

## VOLCANOES OF LASSEN

**SUMMARY:** Students will learn how volcanoes are formed through a hands-on demonstration.

**GOAL:** To increase student awareness and understanding of the processes that created the four major types of volcanoes found in Lassen Volcanic National Park.

**OBJECTIVES:** By the end of the demonstration, students will be able to (1) name the four major types of volcanoes found in the world and in Lassen Volcanic National Park, (2) describe how each of the four types of volcanoes are formed, (3) define the following terms: lava, magma, volcano, volcanic crater, volcanic vent, and volcanologist, (4) name and identify at least two kinds of volcanic rocks: basalt, andesite, dacite, pumice or cinder (upper grades).

**GRADE LEVEL:** Second through twelfth

**TIME REQUIRED:** 30 to 60 minutes

**LOCATION:** Classroom or field site

**MATERIALS:** Total cost is about \$20. (1) Volcano model made of 2'x2' piece of strong flat cardboard with a hole cut in the center to fit a one-pound coffee can. Cut both ends out of the can and push it up into cardboard with 3/4 of the can projecting above the top of the cardboard. Place sturdy paper plates around coffee can leaving the opening free to form a volcano shape. Secure paper plates to coffee can and cardboard base with strapping or masking tape. After all plates are in place, cover plates and cardboard base with plastic coated packaging tape. (2) Can of shaving cream. (3) Large tube of toothpaste. (4) Package of Sugar Pops or round puffed corn cereal. (5) Small funnel to fit in top of volcano (top of can). (6) Package of paper towels and plastic disposal bag. (7) Air or foot pump with extension tube. (8) Rock types: basalt, andesite, dacite, cinder, and pumice (optional). Rock types can be purchased through various educational supply companies. **Remember collecting rocks in Lassen Volcanic National Park is not allowed.** (9) Picture, puzzle, or model showing the inside of a volcano.

**SUBJECTS:** Earth Science, Geography, Geology

**KEY WORDS:** Lava, Magma, Volcano, Volcanologist, Basalt, Andesite, Dacite, Cinder, Volcano Crater, Vent

**BACKGROUND:** Teachers should read handouts on volcanoes provided by the park that define the terms and processes forming the four types of volcanoes (cinder cone, shield, plug dome, and strata cone or composite). Associated rock types should also be identified if used.

**INSTRUCTIONAL SEQUENCE:** (1) Using a picture, puzzle, or drawing of a volcano, have students explain what a volcano is. Define the terms: volcano, magma, lava, crater, and vent. Explain how a volcano is formed using these terms and answers given by the students. (2) Explain that you will demonstrate (with their help) how the four types of volcanoes are formed. (3) Proceed to demonstrate the four types of volcanoes. With each demonstration you will need two students to hold the volcano model and one student to demonstrate the eruption sequence. (4) Demonstration sequence follows.

**Plug Dome Volcano** (a) Explain that the magma and lava pushing up through the vent is like chunky peanut butter or toothpaste. Place a tube of toothpaste under and up through the center of the volcano model. Make sure the top of the toothpaste tube is above the rim of the model. Slowly squeeze the toothpaste tube so that the toothpaste comes out of the tube without going down the side of the tube. (b) Tell the children that this is how a plug dome volcano pushes up and is formed. Explain that because the magma moves slowly up through the volcano like toothpaste, pressure builds up within the earth, which usually results in a violent eruption. This thick pasty magma and lava cannot move very fast or travel very far down the side of the volcano. Since the magma moves slowly up through the volcano, larger crystals are able to form in the cooling magma, forming dacite lava rock. The magma reaches a temperature of 1500° F and is not as hot as other magmas. The lava, as can be seen from the demonstration, pushes up as a large mass forming a dome and as it cools it plugs the crater vent creating a plug dome volcano. (c) Show the students a piece of dacite lava. Name some famous plug dome volcanoes in Lassen Volcanic National Park: Lassen Peak, Chaos Crags, and Bumpass Mountain.

**Shield Volcano** (a) Shake the can of shaving cream well and place it under and up through the center of the volcano model. While the teacher holds the shaving can in place, have the student, who is demonstrating the shield volcano eruption, press on the shaving can to release the shaving cream. (b) Have students note the large volume of lava coming out compared to the plug dome volcano. The lava is hotter (2000° F.) and comes out quicker so no crystals are formed. Consequently, it flows easier and travels further forming a river of lava and a very large broad based volcano. Ask students if the eruption is pahoehoe lava or aa lava. Note: Pahoehoe lava is smooth in appearance; AA lava is jagged and sharp in appearance. Both are basalt type lavas. (c) Show a piece of basalt rock; note that there are no crystals in the rock since the lava cooled too quickly for them to form. (d) Name some famous shield volcanoes: Mount Harkness and Prospect Peak (in the Park), Mauna Loa, and Mauna Kea (in Hawaii).

**Cinder Cone Volcano** (a) Place a funnel on top of the volcano model. Connect a small air pump with the tube under and up through the model to the funnel opening. Place Sugar Pops, Rice Crispies, corn puffs, or any other light, dry cereal in the funnel. Activate the foot pump by having a student press down on it, which will result in the cereal being blown out simulating a cinder cone eruption. Have students pick up the cereal off the floor. Do not allow students to eat the cereal. (b) Share a piece of cinder volcanic rock. Have students note that there are lots of holes in the rock due to the magma having lots of gas in it. The holes are where gas bubbles once existed. The gas helped create this type of lava and eruption. It is like popcorn popping; it throws the erupting cinder lava out of the crater forming a cinder cone with an open crater in the center. (c) This is the most common type of volcano in the world. Name some famous cinder cones in the Park: Hat Mountain, Cinder Cone (near Butte Lake), and Fairfield Peak.

**Composite or Strato Cone Volcano** (a) Demonstrate any two or three of the previous volcano demonstrations in sequence to simulate the formation of a composite volcano, which is a combination of the other three types. This type of volcano is long lived and forms over many centuries. A common type of lava associated with this type of volcano is andesite. Composite volcanoes may have cinder cones on their tops. Name some famous composites outside the Park: Mount Shasta, Mount St. Helens, and Mount Rainier. A composite volcano within the Park: Mount Tehama; remnants of this volcano include Brokeoff Mountain, Mount Diller, Pilot Pinnacle, and Mount Conard. The Sulfur Works Thermal Area may have been its central vent area.

**EXTENSION/ENRICHMENT:** (1) Have students draw pictures of each of the four types of volcanoes. (2) Have students look up stories about famous volcanoes and their eruption history in a reference book or on the Internet and share with the class. (3) Have students demonstrate the shapes of the four types of volcanoes with body movement. Example: outside the classroom, students could do “jumping jack” type exercises demonstrating the shapes of the four types of volcanoes. Or students could do walking-type exercises demonstrating volcano lava flow: fast walk (shield volcano), explosive walk (cinder cone), slow walk (plug dome), and fast-explosive-slow at random walk (composite volcano).

**ASSESSMENT:** (1) Have students name and describe the four different types of volcanoes in writing or oral presentations. (2) Have students draw pictures of each type. (3) Have students write a story about the eruption sequence of one or more of the volcano types. (4) Have students locate and identify two or more of the volcano types demonstrated in this activity on a Lassen Volcanic National Park map.