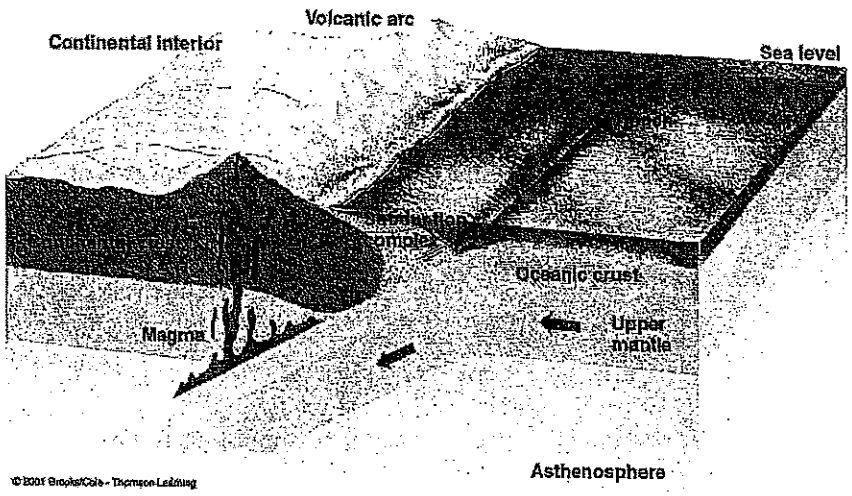
Earthquakes and Subduction Zone Graphing Activity

Name _____ Date _____ Block_____



Background:

A subduction zone is a convergent boundary where two tectonic plates collide. Plates are large, dense masses in the crust of the earth, the lithosphere, that float on top of liquefied rock in the asthenosphere. They are constantly shifting and moving, so when they subduct, one pushes beneath the other. Subduction zones create geologic formations such as mountain ranges, ocean trenches, and island arcs, as well as phenomena like earthquakes and volcanoes.

Earthquakes occur when the brittle rock of the lithosphere moves in response to stress. The worldwide distribution and depths of earthquakes are important evidence for plate tectonics. They help geologist delineate active plate boundaries and infer locations of ancient plate boundaries. Most earthquakes have shallow focus depths (0 to 70 km below the surface), which makes sense since earthquakes do not occur in the hot, plastic rock of the asthenosphere or deeper in Earth's interior. Intermediate (70-350 km) and deep (350-700 km) focus earthquakes do occur, but only near subduction zones. This indicates that solid, rigid material is being forced into the mantle in these areas. Plots of earthquake focus depths along subduction zones provide geologists with profiles of subducted plates and enhance our understanding of what happens at subduction zones.

The table below summarizes the focus depths of 24 earthquakes near the Izu Trench in the western Pacific and the distance from the focus of each earthquake to a seismic station on Bonin Island. Plot a graph of earthquake Relative Distance vs. Focus Depths on graph paper. Place the Focus Depth on the x-axis and Relative Distance on the y-axis. Select colors to represent shallow, intermediate and deep focus earthquakes and make a key on the graph. Give the graph a title.

Data:

Earthquake number	Focus Depth (km)	Relative Distance (km)
1	390	400
2	32	120
3	295	350
4	190	290
5	540	530
6	54	200
7	90	220
8	215	340
9	32	150
10	630	520
11	230	310
12	150	240

Earthquake number	Focus Depth (km)	Relative Distance (km)
13	13	80
14	680	570
15	335	390
16	460	460
17	70	190
18	10	50
19	400	440
20	530	480
21	11	260
22	55	165
23	58	190
24	605	520

Questions: Use the diagram above and the graph to answer the questions below.

1. Using the diagram above identify the plates that are involved in the subduction zone.

_____

2. Which plate is being subducted? _____

3. What happens to the oceanic plate as it descends further into the asthenosphere?_____

3. Why don't earthquakes occur at depths greater than approximately 700 km?

_____

_____

6. Places on the east coast of the United States occasionally experience earthquakes along faults that are left over from ancient plate activity. Do you think that these are likely to be shallow or intermediate and deep focus earthquakes? EXPLAIN your reasoning.

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