



PHYSICAL OCEANOGRAPHY UNIT

LESSON PLAN 6th-8th grade

Topics

Introduction to Physical Oceanography
Properties of Water
Tides
Waves
Currents & Gyres

Objectives

Students will be able to:

- Describe the branches of oceanography and how researchers study them
- Explain how the properties of water are applied to a salt wedge
- Interpret a tide chart and how this information is useful to humans
- Demonstrate how wave action can affect a coastal area and ways to prevent it
- Compare and contrast the importance of surface and deep water currents

Instructional Materials

Topic Video
Vocabulary Flash Cards

Assessment Materials

Video Reflection Worksheet
Video Quiz
Introduction to Oceanography Worksheet (answer PDF available)
Properties of Water Worksheet (answer PDF available)
Tides Worksheet (answer PDF available)
Waves Worksheet

- do at home experiment

Currents & Gyres Worksheet (answer PDF available)

Related Materials

Links to videos and reading material that provides additional information on topics.

Topic articles (can adjust lexile levels)

- https://newsela.com/read/natgeo-oceanography/id/48143/?collection_id=339&search_id=5f60783a-ef11-4f37-a155-b752f8b1b62b
- https://newsela.com/read/dream-job-Deep-Sea-Submersible-Pilot/id/36297/?collection_id=339&search_id=246e5aa6-a055-4e6a-9f56-64679fe5e36e
- https://newsela.com/read/natgeo-simulating-global-ocean/id/2000002559/?collection_id=339&search_id=023f7274-9854-4d8a-b62c-d8ac95079f1e
- https://newsela.com/read/natgeo-ocean-conveyor-belt/id/50391/?collection_id=339&search_id=a33051ce-c65c-4bfd-a3e1-9241d6f715d7



Topic articles continued (can adjust lexile levels)

- https://newsela.com/read/lib-ocean-currents/id/2001006569/?collection_id=339&search_id=cb192c53-d14f-4104-ad10-61c5f0be0a27
- https://newsela.com/read/lib-nasa-tides-ocean/id/26285/?collection_id=339&search_id=3bd897c8-7795-405f-8948-65a6d9952347
- https://newsela.com/read/elem-sci-waves/id/29472/?collection_id=339&search_id=7a1266d0-4999-4b2d-8366-1d2859a98b59

NOAA Resources

The National Oceanic and Atmospheric Administration (NOAA) is a partner of SoundWaters. These are additional resources you may use in addition to the other materials included above.

Tides

https://oceanservice.noaa.gov/education/tutorial_tides/tides01_intro.html
https://oceanservice.noaa.gov/education/tutorial_tides/tides02_cause.html
https://oceanservice.noaa.gov/education/tutorial_tides/tides05_lunarday.html
https://oceanexplorer.noaa.gov/edu/learning/10_tides/activities/predicting_tides.html
<https://www.noaa.gov/education/resource-collections/ocean-coasts-education-resources/tides>

Waves

<https://coast.noaa.gov/data/SEAMedia/Lessons/G4U2L3%20Waves.pdf?redirect=301ocm>
<https://coast.noaa.gov/data/SEAMedia/Lessons/G4U2L3%20Waves.pdf> *used for waves experiment
<https://oceanservice.noaa.gov/education/kits/currents/03coastal1.html>

Oceanography

<https://oceanexplorer.noaa.gov/edu/oceanage/welcome.html> *careers
<https://oceanservice.noaa.gov/facts/oceanographer.html>

Currents & Gyres

<https://sos.noaa.gov/sos-explorer/download-sos-explorer-mobile/>
<https://oceanservice.noaa.gov/education/kits/currents/08affect.html>
<https://oceanservice.noaa.gov/education/kits/currents/05currents1.html>
<https://oceanservice.noaa.gov/education/kits/currents/06conveyor.html>
<https://oceanexplorer.noaa.gov/facts/currents.html>
https://oceanservice.noaa.gov/education/pd/tidescurrents/tidescurrents_currents.html

NGSS Standards

Earth's Place in the Universe: MS-ESS1-1

Earth's Systems: MS-ESS2-6

INTRODUCTION TO OCEANOGRAPHY ANSWER KEY

Oceanography is divided into 4 categories, which scientists study every day.

Sort these science research projects into the correct category

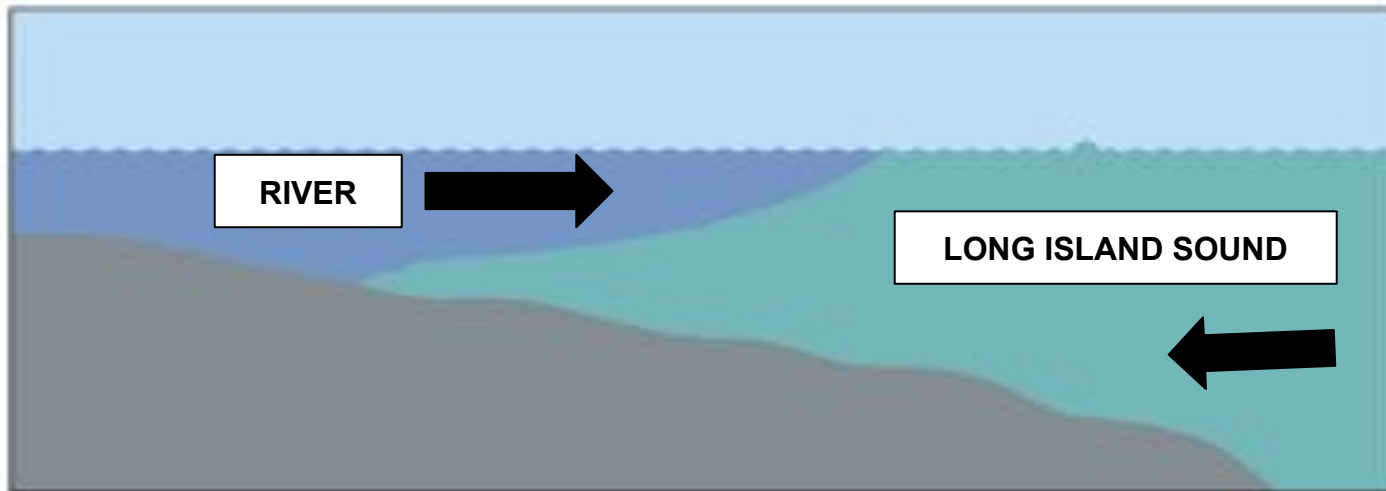
<u>Physical</u>	<u>Biological</u>
Comparing tidal wave height before and after a hurricane	Scuba diving on a coral reef to count and identify types of fish
Measuring how far a floating buoy travels in a current around Long Island	Comparing plankton species between Eastern and Western Long Island Sound
<u>Chemical</u>	<u>Geological</u>
Measuring the amount of dissolved oxygen during different seasons	Surveying the sediment composition to understand bottom habitat areas
Measuring the effects of the pollutants in an oil spill on seawater	Determining the best place to dredge the bottom to place underwater wiring



PROPERTIES OF WATER: DENSITY ANSWER KEY

A salt wedge is an excellent demonstration of density because it involves the interaction between a river and a coastal body of water like Long Island Sound.

On the diagram below, label the river and Long Island. Then, use the arrows to indicate which direction the water is moving.



A salt wedge typically happens when the river has a strong water flow. What would happen to the salt wedge if the river was slow moving?

When the water from a river is fast flowing, it creates the layering effect you see with a salt wedge of fresh water on top of salt or brackish water. If the river is slow, the water will most likely mix instead of layering.



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READING A TIDE CHART

A tide chart is used to predict the tides in an area. The chart shows the water levels on an hourly basis for a particular place. The vertical axis contains the tide height and the horizontal axis shows the time of day.

Using the tide chart, answer the following questions

How many high tides in one day?

2 high tides (12am and 12pm)

How many low tides in one day?

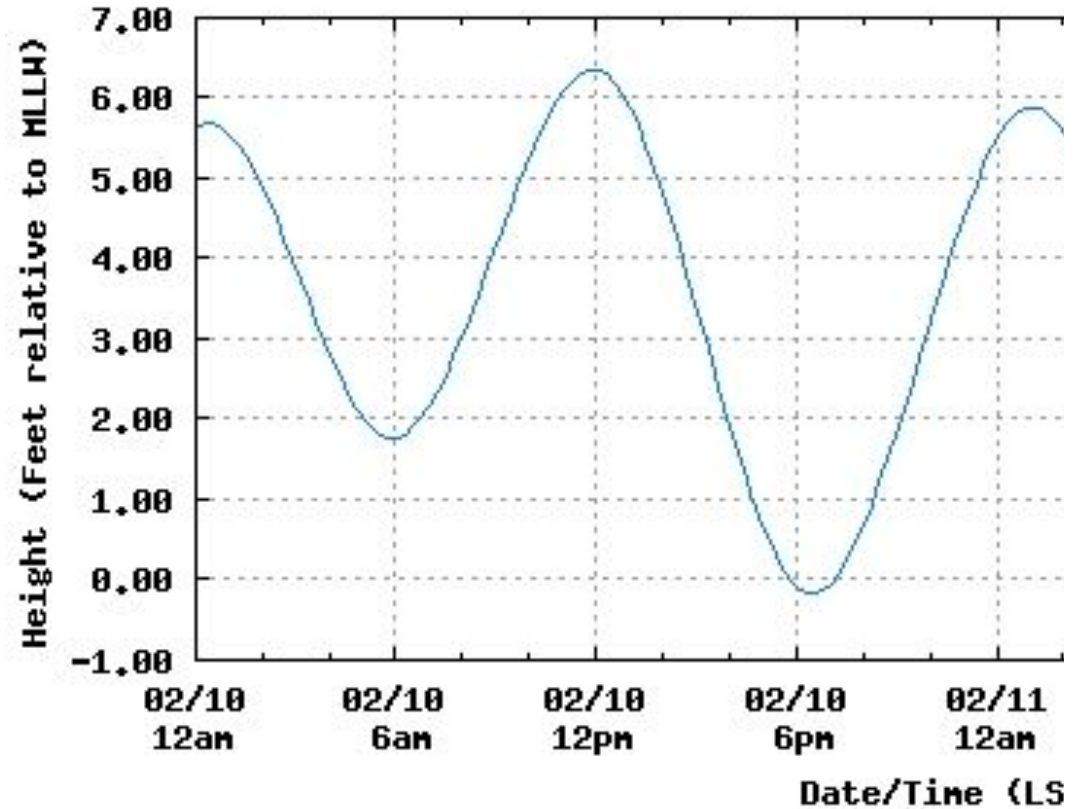
2 low tides (6am and 6 pm)

At 9am, is the tide going towards high or low?

At 9am, the tide is rising, so it's going towards high

If a fisherman wanted to take his boat out at the highest tide of the day, what time would that be and how high is the tide?

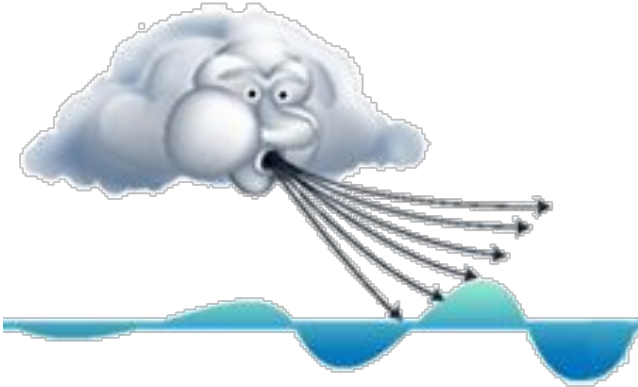
He would have to go out at 12pm because the tide is almost 6.5 ft



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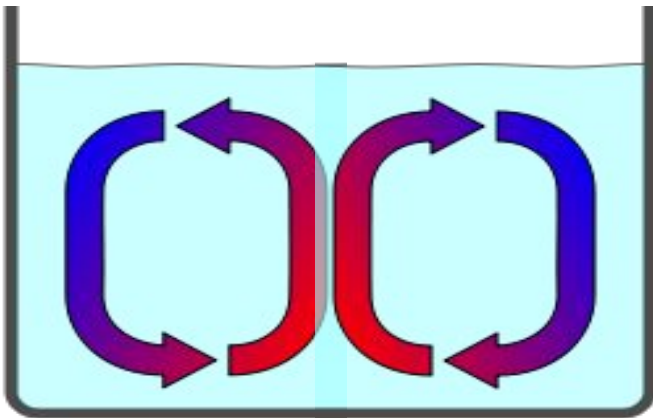
CURRENTS ANSWER KEY

What type of current does each of these images cause? What do they carry or move with them? Why is that important for animals and/or humans?



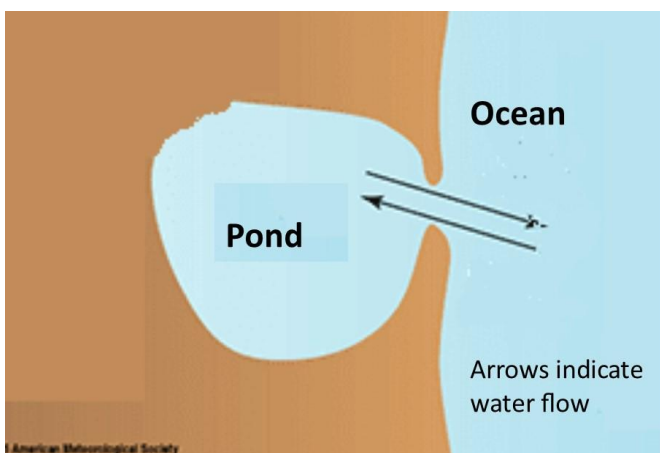
Wind causes surface currents

- Transportation of water from cold areas to warm areas
- Surface currents transfer heat from the equatorial regions towards the poles
- Causes upwelling of nutrients for animals



Thermohaline circulation causes the global conveyor belt

- This is responsible for moving water around the earth, especially between the deeper oceans and the surface
- If the water didn't move, the poles would melt. The ocean would get more fresh
- It creates livable climate/weather and moves nutrients/oxygen for animals/plants



Water flow in and out of an area causes tidal currents.

- Tidal currents bring in new nutrients to animals/plants
- A source of energy - underwater turbines
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