6. **© Text Types and Purposes** Ecologists have discovered that the seeds of many plants that grow in forests cannot germinate unless they have been exposed to fire. Design an experiment to test whether a particular plant has seeds with this requirement. Include your hypothesis statement, a description of control and experimental groups, and an outline of your procedure.

7. **Pose Questions** You live near a pond that you have observed for years. One year you notice the water is choked with a massive overgrowth of green algae. What are some of the questions you might have about this unusual growth?

3.2 Energy, Producers, and Consumers

Understand Key Concepts

8. Primary producers are organisms that
   - **a.** rely on other organisms for their energy and food supply.
   - **b.** consume plant and animal remains and other dead matter.
   - **c.** use energy they take in from the environment to convert inorganic molecules into complex organic molecules.
   - **d.** obtain energy by eating only plants.

9. Which of the following organisms is a decomposer?

   a. 

   b. 

   c. 

   d. 

10. Which of the following describes how ALL consumers get their energy?
    - **a.** directly from the sun
    - **b.** from eating primary producers
    - **c.** from inorganic chemicals like hydrogen sulfide
    - **d.** from eating organisms that are living or were once living

11. What is chemosynthesis?

Think Critically

12. **© Craft and Structure** Classify each of the following as an herbivore, a carnivore, an omnivore, or a detritivore: earthworm, bear, cow, snail, owl, human.

13. **Form a Hypothesis** People who explore caves where there is running water but no sunlight often find them populated with unique types of fishes and insects. What hypothesis can you make to explain the ultimate source of energy for these organisms?

3.3 Energy Flow in Ecosystems

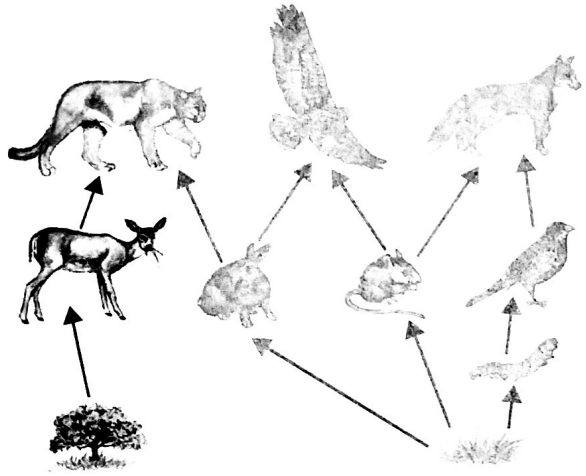
Understand Key Concepts

14. The series of steps in which a large fish eats a small fish that has eaten algae is a
    - **a.** food web.
    - **b.** food chain.
    - **c.** pyramid of numbers.
    - **d.** pyramid of biomass.

15. The total amount of living tissue at each trophic level in an ecosystem can be shown in a(n)
    - **a.** energy pyramid.
    - **b.** pyramid of numbers.
    - **c.** biomass pyramid.
    - **d.** biogeochemical cycle.

Think Critically

16. Which group of organisms is always found at the base of a food chain or food web?
17. **Apply Concepts** Why is the transfer of energy in a food chain usually only about 10 percent efficient?
18. **Use Models** Describe a food chain of which you are a member. You may draw or use words to describe the chain.
19. **Use Models** Create flowcharts that show four different food chains in the food web shown below.



3.4 Cycles of Matter

Understand Key Concepts

20. Nutrients move through an ecosystem in
    a. biogeochemical cycles.
    b. water cycles.
    c. energy pyramids.
    d. ecological pyramids.
21. Which biogeochemical cycle does NOT include a major path in which the substance cycles through the atmosphere?
    a. water cycle
    b. carbon cycle
    c. nitrogen cycle
    d. phosphorus cycle
22. List two ways in which water enters the atmosphere in the water cycle.
23. Explain the process of nitrogen fixation.
24. What is meant by "nutrient limitation"?

solve the CHAPTER MYSTERY

CHANGES IN THE BAY

According to one hypothesis, rising water temperatures have caused most of the changes reported in Narragansett Bay. The bay's temperature has risen more than 1.5°C (3°F) since 1960. This warmth encourages bluefish to stay in the bay later in the fall. It also allows predatory warm-water shrimp to remain in the bay all winter, feeding on baby flounder. Warmer water also enables zooplankton to graze heavily on marine algae. This eliminates the late-winter algal bloom whose primary production used to provide organic carbon to the entire food web.

Those food web changes, in turn, seem to be driving unexpected shifts in the activities of bacteria that transform nitrogen. When the spring bloom provided organic carbon, bacteria denitrified the water, releasing nitrogen into the atmosphere. Now, the bacterial community has changed and actually fixes nitrogen, bringing more of it into the water. It is still not clear what this change means for the long-term health of the bay and adjacent coastal waters.

1. **© Key Ideas and Details** Compare the original situation in the bay with the current situation, taking note of changes in both the food web and the nitrogen cycle. Cite textual evidence to support your response.
2. **Infer** Narragansett Bay harbors sea jellies that prefer warm water and have previously been present only in summer and early fall. These sea jellies eat fish eggs, fish larvae, and zooplankton. If the bay continues to warm, what do you think might happen to the population of sea jellies in the bay? What might that mean for the organisms the jellies feed on?
3. **Connect to the Big idea** Explain how the Narragansett Bay example demonstrates interconnections among members of a food web and abiotic environmental factors. Can you find similar studies in other aquatic habitats, such as Chesapeake Bay, the Everglades, or the Mississippi River delta? Explain.