2. pioneer species: a species that colonizes an uninhabited area and that starts a process of succession

Section Review

SECTION: THE CYCLES OF MATTER

1. Sample answer: Evaporation is a change from liquid to gas, but condensation is the opposite change—from gas to liquid.
2. Sample answer: Decomposition is the breakdown of dead materials by organisms, but combustion is the breakdown of materials by burning.
3. B
4. Sample answer: In the water cycle, water falls to Earth's surface as precipitation. Some water reenters the atmosphere by evaporation from the surface and by transpiration from plants. Water condenses and falls as precipitation. Precipitation may run off and be stored in rivers, lakes, oceans, and groundwater.
5. Sample answer: The carbon cycle starts with photosynthesis in plants. Then, carbon moves through other living things such as animals and microorganisms. Some carbon moves from organisms into the air or soil through respiration, decomposition, or combustion.
6. 78 gal/d × 3.8 L/gal × 365 d/y = 108,186 L/y = 110,000 L/y
7. Student drawings should resemble the cycle diagrams in this section. Lines should be drawn connecting related parts, such as air (atmosphere), soil, animals, and plants (which play a role in each cycle). Also, students should note that decomposition plays a role in both the carbon and nitrogen cycles.
8. Sample answer: Animals might get calcium by chewing on bones; weather might break down bones and release the calcium back into the soil or water.

SECTION: ECOLOGICAL SUCCESSION

1. Sample answer: Succession is a slow change in species in one place over a long time.
2. A
3. Sample answer: First, fast-growing weeds such as crab grass invade; then, new weeds such as horseweed appear; next several shrubs and trees might start to grow; and eventually a forest may develop.
4. Sample answer: The community of cactuses and bushes in the Sonoran Desert is an example of a mature community. This community developed slowly as those organisms that were long-lived and well-adapted to the desert survived.
5. 739,000 ÷ 2,200,000 = 0.3359 or about 34%
6. Sample answer: A rain forest has high biodiversity, and a parking lot has low biodiversity.
7. Sample answer: Soil formation must occur before plants with roots can grow and continues even after a community has developed. Soil formation never stops because leaves, tree branches, and dead organisms contribute to the soil when they decompose.

Chapter Review

1. decomposition
2. succession
3. evaporation
4. Combustion
5. precipitation
6. condensation
7. C
8. B
9. A
10. C
11. C
12. D
13. B
14. D
15. Sample answer: streams, ditches and rivers, lakes
16. solid (ice), liquid, and gas (vapor)
17. Animals obtain carbon from the food they eat. Then, they give off carbon dioxide through respiration and contribute carbon to the soil through feces and decomposition.
18. Humans have the same roles animals do and also cause the release of carbon dioxide into the atmosphere through the combustion of fossil fuels.

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,19.nitrogen gas

20. The main difference between primary and secondary succession is that primary succession begins with the formation of soil. Secondary succession begins on preexisting soil. Pioneer species in primary succession are usually lichens, which begin the formation of soil. In secondary succession, there are no pioneer species but species such as seed plants may quickly germinate and take root in the soil.
21. An answer to this exercise can be found at the end of the Teacher Edition.
22. All water on Earth is part of the water cycle, even the water frozen in snow. This frozen water is part of the water cycle by evaporation or by becoming liquid that flows into the ocean.
23. Sample answer: under the city as groundwater from runoff precipitation; in the clouds as condensation; in glaciers and polar icecaps as what was once precipitation that may become recycled if it melts.
24. Sample answer: The Earth would soon be covered with water. The water cycle would be interrupted. It would no longer rain. Land organisms would probably go extinct.
25. Sample answer: The carbon and nitrogen cycles would be interrupted. Dead organisms might not decay, and nutrients would be locked in their bodies. Nitrogen might be locked in the atmosphere in an unusable form. All other types of organisms might eventually be unable to survive.
26. A lawn does not go through the stages of succession because it is constantly being disturbed by mowing and other activities.
27. A scientist would probably require a life span of more than 100 years to observe all of the stages of secondary succession on an abandoned field. Scientists can photograph changes for future scientists to observe. We know about past changes in certain areas because of historical records of disturbances. One scientist is able to observe several stages but not all stages.
28. D
29. 100% - 32% = 68% of previous water use
    380 L × 68 ÷ 100 = 258 L or about 260 L

Reinforcement

WHAT GOES AROUND

1. respiration
2. photosynthesis
3. A, B, D
4. B
5. precipitation
6. evaporation
7. A, C, D
8. B

Critical Thinking

1. Answers may vary. Sample answer: Scientists are concerned that future freshwater shortages may make producing enough crops to feed the world's growing human population difficult. Tapping into the saltwater supplies of the world's oceans would eliminate that concern.
2. Answers may vary. Sample answer: To move water from one place to another requires pumps, energy to operate the pumps, and a pipeline or trucks.
3. Answers may vary. Sample answer: Growing the saltwater crops near the ocean would reduce the distance the water would have to be transported. Doing so would reduce the transportation costs.
4. Answers may vary. Sample answer: Salt from the sea water could leach into the groundwater, making the fresh water salty. Also, salt could build up in the soil, making it unsuitable for crops that are not salt tolerant.
5. Answers may vary. Sample answer: Another difficulty might be that the types of crops that are salt tolerant may not be an appealing addition to many people's diets. Therefore, people may not buy the salt-tolerant produce.

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