

# Introduction to Waves

Below is an overview of the activity [Introduction to Waves](#) (National Geographic) to incorporate information learned from Dr. Herrington's presentation and subsequent discussion.

## Lesson Overview

Students learn about ocean waves, how they are formed and the parts of waves.

## Lesson Rationale

Many students visit the New Jersey shore each summer and thus are familiar with waves for recreation. However, few students understand how waves are formed. Gaining a better understanding of wave formation gives students a broader understanding of a phenomenon many are familiar with. In addition, it begins to teach students about forces and the movement of matter.

## Key Concept

Through a demonstration, visual representations, and a computer simulation students get to explore the components of waves, different properties of waves (height and length), and how the components of waves affect the size of waves.

## Adjustments to Procedure

The current write-up of the activity has the teacher manually moving the tank in different directions to create waves. This is an excellent demonstration of waves that occur due to perturbations in the sea floor, for example tsunami waves. However, it is misleading to teach students that that majority of waves form due to this force. Instead there is an opportunity to teach students about wind-driven waves. All you need are straws or a hair dryer to demonstrate wind waves along the surface. Either give students straws and let them create waves along the surface (have them point across the water all in the same direction, it can help to put glitter or cinnamon in the water for them to see the water movement better) or attached the hair dryer next to the outside of the tank again pointing across the surface of the water. These two versions will enable you to accurately demonstrate how most waves form in the oceans and lakes.

## Introduction to Waves (K-2)

### Overview:

In this lesson, students learn about ocean waves. They will begin by learning the components of a wave, and will then discuss the meaning of wave height and wavelength. A demonstration will spark discussion about how to make waves, and an activity with the [National Geographic Wave Simulator](#) will allow students to experiment with creating waves of varying sizes.

### Connections to the Curriculum:

Geography, math, earth science

### Connections to the National Geography Standards:

Standard 7: "The physical processes that shape the patterns of Earth's surface"

### Time:

One to two hours

### Materials Required:

- Computer with Internet access
- Blank Xpeditions [outline map of the world](#)
- Globe
- Large baking pan partially filled with water
- Cork
- Construction Paper
- Crayons/markers

### Objectives:

Students will

- identify various bodies of water on a map and globe, discuss their observations about the amount of water on the planet, and hypothesize about the texture of the surface of these bodies of water;
- learn the different parts of a wave and identify them on their own models of waves;
- look at different types of waves and discuss their heights and lengths in terms of the different sizes of the students in the class;
- watch a physical demonstration of how waves are created and see how a boat may react to those waves; and
- simulate additional waves with the National Geographic online wave simulator.

### Suggested Procedure

#### Opening:

Show the students an [outline map of the world](#) as well as a globe, and ask them to identify the areas that are covered with water. For example, they may know which areas are ocean and which are lakes. Then ask the students to describe the water in those areas in terms of whether or not they think that the surface is flat or full of waves.

Gather the students around the pan of water. Tilt the pan in different directions and disturb the water in other ways to demonstrate how waves of different sizes are formed. Have the cork in the

pan represent a boat on the ocean. Ask the students to describe how the "boat" moves as the waves change size. This will give them a three-dimensional representation of what they will see on the wave simulator.

**Development:**

Give the students paper and writing utensils and ask them to draw their own waves. Draw one wave on the board so that all of the students can see it. Explain that each part of a wave has a name, just like each part of a body. Show how the highest part of a wave is called the crest, and the lowest part is the trough. Have the students label the crests and troughs on their own drawings.

Remind the students that waves have different sizes, based on the wave height and wavelength. Line up a few students in front of the class. Show the class that different students have different heights just like the waves. Ask the students to compare their drawings and determine which wave is the tallest or shortest.

Bring the students back together again. Ask the students if they notice anything else about the other wave drawings. If they don't notice it themselves, point out that some students' drawings show waves that are farther apart than others. In order to demonstrate this concept of wavelength, line up a group of students again, side by side, and ask them to stretch out their arms a bit and hold hands. Explain that the students, all of different sizes, now act as a set of waves by tracing from their hands to their heads. The heights can be measured from the tops of their heads, to their hands (from crest to trough). Explain that wavelength is measured from crest to crest or trough to trough, so ask the students to look at the distances between different students' heads and hands. Finally, place the students in pairs or small groups and have them try to re-create their drawings on the [National Geographic Wave Simulator](#).

**Closing:**

Review the parts of the wave and the concept of wave height and wavelength. Ask them to describe what they had to do in order to re-create their waves on the simulator. What did they have to adjust to make the waves bigger? Smaller? What did they have to change in order to make lots of waves versus only a few?

**Suggested Student Assessment:**

Give the students another piece of paper and ask them to draw five different waves. Have them label the parts of the wave and identify which ones have the greatest height, the smallest height, the longest wavelength, and the shortest.

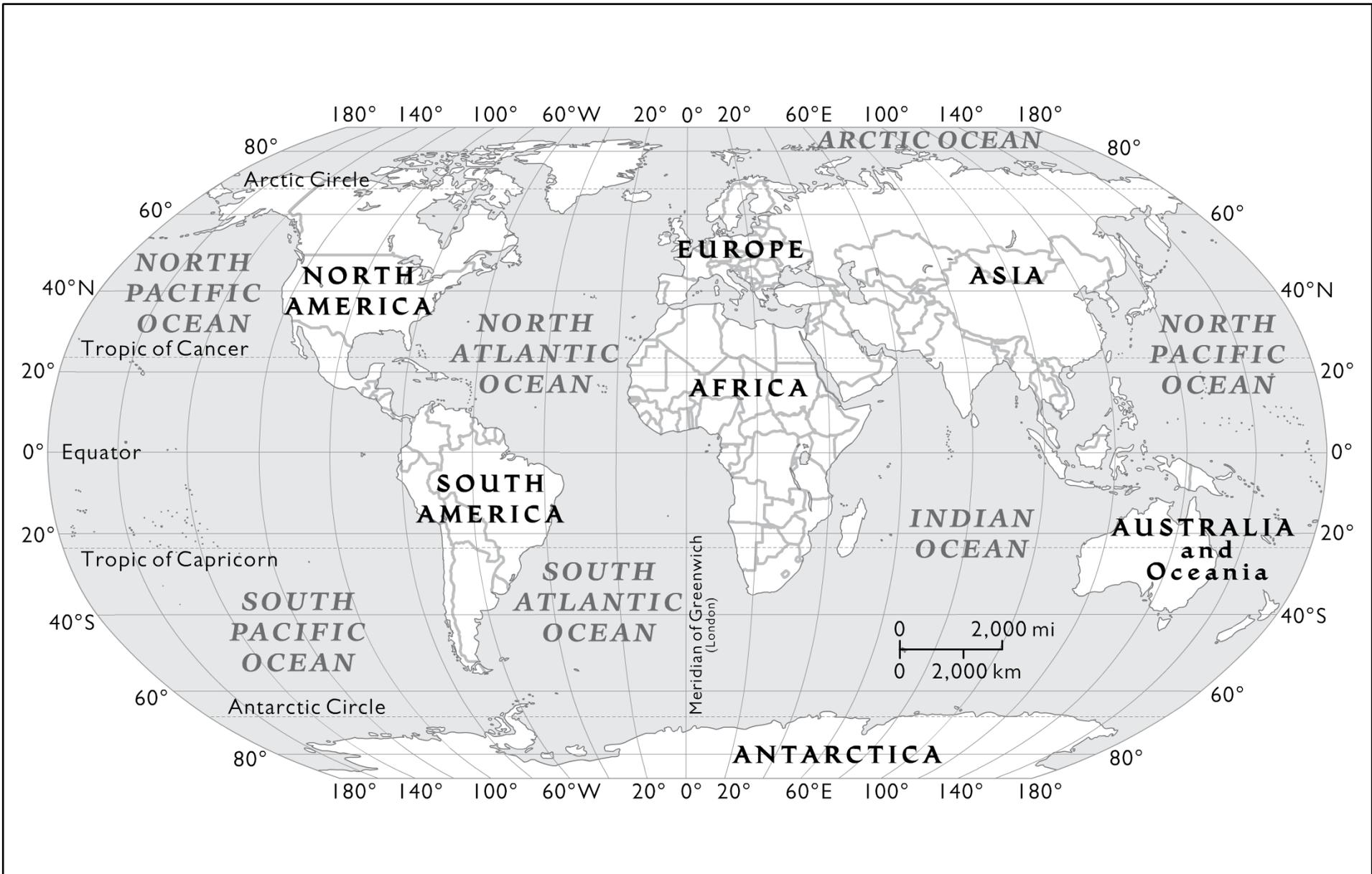
**Extending the Lesson:**

Tell the students to pretend that they are on a boat in the middle of the ocean. Ask them to draw their boat as well as the types of waves that they would like to see. Then ask them to write a story about their experience focusing on the impact the waves might have on their boat.

**Related Links:**

[National Geographic: Wave Simulator](#)

[Oceans Alive! Water on the Move: Wind and Waves](#)



# THE WORLD

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