Lava flow in Hawaii

On the Big Island of Hawaii, Hawai‘i, the volcano Kilauea has been erupting since 2008. Now, however, the volcano’s lava flow is approaching homes and a town.

One of the active lava flows is in the region of Pu‘u ‘Ō‘ō which is 10 miles east of the summit of Kilauea and is inaccessible to the public. This flow has slowed and is not approaching villages, roads, or people.

The other lava flow is near the village of Pāhoa and has now crossed a road and covered a cemetery near the town. Residents are packing up and moving out.

Below is a map of the island of Hawai‘i so that you can appreciate where the volcanic activity is now and where the village of Pāhoa is located.

On Monday, October 27, 2014 the leading edge of the lava flow advanced between 8 and 11 yards per hour.

1. At this rate, how far will the lava creep in one day?

2. Describe that distance in football field lengths.

The width of the flow’s leading edge is about 55 yards wide.

3. Describe that distance in football field lengths.
There are two kinds of lava flows. One flow, a’a lava flow, is too hot to stand near.

i. Pahoehoe lava flow is the cooler flow. Pahoehoe, meaning "smooth, unbroken lava" is basaltic lava that has a smooth, billowy, undulating, or ropy surface. These surface features are due to the movement of very fluid lava under a congealing surface crust. Because the surface of this kind of lava quickly solidifies it is easier to be near than a’a lava since it feels cooler on the surface.

![Pahoehoe lava](image)

ii. A’a, meaning "stony rough lava" and also to "burn" or "blaze" is another type of flow lava. ‘A’ā is basaltic lava characterized by a rough or rubbly surface composed of broken lava blocks called clinkers. Since this sort of lava is made up of clinkers being pushed along by molten lava it is much hotter to be near.

![A’a lava](image)

4. If you could bear the heat of standing 10 feet away from the leading edge of the flow, about how long would it take for the flow to move about 6 inches towards you?

As of Monday, October 27, 2014, the leading portions of the flow crossed Apa’a St/Cemetery road early Sunday morning traversed the cemetery and continued northeast. The front moved about 130 yards from 4:30 pm to 7:30 am the next morning.

5. Has the flow rate slowed at all since the rate that was mentioned just before problem number 1? Show your calculations.
6. Below is a large image of Monday’s U.S. Geological Survey map of where the lava is spreading. The dotted lines are where the steepest path downhill is and where the lava is expected to travel. Use a ruler and the scale written below the map to decide when the lava might reach Pahoa Village Road.

The grayish solid section surrounding the Pahoa cemetery marks the lava flow from the day before = Monday. The darker solid area to the right of Monday’s flow shows Tuesday’s flow.

Flow front map at 1:12,000 scale

Brian wondered when the lava flow would reach the Pacific Ocean but I couldn’t find a contour map that showed an image of the expected flow direction to the Ocean.

7. Why do you suppose it is not that important to calculate when the lava flow will reach the Ocean?

Source:  http://en.wikipedia.org/wiki/Lava
http://hvo.wr.usgs.gov/maps/
http://www.nps.gov/havo/planyourvisit/lava2.htm

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