

OIMB GK12 CURRICULUM

5th Grade

60 minutes

BOTTOM TOPOGRAPHY -- MEASURING OCEAN DEPTHS

Oregon Science Content Standards:

5.2 Interaction and Change: Force, energy, matter, and organisms interact within living and non-living systems.

5.2L.1 Explain the interdependence of plants, animals, and environment, and how adaptation influences survival.

5.4 Engineering Design: Engineering design is a process of using science principles to make modifications in the world to meet human needs and aspirations.

5.4D.1 Using science principles describe a solution to a need or problem given criteria and constraints.

Ocean Literacy Principles:

5. The ocean supports a great diversity of life and ecosystems.

7. The ocean is largely unexplored.

Goals: Students will be able to

- describe basic features of the ocean floor
- understand the difficulties of sea floor exploration
- model how early navigators and scientists were able to map the ocean floor using sounding lines

Concepts:

- The sea floor has features found on land, such as mountains and canyons.
- The sea floor has deep trenches that are thousands of feet deep.
- A long time ago, explorers were able to map the ocean floor by using sounding lines.
- We can use small scale models to experience a deep-sea mapping process.

Materials:

- shoe boxes (plastic or cardboard), one for each pair of students
- Insulatory spray-foam (from a hardware store), or Plaster of Paris, or modeling clay, enough to cover the bottom of each box
- Wooden or bamboo skewers, one for each pair of students
- Color markers (red, orange, yellow, green, blue, purple), one set per pair of students
- 2 copies of the included grid per pair of students--one page for the top of the box, and one for the students to color in the squares.
- Optional: a hand-out of ocean zonation

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Lesson Plan:

Preparation

1. Create model sea floors by covering the bottom of shoe boxes with one of the following: hardening insulator foam, plaster of paris, modeling clay, etc.
2. Cover the top of the box (so that the model sea floor cannot be seen) with the grid paper.

Activity

3. Have the students brainstorm ways that people who explored the oceans centuries ago might have been able to figure out how deep part of the ocean is. Discuss how difficult this would have been.
4. Explain how a sounding line works. (A length of rope marked off at intervals and with a weight at the end, is dropped overboard to measure depth.)
5. Tell the students that they will be given an “ocean box” that has “bottom topography”. The box represents the ocean, and they cannot see what the bottom is like, just as explorers many centuries ago could not tell what the sea floor looked like. The students’ job is to find out, without lifting the paper off of the box, where the sea mounts and trenches are (it is useful to have one box without a top, so the students can see what the inside of the boxes look like).
6. Tell the students that, instead of a sounding line, they will be using a shish-kebab skewer to poke through the paper. Hand each group a skewer. First, they need to mark off from the pointy end of their skewer in 1 inch intervals. Color the bottom inch red, the next orange, the next yellow, and so on up the color spectrum (red, orange, yellow, green, blue, purple). Note: if the boxes are shallow, have the students mark their skewers in $\frac{1}{2}$ inch intervals.
7. The students, working in pairs or groups of three, will push their marked sticks into the grid paper, and will tell their partner the lowest color that they see protruding from the paper (i.e. red, green, blue, etc.). The other student will then color that color in the corresponding square on the group’s grid.
8. Have the students rotate jobs--those who are marking results can rotate with those who are poking holes. Once they have completed the activity, each group should have a colorful grid.
9. Tell the students that the red and orange areas are sea mounts, where there should be tall bumps on the bottom of their “box oceans”. The blue and purple squares are trenches, where it is very deep. Have the students carefully take the top paper off of the box, and compare their colored results to the actual topography on the bottom of the box.
10. Discuss how technology developed during WW1 led to the use of echo-sounding: measuring the time it takes for high-frequency sound waves to travel from the surface to the bottom and back.

Assessment: Have students verbally explain to you if their measurements were accurate, compared to the actual topography of their “sea floor”.

Source: FOR SEA, Marine Science Explorations Grades 6-8

