MiSP Cyclic Phenomena Worksheet #2 L2

Name _____ Date _____

Tides and the Moon

Introduction:

It is not surprising that people who live on Long Island are familiar with tides. After all, they live on an island. They have all been to beaches and docks and noticed that the water is constantly changing in height. Water moves away from the shore and the water level decreases. Hours later, the water has moved back and the water level is higher. In this activity we will look at data for the changing tides and water levels at Montauk.

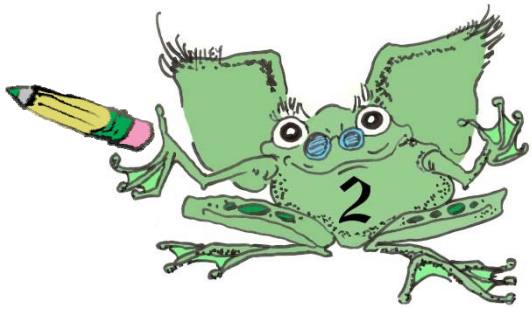
Procedures:

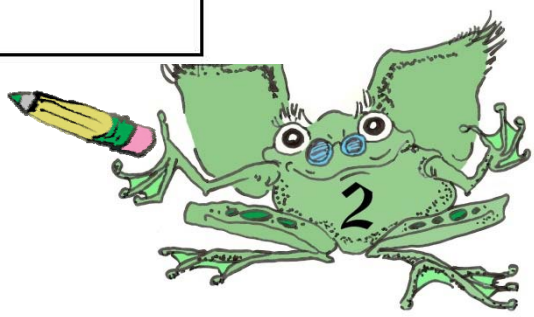
- Look at the data on the chart, "Montauk Water Levels on January 1 and 2, 2010." Note that it lists the water level every hour (using a 24-hour clock) from 0.00 (midnight) on January 1 (New Year's Day) to 23:00 (11:00 p.m.) on January 2.

Graph your data:

Graph the data on the next page to show the relationship between the time (hours) and the water level (feet).

- Label the *x*-axis with time (hours). Use the column of continuous hours from 0 to 47. Also label hour 24, which is midnight on January 2, with "Jan 2" to show when the second day begins. Each line on the *x*-axis will represent 2 hours.
- Label the *y*-axis with water level (feet).
- Connect the data points.
- Give your graph a title.




2

Discussion Questions:

1. Why is the Montauk water level (tide) data an example of a cycle?

   _____

   _____

2. At what hours did high tide (highest water levels) and low tide (lowest water levels) occur?

   Times of high tide: _____

   Times of low tide: _____

3. How many high tides and how many low tides were there per day on January 1 and 2?

Date	Number of High Tides	Number of Low Tides
January 1		
January 2		

4. How many hours apart are

   Each HIGH tide from the next LOW tide? _____

   Each HIGH tide from the next HIGH tide? _____

   Each LOW tide from the next LOW tide? _____

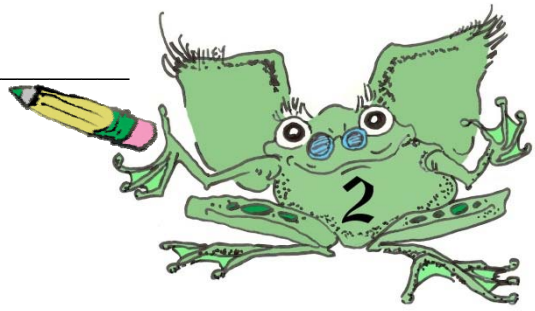
5. Using the graph, predict when (what hour) the next high tide and the next low tide will be on January 3. January 3 begins at hour 48, which is 00:00 or 12:00 midnight.

   First HIGH tide on January 3 _____

   First LOW tide on January 3 _____

6. Look at the high tides (the peaks) and the low tides (the valleys). Are the peaks the same (the same water level in feet)? _____

7. Are the valleys the same (the same water level in feet)? _____



8. Compare the changes in water level in two regions of the graph (10 to 15 hours and 16 to 21 hours) by calculating the unit rate of change (slope). First draw BEST-FIT LINES between hours 10 and 15 and between hours 16 and 21. Use ordered pairs from these best-fit lines to determine the unit rate of change.

Unit rate of change = $\frac{\Delta y}{\Delta x} = \frac{(y_2 - y_1)}{(x_2 - x_1)} = \frac{\Delta \text{ Water Level (ft)}}{\Delta \text{ Time (hours)}}$

Ordered pairs (x_1, y_1) (x_2, y_2)	Δ water level (ft) Δy	Δ time (hours) Δx	**Unit Rate of Change (slope)** $\Delta y/\Delta x$
10–15 hours			
16–21 hours			

9. Compare the unit rates of change (slopes) of the two sections of the graph.

_____

_____

_____

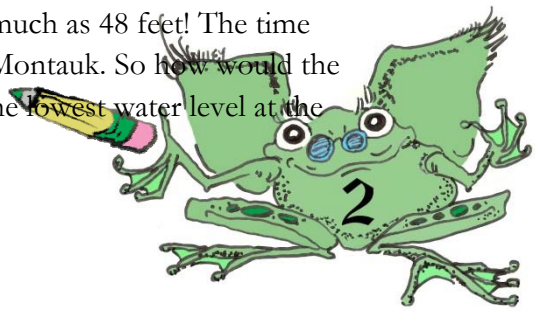
10. What does a positive/+ unit rate of change mean about the changes in water level? What does a negative/- unit rate of change mean about the changes in water levels?

_____

_____

_____

11. The Bay of Fundy in Nova Scotia has the greatest differences in water levels between high tide and low tide. The difference between low and high tide can be as much as 48 feet! The time difference between the low and high tides is about the same as at Montauk. So how would the unit rates of change (slopes) between the highest water level and the lowest water level at the



Bay of Fundy compare to the unit rates of change (slopes) between the highest water level and the lowest water level at Montauk? Explain.

_____

_____