Teacher’s Notes for Geology Lessons:
FORMATION & EVOLUTION OF HAWAI‘I

Objectives: 1) To understand how the Hawaiian Islands formed, and how they continue to evolve today; 2) To see how Hawaiian culture and science interact and reinforce each other

These lecture notes reference:
A) Vocabulary
B) Powerpoint: Hawaiian Islands Formation
C) Activity #1 (Map and calculation)
D) Reading: Hawaiian Legends (Pele) www.coffeetimes.com/pele.htm

Vocabulary
• Hot spot: Places inside the Earth that are unusually hot, for example the Hawaiian Hotspot located to the SE of the Island of Hawaii.
• Subsidence: Sinking
• Dikes: Magma that solidifies inside the earth
• Summit: Very top of a volcano
• Flank: Side of a volcano

Suggested Sequence:
1. UNIT PRE-TEST: see Teacher’s Notes
2. INTRO LECTURE & POWERPOINT: Define Hot Spot and other vocabulary terms (see lecture notes below). Show the PowerPoint (see notes & questions below each slide). Explain that Hawai‘i’s islands form atop a hot spot, and evolve as the Pacific Plate moves northwest over the hot spot. Evolution includes erosion, coral reef development, beach formation and island subsidence. Discuss the relative ages of the Hawaiian Islands (more northwest = older). (Visual = big map of the Hawaiian Islands)

3. ACTIVITY #1 - BRAINSTORM: How fast is O‘ahu moving? Distribute maps & brainstorm how to solve. (NW point of O‘ahu is 400km from hotspot and 4 million years old. Rate = distance/time = 40,000,000cm / 4,000,000yrs = 10cm/year). See map in lecture notes.

4. Optional - DRAW CONCLUSIONS & SHARE: In cooperative groups, have students draw then share what they know about the Hawaiian Islands (e.g., Big Island has lots of lava & black sand beaches; Kaua‘i & O‘ahu have forests and white sand beaches). Discuss if this makes sense in terms of their ages (yes). Note how conclusions were drawn by Hawaiian kahuna and western scientists.
5. Optional - TALK STORY WITH GUEST SPEAKER &/OR GROUP

READING: A cultural expert &/or geologist can preview the readings below (see “Pele Goddess of Fire” reading and “Hotspots – Mantle Thermal Plumes” below) then ask students if they think that the ancient Hawaiians knew the relative ages of the islands. Or, if no guest can be found, divide the reading(s) into small sections and have students review & share Hawaiian legends explaining the formation of the Hawaiian Islands by Pele. Draw correlations between these legends and modern scientific explanations.

6. SUMMARIZE KEY POINTS.
   a. Review lifecycle of Hawaiian islands. Northwest = older, as supported both by Hawaiian legends and modern science; also true within an island (e.g., Wai’anae volcano in NW O’ahu is older than Ko’olau).
   b. Science should make sense. If it conflicts with what you observe around you, you need to clarify.

Teacher Resources

www.coffeetimes.com/pele.htm
Article about Pele, Goddess of Fire by Betty Fullard-Leo

http://pubs.usgs.gov/gip/dynamic/hotspots.html
USCG: Hotspots Thermal Mantle Plumes. An explanation of how the Hawaiian Islands and other volcanoes form in the interior of plates fit into plate-tectonics.

http://www.spacegrant.hawaii.edu/class_acts/VolcanologyDoc.html
Hawai‘i Institute of Geophysics and Planetology, University of Hawai‘i at Manoa, Hawai‘i Space Grant Consortium. Hands-on activities for exploring planets in the classroom.