Toothpaste Chain Volcanoes

Overview:

Unlike most volcanoes, which are found at plate boundaries, Hawaiian volcanoes are found in the middle of the Pacific Plate. A hotspot below the plate provides a source of magma that fuels volcanic eruptions. Long-lasting eruptions from the hotspot produced the Hawaiian Islands. In this demonstration, students will see how a plate moving over a hotspot can produce a chain of island volcanoes.

Objectives:

The student will describe how chain volcanoes form over a hotspot.

Materials:

- Poster board or a thin cardboard (24" x 12")
- Marker
- Toothpaste
- Ketchup or mustard (optional)
- Student Worksheet: "Toothpaste Chain Volcanoes"

Answers to Student Worksheet:

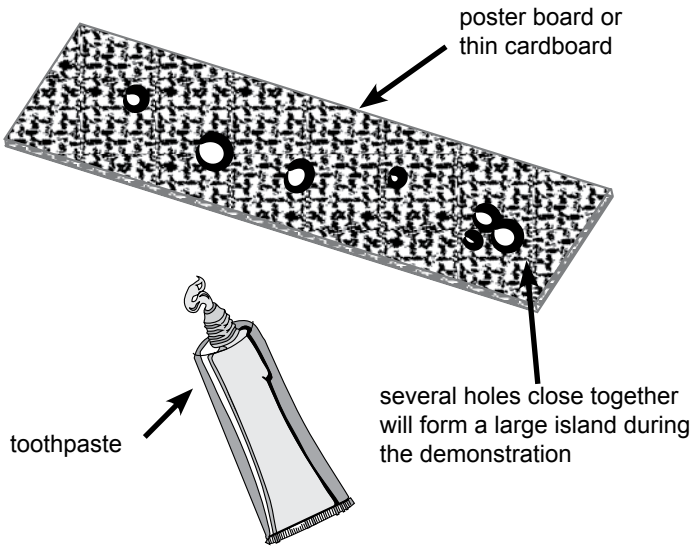
1. a) a plate moving over an erupting hotspot
2. closer to
3. answers will vary

Cultural Tie

According to traditional Hawaiian oral history, Pele came to Hawai'i from Tahiti. She landed first on the islands in the northern part of the archipelago, then gradually worked her way southeast, eventually settling on the Big Island of Hawai'i. This progression corresponds with the relative geologic ages of the islands, and the theory that the islands were formed as the Pacific Plate slid northwestward over a hotspot.

Toothpaste Chain Volcanoes

Activity Procedure:



1. In preparation for this activity, punch several holes in the cardboard (see diagram). On the last opening, punch 3 holes close together.
2. Explain that during this demonstration, the cardboard represents one of Earth's plates. The holes represent weak points in the crust that allow the formation of volcanoes. The toothpaste represents a hotspot.While squeezing the toothpaste tube, move the cardboard over the top to represent a plate moving over a hotspot to form a chain of volcanoes. The toothpaste should squeeze up through the holes and form mounds. A large mound should form over the three holes punched close together.
3. Using the marker, draw a compass on the cardboard. Show students the compass.
4. Discuss the direction your cardboard plate moved and how that relates to the age of the toothpaste volcanoes. Older volcanoes are further from the hotspot than younger volcanoes. If your plate is moving northwest, the older volcanoes are found on the northwest part of the plate.
5. Ask students to discuss the shape and form of the volcanoes you made.
6. Repeat the process, using ketchup squeezing from a bottle as the hotspot.
7. Explain that viscosity is a measure of how much a fluid resists flow. Discuss how a volcano made from a thicker, more viscous liquid would look. Discuss how a volcano made from the thinner, less viscous ketchup looked.
8. Distribute the Student Worksheet: "Toothpaste Chain Volcanoes." Ask students to use what they learned from the demonstration to help them answer worksheet questions.

Extension Idea: Ask students to explain to a partner how the ages of the Hawaiian volcanic islands relate to Pacific Plate movement.

Name:_____ **Student Worksheet**

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Directions: Use what you learned from the toothpaste and ketchup demonstration to answer the questions.

1. A chain of volcanic islands is formed by:
   a. a plate moving over an erupting hotspot
   b. hotspots moving under the plate

2. Circle the correct answer:
   Newer volcanoes are found (closer to / farther from) a hotspot than older volcanoes.

3. What direction did the cardboard plate move? Use the compass on the cardboard and what you know about the age of the toothpaste volcanoes to help you answer this question.

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