

MAPPING THE OCEAN FLOOR

OVERVIEW	During this lesson, students participate in a simulation of the pre-sonar method of mapping underwater terrain.
OBJECTIVES	Following completion of this lesson, the students will be able to: <ul style="list-style-type: none">Develop the understanding that the bottom structure of underwater habitats can be mapped.Describe something they cannot see through the collection and correlation of accurate data.Understand how technology can be applied as a tool for problem-solving
GRADE LEVELS	4 th - 12 th grades
NJCC STANDARDS	Science Indicators: 5.1, 5.3, 5.4, 5.5, 5.6, 5.7, 5.10
MATERIALS	For each student group you will need: <ul style="list-style-type: none">A large Styrofoam cooler, one permanent marker, bricks, rocks, Sand or gravel, two strings marked at 1 cm intervals.2 metal nuts or washers for weights,Two metric rulers (a yard long each),One data sheet for each pair of students. <p>Note: Preparing coolers.</p> <ol style="list-style-type: none">1. Before class, write north, south, east, and west on the sides of the coolers so the students' data sheet maps will all have the same orientation.2. Using the permanent marker, draw lines one centimeter apart on the outside lip of the top of the cooler. Label with a, b, c's going north and south and 1, 2, 3's east to west across the cooler.3. Modify and copy the attached data sheet to correspond to the size of the students' coolers.4. In the cooler on the bottom, place a variety of objects (rocks, bricks, sand or gravel) to simulate a varied underwater terrain.5. Once prepared, place the cooler on a table or other surface high enough up so students cannot see into the cooler and view the bottom.

PROCEDURES Spend 15 to 20 minutes taking measurements of the cooler bottom, 10 to 20 minutes graphing data, and 10 minutes to discuss and observe the cooler bottom. This activity demonstrates the old method of measuring depth. Using a length of string weighted with a washer at one end, students take depth readings at predetermined coordinates by lowering the weighted string into the cooler until it touches the bottom surface. Coordinates are determined by laying the metric rulers across specific marks on the cooler, perpendicular to one another. After the string hits bottom, the marks on the string are counted and the reading is placed at the corresponding coordinate on the worksheet included in this lesson plan. Have the students take at least fifteen measurements, entering data on the worksheet as it is gathered. Have the students connect the points of common depth, creating their own contour maps. After contour maps have been completed, allow students to compare their cooler bottom to their contour map. Ask the students how they might have made a more accurate prediction/contour maps (gather more data).

BACKGROUND The ocean floor has been mapped by scientists despite the fact that it is under water. Until recently, the depth of coastal waters, rivers, and lakes was measured by a weighted and marked line. Now depth sounders and sonar accomplish the same task more quickly and efficiently.

Introduce the topic of underwater mapping by asking students how they might go about accomplishing this task. In the past, people lowered weighted marked ropes into rivers, lakes and coastal waters to test depths. Inquire if the students regard this method as reasonable. How might early readings have been inaccurate? Today, sonar is used to determine bottom measurements. Sonar sends impulses of sound downward and measurements of depth are determined by the length of time it takes the sound impulse to travel to the water body bottom and bounce back again.

EXTENSIONS Show students a nautical chart, as produced by the National Oceanic and Atmospheric Administration (NOAA). Discuss how the chart was produced and how it is used. For information on how to get nautical charts, please contact: NOAA Distribution Branch, N/C G33, National Ocean Service, Riverdale, MD 20737-1199, Telephone: (310) 436-6990.

REFERENCES Internet Resources:

<http://lcweb.loc.gov/exhibits/treasures/trr078.html>

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