

RAFT

IDEAS

Topics: Geography, Maps, Volcanoes

Materials List

- ✓ Clear plastic cups lids, clear hinged food containers (cut apart at hinge), or plastic sheets
- ✓ Crater Lake contour map (page 2)
- ✓ Spacers cut from foam trays, or equal, if needed
- ✓ Permanent marker
- ✓ Glue or tape

This activity can be used to teach:

Next Generation Science:

- Models/maps of Earth's features (Earth & Space Science, Grade 2, 2-2; Grade 4, 2-2)
- Geoscience Processes (Middle School, Earth & Space Science, 2-2)

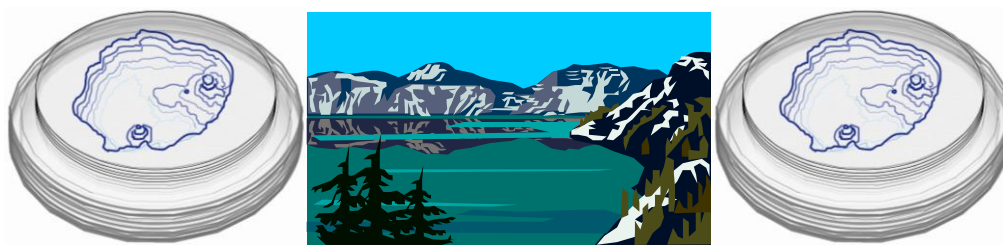
Common Core Math:

- Measurement & units (Measurement/Data, Grade 4, 1; Grade 5, 1)
- Ratios & proportions (Ratios/Proportional Relationships, Grade 6, 1-3; Grade 7, 2)
- Problems using scale/units (Grade 7, Geo., 1; High School, Num. & Quant., Q 1, 2)
- Modeling (High School, Modeling with Geometry, 1)
- Problem Solving (Math Practices Grades 4 - 12)



Modeling Crater Lake

Model a lake bottom with cup lids



Develop students' 3-D map reading skills by making a model showing the sculpted shape that lies under a large volcanic lake!

To Do and Notice

1. Collect 8 clear nesting lids to make the model of Crater Lake.
2. The blackline master, on page 2 can be reduced or enlarged as needed to fit lids.
3. The blackline master of Crater Lake has a contour interval of 100 m (328 ft). To match the scale of the master, the lids would need to be spaced approximately 1.5 mm (1/16") apart. If the master is enlarged or reduced then the required spacing between the lids, to be accurate, should match the distance between the arrows in the boxed note on the master. The model will still be useful if the distance between each set of lids does not match the distance between the arrows.
4. Topographical maps have contour lines which indicate elevation. Bathymetric charts, the underwater equivalent of a topographical map, have depth contours which indicate the depth below the water level. To simplify the chart of Crater Lake, the positive number contour lines for Wizard Island, which is surrounded by the lake, indicate the height above the lake's surface.
5. Place a lid over the blackline master of Crater Lake. Note or mark the orientation and position of the lid relative to the master. Use a fine-tip permanent marker to trace either the lowest or highest contour line(s) onto the lid.
6. Replace the lid with another lid, being careful to match the previous orientation and position of the first lid. (All the lids will fit together at the end— so make sure lids will nest, with the image in the right place.) Trace the line(s) showing the next contour level in sequence. Continue, using a new lid for each successive contour level, until all the contour lines have been traced. Optional: use smaller lids for the Wizard Island contour lines, or create a model out of clay or foam.
7. Using the master as a guide, stack the lids to create the Crater Lake model.
8. Check that the spacing between the lids is about 1.5 mm (1/16") or matches the distance between the arrows on the master if the master was enlarged or reduced. If the spacing is less than what is needed then cut 4 or more foam or cardboard spacers to put between each layer. Use tape or glue to secure the spacers in the corners of the lids away from the drawn lines.
9. Place a master under a model to see how the contour lines relate to a 3-D image.

The Science Behind the Activity

Topographic maps include imaginary lines, called contour lines, which connect points of equal elevation as a way to indicate 3-dimensional shapes on a 2-dimensional map. Topographic maps can aid hikers in navigation and in locating land marks. Topographic maps (sometimes called "topo maps") allow scientists to chart both the elevations and locations of animals, rocks, and plant species. Bathymetric charts, the underwater equivalent of a topographical map, show the depth below the water level.

Crater Lake, located in Oregon, lies inside a caldera, or volcanic basin. The caldera was formed when an ancient volcano, Mount Mazama, collapsed about 7,700 years ago after a large eruption that is estimated to have been more than 40 times as powerful as the 1980 eruption of Mount St. Helens. Melted snow and rain are the source of the water that fills the lake, which has no rivers flowing in or out.

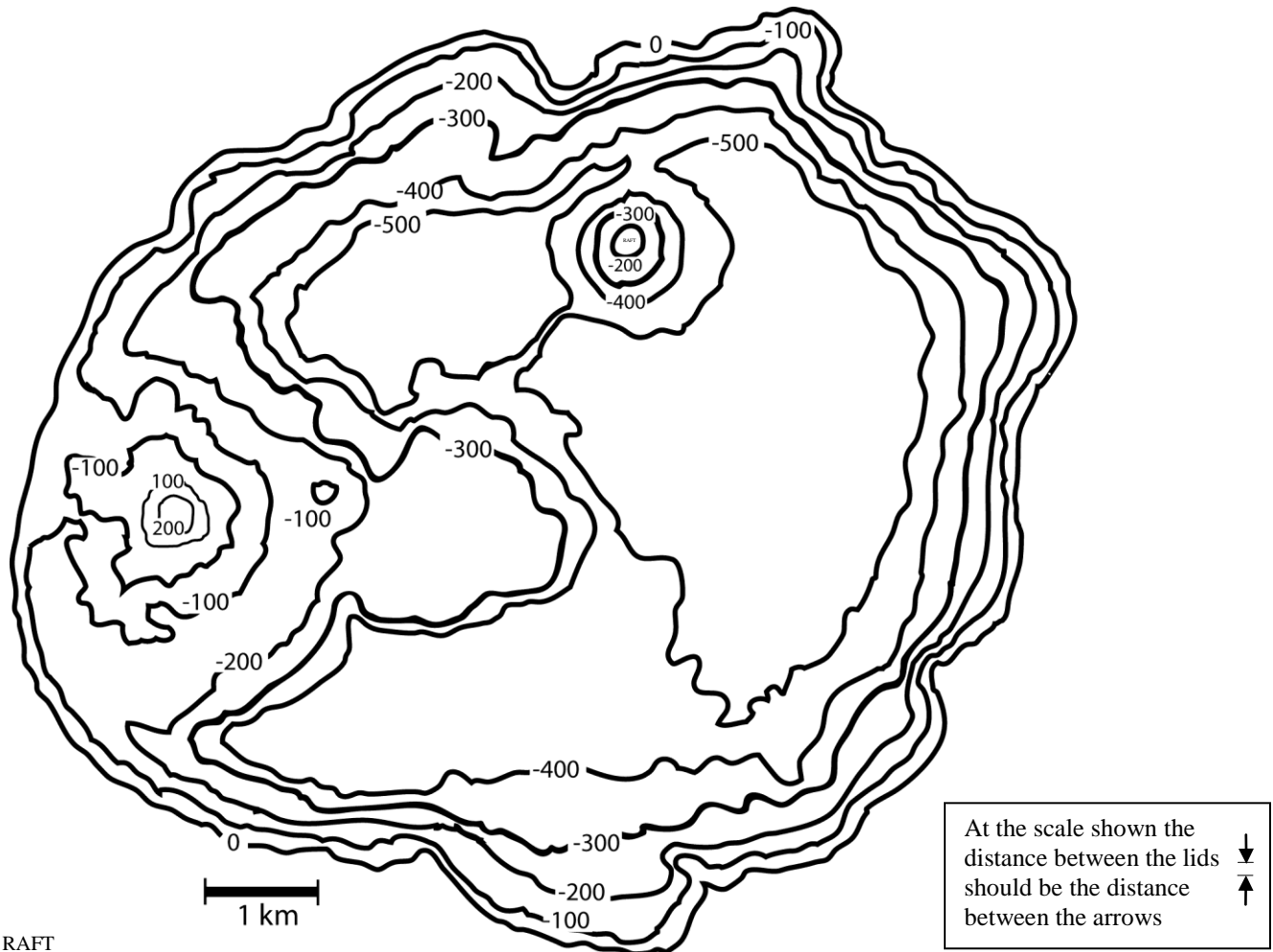
Taking it Further

- Model Crater Lake using foam cut from a foam container to model the different contour lines.
- Explore bathymetry further with the RAFT Idea Sheet *Plumbing the Depths*.
- Create a model of Mount St. Helens; see RAFT Idea Sheet *Pop goes the Mountain!*
- Create a model of a local mountain, lake, or other geographic feature.

Web Resources (Visit www.raft.net/raft-idea?isid=578 for more resources!)

- Crater Lake National Park website- <http://www.nps.gov/crla/>
- Bathymetry of Crater Lake, OR - <http://walrus.wr.usgs.gov/pacmaps/cl-index.html> and <http://oregonexplorer.info/craterlake/bathymetry.html>

Crater Lake



Note: Traditionally, topographical maps have contour lines which indicate elevation. Bathymetric charts, the underwater equivalent of a topographical map, have depth contours which indicate the depth below the water level. To simplify the chart of Crater Lake, the contour lines of Wizard Island, which is surrounded by the lake, show the distance above the lake's surface.