



## Overview:

This lesson addresses the common misconception that young children often hold about waves: water waves transport matter. Students also make their own model of a wave.

## Targeted Alaska Grade Level Expectations:

### *Science*

- [3-4] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating.
- [3] SA1.2 The student demonstrates an understanding of the processes of science by observing and describing the student's own world to answer simple questions.

## Objectives:

The student will:

- predict and record observations;
- observe that waves transfer energy; and
- make a wave model in a bottle.

## Materials:

- Large rectangular pan
- Water
- Toy boat, or cork
- Rocks
- Marbles or dominoes
- Clear plastic bottles (one per group)
- Funnel (one per group or to share)
- Food coloring
- Oil
- STUDENT WORKSHEET: "Wave Investigation"

## Whole Picture:

A common misconception that young children often hold is that water waves transport matter. For example, a boat will move as a wave passes by because the water will "carry" it. Waves transfer energy from one point to another. Water is a medium that waves travel through.

## Activity Preparation:

For younger students, this scientific investigation may be more appropriate as a teacher-led activity. For older students, groups may be more appropriate. For group investigations, each group should have a pan with water in it, a toy boat and a rock.

## Activity Procedure:

1. Explain students will learn more about ocean waves. They will start with a scientific investigation. Distribute STUDENT WORKSHEET: "Wave Investigation." Guide students through the worksheet including the question and prediction.
2. Instruct groups to continue with the following procedure or perform the procedure as a demonstration for the teacher-led option. Place the toy boat or cork on the water in the center of the rectangular pan. Drop the rock to generate a wave on one end of the pan. Students observe and should circle the picture of the most appropriate response.

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**Critical Thinking: Think-Pair-Share Method.** Pose a question: Why didn't the wave carry the boat to the end of the pan? Allow think time of at least 5 seconds. Ask students to pair up and share their responses. Call on students to share each pairs' responses with the class.

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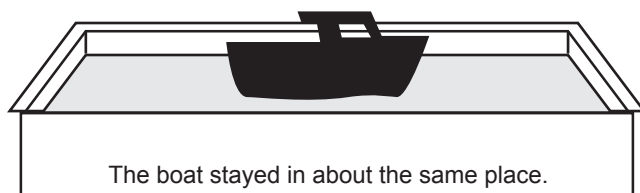
3. Explain the boat didn't move because the water didn't move. What moved through the water is energy. Waves are energy moving through things.
4. As another example of waves moving through a medium, demonstrate energy transfer using marbles or dominoes. Line them up in a row then apply force to one end. Students should observe the energy traveling through the line of marbles or dominoes.
5. As a culminating activity, make waves in bottles. Distribute the following to each group of students: a clear plastic bottle, water, funnel, and food coloring. Instruct groups to fill each bottle about 1/3 full of water and then drop a few drops of food coloring in the bottle. Circulate through the groups and fill the remainder of the bottle up with cooking oil; cap tightly. Students observe waves through the bottle.

## Extension Ideas:

- Collect enough bottles from students so that students may bring their own bottle of waves home.
- Set up learning centers for students to continue exploring the concepts of this lesson using the rectangular pan and toy boat at one center and dominoes or marbles at another center.
- Include children's literature on waves as a read aloud or have them available in the classroom library. Some possible books include:
  - Cowan, C., Paz, O., & Buehner, M. (1997). *My life with the wave*. New York: Lothrop, Lee & Shepard Books.
  - Lee, S. (2008). *Wave*. San Francisco, Calif: Chronicle Books.
  - Souza, D. M. (1992). *Powerful waves*. Minneapolis: Carolrhoda Books.

## Answers:

1. Answers will vary.
2. See figure at right.



## Lesson Information Sources:

Cowan, C., Paz, O., & Buehner, M. (1997). *My life with the wave*. New York: Lothrop, Lee & Shepard Books.

Lee, S. (2008). *Wave*. San Francisco, Calif: Chronicle Books.

Souza, D. M. (1992). *Powerful waves*. Minneapolis: Carolrhoda Books.

Name: \_\_\_\_\_

# Wave Investigation

## Student Worksheet



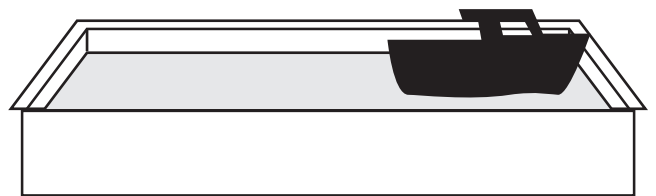
What will a wave do to a boat?

Circle the best answer.

1. I predict...



The boat will stay in about  
the same place.



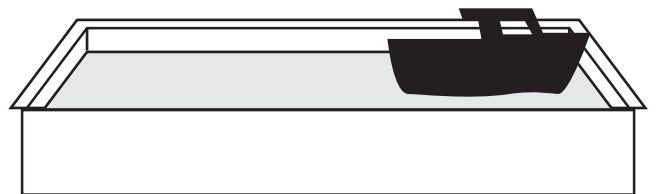
The water will carry the  
boat to the edge of the pan.

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2. I observed...



The boat stayed in about  
the same place.



The boat was carried to  
the edge of the pan.