**Section 3: Cycling of** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Key Ideas**

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| http://my.hrw.com/sh2/sh07_10/student/images/common/chevron_bio.gif | What is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_cycle? |
| http://my.hrw.com/sh2/sh07_10/student/images/common/chevron_bio.gif | Why are plants and animals important for carbon and oxygen in an ecosystem? |
| http://my.hrw.com/sh2/sh07_10/student/images/common/chevron_bio.gif | Why must nitrogen cycle through an ecosystem? |
| http://my.hrw.com/sh2/sh07_10/student/images/common/chevron_bio.gif | Why must \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_cycle through an ecosystem? |

**Why It Matters**

Water, carbon, phosphorus, and nitrogen are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_resources for organisms, including \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Natural cycles of these resources are important to ecosystems, but humans can disrupt these cycles.

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Water, carbon, oxygen, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and phosphorus are five of the most important \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_for life. An ecosystem must be able to cycle these kinds of matter in order to support life.

**Water Cycle**

Life could not exist without the *water cycle.*  **The water cycle** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**moves water between the atmosphere, the land, and the oceans.** As **Figure 9** shows, water vapor \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and falls to Earth’s surface as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Some of this water \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_into the soil and becomes groundwater. Other water runs across the surface of Earth into rivers, lakes, and oceans. Then, the water is heated by the sun and reenters the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Water also evaporates from trees and plants in a process called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

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| Water cycle |

**Carbon and Oxygen Cycles**

Carbon and oxygen are critical for life on Earth, and their cycles are tied closely together. The **carbon cycle** is the continuous movement of carbon from the nonliving environment into living things and back. The carbon cycle is shown in **Figure 10.**

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| Carbon cycle |

**Nitrogen Cycle**

All organisms, including you, need \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  **Nitrogen must be** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**through an ecosystem so that the** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**is available for organisms to** **make** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.** The **nitrogen cycle** is the process in which nitrogen circulates among the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, soil, water, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_in an ecosystem. The nitrogen cycle is shown in **Figure 11.**

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| Nitrogen cycle |

**Figure 11** Bacteria carry out many of the important steps in the nitrogen cycle, including the conversion of atmospheric nitrogen into a usable form, such as ammonia.

The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_is about 78% nitrogen gas, N2. But most \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_cannot use nitrogen gas. It must be changed into a different form. A few bacteria have enzymes that can break down N2. These \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_supply the nitrogen that all other organisms need. The bacteria split N2 and then bind nitrogen atoms to hydrogen to form ammonia, NH3. The process of combining \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_to form ammonia is callednitrogen fixation. Nitrogen may be fixed by lightning. But more nitrogen is fixed by bacteria. Nitrogen-fixing bacteria live in the soil and on the roots of some plants. Nitrogen is also fixed when humans burn fuels in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and industrial plants.

Plants get \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_by assimilation. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_is the process in which plants absorb nitrogen. When an animal eats a plant, nitrogen compounds become part of the animal’s body. During \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, nitrogen from animal waste or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_bodies is returned to the soil by bacteria. Ammonia is then converted to nitrite and then nitrate by the process of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Finally, in denitrification, nitrate is changed to nitrogen gas, N2, which returns to the atmosphere.

**Phosphorus Cycle**

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**is an important part of ATP and DNA and must be cycled** **in order for an ecosystem to support life.** The **phosphorus cycle** is the movement of phosphorus in different chemical forms from the surroundings to organisms and then back to the surroundings. Phosphorus is often found in soil and rock as calcium phosphate, which \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_in water to form phosphate. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of plants absorb phosphate. Humans and animals that eat the plants reuse the organic phosphorus. When the humans and animals die, phosphorus is returned to the soil.