

TOPOGRAPHIC MAP FEATURES: MOUNTAINS AND VALLEYS

INSTRUCTIONS
Grade 8



Science Concept:

Topographic maps can be used to identify mountains and valleys.

Objectives:

The student will:

- identify mountains and valleys on topographic maps;
- describe and make generalizations about regions in Alaska using a topographical map; and
- write a paragraph about topographic maps.

GLEs Addressed:

Science

- [8] SD2.1 The student demonstrates an understanding of the forces that shape Earth by interpreting topographical maps to identify features (i.e. rivers, lakes, mountains, valleys, island, and tundra).
- [8] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating.

Writing

- [8] W3.2.2 The student writes for a variety of purposes and audiences by writing in a variety of nonfiction forms (e.g. letter, report, biography, and /or autobiography) to inform, describe, or persuade

Vocabulary:

contour line – line on a map joining points of the same elevation

contour map – map that shows elevations above sea level and surface features of the land by means of contour lines

dimension – any one of the three physical or spatial properties of length, area, and volume; in geometry, a point is said to have zero dimension; a figure having only length, such as a line, has one dimension; a plane or surface, two dimensions; and a figure having volume, three dimensions

elevation – the vertical distance between a standard reference point, such as sea level, and the top of an object or point on Earth, such as a mountain (The summit of Mount Everest is the highest elevation on Earth.)

feature – make, form, fashion, shape; proportions; a prominent or conspicuous part or characteristic

gradient – the degree to which something inclines; a slope

island – piece of land completely surrounded by water

lake – large inland body of standing fresh or salt water

mountain – generally massive, and usually steep-sided, raised portion of Earth's surface; can occur as single peaks or as part of a long chain; can form through volcanic activity, by erosion, or by the collision of two tectonic plates

river – large, natural stream of fresh water that flows into an ocean, a lake, or another body of water, usually fed by smaller streams that flow into it

slope – to have or take an inclined or oblique direction or angle considered with reference to a vertical or horizontal plane; slant

topographic map – map showing topographic features, usually by means of contour lines

topography – the shape, height, and depth of the land surface in a place or region; physical features that

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make up the topography of an area include mountains, valleys, plains, and bodies of water; man-made features such as roads, railroads, and landfills are also often considered part of a region's topography; detailed description or drawing of the physical features of a place or region, especially in the form of contour maps

tundra – cold, treeless, usually lowland area of far northern regions; the subsoil of tundra is permanently frozen, but in summer the top layer of soil thaws and can support low-growing mosses, lichens, grasses, and small shrubs

valley – long, narrow region of low land between ranges of mountains, hills, or other high areas, often having a river or stream running along the bottom; valleys are most commonly formed through the erosion of land by rivers or glaciers; they also form where large regions of land are lowered because of geological faults

Materials:

- Play clay (two 8-ounce cans per group plus teacher demo)
- Paper plates (two per group)
- Pencil (one per student)
- Notebook (one per student)
- Colored pencils (set of 8 for each group)
- Butcher paper (one 2'x2' piece per group)
- White drawing paper (two 11"x13" sheets per group)
- Topographic maps showing a variety of different areas of the state (at least 6; scaled 1:250,000)

Resources:

Tolman, M. (2006). *Hands-on Earth science activities for grades k-8*. San Francisco, CA: Jossey-Bass.

Activity Preparation:

Gather all materials. Make a model of two mountains with a valley out of play clay.

Activity Procedure:

Please refer to the assessment task and scoring rubric located at the end of these instructions. Discuss the assessment descriptors with the class before teaching this lesson.

Gear Up

Process Skills: *observing, describing, making generalizations, inferring, and communicating*

1. To pre-assess knowledge, ask students to write one or two sentences in their science journal telling what they know about topographic maps.
2. In a class discussion, ask students how high and low places could be represented on a flat map. Record student ideas on a whiteboard or on an overhead.
3. Show students the pre-made clay model of two mountains with a valley between. Ask students how they could show the model of the mountains and valley on paper. Hand out white drawing paper then ask students to work alone or with a partner to draw the model. After five minutes or so, ask students to show the class what they drew and to explain why they drew it the way they did. Discuss the drawings and ask clarifying questions as needed.

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Explore

Process Skills: predicting, observing, describing, and making generalizations

4. Introduce concept of topography to the class. Ask students to predict the types of features they might find on a topographic map. If necessary, introduce vocabulary words to identify and describe features on the topographic maps.
5. Divide students into small groups then have each one choose a topographical map. Ask them to observe and describe as many different features as possible. Groups should record their findings on a piece of butcher paper. After ten minutes have students share what they found.
6. Ask students to identify specifically isolate mountains and valleys on the map then explain how they identified those features. Ask students to make generalizations about the regions on their maps then allow time for students to identify other features they see. Have students record all observations, features, and generalizations about the region represented on their map in their notebook.
7. Next have students exchange maps and repeat steps 5-6.

Generalize

Process Skills: predicting, observing, describing, and making generalizations

8. As a class, discuss the following:
 - a. How can you represent different geographic features on paper, in two-dimensions? (use of contour lines and shading)
 - b. What do you need to know to represent different features? (elevation, slope)
 - c. How can we accurately represent different elevations? (use of contour lines and shading)
 - d. How do you read a topographical map? (use the contour lines, elevation markings, scale, North arrow, and feature symbols)
 - e. What kind of features can you see on a topographical map? (mountains, rivers, islands, valleys, islands, tundra, etc.)
 - f. How are mountains and valleys represented? (shading, contour lines, elevation heights)
 - g. How can you determine the elevation of a mountain or a valley? (contour lines, shading, labels)
 - h. When would you want to use a topographical map? Why? (to identify features found in a region, maybe for hiking, camping, etc.)
 - i. What are the benefits of using a topographic map? (identify features found in a region)
 - j. How does your new understanding of topographic maps compare to your first journal entry?

Apply

Process Skills: making models, inferring and making generalizations, and communicating

9. Divide students into pairs. Hand out clay and white drawing paper. Allow pairs to form their own model of geographic features. When finished, students should draw a map of their features on paper.
10. Have students cover their model, then exchange maps with another group. Using only the map (not the clay model), have students make a model of the other team's geographic features. When done, students should compare the two models. Ask students to self-assess how they did.
11. Share the map and model results with the class. Ask students to share their thinking on how they drew their map. Record various thoughts and ideas on a whiteboard or on an overhead. Ask if students can think of other ways to show the different features.
12. Have students journal in their notebooks about their new knowledge of topographic features and maps.

Extension:

Repeat the activity adding other topographic features to the models.

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Sources:

(2009). Retrieved July 6, 2009, from Oxford English Dictionary website: <http://dictionary.oed.com/general/search.html>

Berube, Margery S.: *The American Heritage Student Science Dictionary*. Houghton Mifflin Company. Boston, New York, 2005.

(2009). June 25, 2009. from <http://dictionary.factmonster.com/>

TOPOGRAPHIC MAP FEATURES: MOUNTAINS AND VALLEYS

Assessment Task:

With your understanding of topographic maps, identify mountains and valleys on a topographic map of one region of Alaska. In your notebook, record the name of at least one mountain and one valley. You may also include the names of other features. Describe and make one or more generalization about the region represented by the map by writing a paragraph that is three to five sentences long (or more). In your paragraph, use correct grammar, spelling and complete sentences. Include a topic sentence with at least three or more supporting details.

Rubric:

Objectives	GLEs	Below Proficient	Proficient	Above Proficient
The student identifies valleys and mountains on a topographic map of Alaska.	[8] SD2.1	The student identifies either mountains or valleys, but not both, on a topographic map of Alaska.	The student identifies mountains and valleys on a topographic map of Alaska.	The student identifies mountains, valleys, and other features (i.e. rivers, lakes, islands, and tundra) on a topographic map of Alaska.
The student describes and makes generalizations about the region represented by a topographic map.	[8] SA1.1	The student describes or makes a generalization, or does neither, about the region represented by a topographic map.	The student describes and makes a generalization about the region represented by a topographic map.	The student describes and makes more than one generalization about the region represented by a topographic map.
The student writes a paragraph about topographic maps.	[8] W3.2.2	The student writes a paragraph that may or may not have a topic sentence and has less than three supporting details; there are more than five grammar or spelling errors; the paragraph is less than three sentences long; there is more than one incomplete sentence.	The student writes a paragraph that has a topic sentence and at least three supporting details; there are five or fewer grammar or spelling errors; the paragraph is three to five sentences long; there is one or no incomplete sentence.	The student writes a paragraph that has a topic sentence and more than three supporting details; there are no grammar, punctuation, or spelling errors; the paragraph is more than five sentences long; there are no incomplete sentences.

