

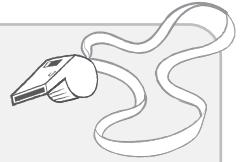
1. Mr. Mayer's science class is studying ocean tides. The students created two models. Model 1 shows the Sun, Earth, and Moon all in line in relation to one another. Model 2 shows the Sun, Earth, and Moon forming a right angle.

In which model should the students show the largest tidal range?

- (A) Model 1; it shows spring tides.
- (B) Model 1; it shows neap tides.
- (C) Model 2; it shows spring tides.
- (D) Model 2; it shows neap tides.

Science Coach

Think about what the students are **modeling**. Consider the **orientation of the Sun, Earth, and Moon** in each of the models. Where are they located in relation to each other during spring and neap tides? Which **type of tide** results in the largest tidal range?



Robert recorded data for the tide and phases of the Moon for May.

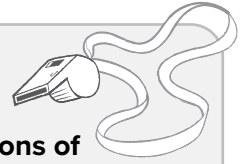
Table 1: Tide and Moon Phase Data

Date	Tidal Range (feet)	Moon Phase
May 5	6.27	New Moon
May 12	4.72	First Quarter Moon
May 19	7.18	Full Moon
May 26	3.16	Third Quarter Moon

Science Coach

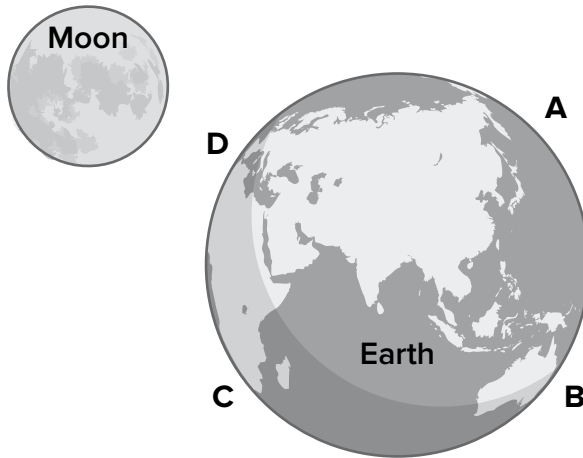
Examine the data.

How do the **positions of the Sun, Earth, and Moon** affect the **tides**? What is the position of the Sun, Earth, and Moon during each phase? Which explanation is supported by the data?

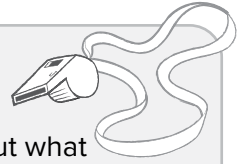


2. How are spring and neap tides related to the phases of the Moon?
- (F) Neap tides occur when there is a new or full moon.
 - (G) Spring tides occur when there is a new or full moon.
 - (H) Neap tides occur only when there is a first quarter moon.
 - (I) Spring tides occur when there is a first or third quarter moon.

Austin and Genna are studying tides. They sketched the model, as shown. Next, they need to show where high tide is occurring.

**Science Coach**

Examine the **model**. Think about what causes the **patterns of daily tides**. Where would the **gravitational pull** of the Moon be strongest? Where do tidal bulges form?



3. Where should Austin and Genna place the label for high tide?
- (A) locations A and B
 - (B) locations B and D
 - (C) locations C and A
 - (D) location D only

Chapter: The Sun-Earth-Moon System

Answer the questions that follow.

For questions 4, 5, and 6, refer to the following passage and illustration.

In this group of questions, you will use your knowledge about tides to answer three questions.

Entering Port Everglades

Noah and Skylar read an article about cargo ships entering and exiting Port Everglades. The article said that a particular cargo ship can only enter the port twice a month when the water is deepest. They wondered if the cargo ship would be able to enter the port that day. To determine whether or not this was possible, they discussed what they had learned about tides in their science class. Skylar pointed out that the tide in Port Everglades would be high at 7:06 AM and 7:36 PM. Noah agreed but said the cargo ship might still not have enough water. To investigate further, they looked up moon phase data and discovered there would be a full moon that night. To help them visualize this situation, Noah drew a model showing the Sun, Earth, and Moon in relation to one another.



4. What would **best** describe the type of tide that would occur at location X?

- Ⓐ high
- Ⓑ low
- Ⓒ neap
- Ⓓ spring

5. Which statement **best** supports Skylar's claim about the high tides at Port Everglades?

- Ⓕ When the Sun, Earth, and Moon are positioned in a line, it creates two spring tides.
- Ⓖ Water moves from one side of Earth to the other, causing two high tides in one location.
- Ⓗ The location travels through a tidal bulge closest to the moon and one farthest away from the moon as the Earth rotates.
- Ⓘ The gravitational pull of the Moon causes one tidal bulge, while the gravitational pull of the Sun creates a second one.

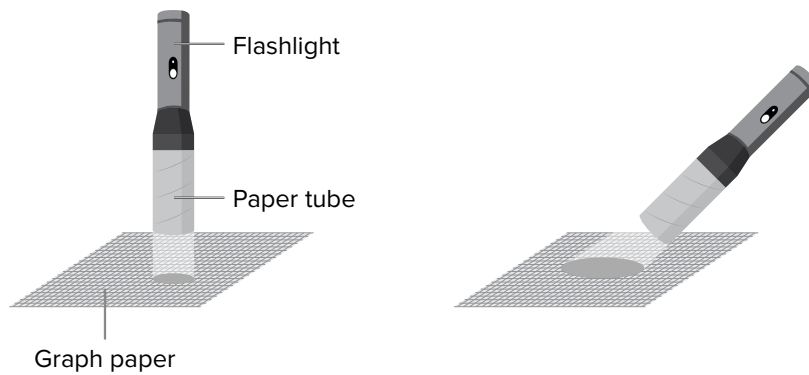
6. Why did Noah and Skylar consider the phase of the moon while deciding if the ship could enter port?
- Ⓐ The deepest water will occur at low tide during a full moon phase.
 - Ⓑ The deepest water will occur at high tide during a full moon phase.
 - Ⓒ The deepest water will occur at low tide during a quarter moon phase.
 - Ⓓ The deepest water will occur at high tide during a quarter moon phase.

7. In January, the Sun rises at 10:00 a.m. in Anchorage, Alaska. In July, the Sun rises at 3:00 a.m. in this same city.

What is the **best** explanation for the difference in sunrise times throughout the year?

- (F) The Sun rises earlier in the northern hemisphere in the summer because the north end of Earth's rotation axis is pointed toward the Sun.
- (G) The Sun rises later in the northern hemisphere in the summer because the north end of Earth's rotation axis is pointed toward the Sun.
- (H) The Sun rises earlier in the northern hemisphere in the summer because the north end of Earth's rotation axis is pointed away from the Sun.
- (I) The Sun rises later in the northern hemisphere in the summer because the north end of Earth's rotation axis is pointed away from the Sun.

Abigail uses a flashlight to model sunlight. The diagram shows her experimental setup.



8. What natural cycle could Abigail model using this setup?

- Ⓐ day and night
- Ⓑ ocean tides
- Ⓒ moon phases
- Ⓓ seasons