

# The Ocean Floor

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<b>Strand</b>	Interrelationships in Earth/Space Systems
<b>Topic</b>	Investigating the ocean environment
<b>Primary SOL</b>	5.6 The student will investigate and understand characteristics of the ocean environment. Key concepts include a) geological characteristics.
<b>Related SOL</b>	5.6 The student will investigate and understand characteristics of the ocean environment. Key concepts include b) physical characteristics; c) ecological characteristics.

## Background Information

A description of the sea bottom would include various characteristic types of areas: the *continental shelf*, *continental slope*, *continental rise*, *deep ocean basin*, *abyssal plain*, *deep-sea trench*, and *seamount*.

The *continental shelf* is a border of a continent submerged under water that slopes gradually and extends to a point of the deep ocean basin. The width of the continental shelf varies considerably from only a few miles to more than 900 miles, but worldwide it averages about 45 miles. It often includes little hills, ridges, terraces, and canyons, but the water is never very deep here. When you are standing in the ocean at the beach, you are standing on the highest part of a continental shelf.

The *continental slope* connects the continental shelf and the oceanic crust. It begins where the bottom sharply drops off into a steep slope. It usually begins at a depth of 430 feet (130 meters) and can be up to 20 km wide.

Past the continental slope lies the *continental rise*. As currents flow along the continental shelf and down the continental slope, sediment is picked up and deposited just below the continental slope. These sediments accumulate (gather) to form the large, gentle slope of the continental rise.

All ocean floors except the North Pacific have *mountain ranges*, several of which are higher than Mt. Everest. The largest mountain chain is the Mid-Atlantic Ridge.

Much of the deep ocean floor, especially in the Pacific, is a *deep ocean basin*, which is about 2.5 to 3.5 miles deep and covers about 30 percent of Earth's surface. It closely resembles the surface of the moon with its features such as the *abyssal plain*, *deep-sea trenches*, and *seamounts*.

The *abyssal plain* is the flat, deep ocean floor. A thick layer of sediment that covers the hills and valleys found in it.

*Deep-sea trenches* are the deepest parts of the ocean. The deepest one, the Marianas Trench in the South Pacific Ocean, is more than 35,000 feet (10,668 meters), or almost 6.6 miles (10.6 kilometers) deep. A Navy-owned submarine, the Trieste, still holds the record for diving to the bottom of the deepest part of the Marianas Trench, the Challenger Deep, on January 23, 1960.

## Materials

- Drawing paper and pencils
- Chart paper and markers
- Shoe boxes (one for each student)
- Modeling clay
- Rocks
- Toothpicks
- Sticky notes
- Copies of the attached worksheet “The Ocean Floor”

## Vocabulary

*continental shelf, continental slope, continental rise, deep ocean basin, abyssal plain, deep-sea trench, seamount*

## Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

### Introduction

1. Ask the students to imagine that they are flying across the United States. Below, they see flat plains, high mountains, and deep canyons. Then ask them to try to picture an area seven miles below the ocean’s surface. What does it look like? Surprisingly, very similar to the topography of the continental U.S.
2. Give students drawing paper, and ask them to listen to your spoken description of features of the ocean floor and to draw/diagram what you describe:

You are walking on the beach toward the water. The *continental shelf* is the part or area of the ocean floor onto which you first walk out from the beach. It slopes very gently. Although it has numerous little hills, ridges, terraces, and canyons, the water is never very deep here. Continuing out, the steeper slope and drop into deeper water is the *continental slope*. Here you find little valleys cut by currents moving across the ocean bottom. Even farther out you come to the *continental rise*, where the slope again becomes gentler and is covered with soft sediments deposited by water currents flowing down the continental slope. Finally, you see the deepest bottom of the ocean — the *deep ocean basin* — which has flat plains, deep trenches, and high mountains. The vast and nearly flat area is the *abyssal plain*. It is broken by some *deep-sea trenches* that are like very deep ditches or canyons. The deepest trench is deeper than the tallest mountain on land! Also, you find some tall *mountain ranges*, which contain a few mountains higher than Mr. Everest, and some *seamounts*, individual mountains that are not part of mountain ranges. All in all, it is quite a varied and fantastic environment for the plants and animals that live there.

3. Repeat the diagramming exercise as a class, using a large piece of chart paper. Allow students to make suggestions about how to draw the diagram, but guide them into creating an accurate representation. Label the parts of this class diagram and post it for later reference.

### Procedure

1. Give each student a shoe box, modeling clay, and rocks. (Note: The rocks are used to create higher elevations of the ocean.)
2. Tell the students that they will be constructing a model of the ocean floor, using the class diagram of the ocean floor as a “blueprint” or guide. Explain to the students that their model should include the following features of the ocean floor: the continental shelf, continental slope, continental rise, abyssal plain, deep-sea trenches, and mountain ranges.
3. Once students have molded their clay, pass out the toothpicks and sticky notes to allow students to label the ocean features.

### Conclusion

1. After the models are complete, provide students with a copy of the attached “The Ocean Floor” worksheet, and have them complete the graphic organizer with location of each feature.
2. Complete the depth and types of organisms that would be found in each area as a whole group, having students point to each area on their shoe box model.

### Assessment

- **Questions**
  - If you were on the beach and walked in the water, what part of the ocean topography are you standing on?
  - What is the deepest part of the ocean called?
- **Journal/writing prompts**
  - If you were a scientist on an Alvin mission (submersible to ocean floor), describe the ocean sites you would see while going to the bottom of the ocean.
  - Draw a diagram of the ocean floor and label the parts.
- **Other**
  - Give students an unlabeled ocean-floor diagram, and have them label all characteristic areas.
  - Have students complete a partially completed chart that lists the key characteristics of the ocean floor.

### Extensions and Connections (for all students)

- Have students make an ocean-floor model in a waterproof container, such as a large, clear plastic box, and then cover the model with opaque liquid, such as very dark colored water. Have students determine the profile of the unseen ocean floor by taking a number of depth measurements with a ruler and plotting the measurements on graph paper.

### Strategies for Differentiation

- Provide photos or video images online to give students a visual of the ocean floor from different perspectives.

- For students needing more of a challenge, have them create a model of the ocean floor after a natural disaster such as an earthquake.

# The Ocean Floor



Name: \_\_\_\_\_

Date: \_\_\_\_\_

	Location	Depth	Marine Life
Continental shelf			
Continental slope			
Continental rise			
Abyssal plain			
Deep-sea trench			
Seamount			