

# Volcanoes

Investigation Data Sheet



## Make A Tiltmeter

One of the tools that volcanologists use to make predictions about eruptions is a tiltmeter. Such a device measures changes in the slope or angle of the ground around a volcano. As a volcano nears eruption, it often swells as magma fills it. This swelling causes the ground around the volcano to rise and tilt. Tiltmeters measure how quickly the slope is changing. If the rate at which the ground tilts speeds up, it is a good clue that the volcano is becoming more active.

### Objective

Set up a simple tiltmeter and a simulated volcano slope to demonstrate how a tiltmeter shows changes in the slope of the ground near a volcano.

### Materials

- a shoe box with a hole about 1 to 2 centimeters in diameter cut out of the end
- a carpenter’s level small enough to fit into the shoebox
- scissors
- a balloon
- enough soil to fill the shoe box about  $\frac{3}{4}$  full

**Safety Notice:** All applicable laboratory safety rules must be followed. Students should not perform any experimental activity without the teacher’s supervision and express permission. Students must follow safety guidelines and wear appropriate protective gear.

### Procedure

- When the carpenter’s level is placed on a surface, the bubble in the cylinder will indicate whether or not that surface is level. If the surface is level, the bubble will be centered in the cylinder. The greater the angle of the slope, the farther the bubble will move toward the high end of the cylinder.
1. Make sure that you have already cut a hole about 2 centimeters in diameter in the end of your shoebox. Place your balloon through the hole so that the opening in the balloon hangs out of the shoe box. The balloon will represent the magma chamber inside your volcano.
  2. Fill the shoe box  $\frac{3}{4}$ -full with soil, covering the balloon in the process. This soil will represent the ground over the magma chamber.
  3. Smooth out your soil with your hand until it is fairly level. Place your carpenter’s level on the soil. Adjust the soil as necessary until the bubble in the level is exactly centered in the cylinder. This represents level ground around your volcano before magma enters it.

4. Now you’re ready to fill your simulated magma chamber with simulated magma. The balloon is the magma chamber and the air you will blow into it represents the magma. As the “magma” fills your “magma chamber,” the ground over the chamber rises — tilting your tiltmeter. The more air added, the more the change in slope increases.

### Conclusions

- What are some other tools scientists use to predict eruptions?

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