Chapter 4 Review

READING TOOLBOX

1. **Layered Book** Create the layered book FoldNote. Use the layered book to summarized the information you learned in this chapter.
2. **Concept Map** Make a concept map that describes the flow of energy through an ecosystem. Try to include the following terms: *trophic level, food web, food chain, producer, consumer, carnivore, decomposer,* and *herbivore.*

Using Key Terms

Use each of the following terms in a separate sentence.

3. *respiration*
4. *biodiversity*
5. *decomposer*

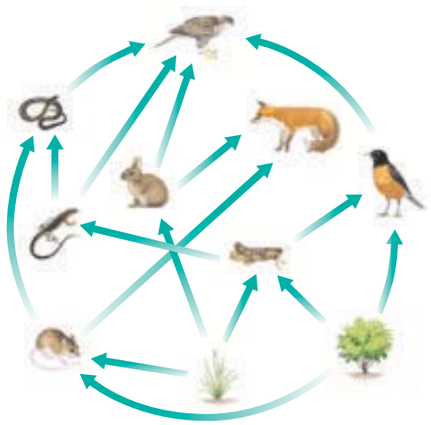
For each pair of terms, explain how the meanings of the terms differ.

6. *climate* and *biome*
7. *ecosystem* and *community*
8. *producer* and *consumer*

Understanding Key Ideas

9. Which of the following is a biotic factor?
   - **a.** rainfall
   - **b.** predators
   - **c.** air temperature
   - **d.** the availability of nitrogen
10. Which kind of organism converts the sun's energy into energy that can be used to grow?
    - **a.** consumers
    - **b.** producers
    - **c.** omnivores
    - **d.** decomposers
11. Which of the following biomes has a wide range of temperatures and is located at mid-latitudes?
    - **a.** taiga
    - **b.** savanna
    - **c.** temperate forest
    - **d.** tropical rain forest
12. Which of the following is not a step in the nitrogen cycle?
    - **a.** nitrification
    - **b.** denitrification
    - **c.** percolation
    - **d.** ammonification
13. Which of the following processes describes the loss of water from leaves to the atmosphere?
    - **a.** transpiration
    - **b.** condensation
    - **c.** precipitation
    - **d.** percolation
14. What percentage of the energy in a rabbit is stored in a coyote that eats the rabbit?
    - **a.** 0%
    - **b.** 10%
    - **c.** 90%
    - **d.** 100%

Use the diagram to answer the following question(s).



15. How would this food web be affected if the plants were eliminated?
    - **a.** Herbivores would become carnivores.
    - **b.** The herbivores would move to another trophic level.
    - **c.** The carnivores would survive, but the herbivores would not survive.
    - **d.** The herbivores would die because of the lack of food. Then, the rest of the animals would die because of the loss of the herbivores.

Explaining Key Ideas

16. **Describe** what eventually happens to the pioneer species in an ecosystem.
17. **Summarize** the steps of energy flow through an ecosystem by creating food chain diagram.
18. **Explain** the process of nitrogen fixation, and describe where it occurs.

Assignment Guide

Section	Questions
1	1, 4, 6, 7, 9, 11, 16, 20, 23, 24, 28, 29, 30
2	1, 2, 5, 8, 10, 14, 15, 17, 19, 21, 25, 27, 32
3	1, 3, 12, 13, 18, 22, 26, 31

Review

Reading Toolbox

1. Answers may vary. Students may summarize one section of the chapter for each page of the layered book.
2. See previous page for answer to concept map.

Using Key Terms

3. *Respiration* is part of the carbon cycle and oxygen cycle.
4. The higher the *biodiversity* of an ecosystem, the more likely the ecosystem will recover from change.
5. *Decomposers* get energy from dead organisms.
6. *Climate* is an area's average weather conditions over a long period. A *biome* is a large region characterized by a specific type of climate and certain types of organisms.
7. An *ecosystem* is a community and its physical environment. A *community* is all the organisms in an area that live together and interact.
8. A *producer* makes its own food with energy from the sun. A *consumer* gets energy by eating producers or other consumers.

Understanding Key Ideas

9. b 10. b 11. c 12. c
13. a 14. b 15. d

Explaining Key Ideas

16. New species will replace pioneer species because the new species outcompete the pioneer species.
17. Producers obtain energy from the sun. The energy in the producer is then passed to a consumer when the consumer eats the producer. The energy is further passed to other consumers in a food chain as one organism eats another.
18. Nitrogen fixation is the reaction of nitrogen with hydrogen to form ammonia. Nitrogen is fixed by bacteria that live in soil.

Interpreting Graphics

19. c
20. about 12°C

Using Science Graphics

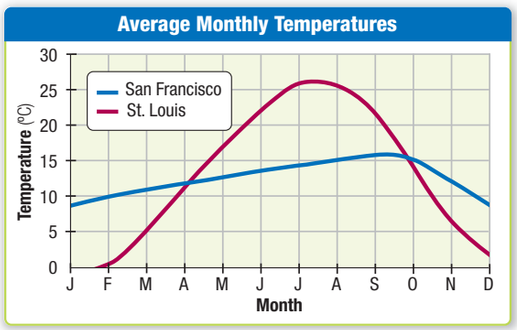
Use the diagram of the food chain to answer the following question(s).



19. Which organisms are consumers?

- **a.** the leaf and bird
- **b.** the tree and leaf
- **c.** the bird and caterpillar
- **d.** the tree and caterpillar

Use this diagram to answer the following question(s).



20. Estimate the difference between the average temperatures of San Francisco and St. Louis in July.

Critical Thinking

21. Predicting Outcomes What would happen to an ecosystem if all of the decomposers disappeared?

22. Analyzing Processes Which component of the carbon cycle removes carbon dioxide from the atmosphere?

23. Drawing Conclusions Why might wetlands be considered economically and environmentally important?

24. Evaluating Information For deciduous trees, compare the benefits and possible disadvantages of shedding leaves in the fall.

25. Forming Reasoned Opinions A friend says that the idea of food chains is silly because almost no ecosystems have simple food chains. Is your friend correct? Explain why or why not.

26. Forming Hypotheses Speculate what might happen to a plant if you sprinkle some nitrogen in a usable form on the soil near the plant.

Writing for Science

27. Advertisement Create an ad explaining how understanding the flow of energy through an ecosystem can help humans feed more people or put less pressure on ecosystems.

Methods of Science

28. Designing an Investigation You are asked to determine the biodiversity inside a local park. How will you measure the park's biodiversity? Explain why you chose this particular method.

Alternative Assessment

29. Research Find information about organisms that live in marine ecosystems. Compare deep-sea organisms with organisms that live near the surface. What are the major abiotic factors that influence the organisms at particular depths? Why don't animals near the surface also live deep below the surface? What is the source of food for animals in the deep sea?

30. Nature Study Spend the afternoon at a park. For every organism that you see, write down what the organism is and how it gets its energy (a butterfly, for example, is a herbivore that gets its energy from flowers). Create two bar graphs. Make one show the number of species in each trophic level and the other show the number of individuals for each trophic level. Explain the patterns that you find.

31. Research Find information on the eutrophication of freshwater ecosystems. Write an essay explaining what happens during this process and how the disruption of the phosphorus cycle affects the ecosystem.

Math Skills

32. Energy Pyramid Assume that 1 energy unit is required to support a great white shark. If an ecosystem has 1,000,000 units of energy at the phytoplankton level, how many great white sharks could this ecosystem support?

Critical Thinking

21. Nutrients would not be cycled through the ecosystem, and dead bodies would pile up. Organisms in the ecosystem would die or move to another ecosystem.

22. photosynthesis

23. Freshwater wetlands act as filters to clean pollutants out of water that flows through them.

24. Trees conserve water by shedding their leaves, but the energy and materials that went into growing and maintaining the leaves is lost.

25. The friend is correct. Most consumers feed on multiple trophic levels, and omnivores can eat both consumers and producers. Most communities are food webs, not food chains.

26. The plant would probably grow more quickly because the growth of many plants is limited by the availability of nitrogen.

Writing Skills

27. Advertisements will vary, but should stress the value of selecting foods that are lower on the food pyramid. Students should support their ideas with facts from the chapter.

Methods of Science

28. Answers will vary. Accept all answers that can be supported with logical reasoning.

Alternative Assessment

29. Abiotic factors that affect organisms at various ocean depths include sunlight, temperature, and water pressure. Organisms are adapted to the conditions of the ocean depth where they live. Some deep-sea organisms get food by eating materials that sink from above. Others are part of a food web that relies on chemosynthetic organisms as producers.

30. Answers will vary depending on organisms in the park. Students should note food chains.

31. Phosphorus can enter fresh water in sewage that contains detergents with phosphates. The phosphates stimulate algal growth, which can lead to oxygen deprivation in the water and result in fish kills.

Math Skills

32. The great white shark is four levels from the base of the pyramid representing phytoplankton. Thus, with 1,000,000 energy units at the base of the pyramid, there would be 100 units at the top of the pyramid. $(1 \times 10^{6})(1 \times 10^{-4}) = 1 \times 10^{2} = 100$ energy units available. If each shark needs one energy unit, the ecosystem can support 100 sharks.