Name: ______________________________

Period: __________

Due Date: __________

Graphing Tides Lab

Background:

Tides are a result of the pull of the moon and the centrifugal force. At any time the earth has two bulges on its surface that stay aligned with the moon. As the earth rotates, different places pass through the bulges. When it passes through a bulge, the place experiences high tide and when it passes through areas of no bulge, it experiences low tides. Most places experience two high tides and two low tides a day, so about every 6 hours there is a new tide.

Over the course of a month the tidal range from day to day varies. The tidal range is the highest high tide minus the lowest low tide. It varies because of the earth sun and moon alignment. Spring tides occur when the sun and moon both pull on the bulges on earth's surface during full and new moons. Since the high tide is so large it is called a SPRING TIDE because the waters appear to spring upwards. When the sun earth and moon are at right angles to each other (during 1st and 3rd quarter) the tidal range is low and a NEAP TIDE occurs. The tides are also affected by the size, shape and depth of the ocean basin.

Purpose:

You will examine the relationships between the tides in Boston Harbor and the phase of the moon, orbit, and earth's rotation.

Procedure:

1. USE PENCIL ONLY!

2. Make a graph with **two lines**.
    a. Graph MUST have: Title, Labels on each Axis, and Proper Units

3. On the X axis put the days of the month.

4. On the Y axis chart the height. (MAKE SURE TO SET UP YOUR Y AXIS TO INCLUDE NEGATIVES. A good range should go from -2.0 to +12.0)

5. You will make two lines: one will be the high tide data the other will be the low tide data. (Heights in the data chart are given in feet.)

6. On the graph you created label your high tide line by the 5th of the month write "3rd quarter." For the 12th of the month label "new moon." For the 19th label 1st quarter and for the 26th label "full moon"

7. Answer the questions after the data.

Adapted from http://www.[illegible].pdf

Tidal Data

DAY	HIGH	LOW	MOON PHASE
1	11.2	-0.7	
2	10.6	0.0	
3	9.9	0.6	
4	9.4	1.0	
5	9.1	1.3	3rd Quarter
6	9.0	1.4	
7	9.0	1.3	
8	9.3	1.2	
9	9.7	1.1	
10	9.9	1.0	
11	10.2	0.4	
12	10.2	0.2	New Moon
13	9.4	1.0	
14	9.3	1.1	
15	9.2	1.2	
16	9.1	1.3	
17	9.0	1.4	
18	9.0	1.3	
19	9.2	0.2	1st Quarter
20	9.5	0.1	
21	10.0	-0.1	
22	10.6	-0.3	
23	11.1	-0.4	
24	11.6	-0.7	
25	11.8	-1.2	
26	11.9	-1.4	Full Moon
27	11.7	-1.5	
28	11.4	-1.3	
29	10.9	-0.9	
30	10.4	-0.4	

Questions: (Answer in FULL and COMPLETE sentences).

1. Describe what happens to the high tide line (ie—it increases/decreases until…then)

2. How many peaks are there in your **high tide** line? Which moon phases do these match?

3. How many dips are there in your **high tide** line? Which moon phases do these relate to?

Adapted from http://www.tnbs.net/departments/science/faculty/mandes/handouts2/tidetab.pdf

4. Look at your low tide line.
   - On what day of the month is low tide at its lowest point?

   - Lowest low tide occurs during which moon phase(s)?

5. Which day of the month has the largest tidal range (range: highest high tide and lowest low tide)?

   - Is this a spring or neap tide? What is the tidal range on this day in feet?

   - Why is there such a drastic change in tides on this day?

6. Based on the graph, which moon phase(s) create the smallest tidal range?

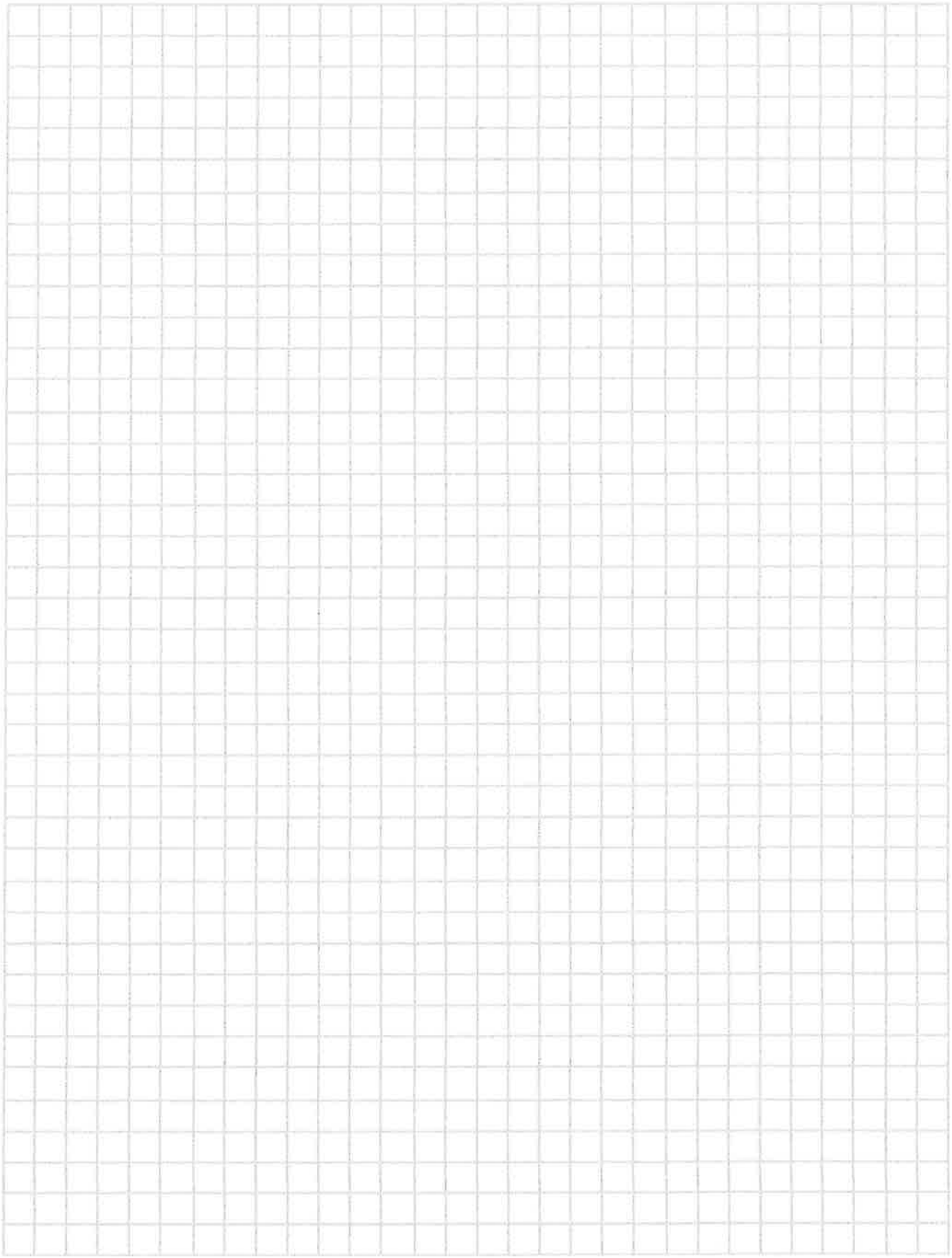
   - Is this a spring or neap tide? WHY is the tidal range so small on this day(s) (again discuss earth/sun/moon alignment)?

7. What are some other factors other than the earth sun moon alignment that could also affect tide heights?

Conclusion:

1. How many times are there high tides in a typical day? How many low tides per day? Why do this many occur in a day? (you may use a diagram to assist your explanation)

2. How many hours apart are high tide and low tides? How many minutes later is a morning low tide from the previous morning's low tides? Why does the tide come at a different time each day?



Adapted from https://www.bsms.ac.uk/departments/science/media/documents/handouts/Aide.pdf