EXPLORING EVEREST'S TOPOGRAPHY

GUIDING QUESTION

How can a flat map show the shape of a mountain?

Students explore a topographic map of Everest, then apply their learning to create a two-dimensional representation and a three-dimensional representation of a mountain.

90 MIN

Materials *(per group)*

- 8.5"x11" piece of paper
- pencil
- ruler
- piece of tagboard or posterboard, roughly 9"x12"
- 6-8 sheets of corrugated cardboard, about 8.5"x11"
- sturdy scissors or utility knife
- glue
- access to a photocopier, or tracing paper

Handouts

- Everest Scavenger Hunt
- Model-A-Mountain

Film Clip

- "George Mallory's Route to Everest"

DIRECTIONS

1. View Mallory's path to Everest and discuss use of maps.

Together as a class, view the film clip "George Mallory's Route to Everest." Discuss with students the difficulty explorers and mapmakers in the 1800s and early 1900s might have had traveling in this terrain. Have students think about how part of Mallory's team's challenge was finding a route to the top of Mount Everest. Ask: *What types of maps would have been helpful with early exploration of Everest? What types of maps do you think climbers use today?* Help students think about how a flat map might show sloping land and changes in elevation.

2. Explore 2-D representations of 3-D landscapes.

Ask students to think about the shape of the land they saw in the film clip, viewing a second time if necessary. Brainstorm with students how a three-dimensional, or 3-D, landscape with steep slopes and mountain peaks might be shown on a flat, 2-D map. Climbers today rely on maps with contour lines and contour intervals. Show students the very detailed contour map of Mount Everest and the Himalaya online. At the center students can locate Mount Everest and its surroundings to the north, south, east, and west. Like most maps, this is a view from above, or aerial view. Ask: *What part of the map helps us to see the slope of the land, such as the steeper and flatter areas?* Help students find the blue contour lines and the measurement in meters, which shows the elevation along that line. The space between each is a contour interval. Look for areas where the contour lines are close together; these are steep areas. Where the lines are farther apart, the land has a less steep slope.

3. Study contours with the Everest Scavenger Hunt.

Have students work in pairs at a computer to explore the online map of Everest using **Handout 1: Everest Scavenger Hunt** and the online map above in step 2. Help students move in different directions on the map and zoom in and out. Discuss students' answers.

NATIONAL GEOGRAPHIC education

THE WILDEST DREAM
CONQUEST OF EVEREST

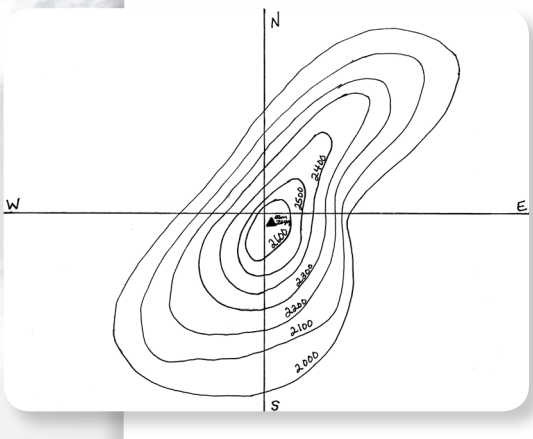
EXPLORING EVEREST'S TOPOGRAPHY

VOCABULARY

- contour interval
- contour line
- quadrant
- slope
- topographic map

4. Design and build a mountain model.

Once students are comfortable with the concepts of contour lines, explain that they will work with a partner to design a 2-D map of a mountain, then build a 3-D model of it. Once completed, they will exchange maps and try to identify each other's mountains. Distribute **Handout 2: Model-A-Mountain,** and the materials for each pair. Encourage students to be precise with drawing the quadrants and help students safely use the scissors or utility knife with cardboard. As you demonstrate, draw very close contours explaining that you are making a steep mountainside, draw v-shaped contours explaining that you are making a ravine or river, or draw elongated contours explaining making a ridge. Depending on the age of the students, you could explain some of the glacial forces in high mountains that act to sculpt the mountain landscapes. For example, sharp jagged-edged ridges are cut out by two opposing large glaciers. V-shaped valleys are not formed by glaciers, but U-shaped valleys are.



When making the mountain out of cardboard, emphasize the importance of drawing and matching up the quadrant lines each time.

5. Match the maps to the mountain models.

Conclude by having student groups exchange maps, then try to find the mountain that matches the map. Have students describe out loud or in writing what they saw on their map that helped them recognize the corresponding 3-D mountain model.

SUGGESTED RESOURCES

Mount Everest and the Himalaya Online Map:
http://maps.nationalgeographic.com/maps/print-collection/himalaya-topography-map.html

Corbun, B., *Everest, Mountain Without Mercy,* National Geographic Books: 1997.

Everest Scavenger Hunt Answers: 1. Students will likely name one of the glaciers; 2. Answers will vary, e.g., at the peak of Mount Everest; 3. 8,850 m and 29,035 ft.; 4. Close together. Climbing would be slow along this steep slope; 5. Far apart. Climbing might be faster since it's not as steep; 6. Answers will vary.

Name _____ Date _____

EVEREST SCAVENGER HUNT

HANDOUT 1

Use the Mount Everest and the Himalaya online map to explore the area's topography and answer the questions below. http://maps.nationalgeographic.com/maps/print-collection/himalaya-topography-map.html

1. Name a feature where contours are far apart.
   Climbing in this area would be: ❍ more steep ❍ more flat

   _____

2. Name a feature where contours are close together.
   Climbing in this area would be: ❍ more steep ❍ more flat

   _____

Check the box next to each feature as you find it. Then answer the questions:

3. ❍ **The summit of Everest**
   What is the elevation of Mount Everest, in meters and feet? _____

4. ❍ **The Northeast Ridge of Everest**
   The contour lines are: ❍ close together ❍ far apart
   Describe what you think climbing might be like along the ridge.

   _____

   _____

5. ❍ **Dong Rongpu Glacier**
   The contour lines are: ❍ close together ❍ far apart
   Describe what you think climbing might be like along this glacier.

   _____

   _____

6. ❍ **International border between China and Nepal**
   Why do you think the border might have been drawn here?

   _____

   _____

   _____

NATIONAL GEOGRAPHIC education

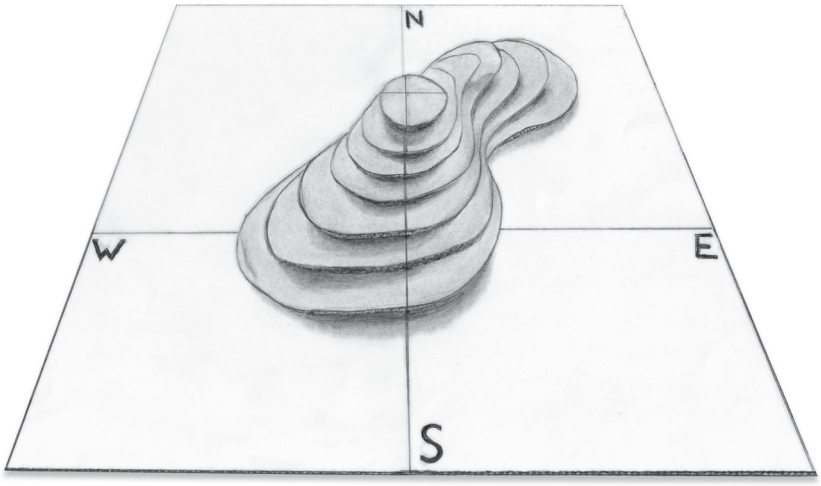
Name(s) _____

MODEL-A-MOUNTAIN

HANDOUT 2

Materials needed per group:

- 8.5”x11” piece of paper
- pencil
- ruler
- piece of tagboard or posterboard, roughly 9”x12”
- 6-8 sheets of corrugated cardboard
- sturdy scissors or utility knife
- glue
- access to a photocopier, or tracing paper



PROCEDURE

1. Using a ruler, draw on a sheet of paper one horizontal and one vertical line to divide the paper into four equal quadrants. Label the lines near the edges north, south, east, and west.
2. Draw a small circular or oval shape, the peak of your mountain, in the center of the map where the lines intersect.
3. Draw 6-8 contour lines surrounding your peak, making sure each line meets where you started drawing. Draw different shapes for each line, with some contour intervals coming close and some far apart, making sure not to cross lines. Create features such as a steep areas, ridges, or flatter glacial valleys.
4. Trace a copy of, or photocopy, your topographic map.
5. Draw quadrant lines, just as you did in step 1, on a sheet of tagboard or posterboard and set aside.
6. Keeping your original topography map, cut out the largest contour of the copy.
7. Select a piece of corrugated cardboard to fit that shape. Draw quadrant lines on it as in step 1.
8. Match up the lines of your contour shape and the lines on your cardboard.
9. Carefully trace the shape onto the cardboard. Cut the cardboard so that it is the same shape. Glue the cardboard shape onto the sheet of tagboard, carefully matching up the lines.
10. With the copied paper again, repeat steps 7, 8, and 9 with the second largest shape: cut, draw quandrant lines, trace, cut, and glue. Continue with each contour shape, being careful to line up the north, south, east, and west lines perfectly. You will stack several cardboard pieces like layers of a cake, each smaller than the one before it. Note: *You can glue small scraps of cardboard between each contour shape to boost your mountain’s height.*
11. Write the name of your mountain at the base, and place it on a display table.

NATIONAL GEOGRAPHIC education