# Volcanic Eruptions
# 4th Grade

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**References:**

- CPS Curriculum Guide 4th Grade Earth Science
- Reference 2

**Benchmarks:**

SLC/GLI #: ES-10

**Objectives:**

This lesson teaches students about rapid processes that change the earth's surface with volcanic eruptions as the primary example. In this lesson, students will simulate a volcano erupting and see the effects on the surrounding land.

**Materials:**

- 12-16 oz. water bottles
- balloons
- rubber tubing (about 18" per volcano)
- drill or something to put hole in bottom of bottles
- duct tape
- thin cardboard, or plastic/plexiglass, or equivalent (to act as volcano mound)
- foil baking pan
- soil
- plaster of paris, container for mixing, and craft stick for stirring
- water
- funnel
- red food coloring (optional)

**Initial Demonstration:**

The initial demonstration is a discussion of rapid processes that change the earth's surface and cause weathering and erosion. These include earthquakes, landslides/mudslides, and volcanoes, etc. Compare the timescales of these types of processes to the others that we've been learning about, such as river erosion and weathering by plants and ice. Use a landslide as a demonstration of a rapid process. Landslides happen because of gravity. The gravity is a force that pulls things down on the earth, and sometimes, gravity pulls the earth itself down. When a landform becomes unstable, possible due to weather such as wind, water, or ice melting, gravity can cause the unstable material to be pulled down. Show pictures of landslides. Demonstrate a landslide by making a mound of soil and rocks on a piece of cardboard or whatever you have.

Slowly tilt the board until gravity pulls the material down and makes it fall down the board. If you want a variation as well, you can redo the demonstration by tipping the board to a certain height where the material doesn't fall, but then if you pour some water on top, that will then cause the material to go ahead and fall. This shows how other outside forces, such as weather, contribute to landslides.

**Target Observations:**

- Students should notice that the soil falls down the board quickly the more it is tipped up.
- They should also notice that the soil falls down more easily when the water is poured on it.
- Finally, they could notice that it happened very quickly, especially compared to the other types of erosion and weathering that we've learned about.

**Procedure:**

In this lesson, students will be making their own volcano and observing the changes a volcanic eruption causes on the earths surface.

Teacher preparation:

You must first create the eruption mechanism with the water bottles. This is too complicated and time consuming for elementary school children to do. Directions:

1.) Cut each water bottle in half, but closer to the bottom than top (you will tape it back together later, but you need to be able to get inside to work).
2.) Drill a hole in the side, but near the bottom of each bottle the size of the rubber tubing (I used 5/16" diameter tubing).
3.) Thread the tubing into the hole, and put the end of it inside the mouth of the balloon.
4.) Tape the balloon onto the tubing with a small piece of duct tape.
5.) Slide the tube back out most of the way, so that the balloon is against the inside wall of the bottle. Tape around the tube where it enters the bottle, so it can't leak.
6.) Replace the top portion of the bottle on the bottom part, sliding the top part into the bottom part a little and tape all the way around the bottle with duct tape so that it doesn't leak. Your eruption mechanism is now fully created.
7.) Optional step: If you can find the materials, and excellent option could be inserted before step 6: make a cone with a diameter equal to that of the water bottle, and place it point up onto of the balloon to act as a plunger both to push the "lava" up and to block the lava from seeping in and around the balloon. As of writing this, I have not thought up a good material to use for this construction. It must be sturdy enough to hold up the plaster of paris mixture in the top portion of the bottle, but of a common material that is easy to find and make.
8.) If you also want to save time during the lesson, you can also cut the cardboard/plastic/plexiglass/sturdy construction paper/etc. to the necessary size and shape so that it can be easily folded into a conical section and taped around the mouth of the bottle to act as the volcano mound. Otherwise, make a pattern so at least the students can do it fairly quickly.

Student directions:

1.) Sprinkle a layer of soil into the bottom of your pan.
2.) Cut and/or fold the paper that will be the volcano mound around the mouth of the bottle. Tape it around the top and along the edge so that it stays in a cone shape.
3.) Pile more soil up along the sides of your volcano mound.
4.) Draw a picture of what your volcano looks like on your data sheet.
5.) Make a prediction of what will happen when it erupts.
6.) Place 2/3 cup of plaster of paris in a mixing container (empty, but completely open milk cartons may work well for this. Add 1/3 cup of water (and a few drops of red food coloring, if available). Mix until smooth.
7.) Quickly use the funnel to pour the plaster of paris into the top of the volcano.
8.) Immediately blow as hard as you can on the end of the tube to erupt your volcano.
9.) Make observations of your volcanic eruption and the end results on your data sheet (examples: how fast it happened, its effect on the surrounding terrain (soil/land), where the plaster of paris (lava) ended up, etc).

**Target Observations:**

- Students should notice that the "lava" erodes some of the soil on the side of the volcano.
- They should also notice that deposition results: when the "lava" hardens, it builds on the slopes of mountains, creating new rock features.
- Finally, they should notice that it happens quickly, compared to other erosion processes, such as that of water.

**Target Revised Model:**

- After this lesson, students should understand that volcanic eruptions are one way that the earth's surface is changed in a rapid process of both erosion and deposition.
- They should also be able to list other examples of rapid erosion/weathering processes, such as landslides and earthquakes.

**Summary:**

In this lesson, students learned about rapid processes that change the earth's surface. The emphasis was on landslides, through the initial demonstration, and volcanoes, through models created with water bottles, a plaster of paris and water solution, and air pressure. Students made their own volcanoes erupt from the air pressure, which caused erosion of the soil around the base of the volcano and deposition from the plaster of paris, which hardened into rock.