

12A Waves

How do ocean waves shape landforms?

Waves are the primary force of erosion along coastlines. Along the Pacific coast, waves can contain a lot of energy and come ashore with great force. The beautiful cliffs along the Pacific coast are formed by this strong wave action.

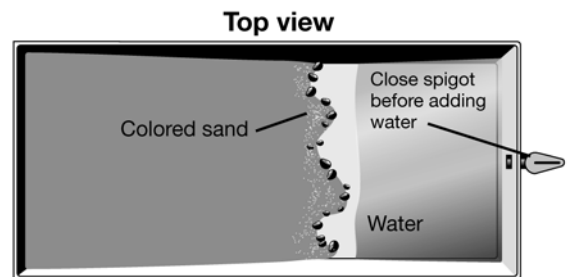
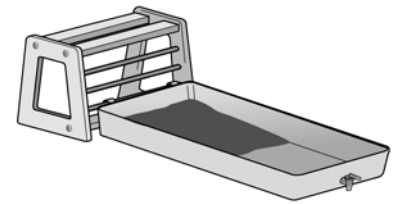
Waves form as energy is transferred from wind blowing across the water's surface. Large waves are often caused by powerful storms far from shore. In this investigation you will model how waves can shape coastal areas.

Materials

- Stream table setup (includes stage, two buckets, the table and grit)
- Small block of wood to be used as a “wave maker” (about 4 cm shorter than the width of the stream table)
- Small rocks and pebbles
- Beaker
- Small amount of colored sand

1 Before and after waves

1. Set up your stream table so that the slope is at the lowest setting.
2. Fill the top half of your stream table with tightly packed grit. The grit should be five to seven centimeters thick. It should gradually slope down towards the middle of the stream table.
3. Create a shoreline in your sand bank. Be creative. Shorelines are rarely straight. Add small rocks and pebbles to your shoreline.
4. Sprinkle the colored sand along the shoreline of your model. Make sure the spigot at the end of the stream table is closed.
5. Fill the empty half of your stream table with water until the water level begins to reach your shoreline.
6. Sketch your shoreline before completing the next step.
7. Place the piece of wood at the end of the table in the “ocean.” Push it back and forth gently to create equal sized waves.
8. Create waves in your stream table for a full minute. Take note of what happens to the colored sand and the shape of your shoreline. When you are done, drain the water and get ready for Part 3.



Shoreline before waves	Shoreline after waves

2 Stop and think

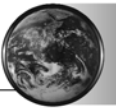
a. What happened to the colored sand as you created waves in your model?

b. Describe the changes that the waves made to your shoreline.

c. Describe the rate of erosion along areas of shoreline that “stuck out” into the ocean. How was erosion different here than areas (such as a bay) that were farther inland?

3 A new shoreline

1. Now form a new shoreline. Again, be creative! You can shape bays, inlets, peninsulas, and areas of different thicknesses of sand.
2. Sprinkle colored sand along your shoreline as you did in the first trial.
3. Use the wood block to make larger waves than the first trial. Note what happens to the shape of your coastline and the colored sand. Create waves for one full minute. Add water as you did in Part 1, step 5.
4. Repeat steps 1 through 3. This time create waves from different angles and observe how this affects the erosion of your shoreline.

**4 Thinking about what you observed**

a. How did the rate of erosion change as you created more powerful waves? Why?

b. Which areas of your coastline eroded the fastest? Why do you think this is so?

c. Which areas of your coastline eroded the slowest? Explain your answer.

d. How did changing the angle of the waves affect the erosion of your shoreline?

e. As waves move ashore, they pick up sediment such as sand and pebbles. How do you think the sand and pebbles affect the erosion of coastal areas?

f. In this investigation you created different sized waves using a piece of wood. How are different-sized waves formed in nature?

5 Exploring on your own

- a. Look up the definitions and find pictures of the following coastal features: sea caves, wave-cut cliffs, sea arch, and sea stacks. Once you have researched each of these features, try to model their formation in your stream table setup.

- b. Use the Internet to research the nearest coastal area to your school. Find pictures. Summarize the shape of this coastline and predict how the coastline will change as waves erode the region.

- c. Look at a map or a satellite picture of the eastern coast of the United States and the Gulf Coast. Focus your attention on the barrier islands along these coasts. How permanent do you think these islands are? Is it a wise decision to build on these islands? Why or why not?
