Topographic Maps

Summary

Topographic maps are used to locate examples of various landforms, such as volcanoes and mesas. Students are asked to relate the building up and breaking down of the Earth's surface over time to the various land forms.

Time Frame

1 class periods of 45 minutes each

Group Size

Individual

Materials

For the each student:

- 3 maps (See links below)
- Colored pencils.

Background for Teachers

Topographic maps show the shape (elevation differences) of the land surface through the use of contour lines, which are lines connecting points on the earth's surface that have the same elevation. Where contour lines are closely spaced, the terrain is steep. The more closely spaced, the steeper the slope. Conversely, gentle ground slopes are portrayed by contours spaced widely apart. Landforms can be identified on topographic maps. In this activity, mesas, buttes, and volcanoes can be identified.

Intended Learning Outcomes

- Know and explain science information.
- Explain observations.
- Sort and sequence data according to given criteria given.

Instructional Procedures

As the teacher, study the topography key (linked as topomap1.gif below). In dry climates, like southern Utah, rocks can erode into mesas and buttes. A mesa (A) is a flat-topped mountain bordered on all sides by steep cliffs. Mesas get smaller as their cliffs erode and become small, flat-topped hills called buttes (B). In western Utah, the earth's hot mantle has pushed magma up in places and erupted lava to form volcanoes (C). Contour lines close to each other represent a steep slope or cliff (D). Contour lines spaced further apart represent a gentle slope (E).

Use the student map (linked below as topomap2.gif) to enable students to discover and visualize the mesa, buttes, and volcano.

Have them color each contour interval (the space between two lines) in the following colors:

- 10 to 20 feet in elevation- green
- 20 to 30 feet- dark blue
- 30 to 40 feet- light blue
- 40 to 50 feet- orange
- 50 to 60 feet- red
- 60 to 70 feet- pink
- greater than 70 feet- yellow

Discuss spacing between contours and how spacing shows steep or gentle slopes.
Have students find and label the volcano, mesa, and buttes, as well as the gentle slope (possibly leading up to a mountain).
Relate the building up and breaking down of the Earth's surface to the landforms they identified.
Following are examples of questions you might ask.

- What probably causes a mesa to form? [uplift]
- What probably causes a butte to form? [weathering and erosion of a mesa]
- Why is the slope more gentle at the base of mesas? [deposition; erosion and weathering break the rocks down and the material is deposited at the base.]
- What landform does a volcano create? [mountain]
- How long does it take for all this to happen? [A long, long time. The deposits that forms the rocks of the Grand Canyon are 300 million years old. The uplift that started the erosion that formed Bryce Canyon started 13 million years ago.]

Continue by using the Snow Canyon map (linked below as Snow Canyon map), showing Snow Canyon State Park near St. George, Utah. On this actual topographic map, have students identify (by coloring in):

- Roads (black)
- Volcano at top right (red) The volcano is where the word "lava" is written and is of relatively conical shape, with a depression (indicated by hachure marks) at the very top to represent the vent of this volcano.
- Cliffs (brown) -very closely spaced contour lines on the majority of the map.
- Gentle slopes (green)- largely spaced contour lines along the roads.

Relate the building up and breaking down of the Earth's surface to the Snow Canyon area. Ask students:

- Where might uplift have occurred?
- Where is deposition occuring?
- Where is weathering and erosion occuring?
- What would likely happen if the area where to be uplifted?

Have students write a paragraph describing how the area would look if there were no mountain uplift, weathering, or erosion.

Ask a few students to share their paragraphs. Make them justify their answers.

Assessment Plan

Give the students a copy of the Topography Map-Teacher Key and have them identify the cliff (d), mountain (c), gentle slope (e), butte (b), and mesa (a). For each of the landforms identified the students should write a sentence identifying how it could have been formed.

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