RAFT IDEAS

Topics: Measurement, Oceanography, Data collection & interpretation

Materials List

- ✓ Hinged container, foam, with no compartments
- ✓ Paperclip, smooth finish, size #1 or jumbo depending on container's depth
- ✓ Stir straw
- ✓ Printed grid, 1 cm (3/8") line spacing, with or without x/y axis labels
- ✓ Data form –optional
- ✓ Graph paper
- ✓ Tape
- ✓ Glue
- ✓ Pushpin
- ✓ Objects to simulate the ocean floor

This activity can be used to teach:
Common Core Math:

- Graph on coordinate plane (Grade 5, Geometry, 1 & 2)
- Problem Solving (Math Practices Grades 4-12)

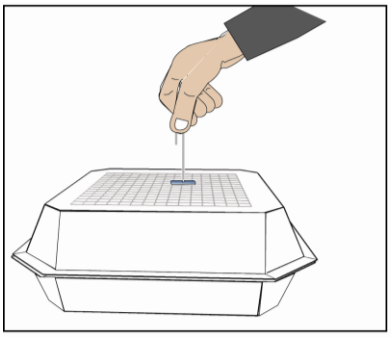
Next Generation Science:

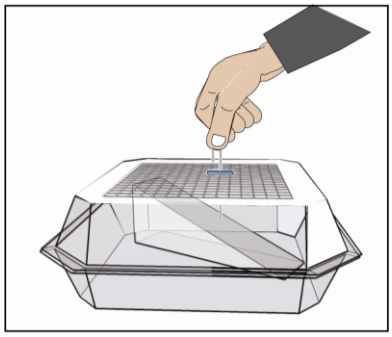
- Earth's features (Grade 4, Earth and Space Science, 2-2)
- Waves are reflected, absorbed, or transmitted (Middle School, Physical Science, 4-2)

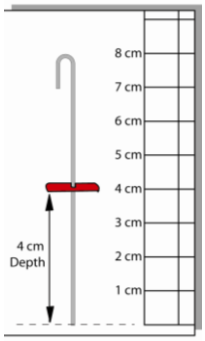
raft resource area for teaching
www.raft.net

Plumbing the Depths

Practice Bathymetry without Getting Wet!

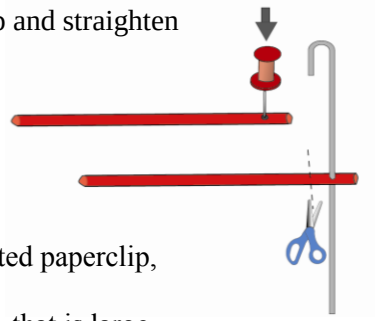






Model the taking, recording, and interpreting of "ocean" depth measurements using a opaque foam container, a hidden ocean "floor", and a simple tool.

Assembly



1. Bend out the wider loop of a smooth finish paperclip and straighten to form a "J" shape as shown.
2. Use a pushpin to poke a hole in a stir straw about ½ cm (~1/4") from one end.
3. Push the straightened end of the paperclip into the hole. The fit must be tight enough that the straw will not slip when the paperclip is moved about.
4. Cut the stir straw about ½ cm (~1/4") from the inserted paperclip, creating a 1 cm (3/8") section.
5. Print and cut a grid, having 1 cm (3/8") spaced lines, that is large enough to fit on the bottom of a foam hinged container. The grid can be printed with the x/y axes labeled or the students can label them with numbers and/or letters.
6. Use tape or glue to secure the grid to the bottom of the foam hinged container.
7. Place rigid objects (e.g., rocks, bottle/jar caps, blocks of stiff foam, wood pieces) into the container to simulate the bottom of the ocean. Glue or tape the items down as needed.
8. The intersections of the grid lines can be pre-poked with a pushpin or left for the students to do in step 3 in **To Do and Notice**.

To Do and Notice

1. Select how many depth measurements are to be made.
2. The measurements could be made at regular intervals or at a small number of widely spaced locations and then at more closely spaced locations made in areas of special interest based on the results of the earlier measurements.
3. With a pushpin poke holes at the selected grid locations as needed.
4. Move the straw on the paperclip to within 1 cm (2/8") of the paperclip's end.
5. Insert the straightened paperclip end into a selected hole with the paperclip held straight up and down. Push down until the end touches the ocean "bottom".
6. Record or note the paperclip's location (coordinates).
7. Pull the paperclip out of the hole without moving the straw on the paperclip. Position the end of the paperclip against an appropriate grid line and measure the distance between the end of the paperclip and the straw.

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8. Record the depth measurement and the measurement's location. Repeat at other locations as needed. The data can be used as a basis for deciding where else to take measurements and/or used to create a 2 or 3 dimensional representation of the ocean's bottom (a pictorial or a physical model).

The Science Behind the Activity

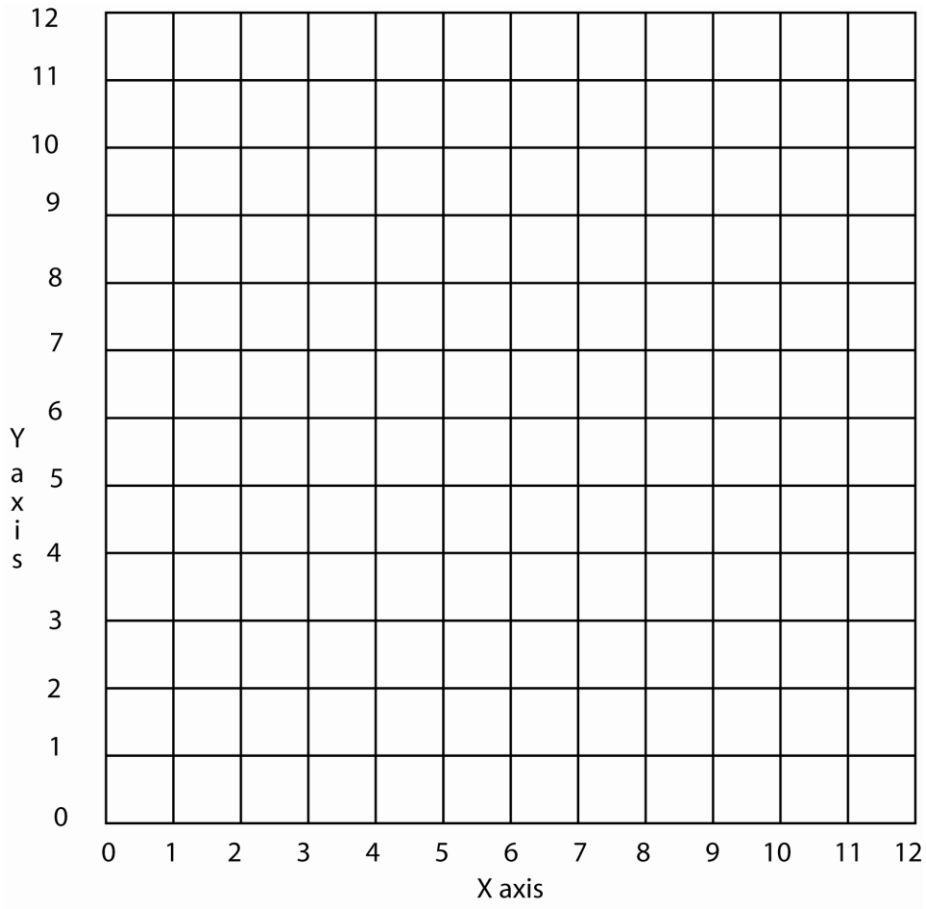
Bathymetry is the taking of measurements to build up an image (relief or topography) of the surface below a body of water (e.g., ocean, lake). One of the earliest methods of measuring the ocean's depth involved dropping weights attached to ropes, which have measured markings. The location of the "sounding" and the depth of the location were recorded and used to build up a picture of the surface under the water. Current methods include sonar (using sound) and satellites (using microwave beams) to map the bottom of the ocean. Peary's and Hansen's soundings taken on the way to and at the North Pole seem to be in alignment with modern depth measurements taken by a submarine.

Taking it Further

- The concept of resolution can be explored by taking more closely spaced, and thus more numerous, measurements of the same area. The low resolution image, 2 or 3 dimensional, can be compared to the higher resolution image.
- Draw a "pond" shape on the grid. Measure the "shoreline" with a string. Estimate the pond's surface area by counting and summing the covered squares. How could the volume of the pond be estimated using the bathymetry data?

Web Resources (Visit www.raft.net/raft-idea?isid=564 for more resources!)

- An Interactive Global Map of Sea Floor Topography - http://ibis.grdl.noaa.gov/cgi-bin/bathy/bathD.pl
- Bathymetry of Lake Tahoe, CA - http://tahoe.usgs.gov/bath.html
- Bathymetry of Crater Lake, OR - http://walrus.wr.usgs.gov/pacmaps/cl-index.html and http://oregonexplorer.info/craterlake/bathymetry.html



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