



THE TIDES

OVERVIEW

This video outline was developed to summarize key concepts of *The Tides*. This video serves as a first step towards giving students experience in visualizing and interrogating data. Real-time data from ORCA's Kilroy Database can be used in conjunction with the introductory video for inquiry based activities.

TOPICS

Depth, tides

AUDIENCE AND SETTING

Middle school students to adult learners. This video can be shared from any computer or device with access to the web. Possible settings include public outreach events and classrooms.

OBJECTIVES

- Recognize what forces cause tides and what determines the magnitude of tides.
- Observe how tides can affect the daily lives' of people.
- Recognize and identify when changes in tides will occur.
- Define and distinguish between the various types of tides.

GUIDING QUESTIONS

- Have you even been to the beach and had to move your blankets or towels to avoid the incoming tide?
- What are tides and what forces cause tides?

KEY TERMS

Gravity The force of attraction that moves or tends to move bodies towards the center of a celestial body, such as the earth or moon; all objects with mass are affected by gravity.

Tide The cyclic rise and fall of the waters of the sea level caused by the combined effects of the Moon and Sun's gravitation forces and the rotation of the Earth.

Semi-diurnal tide Two high tides and two low tides of the same height in a day.

Diurnal tide One high tide and one low tide occurring in a day.

Mixed tides High and low tides of the day that differ in height.

Spring tide The largest tidal range; occurs when the Earth, sun and moon are aligned in a straight line; occur twice during 28-day lunar cycle at the full and dark moon.

High tide The time water is at its highest level of elevation.

Low tide The time of water at its lowest level of elevation and maximum ebb.

Tide cycle A period which includes a complete set of tide conditions or characteristics, such as a tidal day or a lunar month.

Tidal range The vertical difference between the high tide and succeeding low tide; is not constant, changes depending on sun and moon's gravitational force on the Earth; the most extreme tidal ranges occur around the time of full or new moons; the largest annual tidal range occurs around the equinox, if coincidental with a spring tide.

Neap tides The smallest tidal range; occurs when the sun and moon are at right angles, partially cancelling out their gravitational pull, reducing the range of the tide; occur twice during the 28-day lunar cycle when the moon is one-quarter full.

KEY CONCEPTS

- The sun and moon's gravitation pull on earth and the seas determines the tide.
- The spin of the Earth creates centrifugal forces that move the sea.

FLORIDA STANDARDS

[MAFS.K12.MP.4.1](#)

Model with mathematics.

Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

[MA.912.A.3.11](#) Write an equation of a line that models a data set, and use the equation or the graph to make predictions. Describe the slope of the line in terms of the data, recognizing that the slope is the rate of change.

[MA.912.T.3.4](#) Solve trigonometric equations and real-world problems involving applications of trigonometric equations using technology when appropriate.

[MA.912.T.1.8](#) Solve real-world problems involving applications of trigonometric functions using graphing technology when appropriate.

[MAFS.912.F-TF.2.5](#) Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.

[MAFS.912.F-IF.2.6](#) Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

OCEAN LITERACY PRINCIPLES

Principle #1

The Earth has one big ocean with many features.

c. Throughout the ocean there is one interconnected circulation system powered by wind, tides, the force of the Earth's rotation (Coriolis effect), the Sun, and water density differences. The shape of ocean basins and adjacent land masses influence the path of circulation. This 'global ocean conveyor belt' moves water throughout all of the ocean's basins, transporting energy (heat), matter, and organisms around the ocean. Changes in ocean circulation have a large impact on the climate and cause changes in ecosystems.

d. Sea level is the average height of the ocean relative to the land, taking into account the differences caused by tides. Sea level changes as plate tectonics cause the volume of ocean basins and the height of the land to change. It changes as ice caps on land melt or grow. It also changes as sea water expands and contracts when ocean water warms and cools.

Principle #2

The ocean and life in the ocean shape the features of Earth.

b. Sea level changes over time have expanded and contracted continental shelves, created and destroyed inland seas, and shaped the surface of land.

e. Tectonic activity, sea level changes, and force of waves influence the physical structure and landforms of the coast.

Principle #5

The ocean supports a great diversity of life and ecosystems.

h. Tides, waves and predation cause vertical zonation patterns along the shore, influencing the distribution and diversity of organisms.

ADDITIONAL RESOURCES

<http://www.coseeflorida.org/oscrs-the-tides.html>

http://oceanservice.noaa.gov/education/kits/tides/tides07_cycles.html

http://www.ehow.com/info_8092958_differences-between-neap-tides.html?ref=Track2&utm_source=ask

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and



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