

## **TOPO MAP ORIENTATION LESSON PLAN**

(Ver 2); Adapted from “Contour Maps with DOGSTAILS” at <http://www.nationalgeographic.com/xpeditions/lessons/01/g68/dogstails.html>

Link to King’s Hill topo map is <http://www.mytopo.com/maps.cfm?mtlat=46.8438&mtlon=-110.7014&z=14>

**OBJECTIVES:** Students will

- a. make a clay mountain and then use it to create a topographic map
- b. discuss/analyze the spatial distributions and patterns shown on the resulting topographic map
- c. discuss the elements and features of an actual topographic map of the Kings Hill area

**MATERIALS:**

- a. Mound of clay per group (3-4 students) to build a softball-sized (10-12” circumference) mountain
- b. Marking pens and pencil
- c. 4-5 sheets of drawing paper per group
- d. Thin fishing line
- e. Section of US Geological Survey topographic map for Kings Hill
- f. Topo map question sheet

**PROCEDURE:**

a. 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? No...maps are more convenient.

b. Development I:

- 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. The result should be 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 make a map key (e.g., lowest layer is red and represents 0 to 500 ft above mean sea level (MSL))

c. Development II:

Using the provided section of the USGS Kings Hill quadrangle topographic map:

- Discuss the meaning of **contours** (lines of equal elevation) and **contour interval** (vertical distance between two contour lines; on the topo map the interval is 40 ft). **Index contours** are marked with a thick brown line and labeled every 200 ft (e.g., 7200, 7400, etc.). **Intermediate contours** are thin brown lines and not labeled; you must use the contour interval and the neighboring index contours to determine the value of an intermediate contour.
- Discuss some of the map features and symbols, such as benchmark elevations (BM), roads, creeks, etc.
- Discuss the map's scale and north arrow orientation.
- Discuss what it means when contour lines are spaced close together (**steep terrain**, such as the slopes of Kings Hill and Porphyry Peak) and far apart (**flat terrain**, as in the area of O'Brien Park).
- Have students complete the map exercise question sheet