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Chapter Preview Questions

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b. rocks are changed by heat and pressure.

c. sediment is heated and cooled.

d. lava and magma cool and harden.

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Chapter Preview Questions

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a. earthquakes

b. mountain building

c. landslides

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Focus on the BIG Idea

What causes volcanoes, and how do they change Earth's surface?

You know that if you want to open a bottle of soda, you must do so carefully. Otherwise, the soda might spray out of the bottle as soon as you loosen the cap. What causes the soda to rush out with such force? How is this similar to what happens when a volcano erupts? Explain.

Build Science Vocabulary

Use Clues to Determine Meaning

Some volcanoes result from hot spots in Earthís mantle. A **hot spot** is an area where material from within the mantle rises and then melts. A volcano forms above a hot spot when the hot material erupts through the crust and reaches the surface.
A hot spot in the ocean oor can gradually form a series of volcanic mountains. For example, the Hawaiian Islands formed one by one over millions of years as the Pacific plate drifted over a hot spot.

Unfamiliar words

Hot spot is the subject of the sentence.

Definition, follows boldface

Explanation

Example

Build Science Vocabulary

Apply It!

Review the clues to the meaning of *hot spot*. Then complete the following.

1. What clue tells you that *hot spot* might be followed by a definition?

The term is in boldface and is the subject of the sentence.

2. What example helps you understand hot spots?

The Hawaiian Islands formed one by one over millions of years as the Pacific plate drifted over a hot spot

End of Chapter Preview

Section 1: Volcanoes and Plate Tectonics

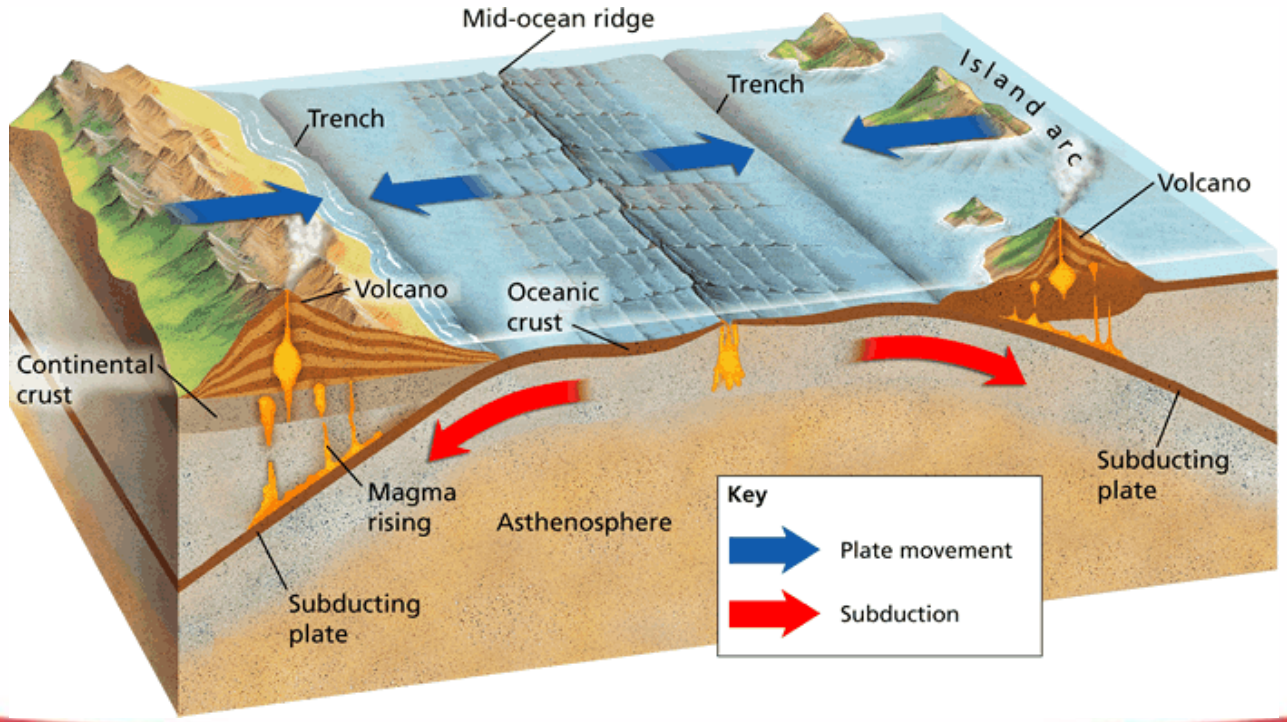
- Where are most of Earth's volcanoes found?
- How do hot spot volcanoes form?

Volcanoes and Plate Boundaries

Volcanic belts form along the boundaries of Earth's plates.

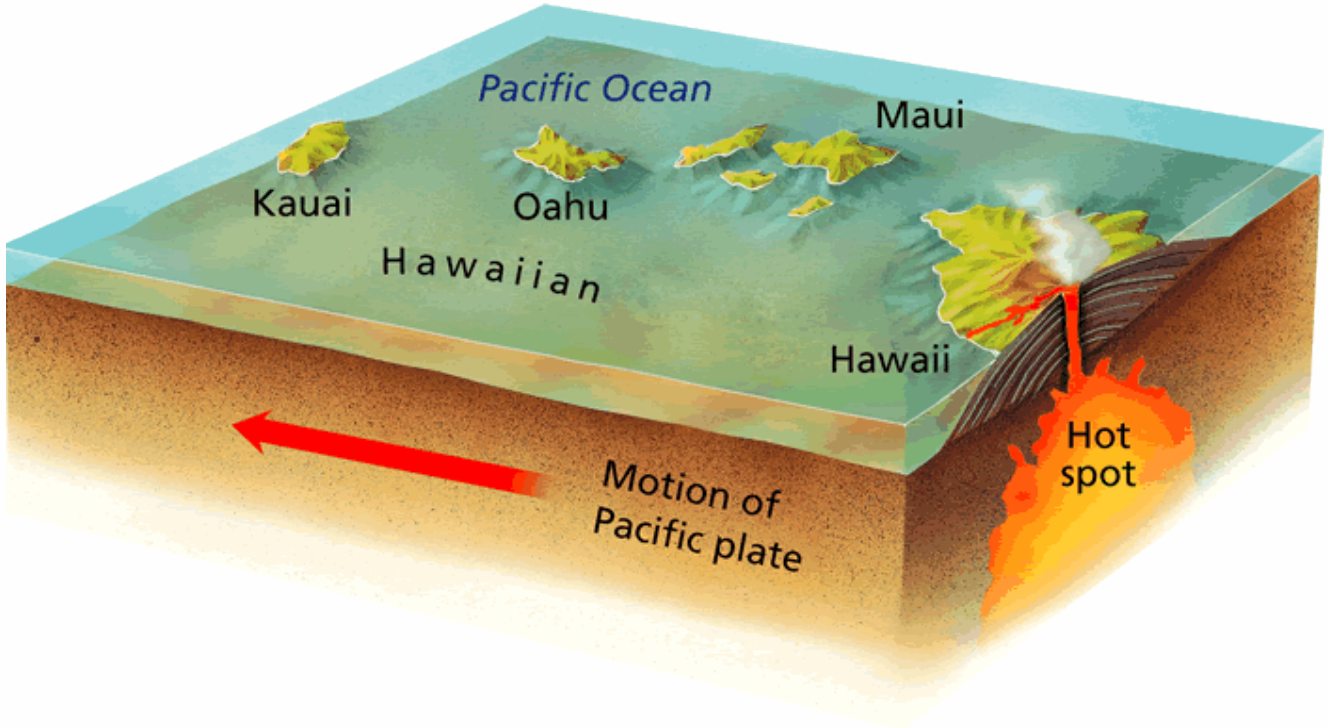
Volcanoes and Plate Boundaries

Volcanoes often form where two oceanic plates collide or where an oceanic plate collides with a continental plate. In both situations, an oceanic plate sinks through a trench. Rock above the plate melts to form magma, which then erupts to the surface as lava.



Hot Spot Volcanoes

A volcano forms above a hot spot when magma erupts through the crust and reaches the surface.



More on Volcanoes

Click the PHSchool.com button for an activity about volcanoes.

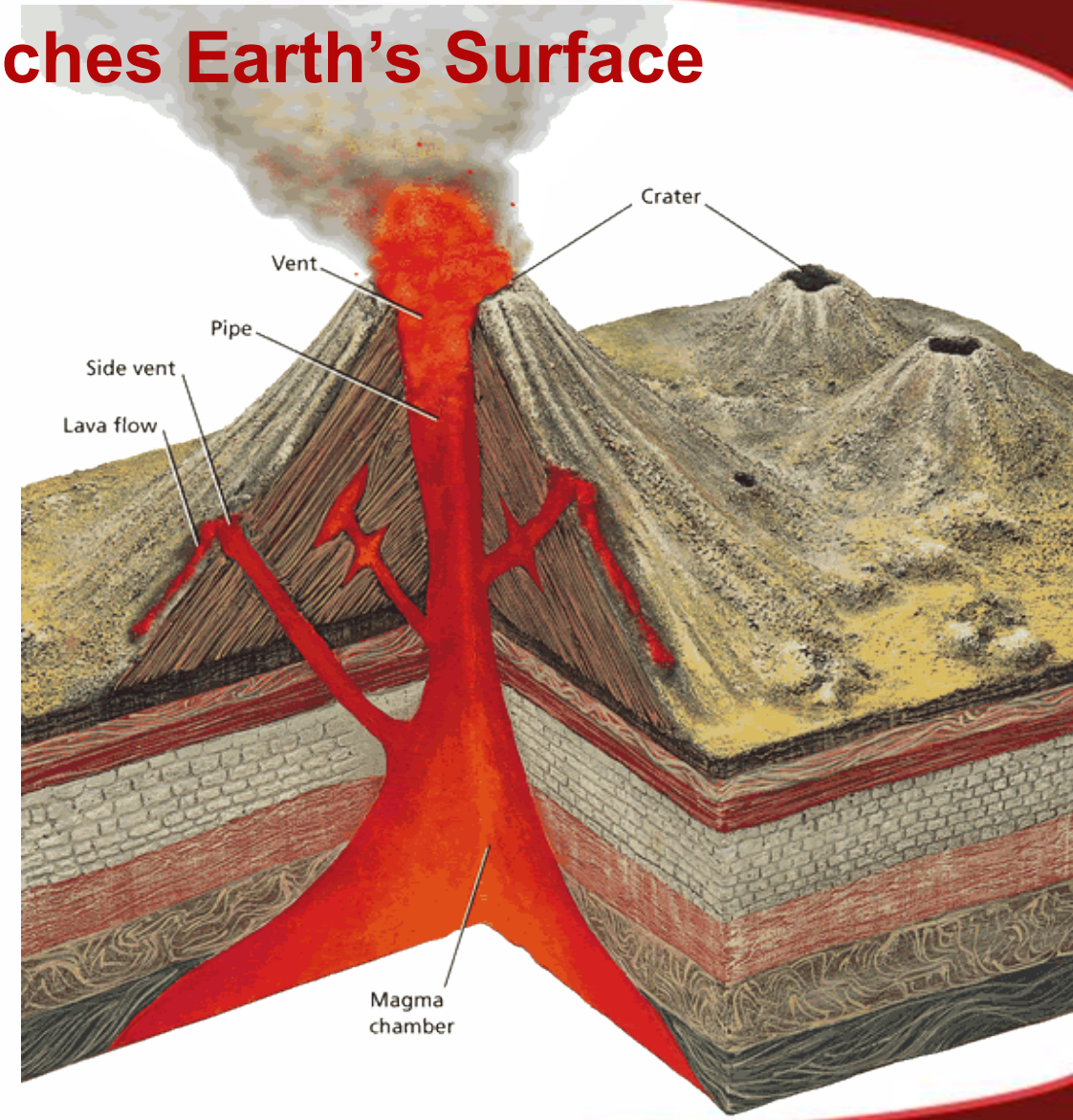
End of Section: Volcanoes and Plate Tectonics

Section 2: Volcanic Eruptions

- What happens when a volcano erupts?
- What are the two types of volcanic eruptions?
- What are a volcano's stages of activity?

Magma Reaches Earth's Surface

When a volcano erupts, the force of the expanding gases pushes magma from the magma chamber through the pipe until it flows or explodes out of the vent.

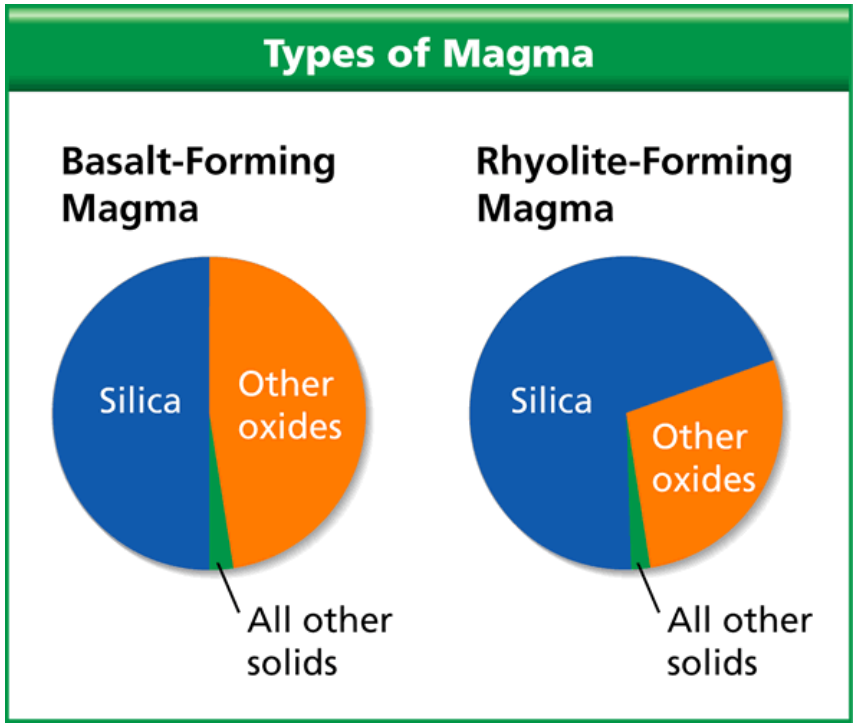


Composite Volcano Eruption Activity

Click the Active Art button to open a browser window and access Active Art about composite volcano eruption.

Math Analyzing Data

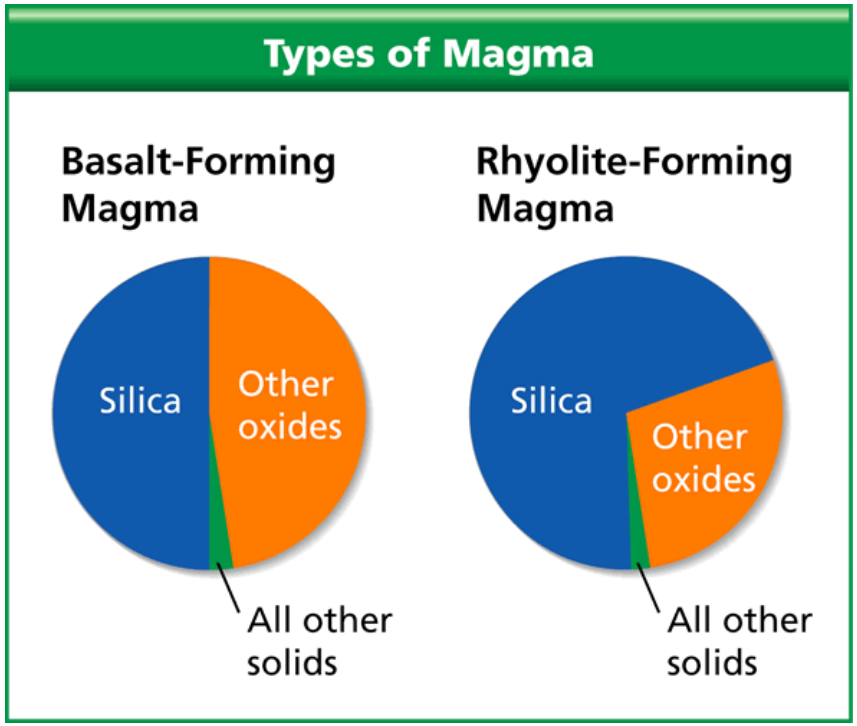
Magma Composition



Magma varies in composition and is classified according to the amount of silica it contains. The graphs show the average composition of the two types of magma. Use the graphs to answer the questions.

Math Analyzing Data

Magma Composition



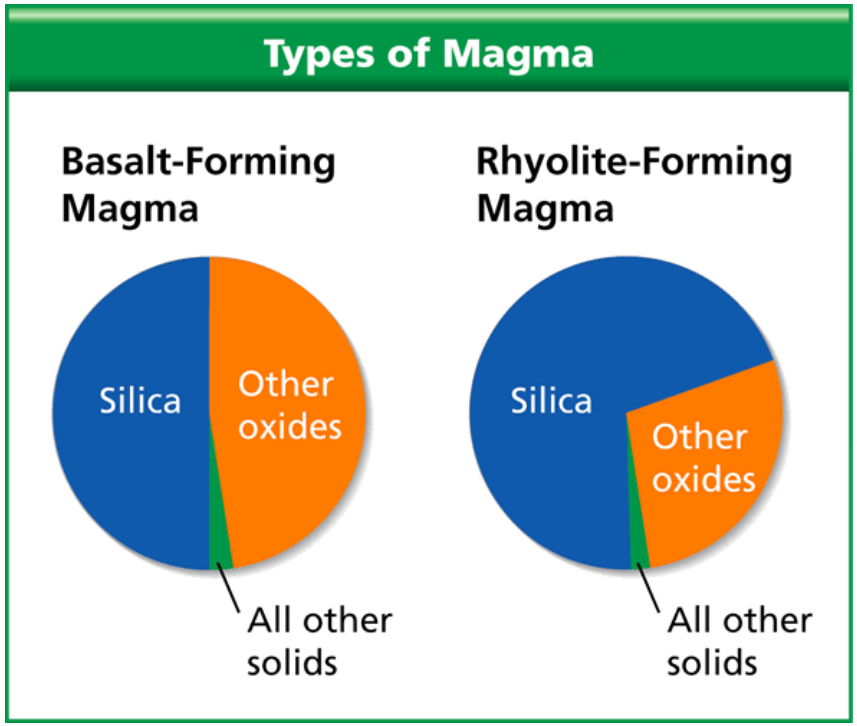
Reading Graphs:

Q. –Study both graphs. What materials make up both types of magma?

A. –Silica, other oxides, and other solids.

Math Analyzing Data

Magma Composition



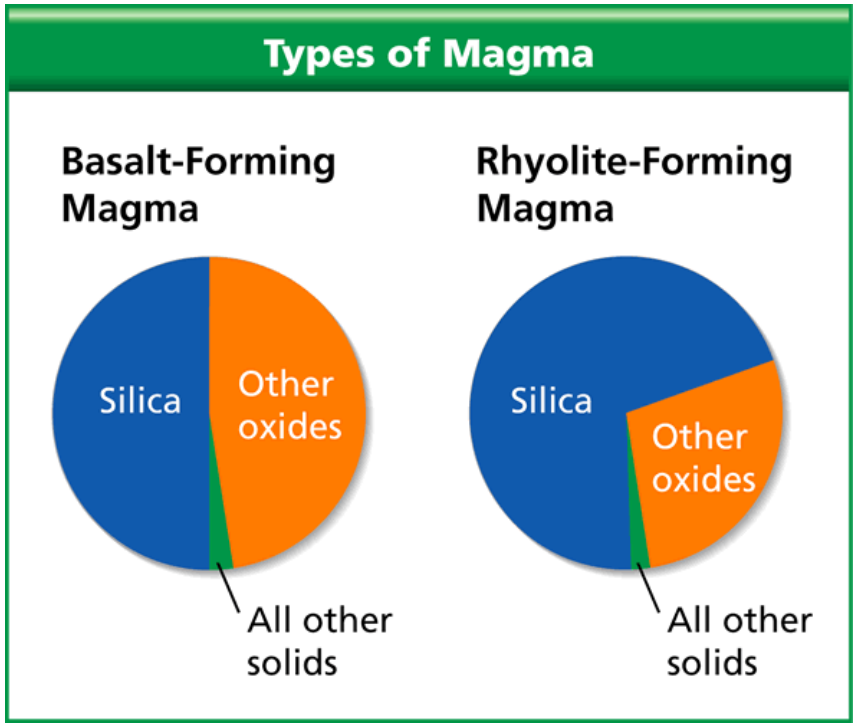
Reading Graphs:

Q. –Which type of magma has more silica? About how much silica does this type of magma contain?

A. –Rhyolite-forming magma; about 70 percent.

Math Analyzing Data

Magma Composition



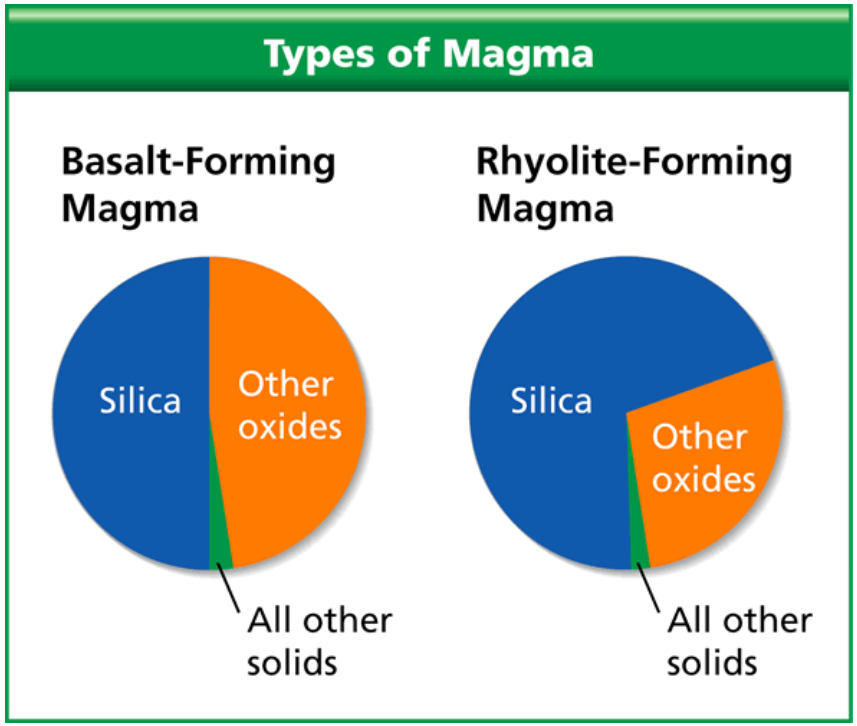
Estimating:

Q. –A third type of magma has a silica content that is halfway between that of the other two types. About how much silica does this type of magma contain?

A. –About 60 percent

Math Analyzing Data

Magma Composition



Predicting:

Q. –What type of magma would have a higher viscosity? Explain.

A. –Rhyolite-forming magma would have higher viscosity because it is higher in silica.

End of Slide

Kinds of Volcanic Eruptions

Within the last 150 years, major volcanic eruptions have greatly affected the land and people around them.

1980 Mount St. Helens
When Mount St. Helens in Washington exploded, it blasted one cubic kilometer of volcanic material skyward.

1991 Mount Pinatubo
Pinatubo in the Philippines spewed out huge quantities of ash that rose high into the atmosphere and buried nearby areas.

2002 Mount Etna
Bulldozers constructed a wall against a scalding river of lava creeping down the slopes of Mount Etna in Sicily.

1950 1975 2000

End of Slide

End of Section: Volcanic Eruptions

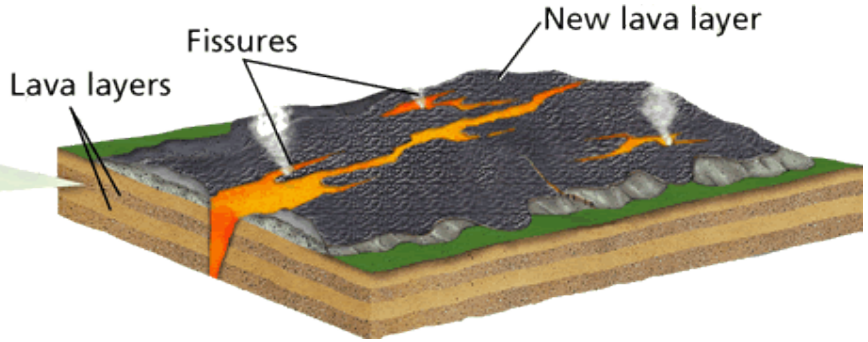
Section 3: Volcanic Landforms

- What landforms do lava and ash create?
- How does magma that hardens beneath the surface create landforms?

Landforms From Lava and Ash

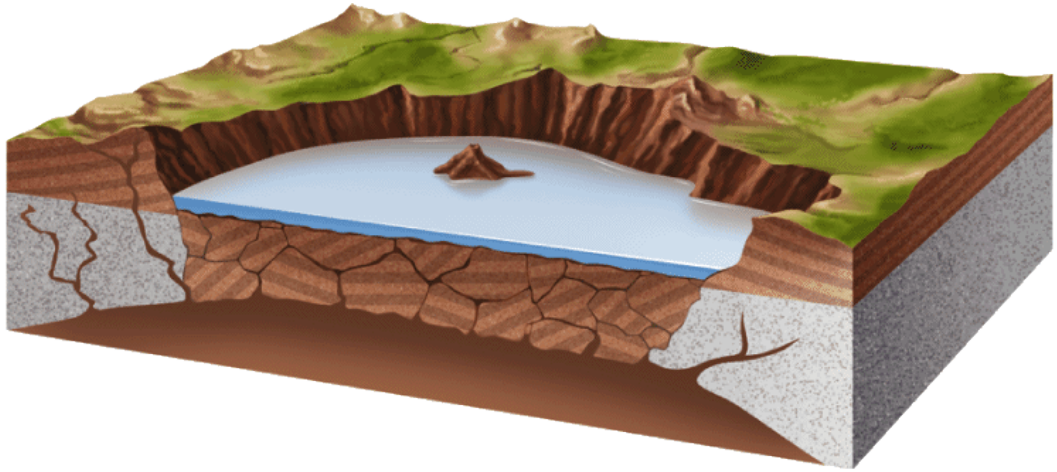
Volcanic eruptions create landforms made of lava, ash, and other materials. These landforms include composite volcanoes, shield volcanoes, cinder cone volcanoes, and lava plateaus.

Lava Plateau
A lava plateau is made up of many layers of thin, runny lava that erupt from long cracks in the ground.



Landforms From Lava and Ash

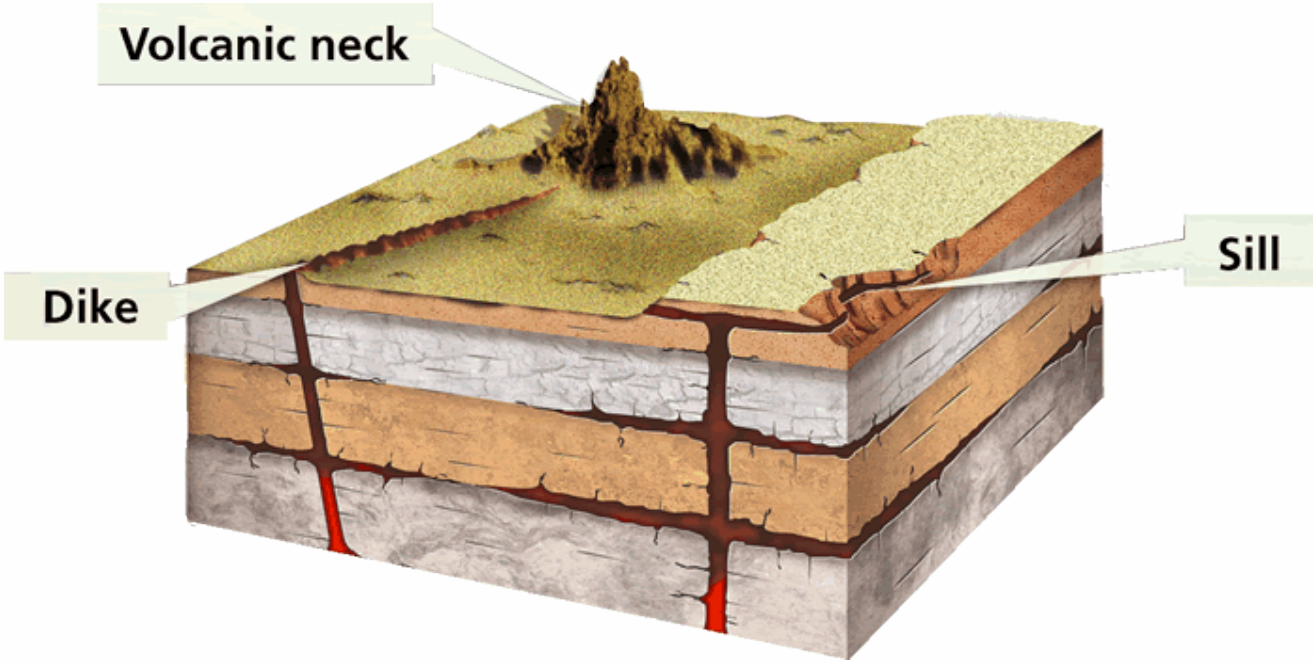
A caldera forms when an volcano's magma chamber empties and the roof of the chamber collapses. The result is a large, bowl-shaped caldera.



3 Later, a small cinder cone forms in the caldera, which partly fills with water.

Landforms From Magma

Features formed by magma include volcanic necks, dikes, and sills, as well as batholiths and dome mountains.



Batholiths

A batholith is a mass of rock formed when a large body of magma cools inside the crust. Several large batholiths form the core of mountain ranges in western North America. Half Dome in Yosemite National Park, California, is part of the Sierra Nevada batholith.

Links on Volcanic Effects

Click the SciLinks button for links on volcanic effects.

End of Section: Volcanic Landforms

Section 4: California Geology

- How does plate tectonics help to explain features of California's geology?

Plate Tectonics and California

The movements of three plates have shaped the geologic features of California over millions of years.

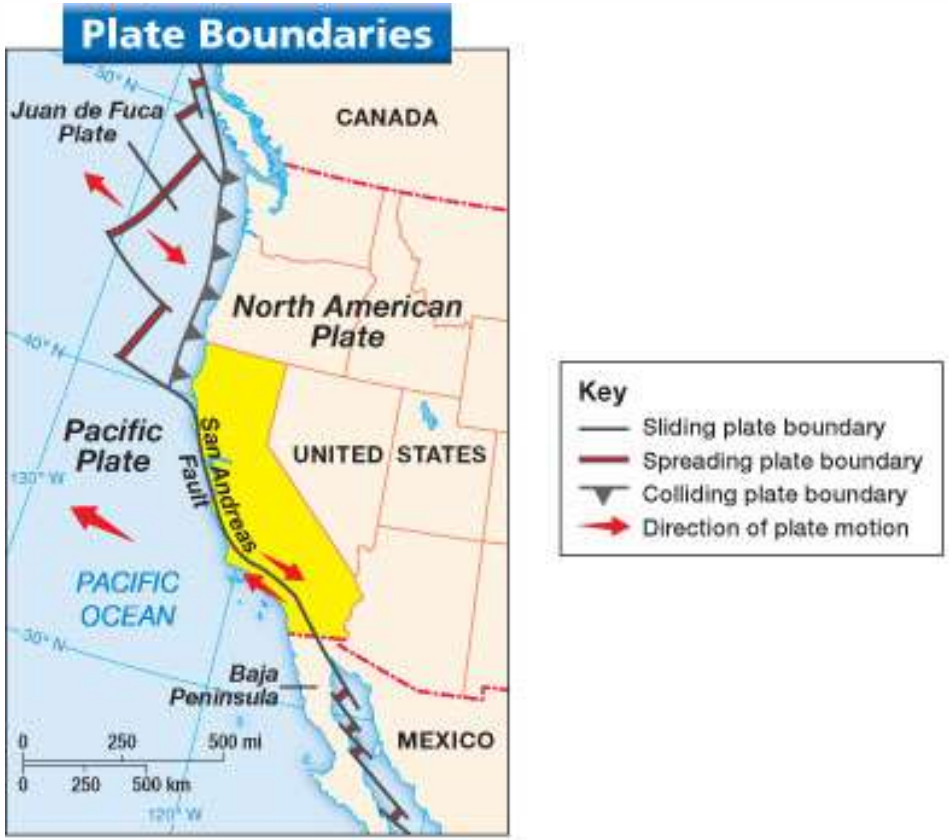


Plate Tectonics and California

Many geologic processes worked together to form California's landscape of volcanoes, faults, mountain ranges, and basins.

End of Section: California Geology

QuickTake Quiz

Click to start quiz.