

**Volcanoes** ▪ *Section Summary*

## Volcanoes and Plate Tectonics

### Key Concepts

- Where are most of Earth's volcanoes?
- How do hot spot volcanoes form?

A **volcano** is a weak spot in the crust where molten material, or magma, comes to the surface. **Magma** is a molten mixture of rock-forming substances, gases, and water from the mantle. When magma reaches the surface, it is called **lava**. When lava has cooled, it forms solid rock. Lava released during volcanic activity builds up Earth's surface.

Volcanoes occur in belts that extend across continents and oceans. One major volcanic belt is the **Ring of Fire**, formed by the many volcanoes that rim the Pacific Ocean. **Volcanic belts form along the boundaries of Earth's plates.** At plate boundaries, huge pieces of the crust diverge (pull apart) or converge (push together). As a result, the crust often fractures, allowing magma to reach the surface. Most volcanoes form along diverging plate boundaries such as mid-ocean ridges and along converging plate boundaries where subduction takes place. Along the rift valley, lava pours out of cracks in the ocean floor, gradually building new mountains.

Many volcanoes form near converging plate boundaries where oceanic plates return to the mantle. Volcanoes may form where two oceanic plates collide or where an oceanic plate collides with a continental plate. Many volcanoes occur near boundaries where two oceanic plates collide. Through subduction, the older, denser plate sinks beneath a deep-ocean trench into the mantle. Some of the rock above the subducting plate melts and forms magma. Because the magma is less dense than the surrounding rock, it rises toward the surface. Eventually, the magma breaks through the ocean floor, creating volcanoes. The resulting volcanoes create a string of islands called an **island arc**. Volcanoes also occur where an oceanic plate is subducted beneath a continental plate.

Some volcanoes result from "hot spots" in Earth's mantle. A **hot spot** is an area where material from within the mantle rises and then melts, forming magma. **A volcano forms above a hot spot when magma erupts through the crust and reaches the surface.** A hot spot in the ocean floor can gradually form a series of volcanic mountains. The Hawaiian Islands formed one by one over millions of years as the Pacific plate drifted over a hot spot. Hot spots can also form under the continents. Yellowstone National Park in Wyoming marks a hot spot under the North American plate.