CHAPTER 9 Volcanoes

SECTION 2

Effects of Volcanic Eruptions

BEFORE YOU READ

After you read this section, you should be able to answer these questions:

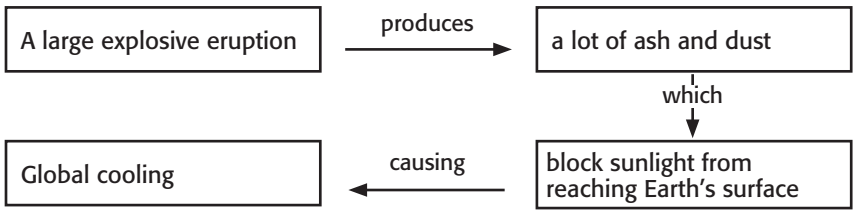
- How can volcanoes affect climate?
- What are three kinds of volcanoes?
- What are three structures that volcanic eruptions can form?

National Science Education Standards
ES 1c

How Can Volcanoes Affect Climate?

In 1815, a huge volcanic explosion happened on Mount Tambora in Indonesia. Historians estimate that the explosion killed 12,000 people. As many as 80,000 people died from hunger and disease following the explosion. However, the explosion did not affect only the people living in Indonesia. It also affected the climate worldwide.

Ash and dust from the explosion flew into the upper atmosphere. There, they spread across the Earth. They blocked sunlight from reaching the Earth's surface. As a result, global temperatures dropped. In 1816, there was a snowstorm in June! The colder temperatures caused food shortages in North America and Europe.



In 1991, an explosive eruption on Mount Pinatubo caused global temperatures to drop. Explosive eruptions may cause global temperatures to decrease by 0.5°C to 1°C. This may seem like a small change, but even small temperature changes can disrupt world climates.

STUDY TIP

Compare After you read this section, make a chart comparing the three kinds of volcanoes. Describe how each type of volcano forms and what it looks like.

TAKE A LOOK

1. Identify What causes global temperatures to drop after a large explosive eruption?

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How Can Volcanoes Affect the Earth's Surface?

In addition to affecting climate, volcanoes can have important effects on the Earth's surface. Volcanoes produce many unique *landforms*, or surface features.

The most well-known volcanic landforms are the volcanoes themselves. There are three main kinds of volcanoes: shield volcanoes, cinder cone volcanoes, and composite volcanoes.

STANDARDS CHECK

ES 1c Land forms are the result of a combination of constructive and destructive forces. Constructive forces include crustal deformation, volcanic eruption, and deposition of sediment, while destructive forces include weathering and erosion.

2. Describe How do shield volcanoes form?

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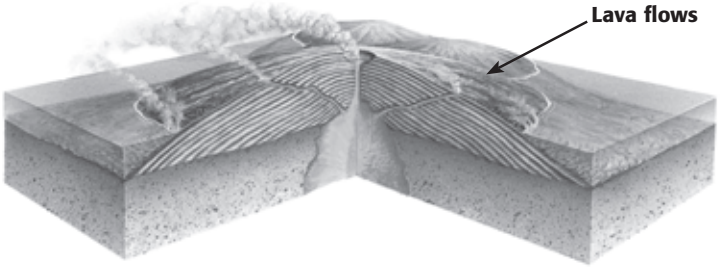
SHIELD VOLCANOES

Shield volcanoes form when layers of lava from many nonexplosive eruptions build up. The lava that forms shield volcanoes is thin and runny. Therefore, it spreads out in thin layers over a wide area. This produces a volcano with a wide base and gently sloping sides.

Shield volcanoes can be very large. For example, Mauna Kea in Hawaii is a shield volcano. Measured from the base on the ocean floor, Mauna Kea is taller than Mount Everest!



Shield volcanoes form when many layers of lava build up over time.

CINDER CONE VOLCANOES

Cinder cone volcanoes are made of pyroclastic material. The pyroclastic material is produced from explosive eruptions. As it piles up, it forms a mountain with steep slopes. Cinder cones are small. Most of them erupt for only a short time. For example, Paricutín is a cinder cone volcano in Mexico. In 1943, Paricutín appeared in a cornfield. It erupted for only nine years. ☑

Most cinder cone volcanoes are found in clusters. They may be found on the sides of other volcanoes. They erode quickly because the pyroclastic material is loose and not stuck together.

READING CHECK

3. Identify What are cinder cone volcanoes made of?

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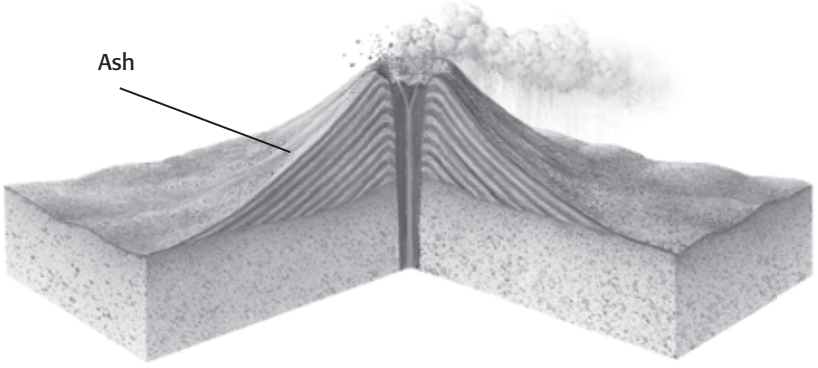

Cinder cone volcanoes form when ash from explosive eruptions piles up. Most cinder cones are small.

TAKE A LOOK

4. Identify Which type of volcanic eruption produces cinder cone volcanoes?

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COMPOSITE VOLCANOES

Composite volcanoes are the most common type of volcano. They form when a volcano erupts both explosively and nonexplosively. They have layers of lava flows and pyroclastic material. They usually have a broad base and sides that get steeper toward the top. Mount St. Helens is a composite volcano.

Critical Thinking

5. Infer The word stratum means "layer." Why are composite volcanoes sometimes also called stratovolcanoes?

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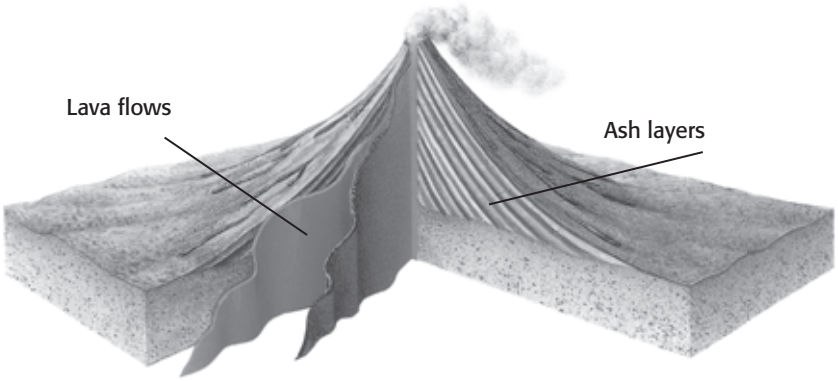

Composite volcanoes form from layers of ash and lava. Most have steep sides.

TAKE A LOOK

6. Identify What two materials are composite volcanoes made of?

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What Are Other Types of Volcanic Landforms?

In addition to volcanoes, other landforms are created by volcanic activity. The landforms include craters, calderas, and lava plateaus.

CRATERS

A **crater** is a funnel-shaped pit around the central vent at the top of a volcano. Lava and pyroclastic material can pile up around the vent. This produces a crater in the middle of the cone. ☑

READING CHECK

7. Define What is a crater?

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CALDERAS

A **caldera** is a large *depression*, or pit, that forms when a magma chamber collapses. The ground over the magma chamber sinks, forming a caldera. Calderas can look similar to craters, but calderas are much larger.

LAVA PLATEAUS

A **lava plateau** is a large area of land covered by a huge volume of lava. Lava plateaus are the largest volcanic landforms. They do not form at tall volcanoes. Instead, lava plateaus form when a large volume of lava erupts from a crack in the crust. Most of the lava on the Earth's surface is found in lava plateaus.

Name _____ Class _____ Date _____

Section 2 Review

NSES ES 1c

SECTION VOCABULARY

caldera a large, circular depression that forms when the magma chamber below a volcano partially empties and causes the ground above to sink	**crater** a bowl-shaped depression that forms on the surface of an object when a falling body strikes the object's surface or when an explosion occurs **lava plateau** a wide, flat landform that results from repeated nonexplosive eruptions of lava that spread over a large area

1. **Compare** Explain how a crater is different from a caldera.

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2. **Describe** How can volcanoes affect climate?

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3. **Identify** What are the three main types of volcanoes?

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4. **Explain** Why do shield volcanoes have wide bases?

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5. **Explain** Why do cinder cone volcanoes erode quickly?

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6. **Identify** What is the largest kind of volcanic landform?

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7. **Apply Concepts** Does the lava that forms shield volcanoes probably have a lot of silica or water in it? Explain your answer.

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