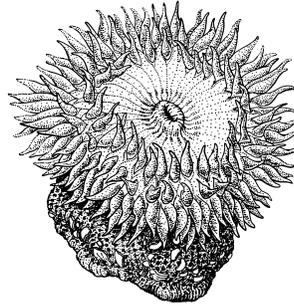


Dishpan Tide Pool



Topics

Tides, Waves

Grades

PreK-2

Site

Indoors

Duration

30 minutes

Materials

- Dishpans (1 per group)
- Images of rocky shore animals from calendars, magazines or websites
- Rocks
- Clay or Plasticine
- Water
- Pitcher to measure water
- Plastic tubing to siphon water
- Wave maker (plastic lid or ruler)
- Notebooks or paper
- Pencils or pens
- *Splash Zone* CD (optional)

Vocabulary

tides, tide pool, waves

National Science Education Standards

Science as Inquiry (K-4)
Abilities necessary to do scientific inquiry

Physical Science (K-4)

Position and motion of objects

Life Science (K-4)

Characteristics of organisms
Organisms and environments

Overview

What's the difference between tides and waves? Students find out by creating a model tide pool in a plastic dishpan. As they slowly add water to their model, students observe and chart the change in the water level and the length of time that various portions of the tide pool are underwater. They make waves and consider how animals could be affected by the changing tides and wave force.

Objectives

Students will be able to:

- Explain the difference between tides and waves.
- Understand the impact of varying water levels on tide pool animals.

Background

Plants and animals living at a rocky shore face many challenges. Fluctuating **tides** require these organisms to spend part of the time underwater and part exposed to the air. Waves challenge these organisms to withstand the force and pull of crashing water.

Tides are periodic, short-term changes in the height of the ocean surface at a particular place. Many factors determine the height and timing of the tides. Tides are influenced by the gravitational forces of the moon, sun and Earth, the Earth's rotation and the shape of the shoreline.

At high tide, rocky shore animals are underwater. They compete for food and space while watching out for hungry predators. An anemone is an animal that opens like a flower and uses the stinging cells on its tentacles to paralyze small animals. Barnacles are animals that use their feathery legs to sweep the water for plankton and detritus.

At low tide, the ocean water recedes, leaving **tide pools**. Dozens of different animals and plants live in these pools of water. Others are left out of the water and must find a way to survive. Some animals with shells—like limpets, hermit crabs and snails—can close up tight to stay wet and safe from predators like birds. Others, like some soft-bodied worms, hide under moist rocks until the tide comes in again.



VOCABULARY

Tides: the rising and falling of the seas, usually two high tides and two low tides daily

Tide pool: a pool formed on rocky shores when ocean water levels fall with the tides

Waves: moving swells in a body of water often caused by winds



ELL TIPS

Create a word wall or vocabulary bank for new words to describe components of the tide pool and the animals who live there. Be sure to include pictures to support recognition of the word representing the item.

Waves crashing on the shore change in force depending on many factors, such as shape of the shore, the weather and tides. As the tide comes in, different parts of the rocky shore are impacted by waves. Animals, like sea stars, have suction cup-like tube feet that allow them to stay stuck to the rocks when forceful waves crash. Other animals, like the purple sea urchins, use both their tube feet and their spines to burrow down into rocks, helping them withstand the pressure of forceful waves. Shells are an adaptation various snails have to help protect them from waves.

Procedure

1. INTRODUCE THE CONCEPT OF TIDES AND TIDE POOLS TO STUDENTS.

As a class, read a book about tide pools or go to www.montereybayaquarium.org and watch a tide pool video. *What are tides? (change in the height of the sea) How many tides are there? (depends on the coastline but often two low tides and two high tides daily) What kinds of animals live in tide pools? (anemones, crabs, snails, urchins, sea stars and so on)* Tell students they are going to build a model tide pool.

2. IN SMALL GROUPS, STUDENTS BUILD A DISHPAN TIDE POOL.

Give each group of students a dishpan and some rocks. Have students use the rocks to make a tide pool in the dishpan.

3. USING CLAY, STUDENTS MAKE TIDE POOL "ANIMALS."

Pass out clay to each group. Have each student mold a small piece of clay into a rocky shore animal. You may also pass out images of various rocky shore animals to give students ideas. Have them place their animals in the tide pool. They should compare the location of each clay animal with the placement of the other models. Which animals are higher on the rocks? Which are lower? If water were slowly added to the dishpan tide pool, which animals would be underwater first?

4. STUDENTS CREATE HIGH TIDE IN THE DISHPAN TIDE POOL.

Add one pitcher of water to the tide pool at a time. After each pitcher is added, record which clay animals are in the water and which are in the air. Continue adding water, a pitcher at a time, until you reach "high tide."

5. CREATE LOW TIDE IN THE DISHPAN TIDE POOL.

As a class, discuss what happens after high tides in real tide pools. (*water level drops to "low tide"*) Ask students to predict which animals would be underwater the longest in their dishpan tide pools when the tide goes out. Which animals would be exposed to air first? What body parts and behaviors do their animals have to deal with low tide? Have them record their hypotheses in their notebooks. Then help students siphon out a pitcher of water at a time. After each pitcher is removed, record whether the clay animals are in the water and which are in the air. You may have each group make a chart with their animals as the column headings. Number the rows from 1 to 5 to indicate the level of water (low tide or 1 pitcher up to high tide or 5 pitchers). Continue removing water until you have "low tide."

6. STUDENTS CALCULATE THE CHANGES IN THE DISHPAN TIDE POOL.

Estimate, measure and compare the depths of the water in your dishpan at high tide and low tide (high tide may equal 5 pitchers and low tide may equal 1 pitcher depending on the size of your dishpan). Describe the changes in water level and exposure to air. (*the lower the water, the longer the animal is exposed to air*)

7. CREATE WAVES IN THE DISHPAN TIDE POOL.

Have students set up the dishpan tide pool so it is low tide. Discuss the difference between waves and tides. Give them a ruler or have them make waves with their hands. *How far up does the water hit the rocks? What do you think would happen if the tide were higher? What animals are impacted by the waves?* Have them record their observations.

8. COMPARE WAVES AT HIGH AND LOW TIDE.

Have students add enough water to their dishpan tide pool so it is high tide. Challenge them to make waves again. *How far up does the water hit the rocks? What animals are impacted?* Have students record their observations.

9. DISCUSS THE CHALLENGES OF LIFE AT A ROCKY SHORE.

Analyze and discuss the students' findings as a class. Discussion questions may include: *What's the difference between getting splashed with water and being covered with water? Why would rocky shore animals live in different places along the rocky shore? What are some ways rocky shore animals deal with tides and waves?*

Extensions

- Find *Sea Searcher's Handbook* online at www.montereybayaquarium.org. Go to page 15 to learn more about the rocky shore habitat and activities you can do with your students.
- Sing along with "Tide Pool Heroes" (track 11) on the *Splash Zone* CD. What happened to Rocky and Sandy? Draw pictures of various parts of the story and create a story timeline. What do you think might happen next? You may even make Rocky and Sandy stick puppets. Use the stick puppets when you sing along with "Tide pool Heroes."

Resources

Website

Monterey Bay Aquarium. www.montereybayaquarium.org

Find information about habitats and animals on exhibit.

Recommended Books and Music

In One Tidepool. Fredericks, Anthony. Dawn Publications, 2002.

Seashore Life on Rocky Coasts. Connor, Judith. Monterey Bay Aquarium, 1993.

Splash Zone CD. Linda Arnold. Monterey Bay Aquarium, 2000. ("Tide Pool Heroes" on track 11)



CONSERVATION TIPS

Children are more likely to grow up to care about nature when they've experienced it with an adult as a child. Bring children to visit nature, such as tide pools or a park. Be sure to walk carefully over the animals' homes and to leave things where you found them.

**THE MISSION OF THE
MONTEREY BAY
AQUARIUM
IS TO INSPIRE
CONSERVATION OF THE
OCEANS.**

Standards

California Science Standards

Grade K: 1a; 3a; 4a, b, c, d, e

Grade 1: 1a; 2a; 4a, b, c, d

Grade 2: 1a, b; 3a; 4a, b, d, e, f, g

Head Start Framework

- Uses senses, variety of tools, simple measuring devices to gather information, investigate, observe processes and relationships.
- Develops ability to observe and discuss common properties, differences, comparisons among objects and materials.
- Begins to participate in simple investigations to test observations, discuss, draw conclusions, from generalizations.
- Develops abilities to collect, describe, record information through discussion, drawings, maps, charts.
- Expands abilities to observe, describe and discuss natural world, materials, living things, natural processes.
- Expands knowledge of and respect for the environment.

