Section Review 4-1

1. greenhouse effect **2.** Polar **3.** Temperate **4.** tropic zone **5.** The gases that trap heat energy in Earth's atmosphere are carbon dioxide, methane, water vapor, and some other atmospheric gases. **6.** Greenhouse gases allow sunlight to strike Earth's surface, where it becomes heat energy. By trapping this heat energy, greenhouse gases maintain Earth's temperature range. **7.** Earth's three climate zones are the result of differences in the angle of heating by the sun. **8.** The five factors that cause climate are: trapping of heat by the atmosphere; latitude; transport of heat by winds and ocean currents; amount of precipitation that results; shape and elevation of landmasses. **9.** Possible student answer: Because of the greenhouse effect, an increase in atmospheric carbon dioxide should cause an increase in the global temperature. **10.** The air over the sea is relatively cooler than the air over the sand.

Section Review 4-2

1. The factors that determine the survival and growth of organisms in an ecosystem are: biotic factors, which include the whole ecological community, and abiotic factors, which are the physical, non-living factors that shape ecosystems. **2.** Three community interactions are competition, predation, and symbiosis. **3.** The class of symbiosis in which one member benefits while the other is neither helped nor harmed is commensalism. An example is barnacles attached to the skin of whales. **4.** The two kinds of disturbances that change ecosystems are natural and human disturbances. **5.** In the process of succession, older inhabitants die out, and new organisms move in. **6.** Abiotic and biotic factors are among the conditions that identify a niche. **7.** All three types of symbiosis have different relationships. In mutualism, both species benefit from the relationship. In commensalism, one species benefits from the relationship and the other species is neither helped nor harmed. In parasitism, one species benefits from the relationship and the other species is harmed. **8.** Ecological succession takes place slowly because organisms usually modify their environment gradually. **9.** Primary succession occurs on newly exposed surfaces, such as on a fresh lava flow; secondary succession occurs when a disturbance does not destroy the soil, such as after a wildfire.

Section Review 4-3

1. c **2.** g **3.** e **4.** b **5.** f **6.** d **7.** h **8.** a **9.** i **10.** A: This biome is hot and wet all year. It must be a rain forest.; B: This biome is dry and has a short cool summer. It must be a tundra.

Section Review 4-4

1. depth, flow, chemistry of overlying water **2.** flowing-water, standing-water **3.** photic zone, aphotic zone **4.** intertidal zone, coastal ocean, open ocean **5.** Abiotic factors include temperate zone climate, saltwater, and low tides. **6.** Possible student answer: In estuaries, abundant plants, algae and bacteria support rich and productive food webs. Pollution that kills these producers might also endanger the organisms that rely upon them for food. Also, animals that spawn and nest in estuaries might be affected. **7.** Phytoplankton are at the base of many aquatic food webs. **8.** Sunlight penetrates the photic zone but not the aphotic zone. **9.** Most of the coastal ocean falls within the photic zone (the layer where photosynthesis occurs), while only a small part of the open ocean is in the photic zone. Yet, because of the sheer size of the open ocean zone, it still has more photosynthetic activity than the coastal ocean. **10.** Possible student answer: The deeper parts of the benthic zone would seem least likely to support life because of the high pressure, frigid temperature, and total darkness.

Chapter Vocabulary Review

1. f **2.** c **3.** d **4.** g **5.** h **6.** a **7.** b **8.** e **9.** mutualism, commensalism, parasitism **10.** ecological succession **11.** biome **12.** canopy, understory **13.** deciduous **14.** coniferous **15.** taiga **16.** plankton **17.** photic **18.** aphotic **19.** zonation **20.** a **21.** d **22.** a **23.** b **24.** a

Enrichment

1. Possible student answer: Time and parent material affect soil composition. Parent material determines the chemical make-up of the soil, and time works with other factors, such as weathering, to determine the size of the particles in the soil. **2.** Possible student answer: Soil composition affects the environment of an area by determining which plants can grow in the area. This, in turn, helps determine which animals can live there.

Graphic Organizer

1. Competition **2.** One organism captures and feeds on another organism. **3.** Symbiosis **4.** One organism lives in or on a host organism and obtains all or part of its nutritional needs from harming it, the host. **5.** Commensalism **6.** Both organisms benefit from the relationship.

Design an Experiment

Analyze and Conclude 1. Check graph to make sure time is on *x*-axis and number of organisms is on

y-axis. **2.** Possible student answer: Bacteria were most numerous at first, followed by heterotrophic protists, microscopic animals, and algae. The numbers of each organism grew steadily as the 2-week period progressed. **3.** Possible student answer: The bacteria appeared first, followed by smaller and eventually larger predatory protists. The bacteria decomposed the organic material present in the culture and supported the populations of protists that prey on them. Larger protists and some small animals appeared later; these organisms included some that prey on the protists that appeared earlier. **4.** Possible student answer: Yes, these changes can be understood as an example of succession in communities of microorganisms. The community that was observed started off with small, simple organisms (bacteria) and progressed to larger, more complex organisms (protists and small animals).