



Name: _____

Date: _____

Student Exploration: Ocean Tides

Vocabulary: gravity, high tide, low tide, neap tide, range, spring tide, tides

Prior Knowledge Questions (Do these BEFORE using the Gizmo.)

1. A boy builds a sand castle near the ocean. When he returns several hours later, the castle is gone. What do you think happened?

2. A boat sails into a bay and drops anchor. Several hours later, it is surrounded by mud. What happened?

Gizmo Warm-up: What is a tide?

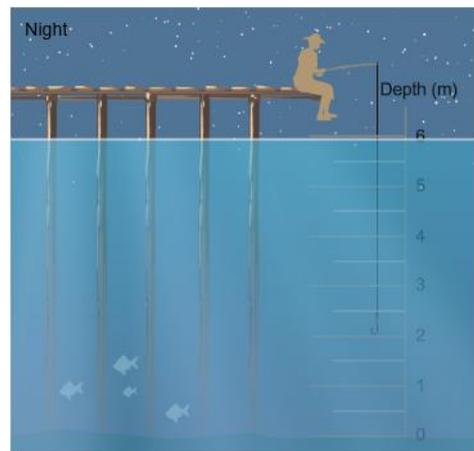
In the Gizmo, the pane on the left shows the position of the Earth and Moon. The Sun is far off in space to the left. The person standing on Earth represents the location of the fisherman shown at right.

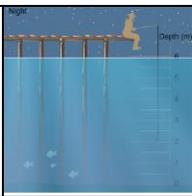
1. Click **Play** (▶) and observe the ocean depth for several days. What do you notice?

The rise and fall of water that you see are called **tides**.

2. Turn on **Show value**. Click **Pause** (⏸) when the water is at its highest level, or **high tide**. What is the water depth at high tide?

3. Click **Play**, and then **Pause** when the water is at its lowest level (**low tide**). What is the water depth at low tide?



<p>Activity A: The Moon and tides</p>	<p><u>Get the Gizmo Ready:</u></p> <ul style="list-style-type: none"> Click Reset (↺). 	
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Question: What causes the tides?

1. Observe: Click **Play** and observe for several days. Try to find a connection between the tides shown at right and the position of the observer shown at left.

What do you notice? _____

2. Form a hypothesis: What do you think causes tides? _____

3. Observe: Click **Play**, and **Pause** the simulation at several consecutive high tides. Each time, look at where the observer on Earth is pointing. Do you see a pattern? What is it?

4. Observe: Observe several low tides. Where does the observer point during the low tides?

5. Extend: Turn on **Show tidal bands**. The tidal bands show the depth of water at different places (not to scale). Notice the two bulges that show high tide. Click **Fast forward** (⏩).

A. In what directions do the bulges always point? _____

B. How does the Moon seem to affect the tidal bulges? _____

6. Think and discuss: The Moon's **gravity** pulls on Earth. How does the Moon's gravity affect the oceans closest to the Moon? _____

<p>Activity B: The Sun and tides</p>	<p><u>Get the Gizmo Ready:</u></p> <ul style="list-style-type: none"> • Click Reset (↺). • Make sure Show tidal bands is on. 	
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Question: How does the Sun affect tides?

1. Observe: Click **Fast forward**. Observe the shape of the tidal bands. How does the shape change as the simulation plays? _____

2. Gather data: Click **Reset**. Use the Gizmo to fill in the table, recording one high and one low tide each day. Calculate the **range**, the difference between high and low tide, for each day.

Day	Depth at high tide	Depth at low tide	Range (high tide – low tide)
0			
1			
2			
3			
4			
5			
6			

3. Investigate: Tides with the largest range from high tide to low tide are called **spring tides**. Click **Reset** to observe the positions of the Sun, Earth and Moon during a spring tide. Then **Fast forward** to another spring tide. (Look for the label in the upper right corner.)

What do you notice about the positions of the Sun, Moon and Earth during spring tides?

4. Investigate: Tides with the smallest range from high tide to low tide are called **neap tides**. Click **Fast forward**, and use the label to help find two periods of neap tides.

What do you notice about the positions of the Sun, Moon, and Earth during neap tides?

5. Conclude: How does the Sun affect tides? _____

