Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Graphing Tidal Cycles

**Purpose**

The purpose of this lab is to determine the tidal pattern an area experiences.[[1]](#endnote-2)

**Procedure**

 **Materials**

1. Graph paper
2. Pencil

**![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]()Sequence of Steps**

1. Read background information in “observations”.
2. Label the graph paper to make a graph of the tidal cycle. The x-axis should be in days, and the y axis should be in feet. For this graph, place the x axis at the top of the graph, rather than at the bottom. See the sample graph for how to set up your graph.

*Sample Graph:*

 Days

 1 2 3 4 5

Tidal Height

-2 -1 0 1 2

1. Use the data in Table 1 to make a graph of the tidal cycle.

Table 1. Tidal Data for Long Beach, New York, January 2003

All times are listed in Local Standard Time (LST). All heights are in feet.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Day | Time | Height | Time | Height | Time  | Height | Time  | Height |
| 1 | 5:45am | 5.5 | 12:16pm | -0.7 | 6:12pm | 4.4 |  -------- | ---------- |
| 2 | 12:18am | -0.5 | 6:35am | 5.6 | 1:07pm | -0.8 | 7:03pm | 4.4 |
| 3 | 1:10am | -0.5 | 7:23am | 5.5 | 1:56pm | -0.8 | 7:53pm | 4.4 |
| 4 | 1:59am | -0.4 | 8:11am | 5.4 | 2:42pm | -0.7 | 8:42pm | 4.3 |
| 5 | 2:45am | -0.2 | 8:59am | 5.1 | 3:25pm | -0.5 | 9:32pm | 4.2 |
| 6 | 3:30am | 0.0 | 9:47am | 4.8 | 4:07pm | -0.3 | 10:23pm | 4.0 |
| 7 | 4:14am | 0.3 | 10:35am | 4.6 | 4:49pm | -0.1 | 11:12pm | 3.9 |
| 8 | 5:01am | 0.6 | 11:22am | 4.3 | 5:32pm | 0.2 | 11:59pm | 3.9 |
| 9 | 5:54am | 0.8 | 12:09pm | 4.0 | 6:18pm | 0.4 | --------- | --------- |
| 10 | 12:45am | 3.9 | 6:56am | 0.9 | 12:57pm | 3.7 | 7:10pm | 0.5 |
| 11 | 1:31am | 3.9 | 7:59am | 0.9 | 1:47pm | 3.5 | 8:02pm | 0.5 |
| 12 | 2:19am | 4.0 | 8:57am | 0.8 | 2:41pm | 3.4 | 8:53pm | 0.5 |
| 13 | 3:10am | 4.1 | 9:50am | 0.6 | 3:39pm | 3.5 | 9:41pm | 0.4 |
| 14 | 4:02am | 4.3 | 10:38am | 0.3 | 4:34pm | 3.6 | 10:28pm | 0.2 |
| 15 | 4:51am | 4.6 | 11:26am | 0.1 | 5:23pm | 3.7 | 11:15pm | 0.1 |
| 16 | 5:36am | 4.8 | 12:12pm | -0.1 | 6:08pm | 3.9 | -------- | -------- |
| 17 | 12:02am | -0.1 | 6:17am | 5.0 | 12:57pm | -0.3 | 6:51pm | 4.1 |
| 18 | 12:49am | -0.2 | 6:58am | 5.1 | 1:40pm | -0.5 | 7:32pm | 4.2 |
| 19 | 1:35am | -0.4 | 7:38am | 5.2 | 2:22pm | -0.6 | 8:15pm | 4.3 |
| 20 | 2:20am | -0.4 | 8:21am | 5.2 | 3:30pm | -0.7 | 9:01pm | 4.4 |
| 21 | 3:05am | -0.4 | 9:07am | 5.1 | 3:44pm | -0.7 | 9:51pm | 4.5 |
| 22 | 3:52am | -0.3 | 9:58am | 4.9 | 4:27pm | -0.6 | 10:44pm | 4.6 |
| 23 | 4:43am | -0.1 | 10:52am | 4.7 | 5:13pm | -0.4 | 11:37pm | 4.7 |
| 24 | 5:43am | 0.1 | 11:48am | 4.4 | 6:08pm | -0.2 | -------- | -------- |
| 25 | 12:32am | 4.7 | 6:53am | 0.2 | 12:47pm | 4.2 | 7:11pm | -0.1 |
| 26 | 1:30am | 4.8 | 8:06am | 0.2 | 1:50pm | 3.9 | 8:17pm | 0.0 |
| 27 | 2:31am | 4.8 | 9:12am | 0.1 | 2:57pm | 3.8 | 9:19pm | 0.0 |
| 28 | 3:35am | 4.8 | 10:13am | -0.1 | 4:05pm | 3.9 | 10:17pm | -0.1 |
| 29 | 4:37am | 5.0 | 11:09am | -0.3 | 5:07pm | 4.0 | 11:13pm | -0.2 |
| 30 | 5:33am | 5.1 | 12:01pm | -0.5 | 6:01pm | 4.2 | -------- | -------- |
| 31 | 12:06am | -0.3 | 6:22am | 5.2 | 12:51pm | -0.6 | 6:50pm | 4.3 |

*Source:* Center for Operational Oceanographic Products and Services, National Oceanographic and Atmospheric Association, National Ocean Service.

**![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]() Observations**

**Background:** Tides are the cyclical rise and fall of sea level caused by the gravitational attraction of Earth to the moon and, to a lesser extent, to the sun. Gravitational pull creates a bulge in the ocean on the side of Earth nearest the moon. A similar bulge forms on the opposite side of Earth from the moon because the moon’s pull is weaker on that side. Tides develop as the rotating Earth moves through these bulges, causing periods of high and low water. In this lab, you will make a graph of tidal data to determine whether an area has diurnal, semidiurnal, or mixed tides.

1. What tidal pattern does this area experience? Explain how you determined this.
2. What is the greatest tidal range for the data you graphed? What is the least tidal range? What types of tides correspond to each of these tidal ranges?
3. Based on your graph, identify the days when each moon phase could have occurred: new moon, first quarter moon, full moon, last quarter moon. How do you know this?
4. On January 4th (Day 5 on the table) at 9:00am, Jarred anchored his boat in about 4 feet of water at the beach. When he returned to his boat at 3:30 that afternoon, the boat was completely in the sand. What had happened? How long did Jarred have to wait to leave the area in his boat?
5. Speculate why a strong understanding of tidal cycles is important for commercial fishermen, who make up an important part of the agriculture industry.
1. Tarbuck, E, & Lutgens, F (2009). *Earth Science*. Boston: Prentice Hall. [↑](#endnote-ref-2)