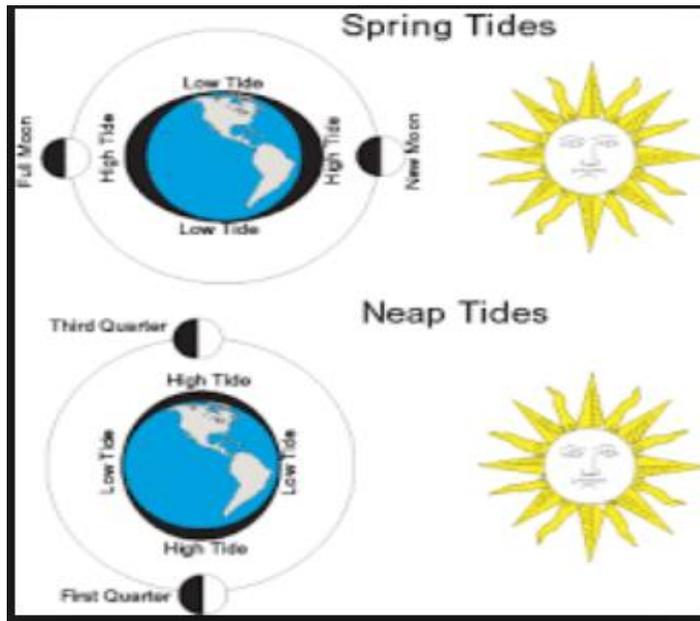


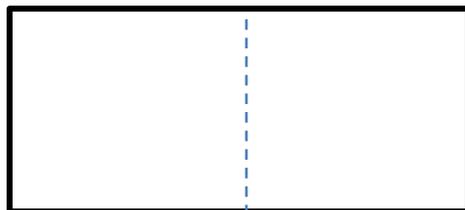
Tidal Range lab

Do Now: Spring tides vs. Neap tides



Use the next blank page in the packet to complete this task

- Hold your paper with the longer side on top (landscape). Draw a line down the center of your paper to separate the paper in half.



- Label one side “Spring Tide”
- Write the definition of a Spring Tide: *the highest high tides and the lowest low tides. It occurs when the sun, moon and earth are lined up, twice a month.*
- Draw a spring tide: **Draw and label** a yellow sun, gray moon, green earth, and blue tidal bulges. Make sure you draw the proper alignment.
- Write the answer to this question at the bottom: During what moon phases does a spring tide occur?

- Label one side “Neap Tide”
- Write the definition of a Neap Tide: *weaker tides, the moon’s pull is partly counteracted by the sun. It occurs when the sun and moon are at right angles), twice a month.*
- Draw a neap tide: **Draw and label** a yellow sun, gray moon, green earth, and blue tidal bulges. Make sure you draw the proper alignment.
- Write the answer to this question at the bottom: During what moon phases does a neap tide occur?

Activity: Tidal Range in Baja Mexico

Objective: To differentiate spring and neap tides. They will also be able to graph tidal ranges and locate the spring and neap tides within the month span.

Introduction:

People that make their living on or from the sea, such as fisherman and sailors, must pay careful attention to the tides. Even people that simply enjoy visiting the beach or going boating are affected by the daily tidal cycle. In many areas, there is just a foot or two differences between successive high and low tides. However, this difference, called the **tidal range**, varies over time and from place to place. The greatest tidal range in the world occurs in Canada's Bay of Fundy, where the difference between low and high tides can be as much as 21 meters (nearly 70 feet)!

The greatest tidal range, the highest high tides and lowest low tides all occur when the sun and moon are lined up. As you will see, these so-called **spring tides** occur in a regular pattern. Some animals (example- horseshoe crabs, sea turtles) lay eggs onshore on the date of the highest high tide in a season. The smallest tidal range, lowest high tides and highest low tides also occur in a regular pattern. These are called **neap tides**.

How do you calculate the tidal range?

Procedure/ Questions:

1. Look at the data for high and low tide levels on the table on the next page (for Baja, Mexico). Find the highest (maximum) high tide and lowest (minimum) low tide and write down the **date** of each. These are the spring tides. **Highlight or circle them on the chart.**

Highest high tide- _____

Lowest low tide- _____ (hint- negative # is very low)

What two moon phases will we have spring tides? _____

2. Look at the table and find the **date(s)** of the lowest high tide and the highest low tide and record them. These are neap tides.

Lowest high tide- _____

Highest low tide- _____

What two moon phases will we have neap tides? _____

3. Now calculate the tidal range for each day by finding the difference between high tide and low tide levels for that day. Record it in the column titled “Tidal Range.” There are two examples given below.

January 1- High tide= 0.54 m Low tide= 0.49 m Tidal Range= **0.05 m**

January 5- High tide= 0.85 m Low tide= -0.06 Tidal Range= **0.91 m**

0.85m - -0.06m= 0.91 m (change both signs to positive signs)

Tide Data for Baja Mexico

	High Tide Level (m)	Low Tide Level (m)	Tidal Range (m)		High Tide Level (m)	Low Tide Level (m)	Tidal Range (m)
January 1	0.54	0.49	0.05	January 21	0.93	-0.27	
January 2	0.59	0.46		January 22	0.96	-0.31	
January 3	0.66	0.31		January 23	0.98	-0.31	
January 4	0.75	0.13		January 24	0.99	-0.30	
January 5	0.85	-0.06		January 25	0.98	-0.27	
January 6	0.95	-0.23		January 26	0.94	-0.22	
January 7	1.05	-0.37		January 27	0.89	-0.16	
January 8	1.13	-0.46		January 28	0.82	-0.09	
January 9	1.18	-0.50		January 29	0.73	-0.01	
January 10	1.19	-0.48		January 30	0.60	0.08	
January 11	1.15	-0.42		January 31	0.45	0.17	
January 12	1.05	-0.31		February 1	0.28	0.23	
January 13	0.90	-0.17		February 2	0.72	0.07	
January 14	0.72	-0.02		February 3	0.78	-0.12	
January 15	0.53	0.12		February 4	0.87	-0.28	
January 16	0.34	0.25		February 5	0.98	-0.41	
January 17	0.72	0.15		February 6	1.07	-0.49	
January 18	0.77	0.00		February 7	1.13	-0.51	
January 19	0.83	-0.13		February 8	1.13	-0.46	
January 20	0.88	-0.22		February 9	1.07	-0.37	

4. Look at the day-to-day change in the difference between high and low tide levels that you recorded for Question 3. Describe any pattern that you detect.

5. Now graph the daily high and low tide levels on a sheet of graph paper. Use one color for high tides and another for low tides to avoid possible confusion. **Make the tide level the y-axis and date of the month the x-axis. Also add a title and a key for what each color represents.**

6. Your completed graph should show spring tides and neap tides. Note that all of the spring tides are not the same height. Rather, each spring tide occurs when high tide is at a “local maximum,” that is the highest value in a certain range, and low tide is at a “local minimum.” The exact opposite holds true for neap tides. **Label each of the spring and neap tides on your graph.**

7. As you know the phases of the moon gradually change in a regular pattern. **Add the following information on the dates of various lunar phases to your graph.**

- a. **First quarter moon- January 2 and Feb. 1**
- b. **Full moon – January 9 and Feb. 8**
- c. **Last quarter moon- January 16**
- d. **New moon- January 24**

8. Try to find a relationship between the patterns of high and low tides that you have drawn and the phases of the moon. **What, if any, relationship appears to exist?**

9. Predict when the following will occur and explain your reasoning:

a. **The next spring tide-** _____

b. **The next neap tide-** _____

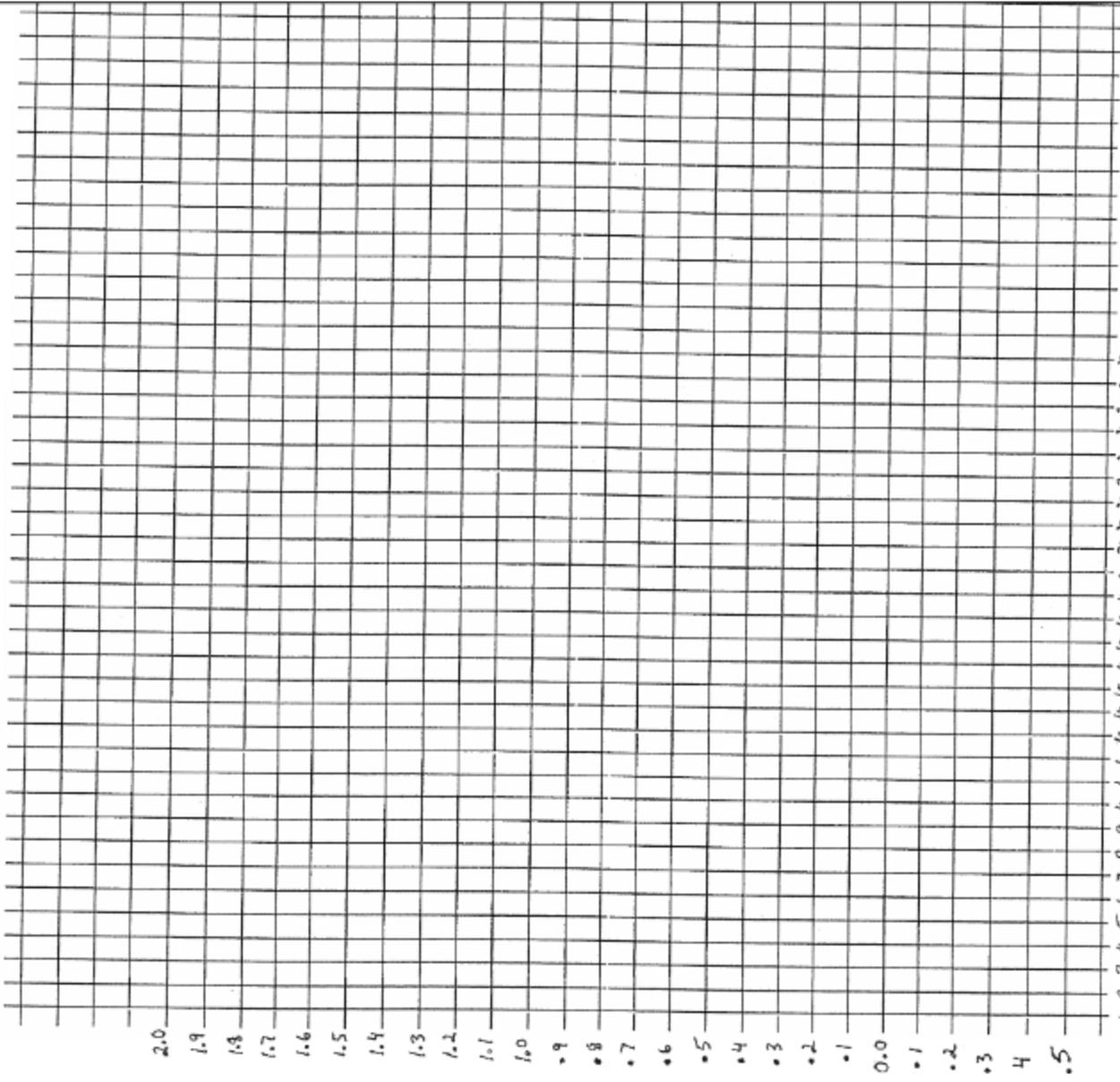
c. **The next new moon-** _____

d. **The next full moon-** _____

Key

High Tide	○
Low Tide	○

Tide Level (m)



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
 January February