

Contour Maps With DOGSTAILS

Overview:

Have you ever seen a child construct something from a lump of clay? Were you amazed at the results? During this lesson your students will craft miniature mountains from lumps of clay. They will then translate their mountains into topographic maps. These maps will include vital features and information such as date, orientation, grid, scale, title, author, index, legend, and sources—or DOGSTAILS, for short. When students know what goes into creating a representational map, they are more likely to understand how to analyze the geographic information in other maps.

Connections to the Curriculum:

Geography, language arts

Connections to the National Geography Standards:

Standard 1: "How to use maps and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspective"

Time:

One to three hours

Materials Required:

- United States Geological Survey (if in the U.S.) or other topographic map of your area
- Two sticks and one ball of clay per student or group
- Colored pencils
- Two sheets of drawing paper per student
- Rulers
- Thin fishing line
- Pencil

Objectives:

Students will:

- make a clay model of a mountain and then use it to create a topographic map; and
- verbally analyze the spatial distributions and patterns shown on the resulting topographic map.

Geographic Skills:

- Acquiring Geographic Information
- Organizing Geographic Information
- Analyzing Geographic Information

Suggested Procedures

Opening:

Discuss with students some common varieties of landforms—hills, mountains, valleys, and plateaus, for example. What distinguishes hilly or mountainous terrain from relatively flat terrain? The amount of "relief"—that is, the amount of elevation change in the land surface within a given area.

Explain that it is sometimes important to have a map that shows the elevation of land on a flat paper surface—a topographic map. Why is this useful? Can hikers carry small three-dimensional models of the hills they walk? Not very easily! Maps are more convenient.

Show students a topographic map of your area. Help them to understand the isolines and be able to pick out land features on the map by the spacing of the isolines.

Development:

Set the clay in a sunny window to warm it then knead until the clay is very soft. Break it into lumps, placing each on a sheet of drawing paper.

Distribute the materials to students or groups and encourage them to shape their clay into mountains.

Once each mountain is complete, mark its peak with a dot.

Draw a straight line that passes through the dot while running from "north" to "south" across the mountain. Draw a second line—running "east" to "west"—perpendicular to the first. The mountain should now appear to be divided into quadrants. These orientation lines will be important later.

Draw three rings around the center dot. One should be a quarter of the way down from the peak; the next should be halfway down; and the third should be three-quarters of the way down.

Holding the fishing line taut, use it to slice through the clay along the lines you have just drawn. You should wind up with four layers.

Place the bottom layer on a fresh sheet of paper and outline it. Be sure to mark where the orientation lines meet the paper.

Take the clay off the paper. Center the next layer within the outline, using the orientation lines to make sure the clay is in the right position. Outline this layer. Then do the same thing with the remaining two layers.

Remove the last layer and explain to the students that they've begun making a topographic map.

Assume that the base of the mountain was at sea level. Then assign elevations to the remaining levels. [Note: The intervals must be consistent.]

Color each layer and create a map key. [Note: Do not use blue, which is reserved for representing water.]

Add the other map essentials: date, orientation, grid, scale, title, author, index, legend, and sources—DOGSTAILS!

Closing:

Display several student-made maps in the classroom. Discuss how the maps represent the clay mountains.

As a group, note the essential features that should be on each map.

Have students demonstrate to a group of younger students the relationships between physical landforms and mapped representations.

Suggested Student Assessment:

Have students give verbal reports on the relationship between the clay mountain and the mapped representation of it. Their report should include a statement of what would change on the map if something were changed on the model. Their understanding should translate into real situations, enabling them to predict the shape and relief of a real landform by looking at a topographic map of it.

If time allows, students can demonstrate their understanding by exchanging paper maps and constructing the corresponding mountains.

Marc R. Dastous of Estrella Middle School in Phoenix, Arizona, contributed classroom ideas for Standard 1.

Related Links:

- National Geographic: MapMachine - <http://www.nationalgeographic.com/mapmachine>
- Topo Zone - <http://www.topozone.com/>