
31. OPERATION S. O. N. A. R. *

***Students Organized for North American Research**

Overview: Students get hands on practice measuring, mapping and recreating the topography of floor beneath a body of water.

Objective: Students will measure, graph and create a 3 dimensional map of the earth's surface below a body of water.

Time needed: 90 minutes

Group Size: 2-4

Age appropriateness: 5th Grade and up

Site: Classroom after a visit to the Yuma Conservation Garden Pond

Background: Sonar is a system using transmitted and reflected sound waves to detect the depth of the surface of the earth below a body of water. The waves hit the bottom and bounce back to the surface. The time it takes the waves to return from the bottom is mathematically computed to determine the measure of depth. The earth's surfaces hidden below water is measured by using sonar from a boat or a satellite in space.

Materials:

Provided by the classroom teacher

Shoe box

Items to be placed in box (stapler, eraser, glue, crayons, tape, etc.)

Construction paper

Graph paper

Pencils

Dip strip

Color pencils (optional)

Scissors

Preparation:

1. Attach any of the above listed items into the bottom of the shoe box (or any other item of your choice).
2. Make a 1 inch grid and label the grid with letters and numbers. The coordinates for the first square would be A1.
3. Cover the box with construction paper.
4. Make copies of dip strips and of graph paper for each row and column that covers the top of the box.

Pre Activity: Lessons about sonar, topographic maps, elevation, and land forms need to proceed this activity.

Procedure:

1. Give each group a box and warn students not to shake the contents.
2. Students should cut out the Dip Strips and attach them to a pencil. Be sure to align the zero line with the top of the box, so that when the pencil is fully inserted and touches the bottom of the box it will measure "0". The length of the strip may need to be adjusted depending on the depth of the box being used.
3. Push the pencil into the A1 space and measure the surface. Record that number on the graph.
4. Repeat this step for each space in every row. You should end up with one graph for each row.
5. Locate any position on the graphs that has a number higher than zero. Color in that many boxes in the column above. For instance, if hole A3 measured 2 on your dip strip, color in two boxes on the graph.
6. Cut out the uncolored boxes on each graph. Don't cut the labels along the bottom.
7. Fold each graph to stand upright.
8. Tape the standing graphs in sequence on top of a copy of the graph. The result should be a 3 dimensional graph of the earth's surface below water level.
9. Then have students look over the finished graph and see if they can identify the item that was placed in the box.

Modifications: Unifix cubes could be used instead of graph paper.

Extensions: Build a large seascape in a Xerox paper box. Each depth could be color coded which would help students visualize contour.

Reference List:

"Making Bar Graphs", Super Science Blue Edition, Vol. 4, No. 1, September, 1992.
Voyage of the Mimi

Time of Year: any

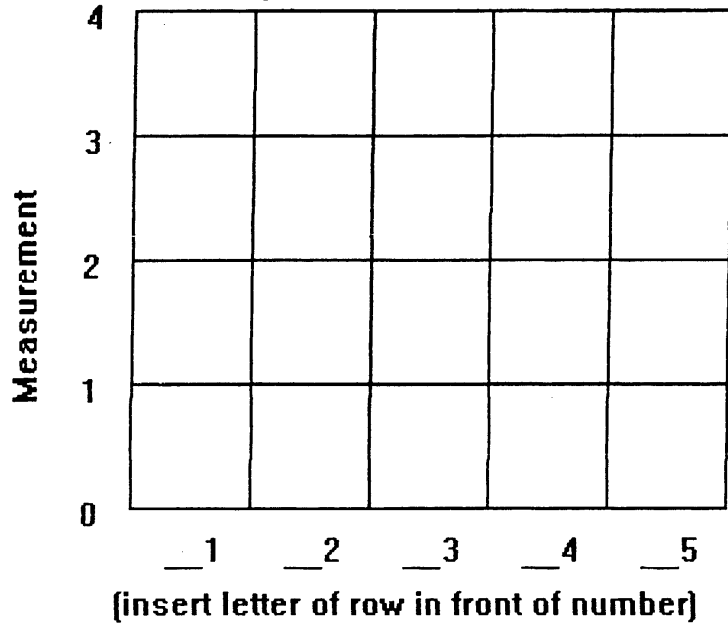
****This activity was adapted from "Making Bar Graphs", Super Science Blue Edition.**

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Sample Graphs and Dip Strip

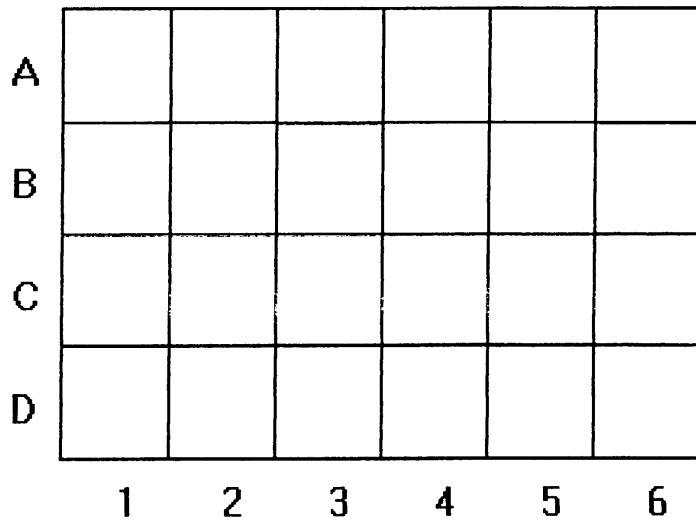
Dip Strip

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16

Example: Student Bar Graph



BOXTOP GRID



3-D Model

