

## **Best Practices Activities**

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Our study of the ocean was part of a thematic unit undertaken by the entire 7th grade team at Ft. Clarke Middle School. While Language Arts teachers had students read and write pieces about marine life, Geography teachers were teaching about the economics of water and marine life. At the same time, Math teachers were having students record and graph data about the oceans. Science teachers were teaching the science of the ocean during this time-frame. Topics covered in science included ocean composition, salinity, currents, waves, tides, density, seafloor spreading, marine life and issues such as erosion, oil spills, shark attacks, and hurricanes.

Two activities used during this unit are described below.

### **1. Mapping the Ocean Floor**

A. Students first read "Exploring the Ocean" and answered the questions on the related sheet. (This introduced them to the topography of the ocean floor.)

#### **B. Mapping the Ocean floor Activity**

Students were given a shoe box that depicted all the major ocean floor features. Using a straw and a metric ruler, they were to "probe" and measure the depth of the ocean floor. They recorded their data, graphed it, and then wrote conclusions.

### **2. Constructing and Using a Hydrometer**

We studied in this unit how salinity affected the density of water. To test concepts, students constructed a hydrometer and then tested it using increasing amounts of salt. This lab activity was very successful, even with low level students. This activity reinforced measurement concepts along with salinity and density of the ocean.

## SECTION 5-1

## SECTION SUMMARY

## Exploring the Ocean

### Guide for Reading

- ◆ What factors make ocean-floor research difficult?
- ◆ What processes have shaped the ocean floor?

# 5

Studying the ocean floor is difficult for three reasons: First, the deep ocean is totally dark because sunlight does not penetrate far below the surface. Second, the water is very cold. And third, the water pressure is very high. **Because of the darkness, cold, and extreme pressure, scientists have had to develop technology to enable them to study the deep ocean floor.** That technology includes sonar, scuba, submersibles, satellites, remote underwater manipulators, and gravity mapping. **Sonar** is a system that uses sound waves to calculate the distance to an object.

Scientists have discovered many features on the ocean floor. Extending out from a continent's edge is a gently sloping, shallow area called the **continental shelf**. At the edge of the shelf, the ocean floor drops off in a steep incline called the **continental slope**. Beyond this slope is the **abyssal plain**, a smooth and nearly flat area of the ocean floor. In some places, deep, steep-sided canyons called **trenches** cut into the abyssal plain. A continuous range of mountains called the **mid-ocean ridge** winds around Earth. There are mountains on the abyssal plain, too. Some reach above the ocean surface to form volcanic islands. Others, called **seamounts**, are completely underwater.

Earth consists of layers around its center, or core. The outer layer, or crust, is thin and rocky. The thick layer between the crust and the core is the mantle. It contains a hot liquid called **magma**. Magma flows out of the mantle and onto the surface through cracks in the crust. Magma on the surface is called lava, which hardens to form new crust.

Earth's crust is made up of large **plates** that float on the mantle. As these plates slowly move, they create different landforms. **The mountain ranges of the mid-ocean ridge, trenches, and underwater volcanoes are all formed by the interactions of Earth's plates.** At the mid-ocean ridge, plates are diverging, or moving apart. Magma squeezes up through cracks between the plates and hardens to form new rock. Newer eruptions push the older rock away from the ridge in a process called **sea-floor spreading**. Over millions of years, sea-floor spreading created the ocean floor.

Even though new ocean floor is created at the mid-ocean ridge, Earth stays the same size. Where two plates converge, or come together, one plate sinks under the other plate. The old rock sinks into a trench and back into Earth's mantle.

**SECTION 5-1 REVIEW AND REINFORCE**

# Exploring the Ocean

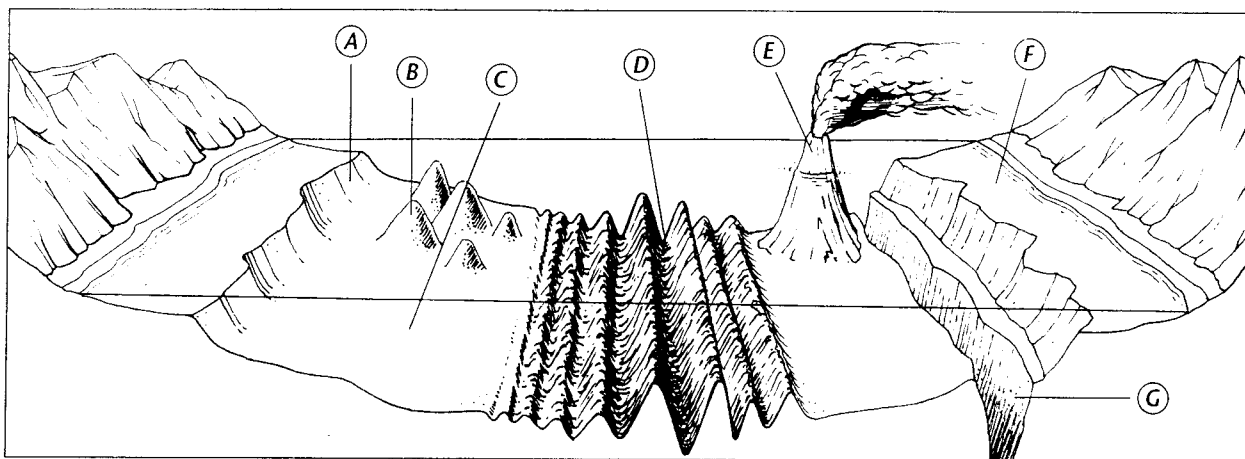
## ◆ Understanding Main Ideas

Answer the following questions on a separate sheet of paper.

1. What factors make it difficult to explore the ocean floor?
2. Describe the process of sea-floor spreading.
3. Why doesn't Earth get larger when new rock is added to the ocean floor at the mid-ocean ridge?

## ◆ Building Vocabulary

Match each letter on this diagram with one of the terms listed below. Write the letter on the line before each term. Then define each term in your own words in the spaces provided.



- \_\_\_\_\_ 4. mid-ocean ridge \_\_\_\_\_
- \_\_\_\_\_ 5. trench \_\_\_\_\_
- \_\_\_\_\_ 6. continental slope \_\_\_\_\_
- \_\_\_\_\_ 7. abyssal plain \_\_\_\_\_
- \_\_\_\_\_ 8. seamount \_\_\_\_\_
- \_\_\_\_\_ 9. continental shelf \_\_\_\_\_
- \_\_\_\_\_ 10. volcanic island \_\_\_\_\_

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Name: \_\_\_\_\_ Date: \_\_\_\_\_ Per: \_\_\_\_\_

### Mapping the Ocean Floor

Mapping an ocean or lake floor is much different from mapping a continent. Scientists can't observe and measure underwater the same way they do on land. One way people can find the depth of water is by lowering a weighted rope or chain. When the bottom of the rope or chain hits the ocean or lake floor, the rope or chain will become slack. By measuring how much of the rope or chain is in the water, a person can tell how deep the water is at that spot.

Strategy: You will map the ocean floor, using a model that includes all the major surface features. **DO NOT LIFT LID OF YOUR SHOEBOX MODEL UNTIL YOU ARE TOLD.**

#### Materials:

Ocean Model in shoe box, Straw and Metric Ruler

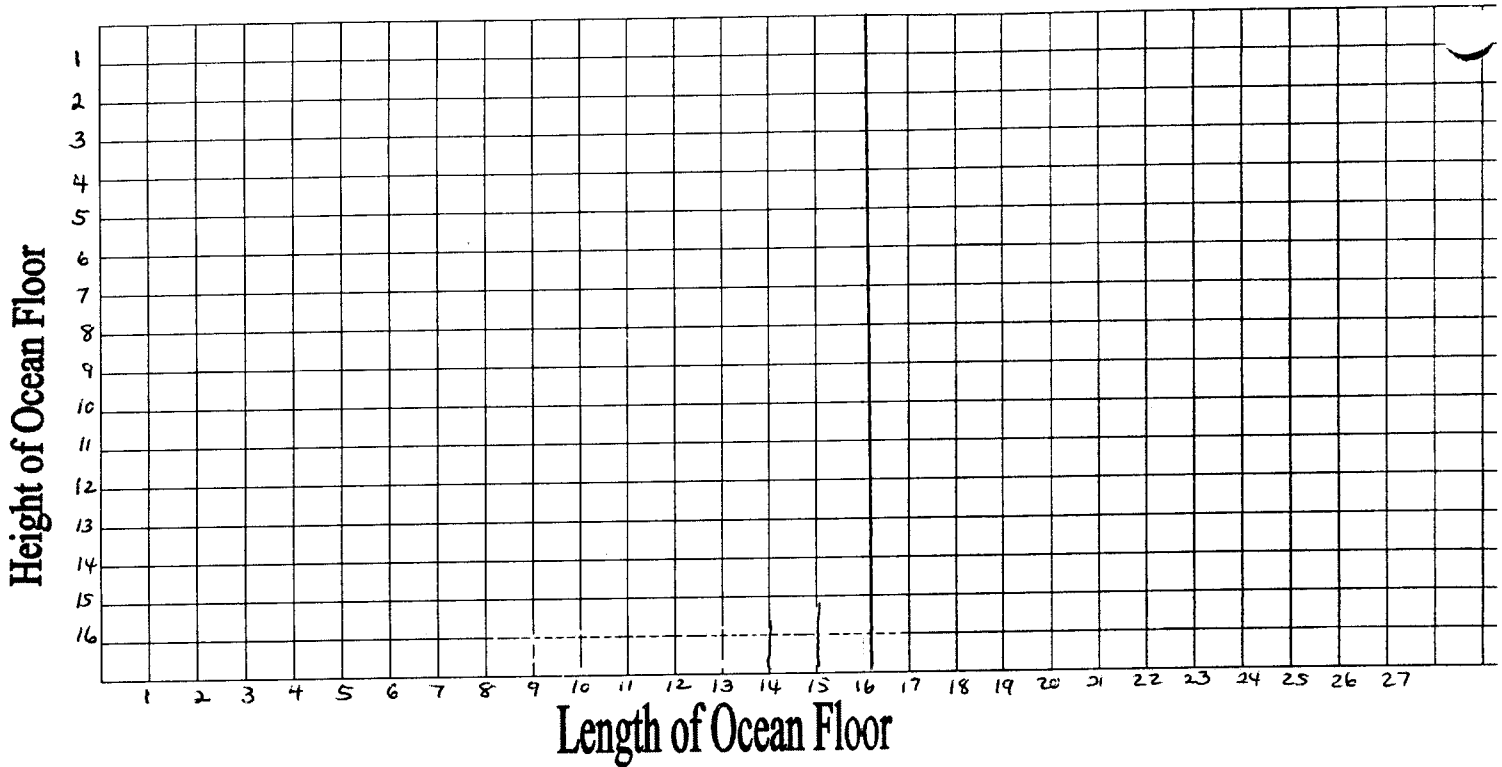
#### Procedure:

1. In your group, review the diagram of the ocean features, from Exploring the Oceans. Observe the ocean features such as: continental shelf, continental slope, abyssal plain, and mid-ocean ridge.
2. Using your straw as a probe, insert it in each numbered opening. Mark with your finger on the straw, the height at which it reached. Measure with ruler and record data in table. Make inference as to which ocean feature it models. Continue until you have investigated all numbered openings.
3. Create a map of an ocean floor by graphing ocean height versus ocean length. Use the data number that were found on your shoebox model.

Data Table

Length of Ocean Floor (cm)	Straw Depth Reading (cm)	Inference of Ocean Features
1.	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
10	10	10
11	11	11
12	12	12
13	13	13
14	14	14
15	15	15
16	16	16

## Graph of Ocean Floor Model Measurements



### Questions and Conclusions:

1. Indicate on your graph in pencil, where you think, the following ocean features are located: continental shelf, abyssal plain, mid-ocean ridge, sea mount, trench and continental slope.

Take your shoebox cover off and observe the features. Answer the following questions.

1. Label the ocean floor features of the ocean in pen this time. How different are the locations of these features compared to the first one in pencil?  
\_\_\_\_\_
2. How accurate was your graph or map? \_\_\_\_\_
3. If readings were taken closer than you did, how would this affect the accuracy of your map or graph? \_\_\_\_\_
4. Give at least two reasons why it would be difficult to use these materials to measure distances for a map of the real ocean floor. (for example, a straw for a probe). \_\_\_\_\_
5. What ocean floor feature would have the following characteristics?  
 A) Coldest water temperature \_\_\_\_\_ B) Most surface currents \_\_\_\_\_  
 C) Greatest amount of sunlight \_\_\_\_\_ D) Warmest water temperature \_\_\_\_\_  
 E) Most dense water \_\_\_\_\_ F) Greatest water pressures \_\_\_\_\_  
 F) Benthos organisms found here \_\_\_\_\_ H) Where rip currents occur \_\_\_\_\_
6. Using your notes, summarize the history of ocean water exploration from the last century. What new developments have made exploration easier? \_\_\_\_\_  
 \_\_\_\_\_