

---

## PART 1: A\_Shield Volcanoes

---

At the end of the activity, each group member will turn in:

1. One completed table of Submarine Rift Zone lengths and orientation of the Hawaiian Ridge.
2. One graph with plotted Rift Zone lengths and orientations.
3. Completed questions below.

### Overview

- With your group you will look at a map of the Main Hawaiian Islands and answer questions below.
- Then, after checking your results with the instructor, with your group you will fill out a table of Rift Zone lengths and orientations for the Northwestern Hawaiian Islands.

### Directions and Questions

#### MAIN HAWAIIAN ISLANDS

1) How many large **shield** volcanoes make up each of the Main Hawaiian Islands? (start from youngest island, to the east, to the oldest island, in the west)

Hawai'i      Maui   Kaho'olawe      Lāna'i      Moloka'i      O'ahu      Kaua'i      Ni'ihau

2) Indicate how many **subaerial** (above sea level) rift zones you see on each of the Main Hawaiian Islands.

Hawai'i      Maui   Kaho'olawe      Lāna'i      Moloka'i      O'ahu      Kaua'i      Ni'ihau

**\*\*Note: It may be very difficult to clearly distinguish subaerial rift zones on some islands. Generally, you are looking for broad topographic ridges that radiate from the center, or top, of a shield volcano.**

3) Indicate how many **submarine** (below sea level) rift zones you see around each of the Main Hawaiian Islands.

Hawai'i      Maui   Kaho'olawe      Lāna'i      Moloka'i      O'ahu      Kaua'i      Ni'ihau

**\*\*Note: Generally, you are looking for broad topographic ridges that radiate away from the coasts of the islands. Not all islands have clearly distinguishable submarine rift zones.**

4) What are the **lengths** and the **orientations** of the submarine rift zones on the selected Main Hawaiian Islands listed below?

*For lengths:* estimate in kilometers from the coastline to the tip, or end, of the rift zone. Use ruler and convert centimeters to kilometers.

*For orientations:* estimate orientation in degrees, from 0-360°, the direction of the tip of the rift zone points from the volcano summit. Use a full circle protractor.

Hawai'i		Maui		O'ahu		Kaua'i	
<u>Length</u>	<u>Orientation</u>	<u>Length</u>	<u>Orientation</u>	<u>Length</u>	<u>Orientation</u>	<u>Length</u>	<u>Orientation</u>

5) Check with your Instructor to see how you did before estimating rift zone lengths and orientations for the Northwestern Hawaiian Islands.

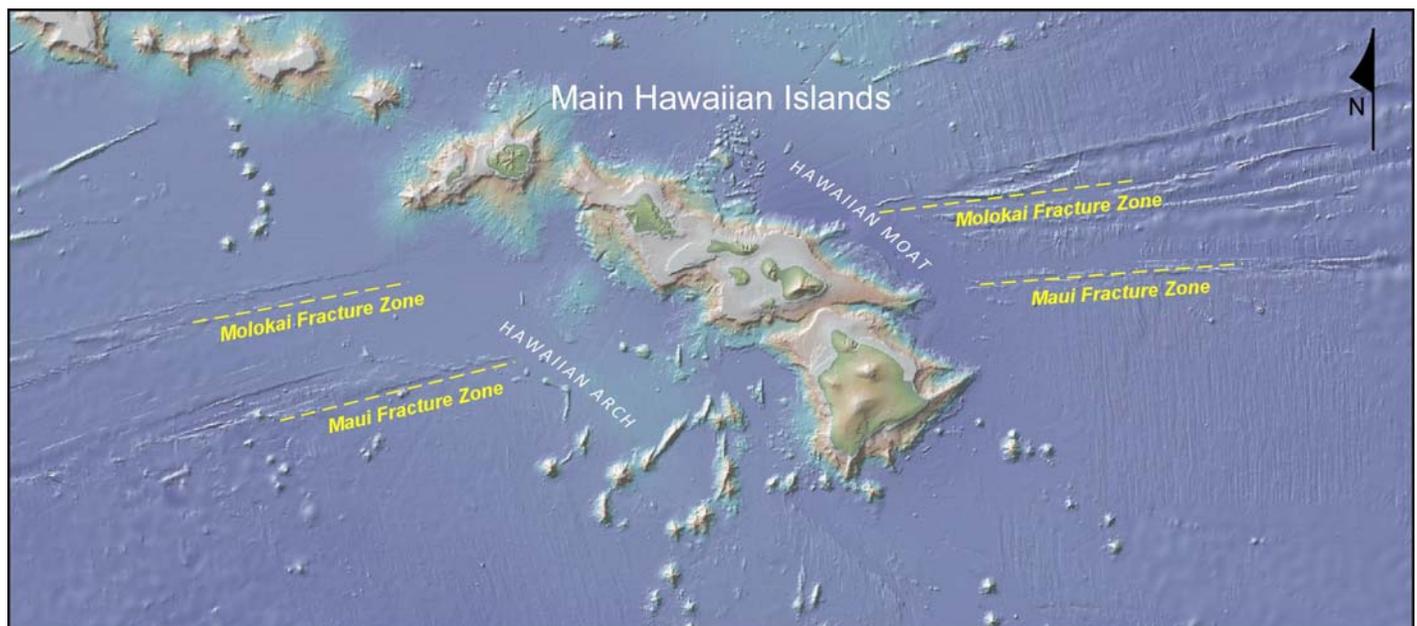
## NORTHWESTERN HAWAIIAN ISLANDS

6) **COMPLETE TABLE PROVIDED:** Each group member will FILL OUT the table of **Submarine Rift Zone lengths and orientation of the Hawaiian Ridge**. Your group should divide the table so each member only does ONE of the FOUR parts of the Hawaiian Ridge, so you will each be working on separate parts of the Hawaiian Ridge. Once each member has filled out their section of the table, you can share results so you each group member has a completed table with all the rows filled out. [**\*\*Record only the LONGEST rift zone, where there are multiple rift zones on a single shield volcano\*\***]

7) **COMPLETE GRAPH PROVIDED:** Each group member will PLOT the rift zone lengths and orientations on the graph provided for **Rift zone lengths (km) vs. Distance to Kilauea (km)**. You should draw a dot on the graph for the length of each rift zone, and a line over the dot estimating the direction, or orientation, of the rift zone from 0 to 360 degrees.

8) **Summarize your observations** about the changes in **length** and **orientation** of the rift zones along the Hawaiian Ridge in several sentences, addressing these questions:

- Is there a preferred orientation or length for the rift zones?
- How does the general orientation of the rift zones compare with the orientation of **fracture zones** within the Pacific Ocean crust on the MAP below?
- Describe TWO possible **explanations** for the variation in the length and orientation of rift zones for the Northwestern and Main Hawaiian Islands of the Hawaiian Ridge.



**SUBMARINE RIFT ZONES OF THE HAWAIIAN RIDGE**

#	Volcano/ seamount name	Dist. from Kilauea (km)	Rift zone length (cm)	Rift zone length (km)	Rift zone orientation (degrees)
			cm (on map) x 4=km (on ground)		
1	Academician Berg	2608			
2	Turnif	2586			
3	Kure	2543			
4	Nero	2492			
5	Midway	2447			
6	Ladd	2391			
8	Salmon Bank	2316			
7	Pearl & Hermes	2293			
9	Kilo Moana	2114			
10	Lisianski	2052			
11	Pioneer Bank	1998			
12	Kaiuli	1940			
13	W. Northampton	1886			
14	E. Northampton	1846			
15	Laysan	1831			
16	Mōlī	1795			
17	Maro East	1747			
18	Maro West	1682			
19	Raita	1611			
20	NW Gardner	1514			
21	Gardner	1449			
22	West St. Rogatien	1365			
23	St. Rogatien Bank	1339			
24	W. Brooks Bank	1317			
25	Brooks Bank	1302			
26	SE Brooks Bank	1284			
28	Kānehunamoku	1235			
27	French Frigate Shoals	1230			
30	Mokumanamana	1080			
31	Necker SE	1045			
32	Keoia	963			
33	Twin Banks West	920			
34	Twin Banks East	901			
35	Westpac Bank	871			
36	Nīhoa West	825			
37	Nīhoa East	794			
38	Middle Bank	702			
39	Nīihau	565			
40	Kaua'i	519			
41	Wai'anae, O'ahu	374			
42	Ko'olau, O'ahu	339			
43	West Moloka'i	280			
44	East Moloka'i	256			
45	Lāna'i	226			
46	West Maui	221			
47	Kaho'olawe	185			
48	Haleakalā	182			
49	Māhukona, Hawai'i	145			
50	Kohala, Hawai'i	100			
51	Hualālai, Hawai'i	65			
52	Mauna Kea, Hawai'i	54			
53	Mauna Loa, Hawai'i	20			
54	Kīlauea, Hawai'i	0			

