

Name: \_\_\_\_\_

Date: \_\_\_\_\_

### **Mapping the Ocean Floor Worksheet** (page 1)

Read the information below and then scan the table. On a separate sheet answer the questions that follow.

In this activity, you will learn how scientists use math to find out about the ocean floor. The data in the table below represents various measurements of the depth of the Atlantic Ocean between Cape May, New Jersey and Cape Roca, Portugal. You will use this data to construct a **profile**, or side view, of the floor of the Atlantic Ocean between these points. You will need a pencil, a ruler, and graph paper. Questions 1-3 will help you construct an appropriate graph. Once your graph is completed, use it to help answer the remaining questions.

<b>Distance From Cape May (miles)</b>	<b>Ocean Depth (fathoms)</b>	<b>Distance from Cape May (miles)</b>	<b>Ocean Depth (fathoms)</b>
0 (Cape May)	0	2,200	1,150
100	100	2,225	750
125	1,000	2,325	700
325	2,000	2,450	550
475	2,500	2,475	0
650	3,000	2,525	1,000
900	2,800	2,700	2,000
1,125		2,725	
1,300	3,125	2,800	2,800
1,425	2,900	3,150	2,700
1,475	2,000	3,300	2,300
1,600	1,600	3,400	
1,900	2,500	3,425	500
2,000	2,100	3,475	100
2,150	1,800	3,500 (Portugal)	0

1. The ocean depths in the table are measured in **fathoms**, where 1 fathom equals 6 feet. Find the minimum and maximum depths in the table. From what point is ocean depth measured? What does the maximum depth represent?
2. What is the maximum ocean depth between New Jersey and Portugal in feet? In miles? (Hint: one mile equals 5,280 feet).

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3. Notice that the data for ocean depth at a distance of 2,725 miles is missing from the table. Estimate the depth at this point. Add your estimate to the table and explain any assumptions that you made.
4. Now construct a graph of the depth of the ocean floor, with ocean depth as the vertical axis and distance between New Jersey and Portugal as the horizontal axis. Do not connect the points on the graph yet. Before making your graph, carefully consider what intervals you will use for each axis and where sea level should be located. Once you complete the graph, write a brief description of it, in particular noting any significant changes in depth.
5. Did you choose the same interval for both the vertical and horizontal axes of your graph? Why or why not? What is the effect of your choice on the shape of the graph?
6. One of the points in the graph represents an island. Which point do you think this is? Explain your reasoning.
7. The longest mountain range on Earth runs underwater, stretching nearly 80,000 km through all of Earth's oceans. In the Atlantic Ocean, this mountain range is called the **Mid-Atlantic Ridge**. Locate and label this feature on your graph.
8. (a) The Mariana Trench in the South Pacific is the deepest known region of any ocean at about 36,200 feet. How much deeper is this than the deepest point between New Jersey and Portugal?  
(b) Make a bar graph comparing the depth of the Mariana Trench with the height or depth of the following: Mt. Everest (29,035 feet), the Grand Canyon (6,000 feet), and the Empire State Building (1,472 feet, including the TV antenna on top.) Use positive numbers for all heights/depths.
9. Oceanographers measure the depth of the deep ocean using **sonar**, a technology originally invented to detect submarines. Sonar equipment aboard a ship sends out sound waves, which bounce off the ocean floor and return to the ship. The longer the time interval for the waves to return, the deeper is the ocean floor at that point. Oceanographers use the formula:  $D = \frac{1}{2}v * t$ , where D is the ocean depth, v is the speed of sound in water (5,806 ft./sec), and t for the time interval in seconds between sending and receiving the sound wave, to make this calculation. Use this formula to complete the following table of sonar data for two locations, rounding to the nearest 10 fathoms. Add the results to your graph and the table on the previous page. Then connect all the points on your graph.

<b>Distance From Cape May (miles)</b>	<b>Time Interval (seconds)</b>	<b>Ocean Depth (feet)</b>	<b>Ocean Depth (fathoms)</b>
1,125	6.0		
3,400	2.07		

10. Explain why the sonar equation in #9 above includes the fraction  $\frac{1}{2}$  (Hint: The standard formula for velocity is  $v = d/t$ , where  $d$  is distance and  $t$  is time. This can be rearranged as  $d = v \cdot t$ .)