

ANSWERING A QUESTION WITH TIDE DATA

Your mission: Travel back in time to May 2016. You are taking a trip to Delaware to see the largest concentration of spawning horseshoe crabs in the world. Spawning is highest during the new and full moons, and you've learned that often the highest numbers of crabs are present during the nighttime high tides.



Each spring, horseshoe crabs come ashore to spawn.

Question: What's likely the BEST date and time to see horseshoe crab spawning in May 2016?

Get the Data: To answer this question, use the tide data tool to create a tide chart.

- Using the map features, zoom into the area around Delaware Bay.
- Select (click) one of the colored markers along the edges of Delaware Bay.
- Inside the small pop-up window, click 'More info' and you will be taken to a new website.
- Scroll down the page and change the date range: From May 1 To May 31
- Click the 'Plot' button. A tide chart should appear.
- Find the legend located directly beneath the chart. Inside the legend, click 'Predictions.' The blue line should disappear, leaving only the 'verified' tide data visible on the chart. Save or print the chart, if desired.

Interpret the data: Using your tide chart, answer the questions below.

1. Approximately, when did the most extreme 'spring' tides occur in May 2016?
From May _____ To May _____

2. Approximately, what time was the NIGHTTIME high tide, during the above period?
Note that 00:00 is midnight, 1 AM is 01:00, and 11 PM is 23:00.

3. What was the moon phase during these extreme tides?
 - a. Full moon
 - b. Quarter moon
 - c. Waxing Gibbous
 - d. Either full or new moon

Draw a Conclusion: The *likely* best time to see horseshoe crab spawning in May 2016.....

Going further: *On a separate sheet of paper, make a diagram of the approximate orientation of the Moon relative to the Earth and Sun on the date in your conclusion above. Color a blue tidal bulge around the earth, indicating an approximate spring tide or neap tide. Label your diagram.*

CALCULATING MEAN TIDAL RANGE

Question: What was the mean tidal range in Delaware Bay from May 7-9, 2016?

Get the Data: To answer this question, use the tide data tool to create a new tide chart.

- Using the map features, zoom into the area around Delaware Bay.
- Select (click) one of the colored markers along the edges of Delaware Bay.
- Inside the small pop-up window, click 'More info.'
- Scroll down the page and change the date range to the following:
From May 7, 2016 To May 8, 2016
- Click the 'Plot' button. A tide chart should appear.
- Find the legend located directly beneath the chart. Inside the legend, click 'Predictions.' The blue line should disappear, leaving only the 'verified' tide data visible on the chart. Save or print the chart, if desired.

Calculate the mean tidal range: Complete the table on the next page. Instructions and an example table is below.

1. Record the height of the *first low tide* and the *first high tide* in your table.
2. Calculate the difference in height between the first low and high tide.
3. Record the height of the next consecutive high and low tides, completing the table.
4. Calculate the mean tidal range.

Table: Example using tide data from Lewes, DE

| Date | Low tide or high tide? | Tide height (ft) | Tidal Range (high tide height - low tide height) |
|------------|------------------------|------------------|--|
| 05/06/2016 | High | 6.87 | |
| 05/06/2016 | Low | 1.26 | $6.87 - 1.26 = 5.61$ ft |
| 05/06/2016 | High | 6.20 | $6.20 - 1.26 = 4.94$ ft |

Table: Mean tidal height

| Date | Low tide or high tide? | Tide height (ft) | Tidal Range (high tide height - low tide height) |
|------------------|------------------------|------------------|---|
| | High | | |
| | Low | | |
| | High | | |
| | Low | | |
| | High | | |
| | Low | | |
| | High | | |
| | Low | | |
| TOTAL | | | |
| MEAN TIDAL RANGE | | | |