

# 3 LESSON PLAN

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Subject: Science

Theme: Ocean

Question: **What causes waves?**

**Content objective(s):** Students will learn what causes waves and what influences their size.

**Language objective(s):** Students will use simple present, and be verb to talk about waves; use *will* to make predictions

**21st-century skills:** Communication, creativity, collaboration, critical thinking, information literacy

**Vocabulary:** Wind, ocean, waves, surface, shore, coast, energy, earthquake, hurricane, storm

**Background information for the teacher:** Anything that disturbs the surface of the ocean will cause waves to form. Deep sea earthquakes can also disturb the ocean surface, sending waves toward the coast. Waves do not move horizontally; they only move up and down (a wave does not represent a flow of water). You can see this by watching a floating buoy or a small boat go up and down with a wave; it does not, however, move horizontally with the wave. Rather, the wind transfers some of its energy to the water through friction between the air and water molecules. Stronger winds (like storm surges) cause larger waves. As the wave approaches the coastline, it will encounter the rising sea floor and begin to show its true size.

## Lesson:

Show pictures or YouTube videos of a hurricane causing large waves and a calm ocean. Ask students to describe what they see and the size of the waves. Ask: *What do you think causes these waves?* Elicit the answer that the wind blowing across the surface of the water causes the waves. The more wind there is, the larger the waves.

Draw and label a diagram on the board showing the wind moving across the surface of the water. Indicate that movement with a horizontal arrow (→). Add waves to the diagram and indicate their movement with a vertical arrow (↓).

Draw an incline  to illustrate the rising of the sea floor and show how waves increase in height as they get closer to shore.

# LESSON PLAN 3

Demonstrate with five marbles how wind energy transfers to the water. Put four marbles together in a straight line, touching each other. Before you gently roll the fifth marble toward the line of marbles, ask students what they think will happen when it touches the first marble. Accept all predictions, then roll the fifth marble. The energy in the rolling marble will transfer through the marbles and cause only the marble at the other end to move. The energy transfers invisibly just as the wind energy transfers through the water, pushing the waves along the surface.

Write the following short reading text on the board or create a handout for each student. Have students work with a partner to fill in the blanks with the new vocabulary.

## Vocabulary: coast, energy, storms, surface, waves

Waves begin when winds, earthquakes, hurricanes, and (1) \_\_\_\_\_ out in the ocean move the water's (2) \_\_\_\_\_. The size of these (3) \_\_\_\_\_ depends on how strong the winds, storms, and earthquakes are. The waves only move up and down, but the (4) \_\_\_\_\_ of the wind pushes them to the (5) \_\_\_\_\_ or shore.

Go over answers with the class.

## Answers

Waves begin when winds, earthquakes, hurricanes, and (1) storms out in the ocean move the water's (2) surface. The size of these (3) waves depends on how strong the winds, storms, and earthquakes are. The waves only move up and down, but the (4) energy of the wind pushes them to the (5) coast or shore.

## EXTENSION

### Making waves in a bottle.

To extend this lesson, you can have students make their own waves using a large, clear, empty plastic bottle, some water with blue food coloring, and some vegetable oil. View full instructions at the websites below.

<http://www.videojug.com/film/how-to-make-an-ocean-in-a-bottle>

[www.tryscience.org/experiments/experiments\\_makewaves\\_athome.html](http://www.tryscience.org/experiments/experiments_makewaves_athome.html)