



# Cycles of Matter

## Section 4-3

# Water Cycle

**Key Idea:** The water cycle continuously moves water between the **atmosphere** and the **land**, and the **oceans**.

# Water Cycle

Water:

- **condenses** and falls to Earth's surface as **precipitation**.
- **percolates** into the soil and becomes **groundwater**.
- **runs across** Earth's surface into rivers, lakes, and oceans.
- **heated** by the sun and reenters the atmosphere by **evaporation**.
- **evaporates from trees and plants** in a process called **transpiration**.

# Carbon and Oxygen Cycles

**Key Idea:** Animals, plants, and other photosynthesizing organisms play an important role in cycling carbon and oxygen through an ecosystem.

- **Carbon cycle** is the continuous movement of carbon from the nonliving environment into living things and back.
- **Respiration** is the process of exchanging oxygen and CO<sub>2</sub> between organisms and their surroundings.

# Carbon and Oxygen Cycles

- During the process of photosynthesis plants use  $\text{CO}_2$ , in the air to build organic molecules and  $\text{O}_2$  is released into the surroundings.
- Carbon is also released into the atmosphere in the process of combustion, the burning of fossil fuels.

# Nitrogen Cycle

**Key Idea:** Nitrogen must be cycled through an **ecosystem** so that the nitrogen is available for organisms **to make proteins.**

- The **nitrogen cycle** is the process in which nitrogen circulates among the air, soil, water, and organisms in an ecosystem.
- The word **convert** means to change from one form to another.

# Nitrogen Cycle

- The atmosphere is about 78% nitrogen gas.
- In nitrogen fixation, bacteria convert nitrogen gas into ammonia.
- Nitrogen-fixing bacteria live in the soil and on the roots of some plants.
- When an animal eats a plant, nitrogen compounds become part of the animal's body.
- In denitrification, nitrate is changed to nitrogen gas which returns to the atmosphere.

# Phosphorus Cycle

- **Key Idea:** Like water, carbon, oxygen, and nitrogen, phosphorus 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 Cycle

- Phosphorus is often found in soil and rock as calcium phosphate, which dissolves in water to form phosphate.
- The roots 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.