e Erosion

How Do Waves Cause Erosion and Deposition?

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After you read about Lila's trip, answer the question.

How did the waves affect Lila's boat ride?

PLANET DIARY Go to **Planet Diary** to learn more about wave erosion and deposition.

Warm-Up
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How Do Waves Cause Erosion and Deposition?

Vocabulary

- headland
- beach
- longshore drift
- spit

Skills

- Reading: Summarize
- Inquiry: Communicate

Erosion by Waves

Waves shape the coast through erosion by breaking down rock and moving sand and other sediment. One way waves erode the land is by impact. Large waves can hit rocks along the shore with great force. This energy in waves can break apart rocks. Over time, waves can make small cracks larger. Eventually, the waves cause pieces of rock to break off. Waves also erode by abrasion. As a wave approaches shallow water, it picks up sediment, including sand and gravel. This sediment is carried forward by the wave. When the wave hits land, the sediment wears away rock like sandpaper wearing away wood.

Waves coming to shore gradually change direction. The change in direction occurs as different parts of a wave begin to drag on the bottom. The waves in **Figure 1** change direction as they approach the shore. The energy of these waves is concentrated on headlands. A **headland** is a part of the shore that sticks out into the ocean. It is made of harder rock that resists erosion by the waves. But, over time, waves erode the headlands and even out the shoreline.

FIGURE 1

Wave Erosion

Identify Shade in the arrows that indicate where the greatest energy of the waves is concentrated.

Summarize Read the text about wave erosion and explain how a wave erodes by abrasion.

Landforms Created by Wave Erosion Think of an ax striking the trunk of a tree. The cut gets bigger and deeper with each strike of the blade. Finally the tree falls. In a similar way, ocean waves that hit a steep, rocky coast erode the base of the land there. Where the rock is softer, the waves erode the land faster. Over time the waves may erode a hollow area in the rock called a sea cave. Eventually, waves may erode the base of a cliff so much that the rock above collapses. The result is a wave-cut cliff. A sea arch is another feature of wave erosion that forms when waves erode a layer of softer rock that underlies a layer of harder rock. If an arch collapses, a pillar of rock called a sea stack may result.

Deposits by Waves Deposition occurs when waves slow down, causing the water to drop its sediment. **Waves shape a coast when they deposit sediment, forming coastal features such as beaches, sandbars, barrier beaches, and spits.**

1 Beaches A **beach** is an area of wave-washed sediment along a coast. The sediment deposited on beaches is usually sand. Most sand comes from rivers that carry eroded particles of rock to the ocean. Some beaches are made of small fragments of coral or seashells piled up by wave action. Florida has many such beaches.

Waves usually hit the beach at an angle, creating a current that runs parallel to the coastline. As waves repeatedly hit the beach, some of the beach sediment moves down the beach with the current, in a process called **longshore drift.**

FIGURE 2

INTERACTIVE ART **The Changing Coast**

Apply Concepts **Use what you've learned about features of wave erosion and deposition to complete the activity.**

1. Identify the landforms above. Label them in the spaces on the art.
2. Write an *E* or a *D* in each circle to indicate whether the landform was shaped by erosion or deposition.

2 Sandbars and Barrier Beaches Incoming waves carrying sand may build up sandbars, long ridges of sand parallel to the shore. A barrier beach is similar to a sandbar. A barrier beach forms when storm waves pile up large amounts of sand above sea level, forming a long, narrow island parallel to the coast. Barrier beaches are found in many places along the Atlantic coast of the United States, such as the Outer Banks of North Carolina. People have built homes on many of these barrier beaches. But the storm waves that build up the beaches can also wash them away. Barrier beach communities must be prepared for the damage that hurricanes and other storms can bring.

apply it!

Communicate How could a sea cave become a sea arch? Discuss with a classmate and write your conclusions below.

Longshore drift

3 Spits One result of longshore drift is the formation of a **spit.** A spit is a beach that projects like a finger out into the water. Spits form as a result of deposition by longshore drift. Spits occur where a headland or other obstacle interrupts longshore drift, or where the coast turns abruptly.

Lab zone Do the Quick Lab *Shaping a Coastline.*

Assess Your Understanding

1a. Identify List two ways waves erode rock.

b. List What are two features formed by wave depostion?

got it?

O **I get it!** Now I know that waves shape the coast by

O I need extra help with