

Regents Earth Science: The Tides Lab # _____

Name: _____

Lab Partners: _____



View of the Hudson from the Mid-Hudson Bridge about 1 hour north of Peekskill, NY. The left depicts high tide/the right depicts low tide.

Introduction: Each day the water level in the oceans changes in a periodic way. This change in sea level is called the tides. The tides are caused by the gravitational attraction of the moon and the sun. Ocean tides often extend into stream that empty into the ocean. The level of the Hudson River is affected as far north as Albany. This data show the changing water level of the Hudson River at Peekskill, NY, over a period of 42 hours. Use this data to construct a graph to show the changing water level over this period of nearly two days. Since

your graph will show data both above and below mean sea level, data must be shown above and below a "0" line of mean sea level that runs across the middle of our graph. A (-) value indicates the level below sea level.

Date	Time	Height (m)	Date	Time	Height (m)
October 20 am	12:00	0.8	October 21 am	12:00	0.45
October 20 am	1:00	0.7	October 21 am	1:00	0.5
October 20 am	2:00	0.5	October 21 am	2:00	0.45
October 20 am	3:00	0.2	October 21 am	3:00	0.3
October 20 am	4:00	-0.2	October 21 am	4:00	0
October 20 am	5:00	-0.6	October 21 am	5:00	-0.3
October 20 am	6:00	-0.7	October 21 am	6:00	-0.45
October 20 am	7:00	-0.65	October 21 am	7:00	-0.5
October 20 am	8:00	-0.4	October 21 am	8:00	-0.45
October 20 am	9:00	0	October 21 am	9:00	-0.3
October 20 am	10:00	0.3	October 21 am	10:00	-0.1
October 20 am	11:00	0.5	October 21 am	11:00	0.1
October 20 pm	12:00	0.6	October 21 pm	12:00	0.3
October 20 pm	1:00	0.6	October 21 pm	1:00	0.4
October 20 pm	2:00	0.5	October 21 pm	2:00	0.4
October 20 pm	3:00	0.2	October 21 pm	3:00	0.3
October 20 pm	4:00	-0.1	October 21 pm	4:00	0.1
October 20 pm	5:00	-0.4	October 21 pm	5:00	-0.1
October 20 pm	6:00	-0.5	October 21 pm	6:00	-0.3
October 20 pm	7:00	-0.5			
October 20 pm	8:00	-0.4			
October 20 pm	9:00	-0.1			
October 20 pm	10:00	0.1			
October 20 pm	11:00	0.3			

*Note your graph will take up MOST of the paper so you must label the axis very small/fine!

- 1.) On a piece of graph paper. Place time on the x axis and make increments of 1 hour for each box. Draw the x axis only two boxes up from the longest length of the paper to ensure you will have enough space for the y-axis
- 2.) Draw the Y axis leaving only 2 boxes of space between the axis and the edge of the paper. Make your vertical scale increase by 1/10 (0.1) of a meter every two boxes to utilize most of the graph.
- 3.) Plot the data and connect the points with a smooth curve. Draw a line to represent sea level (0) m when you are finished.

Vocabulary: Use the following terms in a sentence which explains and defines the term:

- 1.) Tide:
- 2.) Tidal Range:
- 3.) Neap Tide:
- 4.) Spring Tide:

Tidal Analysis and Discussion Questions

- 1.) According to your graph, what was **the time** of the first high tide (to the nearest half-hour): _____
- 2.) What was **the time** of the **second** high tide? _____
- 3.) What then, is the **time difference** *between* one high tide and the next successive **high tide**? _____
- 4.) What was the time difference between successive **low tides**? _____
- 5.) How many complete tidal cycles are shown on your graph? (From one high tide → the next)

- 6.) Using the graph, **predict the time** of the next high tide: _____ a.m. or p.m (circle)
- 7.)
 - a. Is the *tidal range* increasing or decreasing in your graph? Recall that a range is the *difference* between max and min. measurements for each tidal period. _____.
 - b. Which moon phase(s) could we be approaching based upon this data? _____
- 8.) What evidence suggests that the change of tides is a cyclic relationship? (use the graph as well as information about the moons revolution).

9.) Explain the difference between **tidal ranges (max-min)** during a spring and neap tide

Spring:

Neap:

10.) a. Where is the moon positioned relative to the Earth and Sun during a spring tide? **Draw a picture below**

b. What **two** moon phases can occur during spring tides?

11.) a. Where is the moon positioned relative to the Earth and Sun during a neap tide? **Draw a picture below**

b. What **two** moon phases can occur during neap tides?

12.) What type of tide occurs during the solar and lunar eclipse? _____

13.) Which type of eclipse can only occur during a **full moon**? _____

14.) If the tidal **range is increasing**, and the moon is currently in its **waxing gibbous** phase, what phase of the moon would be viewed from earth in 3 days' time?

Conclusion I:

Do all locations on Earth experience the same tide at the same time? Explain why or why not?

Do all locations on earth experience the same tidal ranges? What factors influence this?

Conclusion II: After reading “The Gravity of the Situation: The Moon and the Tides,” describe what will happen to the moon’s revolution around Earth over time. In turn, what will thus happen to the Earth’s rotation over time and why. How has the Earth-Moon system already changed since the beginning of time? (10 points)
