

Ready to Rumble

Concept Development

Challenge: How can you determine the type of plate boundary by examining focus depth data?

Materials: plate boundary map
colored pencils
graph paper

Let's Dig In:

In this activity you are given data about the focus depth of ten different earthquakes in five different regions on Earth. With your lab partner, construct a line graph of the different earthquakes at each of the five locations. Each data set should be plotted with a different colored pencil, but on one graph. Be sure to figure out the range of numbers you will need on the vertical axis before you begin plotting your points. Your graph will need to have the axes labeled and numbered. Include a title.

Data Table Focus Depth for Various Earthquakes

Location	Plate Boundary Type	Earthquake Number							
		1	2	3	4	5	6	7	8
California Focus Depth (km)	Transform	19	13	34	9	10	9	22	12
New Zealand Focus Depth (km)	Ocean-Ocean Convergent	12	105	72	49	146	246	133	264
Atlantic Ocean (middle) Focus Depth (km)	Divergent	10	1	8	5	16	21	13	15
Chili Focus Depth (km)	Oceanic-continental Convergent	20	420	195	390	85	240	55	320
Central Asia (Himalayan Mt.) Focus Depth (km)	Continental-continental Convergent	13	24	13	33	124	85	36	55

Go Figure:

1. Which location(s) generally have shallow focus depth?
2. Which location(s) generally have a deep focus depth?
3. Consider the locations that include deep focus quakes. What type of plate boundary features do they have in common?
4. What types of plate movement cause only shallow focus earthquakes?
5. Why do both deep and shallow earthquakes occur along convergent boundaries?

Teacher Notes
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GEOMES Topic: The Dynamic Earth – Earthquakes

Lab setup:	none	<u>easy</u>	moderate	difficult
Reasoning level:	easy	moderate	<u>difficult</u>	
Time required:	20-40 minutes	<u>40-60 minutes</u>	60-90 minutes	
Process skills:	<u>interpreting data</u>	<u>comparing</u>	<u>inferring</u>	

Objectives: Students will use earthquake data from five different locations on earth to correlate focus depth with different types of plate boundaries.

National Education Science Standards:

Content Standard: Earth and Space Science - Structure of the earth system
Science as Inquiry: Understandings about scientific inquiry

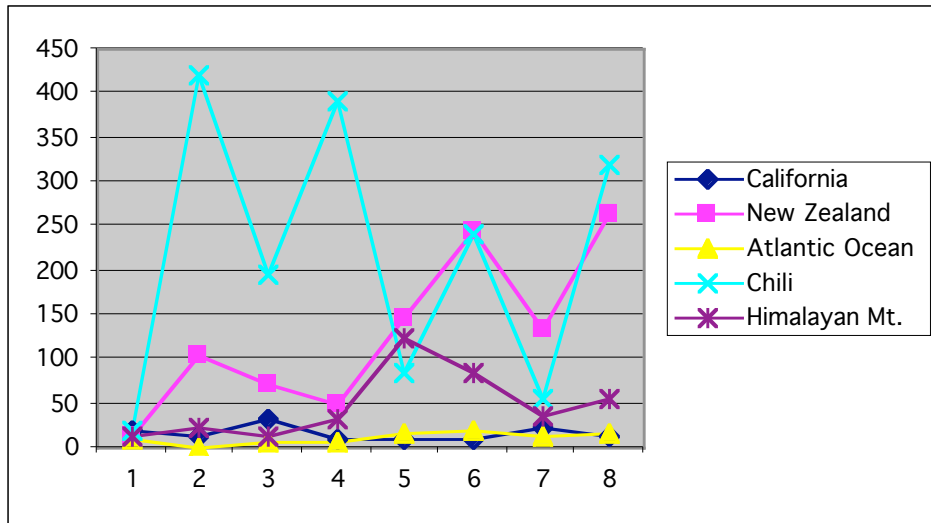
Materials: graph paper
plate boundary map from a textbook or can be found at the USGS web site

Teaching Strategies:

The data for the data sets was gathered from the USGS website. The site includes a wealth of information about earthquakes and plate boundaries. This activity is based on the assumption that the students have some knowledge about plate tectonics. Students should be familiar with the three types of plate boundaries; convergent, divergent, and transform. Within these main types, are combinations of the two types of plates, oceanic and continental. Students should know about subduction zones as well. The purpose of this concept development activity is to allow students to make connections between the types of plate boundaries and the focus depths of earthquakes. Specifically, they should be able to construct the generalization that deep focus earthquakes indicate the presence of subduction zones.

Students will be making a graph of the focus depth information from the data sets. They may need help setting up appropriate parameters for the graphs (see the example below). It also works well to have students construct their graphs using computers.

Sample Data and Observations: The student graph will look like this:



Sample Responses to Go Figure

1. California and Central Asia have shallow focus depth.
2. Chili and New Zealand have a deep focus depth.
3. Deep focus earthquakes seem to have convergent boundaries.
4. Shallow focus earthquakes tend to occur at a fault.
5. Both deep and shallow earthquakes occur along convergent boundaries because one plate is sliding under another. In convergent boundaries one plate is being subducted. The subducted plate is the more dense plate that is usually is oceanic crust. Friction between the subducted plate and the overriding plate creates stress along the boundary between the plates. The earthquake's focus can be anywhere along this boundary, shallow or deep.