ROCKY SHORE WAVES

Topic
Waves and Change

Duration
Two sessions

Vocabulary
energy
gravity
sediment
slope
tides
waves

STANDARDS

Practices
Developing and Using Models

Core Ideas
Earth Materials and Systems

Crosscutting Concepts
Stability and Change

OCEAN LITERACY PRINCIPLES

OLP 1, OLP 2

Focus Question

What impact do waves have on rocky shore communities?

Overview

Students create a model of a rocky shore. Students discuss how waves form. Students create waves using their model to identify the impact of waves on the rocky shore. Students discuss how waves impact the rocky shore, and infer how waves impact life on the rocky shore.

Objectives

Students will be able to:

- Identify features of a rocky shore
- Determine how waves can form
- Explain how waves can impact the rocky shore

Materials Needed

Per group:

- A photo of the rocky shore (from pages 33–36)
- Large plastic container such as a dish pan
- Four cups of different-sized sediment (fine sand, course sand, gravel, and large rocks)
- Pitcher of water
- Popsicle stick or plastic spoon to make waves
- Scientist notebooks (if used in class)
- Copies of activity sheet (page 44) for each student

Teacher Preparation

1. Build a model of the rocky shore as an example for students (use four different types of sediment to create a gradual slope with the largest rocks being predominant; add water).
2. Prepare supplies for student groups (three to four students per group recommended)—fill each plastic container with a photo of the rocky shore, four cups of different-sized sediment, a popsicle stick or plastic spoon)
3. Plan on designating specific work spaces for groups.

Teacher Tips

- Students are making a model of the rocky shore, so make sure the large rocks predominate.
- Different-sized sediment can be purchased at local home improvement stores.
- Demonstrating for students how to make waves by using the wave maker will benefit group work and their observations.

Extension Suggestions

- Create a big model of the rocky shore for the classroom using a "kiddie pool." This provides the opportunity to add more props and supports the lesson with a larger example.
- Have students perform the extension investigations on the Making Waves Activity Extension sheet (page 45).

Teacher Preparation (continued)

4. Each student will need a copy of the activity sheet (page 44) and a pencil.
5. Teachers will need easy access to a whiteboard or interactive whiteboard to record student input.

Background

A rocky shore is a complex ecosystem. It is an area where the ocean meets the land, and the land is predominantly rock. Among the many large rocks are smaller rocks, sand, seaweeds and animals. The rocky shore's landscape consists of ledges, platforms, boulders and tide pools. Waves are constantly transporting and depositing sediment to various zones of the rocky shore. They are a major factor in the formation of the rocky shore ecosystem.

Waves are formed by energy passing through water, causing it to move in a circular motion. This energy often comes from the wind. They can be formed by underwater disturbances as well, such as earthquakes or volcanic eruptions. Waves are also caused by the gravitational pull of the sun and the moon—tides. Manmade objects can also create waves.

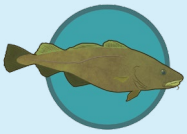
Many sizes of rocks are found on the rocky shore. Formation and displacement of sediment depends on the strength of the waves and wind as well as the slope of the land. The slope of the land can also be modified by the strength of the waves and wind and the size of the sediment present.

Procedure

1. Ask students to recall what a rocky shore looks like. Encourage them to come up with as many characteristics as possible.
2. Ask students to discuss with a classmate sitting next to them why they think a rocky shore looks the way it does. After a couple of minutes, have students share their thoughts with the class.
3. Point out that one of the reasons a rocky shore has its shape is because of the waves. Ask students how they think waves are formed. Record their answers where visible to the entire class. Make sure the following is written: wind, underwater disturbances, tides, and man-made objects. Inform students they will have a lesson on tides in the near future.
4. Show students your prepared model of a rocky shore and inform them that they will be working together in groups to create their own rocky shore.
5. Discuss the steps students need to take to create their own rocky shore, and inform them of how they are going to make waves.

Books

- ★ *Basher Science: Oceans: Making Waves!* by Dan Green
- ★ *Tsunamis* (A True Book) by Chana Stiefel
- ★ *Where Albatross Soar: A Beachside Story of Waves and Storms* by Bryan Knowles



Websites

- ★ Watch a brief video on why the ocean has waves on the National Oceanic and Atmospheric Administration website.

Scientist Notebook

- ★ Students can record how waves are formed (by energy passing through water, causing it to move in a circular motion). They can record the different ways waves can form. They can record their observations of the activity or paste their activity sheet into their notebook.

Procedure (continued)

6. Show students the activity sheet (page 44), review the questions, and advise them to follow instructions carefully.
7. Allow student groups twenty to thirty minutes to create their rocky shore, make waves, and record observations.

Wrap-up

- ★ Have groups review with the class the observations and answers they recorded on their activity sheet. If results differ, question why.
- ★ Ask students to make inferences as to what impact waves could have on living organisms at the rocky shore.
- ★ Conclude by addressing the fact that waves have a major impact on the formation of the rocky shore ecosystem.

MAKING WAVES

Name: _____

Date: _____

Make a Rocky Shore Checklist ☑

- ☐ Add cup of smallest sediment to your basin.
- ☐ Spread out sediment covering the bottom of your basin completely.
- ☐ Add cup of second smallest sediment to your plastic basin.
- ☐ Spread out sediment to cover most of the smallest sediment.
- ☐ Add cup of second largest sediment to your plastic basin.
- ☐ Spread out sediment to cover half of your second layer of sediment.
- ☐ Add cup of largest sediment to your plastic basin.
- ☐ Spread out sediment to cover half of your third layer of sediment.

Making Waves Checklist ☑

- ☐ Add water slowly to the side of your basin with the smallest sediment.
- ☐ Fill the basin until it is completely covering the smallest sediment.
- ☐ Make waves by slowly pushing water.
- ☐ Make sure you push the water in only one direction.

Record Your Observation

1. Why does the water flow downhill?

2. What caused the sediment to stop moving?

3. What types of sediment moved more? Why do you think this happened?

4. Now that you have seen the impact waves can have on the rocky shore, what inferences can you make about how waves impact life on the rocky shore?

MAKING WAVES

Name: _____

Date: _____

Activity Extension

Now that you have created a model of the rocky shore and have made some waves, try out the investigations below!

Change the Slope!

Place a book beneath one end of your basin to create a rocky shore with a larger slope.

1. What do you think will happen to the shape of the rocky shore if it has a larger slope?

_____

_____

Make some steady waves for your rocky shore with a larger slope.

2. What did you observe? Why do you think this happened?

_____

_____

Change the Size!

3. What do you think will happen to the rocky shore if you increase the size and force of your waves?

_____

_____

Make some larger, stronger waves by pushing your wave maker more forcefully.

4. What did you observe? Why do you think this happened?

_____

_____

Change the Angle!

5. What do you think will happen if you change the angle of your waves?

_____

_____

Make waves that break onto your rocky shore from different angles.

6. What did you observe? Why do you think this happened?

_____

_____

_____

_____

_____

_____

_____