



Subduction Boundary Lab

Introduction:

The vast majority of earthquakes occur at plate boundaries. The deepest earthquakes occur at subduction boundaries where lithosphere is plunging down into the mantle. Deep focus earthquakes are defined as those with foci (plural of focus) occurring deeper than 300 kilometers. Shallow earthquakes have foci less than 70 kilometers deep, while intermediate focus earthquakes occur at depths between 70 and 300 kilometers. In this lab activity, you will plot actual earthquake foci data from an area where subduction is currently occurring. This area is the Tonga Islands in the southwest Pacific.

Procedure:

1. Look at Earthquake Depth Data Table (on the right). Place colored dots next to the depths using one color for shallow quakes, one for intermediate, and one for seep. Determine the number of shallow (<70), intermediate (70-300) and deep (>300) earthquakes occurring at the Tonga Trench and record them all on the summary table below.

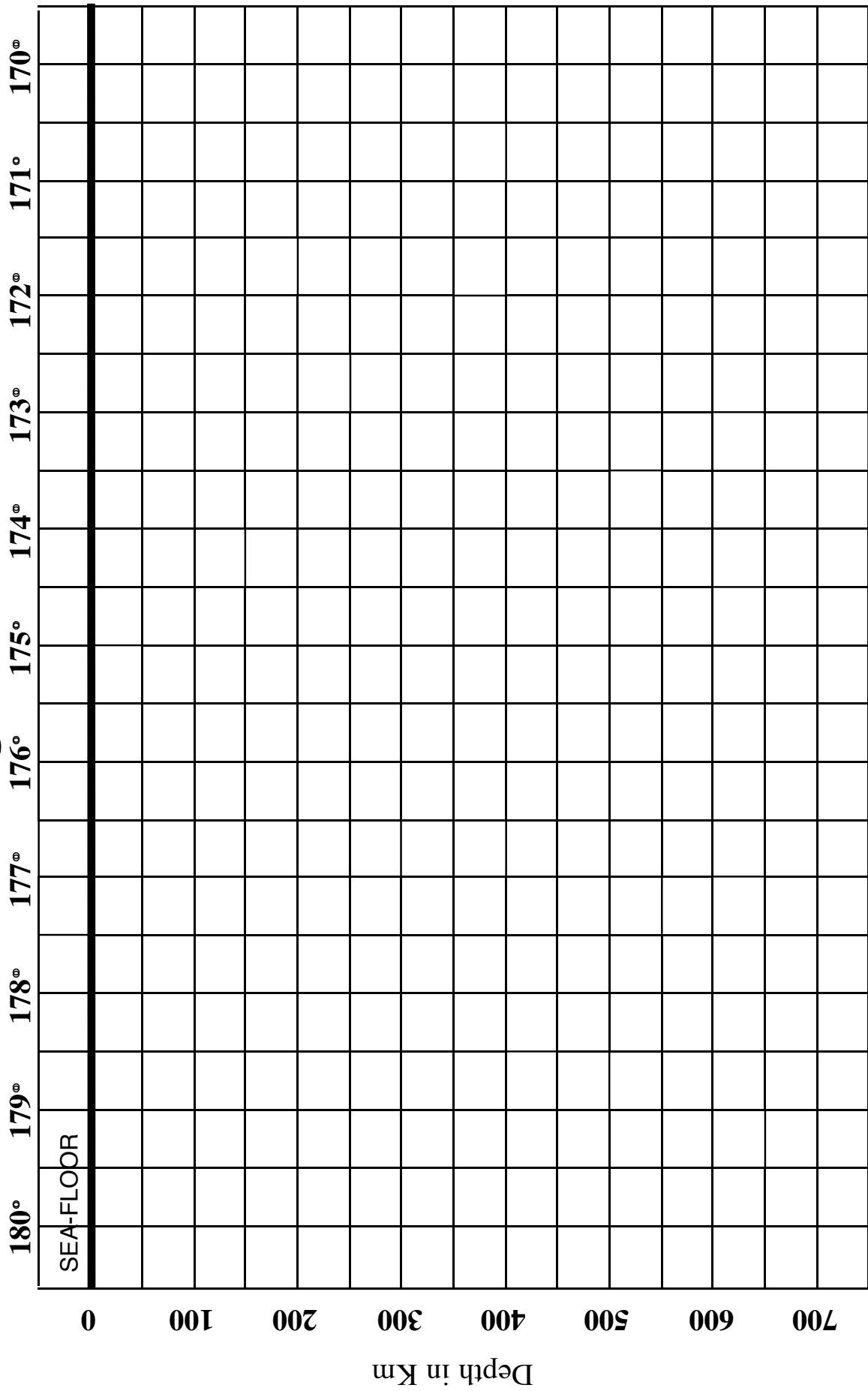
SUMMARY TABLE		
Earthquake Type	Focus Depth	Tonga Trench
Shallow	Less than 70 km	
Intermediate	70-300 km	
Deep	More than 300 km	
Total number of earthquakes		

2. On the graph on page 2, plot the earthquake foci for the data presented in the table. Use the same colors as above to plot the points on the chart. Use one color for shallow, one for intermediate, and one for deep. **DO NOT CONNECT THE DOTS!** Instead draw a *Best-fit* line for the points. A *Best-fit* line is a line that does not go through the points but shows a trend of data.

- Assume the line represents the upper surface of the subducting plate
- Label the approximate location of the Tonga Trench on the graph
- Using your reference tables, indicate the names of the two converging plates
- Using your reference tables, indicate the relative movement of the plates using arrows

Longitude (°W)	Focus depth (km)
176.2	270
173.8	35
175.8	115
174.9	40
175.7	260
175.9	190
175.4	250
174.7	35
176.0	160
175.7	205
173.9	60
177.7	580
174.9	50
178.5	505
177.9	565
179.2	650
178.7	600
173.8	50
178.3	540
177.0	350
174.6	40
178.8	580
176.8	340
177.4	420
173.8	60
178.0	520
177.7	560
174.1	30
177.7	465
179.2	670
178.8	590
178.1	510
175.1	40
178.2	550
176.0	220
178.6	615
174.8	35
178.2	595
179.1	675
177.8	460
177.0	380

Tonga Trench



ANALYSIS AND CONCLUSION

1. Using the reference tables, identify the following as a convergent, divergent or transform boundary:

- a. Mid Atlantic ridge _____
- b. Tonga trench _____
- c. Aleutian trench _____
- d. East Pacific Rise _____
- e. Great Rift Valley _____
- f. San Andreas Fault _____

2. Which tectonic plate is being subducted at the Tonga trench?

3. Compare the distances of the Tonga Trench and Chile Trench from the East Pacific Rise, which is closer and which is farther?

4. If the East pacific rise is the source of new rock, which trench would contain the oldest rock? Why?

5. At which type of plate boundary do we find the deepest Quakes? (Circle the correct answer)
TRANSFORM SUBDUCTION

6. As a plate subducts deeper into the mantle, what happens to the depth of the quakes?

7. Which type of plate boundary creates new ocean crust?

8. From looking at your reference tables where do we usually find divergent boundaries?

8. Which Geographic features are most associated with subduction zones?

9. What is the relative movement of the plates along the San Andreas Fault? What type of boundary is it?
