Cincinnati Public Schools

Remote Learning Plan

Grade 7

SCPA - 7 Science Moraga

Week 1 - Tides

Student Name_____ Bell _____

Weekly Learning Outcomes:

- Week 1: Tides- Explain, model the causes of tides and chart, graph to predict high and low tide occurrences.
- **Directions** - Do your Reading and Questions for the week. Then select and complete activities from the menu for that week. **OR** or go one Schoology
- **Task** - Complete Reading Comprehension and the Read and Respond Non Fiction for the week and 100 points worth of work from the menu **for the week.**
- **How do I know if my work is good?**
    - Information is accurate.
    - All parts of the question are answered completely.
    - Work is detailed and completes the required task.
    - If applicable, work is colorful and visually appealing.
- **What if I need help?**
    - Visit www.discoveryeducation.com and read the Engage and Explore tabs for the following lessons
        - 6.1 (TIdes)
    - Visit www.studyjams.scholastic.com and explore the slide shows/videos listed below. Once finished, complete the “Test Yourself” activity.
        - Weather & Climate: Tides

Reading Comprehension Week 1: Tides- Explain, model the causes of tides and chart, graph to predict high and low tide occurrences.

This text is from the U.S. National Oceanic and Atmospheric Administration.

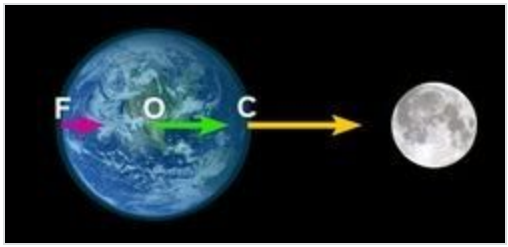
Tides

Tides are [one] kind of wave motion in the ocean. Tides are a change in the ocean water level, typically reaching a high and low level twice a day usually occurring about six hours apart. The term for the change from low to high tide is called the "flood tide." The change from high tide to low tide is called the "ebb tide."

Tides result from the pull of gravity; on the earth alone, between the earth and moon and between the earth and the sun. The gravitational pull of the sun on the earth is about 178 times stronger than the gravitational pull on the earth from the moon. However, because of the close proximity of the moon, when compared to the sun, the tidal pull by the moon is over twice that of the sun.

The result of this tidal pull is a bulge in the ocean water almost [in line] with the position of the moon; one bulge toward the moon and one on the opposite side of the earth, away from the moon. When we observe the tides, what we are actually seeing is the result of the earth rotating under this bulge.

It is easy to understand why there should be a bulge of water, producing a high tide, on the side of the earth facing of the moon. But why is there a bulge on the opposite side as well?



It is obviously not gravity that is doing it but rather, it is the *difference* in gravitational force across the earth that causes the bulge. This difference in gravitational force comes from the moon's pull at various points on the earth.

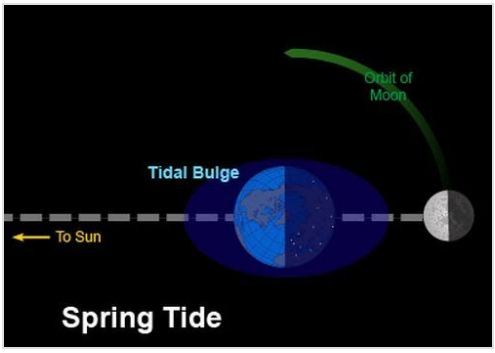
Because the pull of gravity becomes stronger as the distance decreases between to object, the moon pulls a little harder at point "C" (closest point to the moon) than it does at point "O" (in the center of the earth), and the pull is weaker still at point "F" (farthest point from the moon). If it were not for the earth's gravity, the planet would be pulled apart [Figure 1].

Yet also because of the earth's gravity, which pulls us toward the center of the planet, we can mathematically subtract the moon's pull at the center of the earth from the moon's pull at both point "C" and "F." When this vector-based subtraction occurs, we are left with two smaller forces; one toward the moon and one on the opposite side point away from the moon [Figure 2] producing two bulges.

As the earth makes one rotation in 24 hours, we pass under these areas where the tidal force pulls water away from the earth's surface and experience high tides. Also, since the difference in gravitation force is constant across the earth, the bulge on both sides of the earth is essentially the same. [This] explains why consecutive high tides are nearly the same height each time regardless whether the moon is overhead or on the opposite side of the earth.

The change in the water level with the daily tides from location to location results from . . . many factors. The oceans and shorelines have complex shapes, and the depth, and configuration, of the sea floor varies considerably.

As a result, some locations only experience one high and low tide each day, called a diurnal tide. Other locations experience two high and low tides daily, called a semi-diurnal tide. Still, other sites have mixed tides, where the difference in successive high-water and low-water marks differ appreciably.

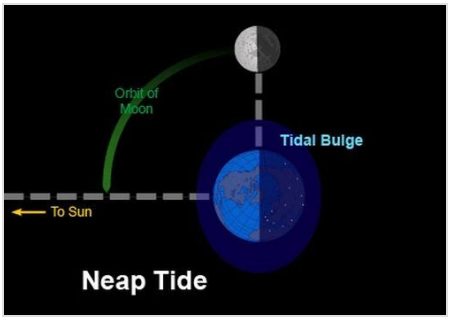


Another factor in the variation of tides is based on the orbit of the moon around the earth and the earth around the sun. Both orbits are not circles but ellipses. The distance between the earth and moon can vary by up to 13,000 miles (31,000 km).

Since the tidal force increase with decreasing distance, [the] tides will be higher than normal when the moon is at its closest point (called perigee) to the earth, approximately every 28 days.

Likewise, the earth's elliptical orbit also causes variations in the sun's pull on the tides as we move from the closest point to the farthest point (called apogee) over the course of a year. And just to complicate things even more, the moon's orbit is inclined 5° to the earth's rotation.

So the north/south orientations of the bulge also varies between the northern and southern hemisphere over this same 28-day orbital period.



As the moon completes one orbit around the earth (about every 28 days), there are two times in each orbit when the earth, moon and . . . sun are [in line] with each other and two times when the earth, moon and sun are at right angles.When all three are inline (around full and new moons), the combined effect of the moon's and sun's pull on the earth's water is at its greatest resulting in the greatest ranges between high and low tide. This [is] called a "spring" tide (from the water *springing* or rising up).

Seven days after either [a] full or new moon, the earth, moon and sun are at right angles to each other. At this time the pull of the moon and the pull of the sun partially cancel each other out. The resulting tide, called a "neap" tide, has the smallest range between high and low tide.

Read and Respond
NONFICTION

Article/Author: _____

Main Idea:

_____

_____

_____

_____

Three Important Facts or Statistics:

1. _____

_____

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2. _____

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3. _____

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One Opinion From the Article:

_____

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My Opinion About the Article:

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Supporting Detail 1:

Supporting Detail 2:

Supporting Detail 3:

Author's Purpose

☐ Persuade ☐ Inform ☐ Entertain

☐ Explain ☐ Describe

Text Structure

☐ Description ☐ Problem & Solution

☐ Order & Sequence ☐ Cause & Effect

☐ Compare & Contrast

Name _____ Bell _____ Date _____

Tides Worksheet

The world's oceans are in constant flux. Winds and currents move the surface water causing waves. Ocean levels fluctuate daily as the sun, moon and earth interact. As the moon travels around the earth and as they, together, travel around the sun, the combined gravitational forces cause the world's oceans to rise and fall. Imagine the earth covered completely by water. As the earth spins, this water is balanced evenly on all sides by centrifugal force. The moon has a gravitational pull on this layer of water as it orbits the earth. This pull causes the water to bulge toward the moon. Because the earth is spinning there will be a bulge on the opposite side of the earth as well. As the earth rotates on its axis, each location on the earth will experience both tidal bulges. The areas of high water levels are high tides and the areas of low levels are low tides. The Sun also affects tides, but since it is so much further away from Earth than the moon, the affect the moon has is much greater.

Since the earth and the moon rotate around the sun, there is an added modifying factor. When the sun and moon are aligned, there are exceptionally strong gravitational forces, causing very high and very low tides, which are called spring tides, though they have nothing to do with the season. When the sun and moon are not aligned, the gravitational forces cancel each other out, causing moderate tides. These are called neap tides. Tides vary from day to day, but most places on Earth experience two high tides and two low tides every day (about 6 hours in between each tide).

1. What are tides caused by?

2. Which exerts stronger gravitational pull on earth, the sun or the moon? Why?

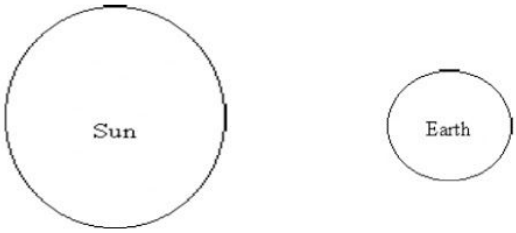
3. What is a spring tide? What position do the sun and moon have to be in to create a spring tide?

4. What is a neap tide? What position do the sun and moon have to be in to create a neap tide?

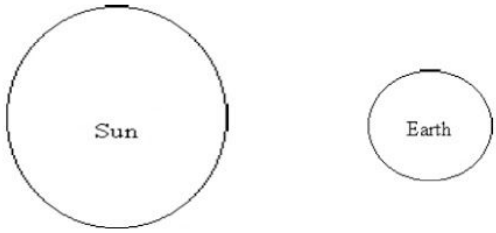
5. In most places on earth, how often do high and low tides occur?

6. Draw the position of the moon during a spring tide and a neap tide.

Spring Tide



Neap Tide



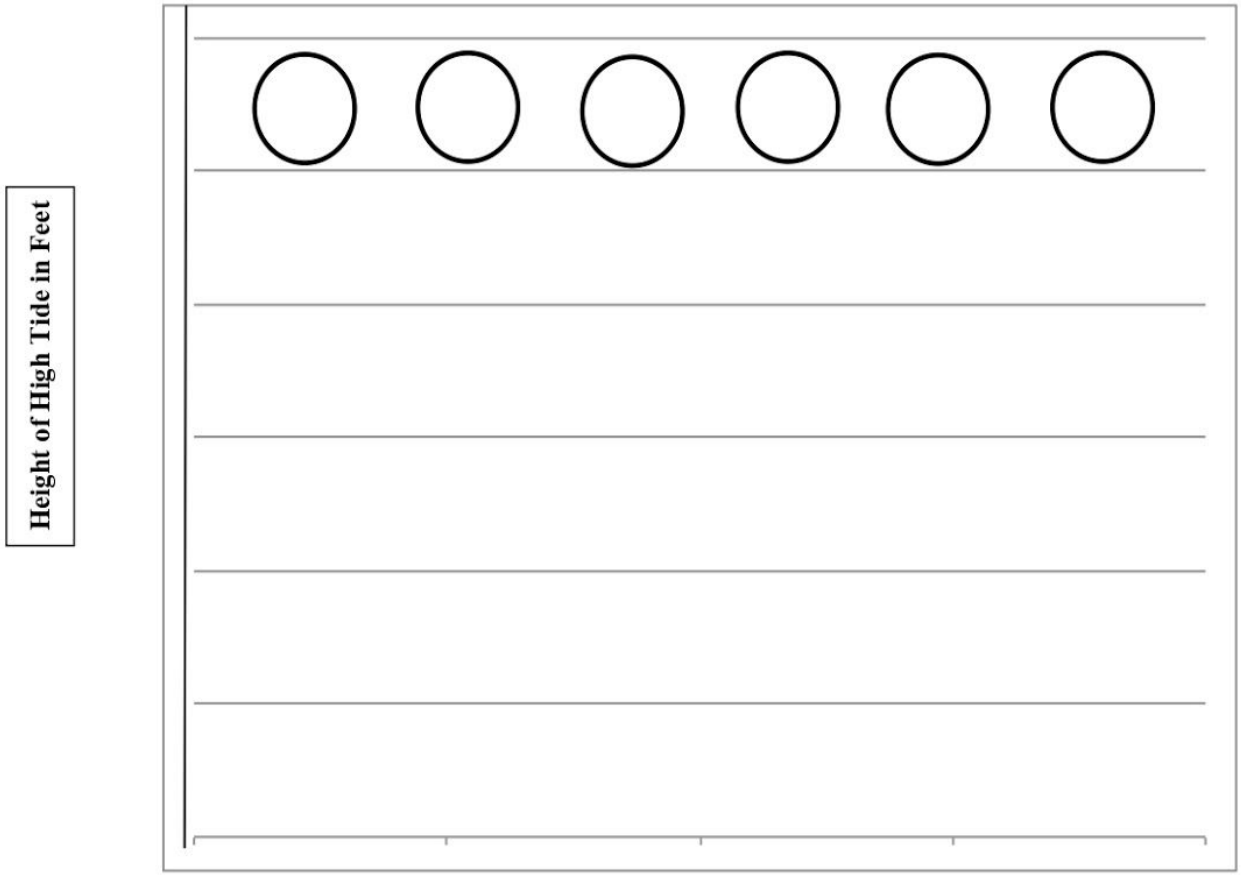
Graphing High Tides

Directions: The chart below shows the height of high tide at Kitty Hawk, North Carolina over the course of a month. It also shows the phase of the Moon on each date.

1. Fill out your scales with the dates on the x-axis (side-to-side) and feet on the y-axis (up and down).
2. Make a line graph of the high tides.
3. Fill in the circles at the top of your graph with the phase of the Moon for each date.

Date	Height of High Tide in Feet	Phase of the Moon
02/11/2013	3.9 feet	New Moon
02/14/2013	3.6 feet	Waxing Crescent
02/17/2013	2.4 feet	First Quarter
02/20/2013	2.9 feet	Waxing Gibbous
02/24/2013	3.5 feet	Full Moon
02/24/2013	3.2 feet	Waning Gibbous

High Tides and Lunar Phases at Kitty Hawk, NC



Tides Menu

Directions: Choose activities from the menu below after finishing your Reading Comprehension and worksheets for the week. Each week should total 100 points.

25 POINTS

Week 1: Tides- Explain, model the causes of tides and chart, graph to predict high and low tide occurrences.

- ❏ Create 8.5x11 informational fact poster that explains the cause of tides and find a graph of low and high tides for a location on earth and include that on your poster.
- ❏ Define in writing or pictures the cause of tides and what a graph of high tide and low tide data looks like and its parts.

50 POINTS

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- ❏ Create a table that compares high tide and low tide - include facts and diagrams
- ❏ Write a story that explains the cause of tides and describes how someone would use a tidal chart.

75 POINTS

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- ❏ Create a new product with an ad that would measure the changes in the tidal levels. The ad of your product should include the causes of tides.
- ❏ Construct a graph to illustrate the change in low and high tide on one place on earth. Bay of Fundy is a great place to use data from.