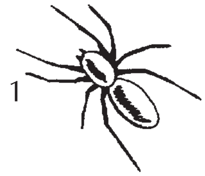


Activity #1

Haleakalā Past and Present

● ● ● Class Period One *The Influence of the Past on the Present*

Materials & Setup

- *ʻO Wākea iā Papa Hānau Moku* acetate (master, p. 9)
- Overhead projector and screen
- *Inside Hawaiian Volcanoes* video, Smithsonian Institution (provided with this curriculum)
- VCR

For each group of four to six students

- Small plastic bag of cinder (from a garden supply store)
- Small plastic bag of soil

For each student (optional)

- Student Page "*Inside Hawaiian Volcanoes* Quiz" (pp.10-11)

Instructions

1) Divide students into groups of four to six students. Give each group a bag of cinders and a bag of soil. Have them observe the contents of the two bags, write down a description of each, then write a comparison of the two.

2) Ask groups to share some of their responses.

3) Ask groups to write down an hypothesis about which would be easier for a plant to grow in and why. Again have groups share some of their responses. Help students consider the effects of the cinders' porosity (inability to store water) and sharpness (danger of cutting fragile roots) on the ability of plants to grow.

4) Ask students whether an earthworm would do best in the soil or cinders. What about a spider? Have students explain their reasoning.

5) Ask whether anyone has been to the summit area of Haleakalā. Did they see cinders up there? How about soil? The substrate of the summit area largely consists of cinders and other volcanic products such as lava bombs. These rocks can tell us a lot about the past, present, and future of Haleakalā. They tell a story about the challenges of life in the summit area. They tell us something about the age of Haleakalā. As Hawaiian volcanoes reach a certain stage, their eruptions tend to become more explosive and they tend to eject more cinders than lava flows. And they may help scientists predict the general location and timing of future eruptions. Deciphering the secrets of Haleakalā and learning from the mountain are the themes of this unit. In order to learn about the present, we need to understand the past.

6) Show the *'O Wākea iā Papa Hānau Moku* acetate. Read the chant aloud with students. Take the "one" role yourself or ask a student who is proficient in Hawaiian pronunciation to take that role. This chant illustrates one view of the origin of the Hawaiian Islands. Ask students to share ideas about how this chant compares with their understanding of the origin of the islands.

7) For another perspective, show the *Inside Hawaiian Volcanoes* video (25 minutes).

8) As homework, assign students the task of writing and/or illustrating how plate tectonics theory explains the formation of the Hawaiian Islands.

Teaching Option

- Instead of, or in addition to, the homework assignment, have students complete the Student Page "*Inside Hawaiian Volcanoes* Quiz."

Journal Ideas

- How is the formation of the Hawaiian Islands explained in Hawaiian tradition? Write and/or illustrate your response, and keep in mind that there is more than one traditional explanation of the Islands' origin. You may wish to find another version than the one presented in the chant you read during class.
- Compare the plate tectonics explanation of the formation of the Hawaiian Islands with a traditional Hawaiian explanation.

Assessment Tools

- Student writing and illustrations of the plate tectonics theory explanation of Hawaiian Islands formation
- Optional: Student Page "*Inside Hawaiian Volcanoes* Quiz" (teacher version, pp. 7-8)
- Journal entries

Teacher Version

Inside Hawaiian Volcanoes Quiz

1) What is the name of the rock that Hawaiian volcanoes are made of?

   Hawaiian volcanoes consist almost entirely of a rock called basalt.

2) If the active volcano Lo‘ihi, now 914.6 meters (3000 feet) beneath sea level southwest of Kīlauea Volcano, has .3 meters (1 foot) of lava added to its summit each year, when will the volcano become an island?

   A little over 3000 years from now

3) Geologists know that the increasing weight of a growing volcano progressively depresses or pushes down the underlying sea floor. How will this process affect the time needed for Lo‘ihi to become an island?

   Lo‘ihi will require more time to become an island because of that process.

4) What is the geographic relationship between most active volcanoes and the boundaries of tectonic plates? Do the Hawaiian volcanoes conform to this general relationship? Why or why not?

   Most active volcanoes are located along the boundaries between the crustal plates. These are locations where the processes of global plate tectonics favor the emergence of magma at the boundaries.

   The Hawaiian volcanoes do not conform to this general situation and instead are near the center of the largest of all the crustal plates, the Pacific Plate. The Hawaiian volcanoes receive magma from a “melting spot” or “hot spot” in the mantle, 25 miles or more beneath the ocean floor. The reason for the existence of the hot spot is not known.

5) Hawaiian volcanoes swell or inflate before eruptions. How can the resulting change in shape of the ground surface be measured?

Inflation-caused change in shape (ground deformation) of Hawaiian volcanoes can be measured a) by leveling surveying stations to determine their change in elevation, b) by using an electronic distance-measuring instrument to determine changes in horizontal distance and, c) by leveling the corners of a triangle to determine changes in the slope or tilt of the ground surface.

6) Most Hawaiian volcanoes are called shield volcanoes because of their broad, gentle profiles. Why do you suppose this shape is so common for Hawaiian volcanoes, in contrast to shapes of such steep-sided cones as Mount St. Helens and other high volcanic peaks in the Cascade mountain range of the Pacific Northwest?

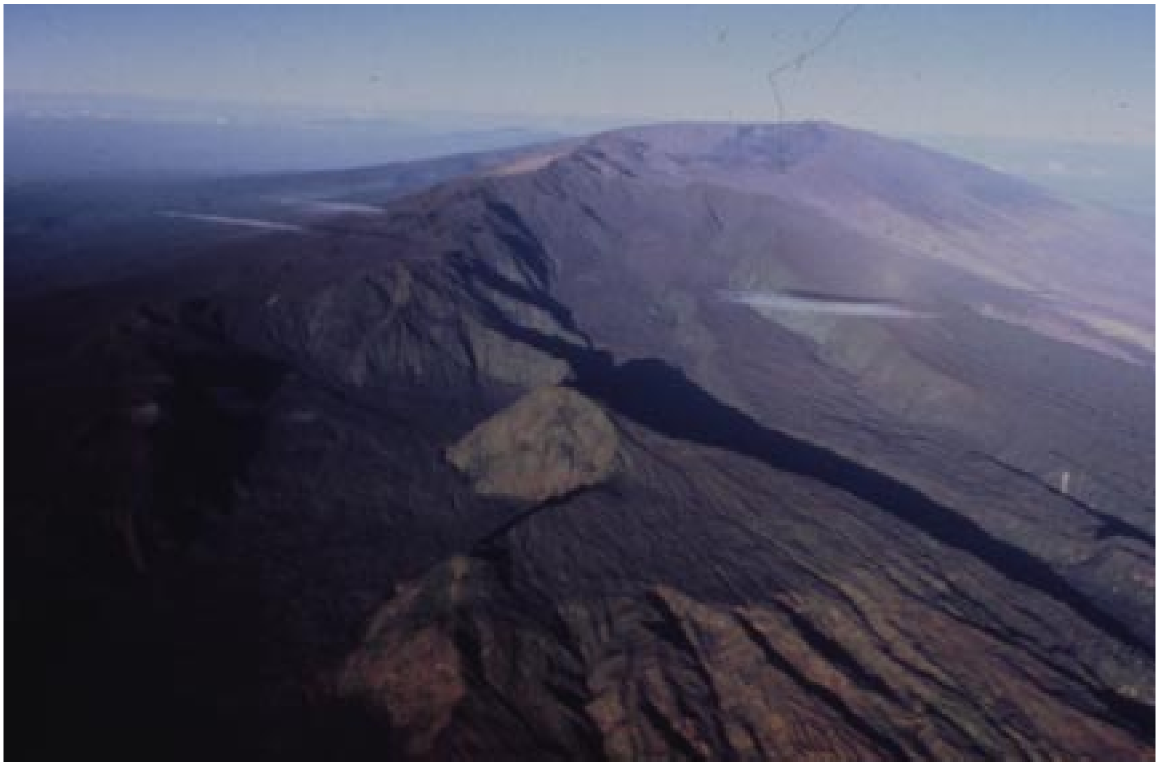
Hawaiian lavas (basalt) flow far more easily (lower viscosity) than the lavas (andesite and dacite) of a volcano like Mount St. Helens. Flows of high fluidity tend to spread farther and thinner than the stickier (higher viscosity) Mount St. Helens lavas. In addition, a Hawaiian volcano erupts lava flows at many vent areas on its flanks (rift zones) as well as at the summit. This wide vent distribution helps to build a similarly wide volcano with a broad, gentle profile.

7) Which is older, the West Maui volcano or Haleakalā? Explain your reasoning.

The West Maui volcano is older. Reasoning may include:

• West Maui is more weathered and eroded than Halekalalā.

• Haleakalā is located southeast of the West Maui volcano. The Hawaiian Islands are progressively older to the northwest.



Haleakalā from the air (Photo: The Nature Conservancy)

‘O Wākea iā Papa Hānau Moku

(Malo/Traditional)

One: *‘O Wākea noho iā Papa-hānau-moku*
All: *Hānau ‘o Hawai‘i, he moku*
Hānau ‘o Maui, he moku
One: *Ho'i hou ‘o Wākea noho iā Ho'ohōkūkalani*
All: *Hānau ‘o Moloka‘i, he moku*
Hānau ‘o Lāna‘i ka ula, he moku
One: *Lili-ōpū-punalua ‘o Papa iā Ho'ohōkūkalani*
Ho'i hou ‘o Papa noho iā Wākea
All: *Hānau ‘o O‘ahu, he moku*
Hānau ‘o Kaua‘i , he moku
Hānau ‘o Ni‘ihau, he moku
He ‘ula a o Kaho‘olawe

This chant talks about the birth of the Hawaiian Islands.

First is Hawai‘i and Maui born of the union between Wākea (Sky Father) and Papa (Earth Mother).

Then Wākea is with Ho'ohōkūkalani (his daughter) and Moloka‘i and Lāna‘i are born.

Then Papa and Wakea have O‘ahu, Kaua‘i, Ni‘ihau and Kaho‘olawe.