

# Shrinking Shore

## Home Connection

Dear Family,

During the last few days, your child worked with a team to plan structures for preventing beach erosion. They acted just like engineers! They...

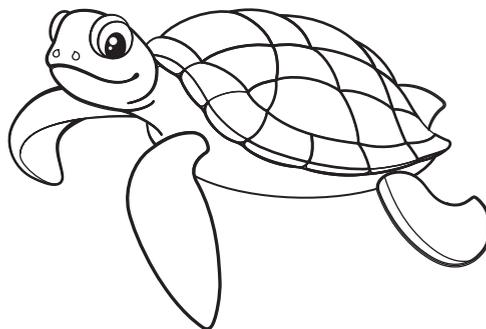
- identified and learned about a problem
- planned ways to solve the problem
- made models of structures for preventing erosion
- tested their models
- thought about test results and made a new plan

In this exploration, your child learned about engineering design, ocean waves, beach erosion, and several structures that engineers use to prevent beach erosion. Your child also practiced skills. They such as planned and conducted an investigation, used quantitative data to make comparisons, and made claims supported by evidence.

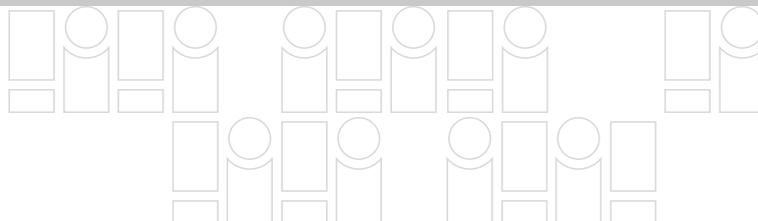
Talk to your child about the project. Ask prompting questions if your child needs help:

- *What problem were you trying to solve?*
- *What did you learn about waves in the ocean?*
- *What is beach erosion? How does it affect sea turtles?*
- *What kinds of structures can prevent beach erosion?*
- *What materials did you use to make your models?*

On the back of this page, work with your child to find out more about what the team did in this exploration.



This STEM project has been developed in partnership with Texas A&M University.



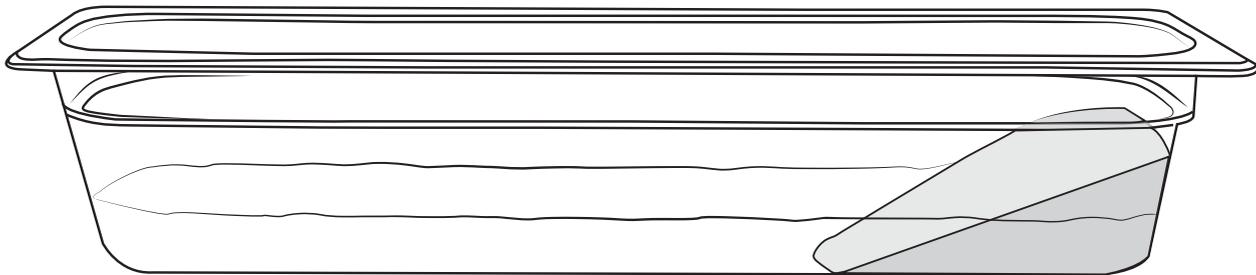
# Shrinking Shore

## Home Connection

### Preventing Beach Erosion

In this activity, children compared the effectiveness of three structures used to prevent beach erosion: a breakwater, a reef, and netting that mimics beach grass roots and stems. First, children made a model beach. Then they built and tested models of the structures.

**Ask:** *What did you use to make your model beach?*



**Ask:** *Which structures did you build to prevent erosion on your beach? Why did you choose those structures? Show me where you put those structures.*

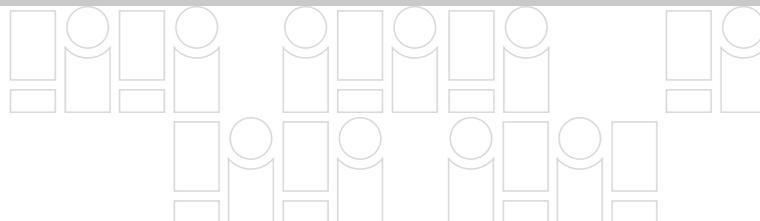
### Try It!

Explore waves in water. Place a large, shallow baking pan where your child can look down into it. (If you use a glass pan, place it on a surface that does not have a pattern.) Pour 1 inch of water into the pan. Wait until the water is calm.

Use the spoon to quickly tap the bottom of the pan near the narrow end. A small wave should move across the water. Have your child describe what he or she sees. Wait until the water is calm again. Tap the pan at a regular rate for at least 20 seconds. **Ask:** *What pattern do the waves make?* Try tapping at a regular rate near the corner of the pan. **Ask:** *Do the waves make a different pattern?* Have your child use the spoon to make different patterns of waves.

Place a small cork or piece of plastic foam in the middle of the pan so it floats freely. Make waves by tapping the bottom of the pan near the end. Have your child watch what happens. **Ask:** *How is the movement of the object different from the movement of the waves?* (The waves move back and forth, but the object moves up and down in the same part of the pan.)

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# Make Waves

Name \_\_\_\_\_

**Follow these steps.**

## Waves in a Rope

1. Lay the rope on the floor. Each partner holds one end.
2. Move one end of the rope side to side. Draw the shape the rope makes.



3. **Explore** Practice making big waves and small waves.  
I made waves bigger by \_\_\_\_\_  
\_\_\_\_\_

4. I made waves smaller by \_\_\_\_\_  
\_\_\_\_\_

5. **Think** Check the sentence you think is true.

Small waves carry more energy.

Big waves carry more energy.

All waves carry the same amount of energy.

6. Tell why you checked the sentence you did. \_\_\_\_\_  
\_\_\_\_\_

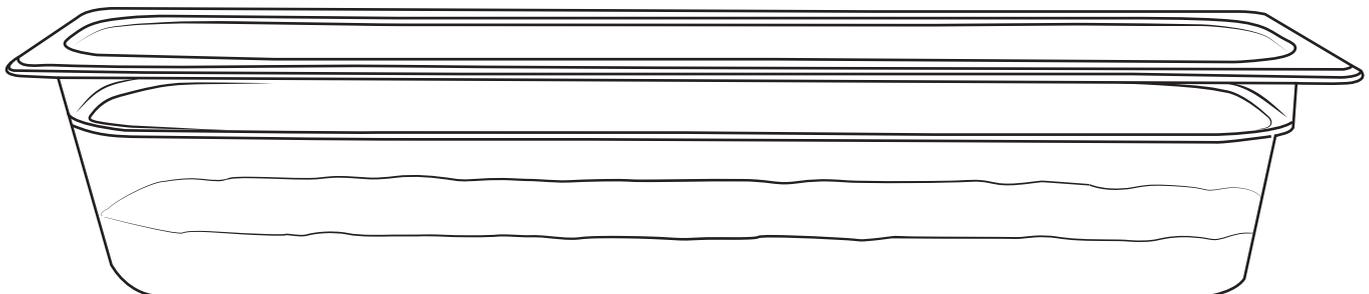
# Make Waves

(continued)

Name \_\_\_\_\_

## Waves in Water

7. Pour 4 cups of water into the tub.
8. Place the wave-maker in the water. Push it over to make a wave. Wait until the water is calm. Repeat.
9. **Think** What action moved energy into the water creating a wave? \_\_\_\_\_
10. Place a cork in the middle of the tub. Make a wave.
11. **Observe** the cork from the side of the tub. Complete this sentence:  
When a wave moves through the water, the cork  
\_\_\_\_\_.
12. Draw a red X where you put the cork in the water.  
Draw an → to show which way the waves were moving.  
Draw a green X where the cork stopped after making waves.



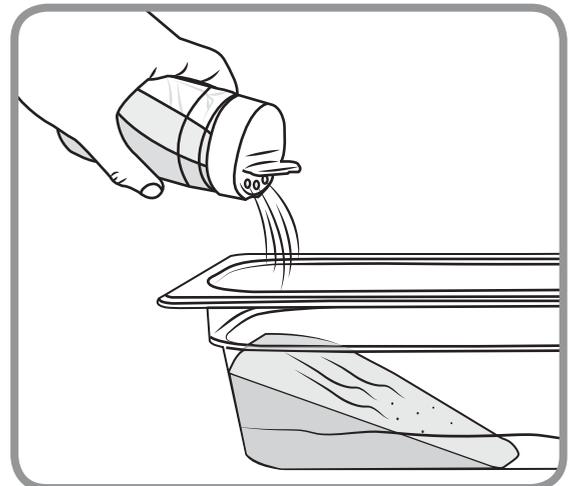
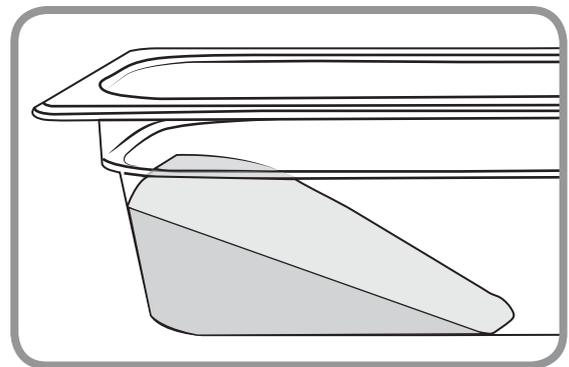
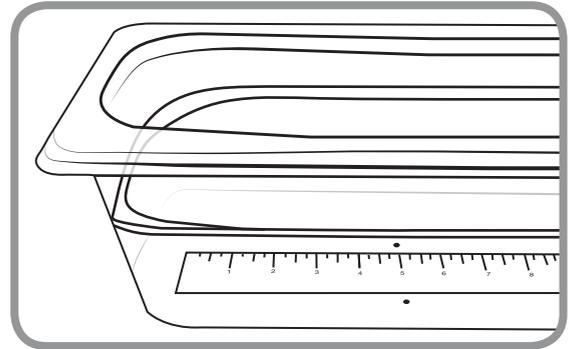
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# Make a Model Beach

Name \_\_\_\_\_

## Follow these steps.

1. **Measure** Place a ruler inside the tub. Measure 5 inches from one end. Draw a dot on each side of the ruler to mark the distance.
2. Pour the blue sand into the same end of the tub. Use the spoon to make a smooth, flat slope.
3. **Observe** Look from the side. Does the beach look like a triangle?
4. Slowly pour 4 cups of water into the other end of the tub. Do not disturb the beach.
5. When the water calms, shake a thin layer of brown sand over the blue sand above the water.



# Measure Beach Erosion

Name \_\_\_\_\_

**Follow these steps to test the unprotected beach. Later, test each structure the same way.**

1. Use the wave-maker to make a wave. Then let the water become calm. Repeat 6 more times.
2. **Observe** How did the energy carried by the waves change the beach?
3. **Measure** Hold the grid above the beach. Count the squares of blue sand. Write the number in the chart next to “Unprotected beach.”
4. **Compare** Let all team members count the squares of blue sand. Agree on a number. Write it in the chart.

	Number of squares eroded	
	My count	Team count
<b>Unprotected beach</b>		
<b>Breakwater</b>		
<b>Reef</b>		
<b>Netting</b>		

5. Scoop out any sand eroded from the beach.
6. Shake more brown sand over any blue sand.

# Compare Structures

Name \_\_\_\_\_

## Test the Breakwater

1. **Measure** Place your breakwater into the water 4 inches away from the edge of the sand.
2. Follow the steps on the **Measure Beach Erosion** page.
3. **Record** Write your results in the chart next to “Breakwater.”

## Test the Reef

4. **Measure** Place your model reef into the water 4 inches away from the edge of the sand.
5. Follow the steps on the **Measure Beach Erosion** page.
6. **Record** Write your results in the chart next to “Reef.”

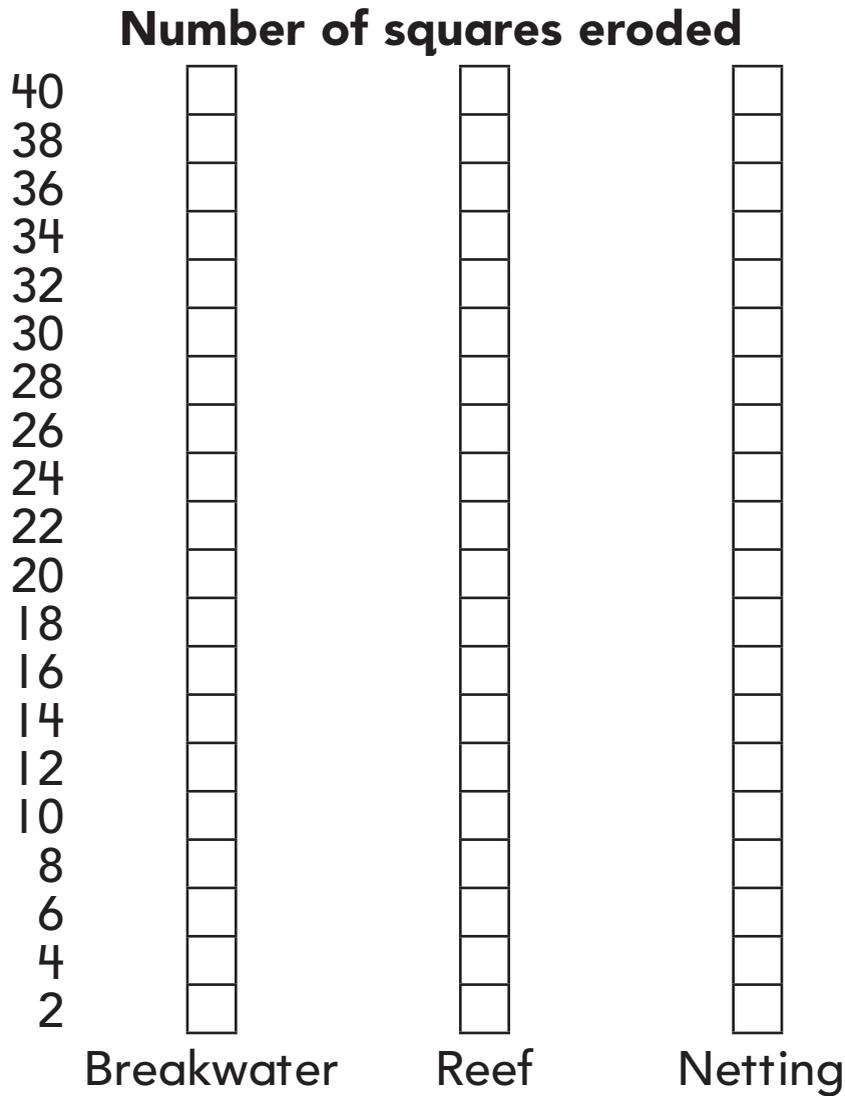
## Test the Netting

7. Lay a piece of netting flat on the beach. Use toothpicks to attach it.
8. Follow the steps on the **Measure Beach Erosion** page.
9. **Record** Write your results in the chart next to “Netting.”

# Graph and Think

Name \_\_\_\_\_

**Graph** Use the chart on the **Measure Beach Erosion** page. Color the number of squares where sand had eroded.



## Think About It

**Compare** Which structure best protected the beach from erosion?

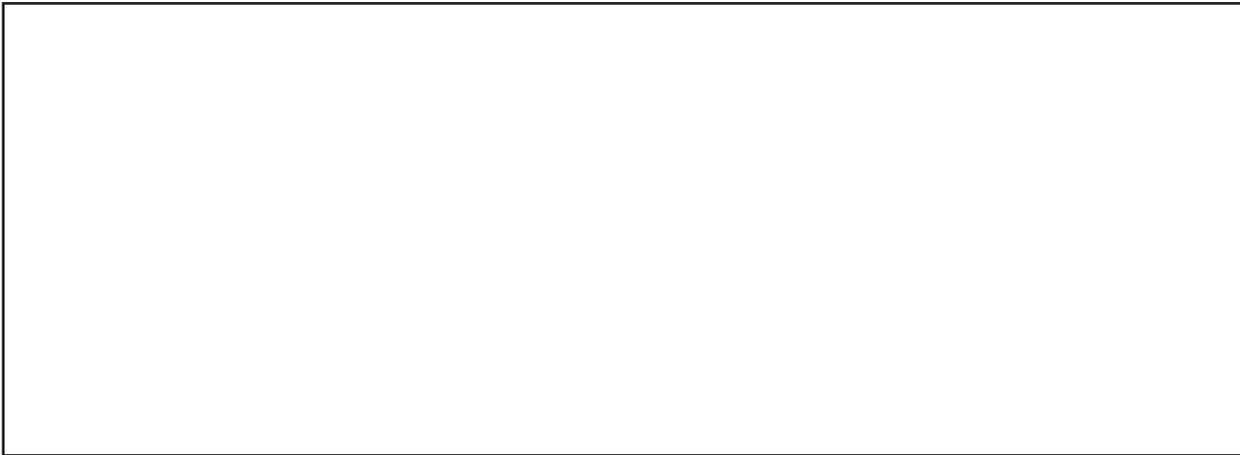
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# Beach Protection Plan

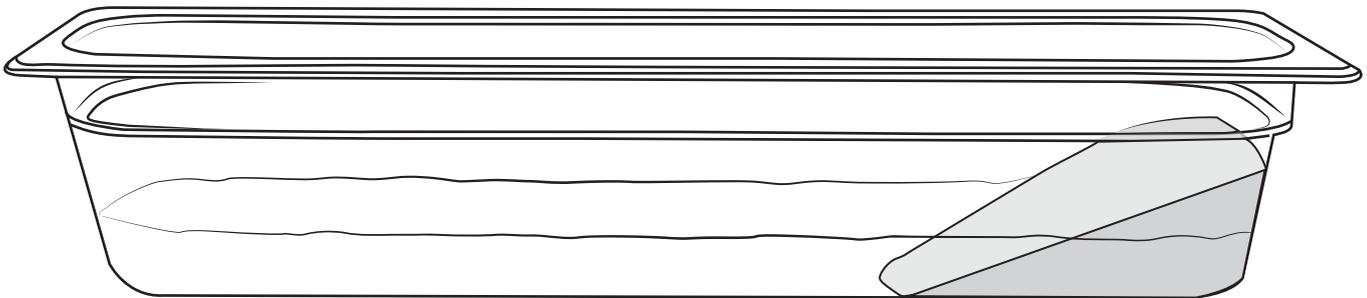
Name \_\_\_\_\_

## Follow these steps.

1. **Plan** Draw the structures you will use. You can use a breakwater, a reef, or netting. If you use a breakwater or a reef, write how tall and wide it is.



2. **Plan** Use the picture below to show your plan. Label the two structures. Write how far away from the edge of the sand you would place a breakwater or reef.



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# Test the Protected Beach

Name \_\_\_\_\_

## Follow these steps.

1. Circle the structures you used.  
Breakwater      Reef      Netting
2. Use the wave-maker to make a wave. Let the water become calm. Repeat 6 more times.
3. **Measure** Hold the grid above the model beach. Count the squares of blue sand. Write the number in the chart next to "Protected beach."

	Number of squares eroded	
	My count	Team count
<b>Protected beach</b>		
<b>Unprotected beach</b>		

4. **Compare** Let all team members count the squares of blue sand. Agree on a number. Write it in the chart.
5. Use the **Measure Beach Erosion** page. Write the number of squares eroded on the unprotected beach in the chart above. How well did your structures protect the beach? \_\_\_\_\_.

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# Reflect On It

Name \_\_\_\_\_

## Answer these questions.

1. Our plan met these goals:

- We used 2 kinds of structures.
- Our beach lost 7 squares or less of sand.
- Our breakwater or reef was 7 squares wide or less.
- Our breakwater or reef was at least 2 inches from the edge of the sand.

2. Our plan was successful because \_\_\_\_\_

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3. Think about the other team plans. Circle the structure that was most often used:

Breakwater

Reef

Netting

4. Think about how you might change your plan. What did you learn that might make your model more successful?

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