Chapter 4

Answers to Section 1 Review

1. Biotic components include: caribou, plants (higher plants, lichen, moss). Abiotic components include air, water, rock, and light. Students could also include soil in both the biotic and abiotic lists.
2. Answers may vary. A population is a group of individuals of one species living in an area at a given time.
3. The abiotic factors, including water, air, rocks, and sunlight, are not part of a community.
4. A species is a group of organisms whose members can mate to produce fertile offspring. A population is a subset of a species; it consists of members of the same species that also live in the same vicinity.
5. Answers may vary. Students should understand that only biotic factors are part of a community.
6. Each species has evolved to occupy a certain type of habitat. If that habitat is destroyed, the species may become rare because its members cannot get all the things they need to survive.

Answers to Section 2 Review

1. An adaptation is an inherited trait that increases an organism's chances of survival and reproduction, such as thick fur, sharp claws, or a sticky tongue.
2. Organisms within populations differ in their traits. These differences make some organisms more likely to survive and reproduce in their environment than others in their population are. The genetic characteristics of populations change over time in response to these likelihoods, which is a process called *evolution.*
3. Answers may vary. Sample answer: Artificially selecting the most nutritious rice can help nourish more people.
4. When a pesticide is sprayed on insects, many of them die. But the insects that survive have traits that allow them to resist the pesticide. Those resistant insects produce offspring that are resistant, so the population becomes resistant.
5. If the environment contains limited resources, organisms that have certain characteristics or traits may be more likely to survive and reproduce in the environment than other organisms in the same environment.
6. No. This is an adaptation to the physical environment, so it is natural selection. Coevolution involves two organisms that have evolved mutually beneficial traits.

Answers to Section 3 Review

1. Many animals use the components of angiosperms for food. Many angiosperms depend on animals to pollinate them and to spread their seeds.
2. Algae make their own food using the sun's energy and in turn are the initial source of food for most ocean animals.
3. Archaebacteria: single-celled, lack nuclei, live in extreme environments; eubacteria: singlecelled, lack nuclei; fungi: have cell walls, absorb food through body surface; protists: mostly single-celled, most live in water; plants: multi-celled, photosynthesize food, have cell walls; animals: multi-celled, ingest their food
4. Fungi and some bacteria break down the remains of organisms and return the nutrients from the remains to the soil. Some bacteria also convert nitrogen to a form plants can use.
5. Many insects have evolved together with angiosperms. The success of angiosperms spurred the success of insects.
6. Angiosperms produce flowers as reproductive structures, while gymnosperms called *conifers* produce cones. Unlike the seeds of gymnosperms, the seeds of angiosperms are enclosed in fruit.

Chapter 4 Review

Using Key Terms

1. Sample answer: Thick fur is an adaptation that helps deer survive in cold weather.
2. Sample answer: An invertebrate does not have a backbone.
3. Sample answer: Water, rocks, light, temperature, and air are all abiotic factors in an ecosystem.
4. Sample answer: A habitat is the place where an organism lives.
5. Sample answer: A species is a group of organisms that are closely related and can breed to produce fertile offspring.
6. A community is a group of various species that live in the same place and interact with each other. A population is an interbreeding group of individuals of the same species in a given area.
7. Evolution is the change in the genetic characteristics of a population from one generation to the next. Natural selection is a

process that drives evolution in nature.

8. A gymnosperm is a plant whose seeds are not enclosed in fruit. An angiosperm is a plant that produces flowers and seeds enclosed in fruit.

9. Bacteria are single-celled organisms that lack nuclei. Protists can be multi-celled, and their cells contain nuclei.

Understanding Key Ideas

10. c
11. c
12. d
13. b
14. d
15. b
16. d
17. a

Short Answer

18. Energy, mineral nutrients, water, oxygen, and living organisms are all necessary to maintain an ecosystem.

19. Biotic factors are the living or once-living factors, and abiotic factors are the non-living factors.

20. An adaptation is an inherited trait that increases an organism's chance of survival. Evolution is a change in the genetic characteristics of a population from one generation to the next. Populations evolve adaptations.

21. Step 1: The pesticide kills most of the insects, but some are not killed; Step 2: The surviving insects pass the trait for resistance to their offspring; Step 3: Each time the pesticide is used, the resistant insects become a larger portion of the population, which is evolution.

22. Archaebacteria are single-celled, lack nuclei, and live in extreme environments. Eubacteria are single-celled, lack nuclei, and live in everyday environments. Fungi absorb food through their surfaces and have cell walls. Protists are mostly single-celled, and most live in water. Plants are multicelled, produce food through photosynthesis, and have cell walls. Animals are multi-celled and ingest their food.

Interpreting Graphics

23. The population dropped in size after each spraying.

24. Yes. The population still alive after each spraying steadily increased during the summer indicating that a larger and larger proportion of the population is resistant.

Concept Mapping

25. Answers to the concept mapping questions are on pages pp. 715–720.

Critical Thinking

26. No, individual people cannot evolve. Individuals with different traits can reproduce, and the traits that are best suited to the environment may become more common in the population. In this way, the genetic makeup of any population can gradually change.

27. Answers may vary. Leaf litter may accumulate because fungi are not there to help break it down. Plants that have fungal associations may not grow there.

28. Answers may vary. Many antibiotics are used in a hospital, so hospitals could be an area where bacteria evolve antibiotic resistance.

29. Answers may vary. Natural selection may not be taking place in most modern human populations because we are protected from most environmental factors.

Cross-Disciplinary Connection

30. Answers may vary.

Portfolio Project

31. Answers may vary.

Math Skills

32. Total plant mass is 2500 kg and total animal mass is approximately 500 kg. Therefore, the mass of the plants is about 5 times the mass of the animals.

33. 4,100 _ 1,700 _ 2.4; The ratio of bacteria to fungi is about 2.4 to 1.

Writing Skills

34. Answers may vary. Evolution provides a simple mechanism (natural selection) that explains why organisms are well suited to their environments, why populations change over time, and why and how new species develop.

35. Answers may vary. Insects are treated with a pesticide; most

die, but some are not harmed; over generations, insects that can survive the pesticide become a dominant part of the population; the pesticide eventually becomes ineffective because the insect population has evolved to be resistant to it.

Reading Skills

1. c
2. c

Standardized Test Prep Answers

1. C
2. I
3. A
4. F
5. Answers will vary. See Test Doctor for detailed scoring rubric.
6. Answers will vary. See Test Doctor for detailed scoring rubric.
7. D
8. G
9. Answers will vary. See Test Doctor for detailed scoring rubric.
10. D
11. H
12. D