UT Extension
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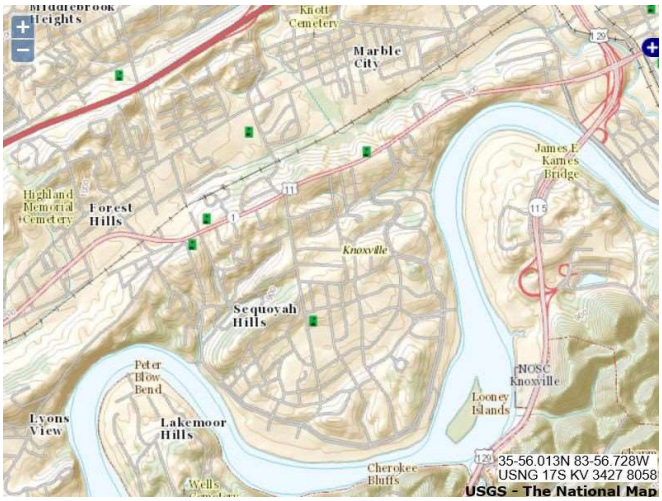
Backyard STEM

Making a Mountain Map

What is topography and how is it shown on a flat map?

Topographic maps are models that represent changes in elevation in the landscape. Equal elevations are depicted with contour lines, which do not ever cross, because there can only be one elevation in a single location.

The purpose of this activity is to introduce the students to topographic maps, define key terms and talk about how to use a topographic map. This activity can use local examples of landforms and points of interest that would be familiar to students.



Ask your students:

⇒ What is topography?

⇒ What does a topographic map show us?

⇒ What is a contour line?

⇒ What kinds of information do topographic maps provide us?

Introduce Key Concepts:

Topography is the relief or change in elevation across the land. Topographic maps are 2-dimensional models of the 3-dimensional landscape with relief. Topographic maps show elevation information using contour lines and points of interest (like roads, streams, lakes, and buildings). Landforms can be identified on a topographic map, such as ridges, valleys, rivers, floodplains, buttes, islands, plains, peaks, peninsulas, mesas, plateaus, etc.). All maps include a scale, which is used to measure relative distance on the map that indicates actual distance in the 3-dimensional landscape.

Contour lines join points on a map with equal elevation. Every contour line eventually connects at the ends (or runs off the map). Contour lines generally do not cross because there is only one elevation value for any given location unless there is an overhanging ledge. Contour interval is the change in elevation between contour lines. The closer the contour lines are to each other, the steeper the slope of the landscape. The farther apart the contour lines, the flatter the landscape.

ACTIVITY:

Show the students a topographic map of the local area. Topographic maps are available for purchase or free download from the United States Geologic Survey (http://tinyurl.com/TN4Husgsmaps). Break into small groups of 3-5 depending on how many maps you have. Ask your students to:

- Locate their school/camp/home on the map.
- Name the nearest creek, stream or river.
- Point out at least 5 geographic landforms (see next page).
- Identify the scale of the map (What does one inch on the map represent?).

Project Area: Environmental Science

Skill Level: Intermediate

Learner Outcomes:

⇒ Be able to identify topographic map features.

⇒ Be able to create contour lines that represent elevation change.

Tennessee Science Curriculum Standards:

CLE 3204.3.7 Investigate how maps can be used to interpret changes in the earth system

93204.3.16 Interpret topographic maps.

Success Indicator:

Students understand that a map is a 2-D representation of a 3-D landscape and can define contour lines.

Science Skills: Design a model, observe, reflect

Life Skills: Observing, Reasoning

Tags: maps, topography

Materials:

⇒ Topographic map

⇒ Play dough

⇒ Clear plastic container (roughly 8"x8"x2")

⇒ Measuring cup (or mason jar, 100 mL gradations)

⇒ Pitcher of water (optional food coloring)

⇒ Clear transparencies or plastic wrap

⇒ Permanent sharpies or Wet erase markers

⇒ Ruler

Credits: Andrea Ludwig and Jennifer DeBruyn

Environmental Science

Project Area:
Environmental Science

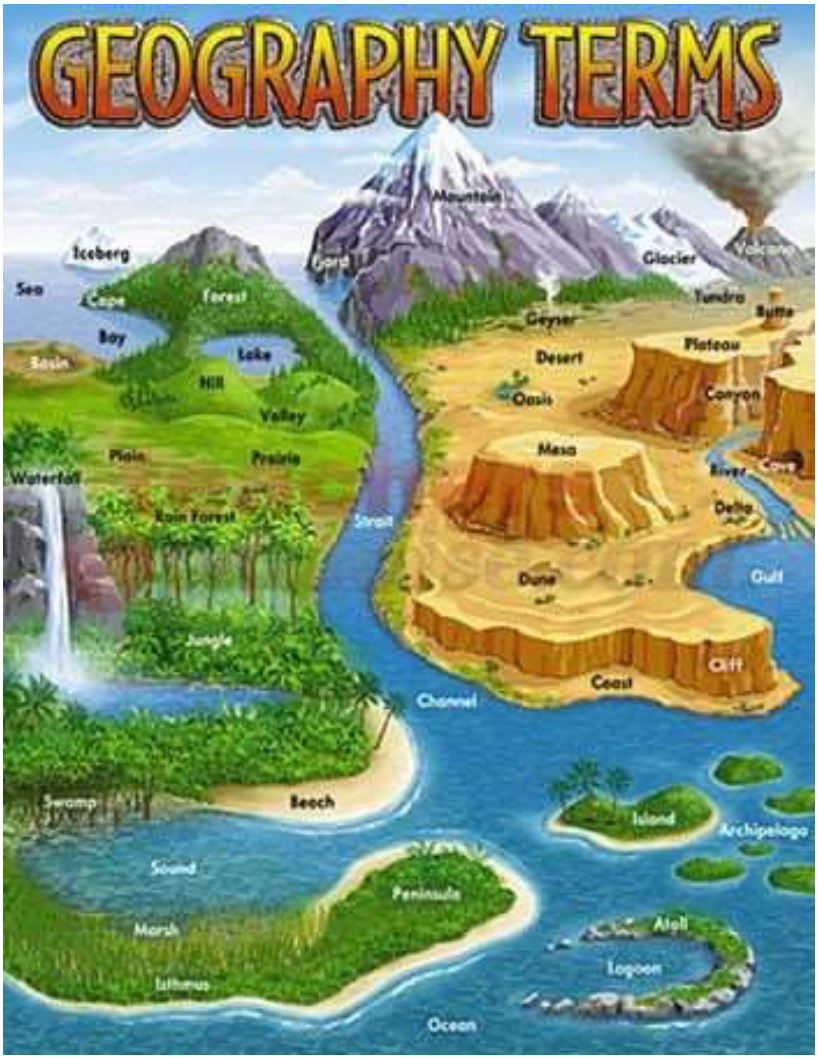
Skill Level: Intermediate

Did you know:

- The most common scale on a topographic map is 1:24,000. That means that one inch on the map represents 24,000 inches on earth, or 2,000 feet.
- The continental United States is over 15 million feet wide.
- The United States Geologic Survey has over 200,000 historical topographic maps in it's collection.

Making a Mountain Map

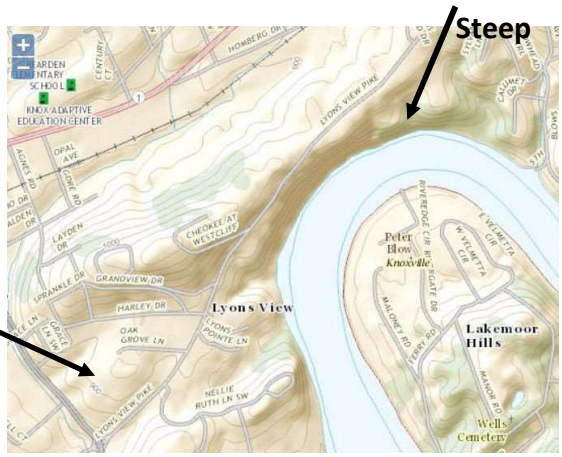
A graphic that shows the location and general shape of geographic landforms (Source: http://www.teachersparadise.com/c/chart-geography-terms-17-x-22-p-8967.html).



Common Tennessee Landforms:

- Plateau
- Valley
- Channel
- River
- Swamp
- Bluff
- Mountain
- Hill
- Ridge
- Saddle
- Plain
- Basin
- Floodplain
- Lake

Ask students to identify 1) the highest elevation and the lowest elevation on the map, and 2) steep areas with high slope (close contour lines) and flat areas with low slope (spaced out contour lines).



Original recourse for the following activity is:

Idaho State University Department of Geosciences, *Introduction to Topographic Maps*: http://geology.isu.edu/geostac/Field_Exercise/topomaps/topo_interp.htm

Investigate: Making a Mountain Landscape and Creating it's Topographic Map

Optional: Make it Local!!

Before the learning session, ask your students to go to Google Earth and look around their community/city/county. Ask them to write a paragraph about what they observe from the aerial photography. Compare and contrast what they can see versus what they can't see.

Activity:

1. Break students into pairs or small groups depending on supplies.
2. Give the students 10 minutes to make their own landscapes with playdough in the bottom of the container. The dough shouldn't cover the entire bottom. Relatively simple landscapes with nice rolling features are recommended (for ease of mapping). Intricate and small features will not be able to be mapped. Make sure the students create ridges/mountains (high points) and valleys (low areas). Do not exceed the top of the container with the playdough structures. For young groups, consider making your playdough landscape first and then asking the students to replicate it.
3. Place transparency or plastic wrap over the top of the container. Mark the four corners of the container with a light-colored thin line. These will be indicators to help line up the transparency/wrap each time it is placed on the container.
4. Demonstrate this step, and then ask the students to repeat. Place transparency over the top of container. Look directly down into container and notice the relief of the model below. Trace the bottom of the clay landscape (where the clay meets the container). Label this line as 0 ft. This represents the lowest elevation of the topographic map. Identify this line as a contour line, which is a line that joins points of equal elevation.
5. Demonstrate this step, and then ask the students to repeat. Fill the measuring cup with 100 mL of water. Pour the water into the container, evenly distributing it across the landscape. The water line will represent a new elevation, the second contour. Draw the second contour line, tracing around where the water and play dough meet. Label this contour as 30 ft (or other length unit). If your container is relatively large, then increase the water additions to 200 mL or other adequate volume. Ideally, six to eight contours will create an interesting map. Therefore, it should take 6-8 volumes of water to fill the container.
6. Repeat Step 5 until the landscape is completely submerged. Each addition of 100 mL will represent another 30 ft of elevation change. Be sure the added water volumes are consistent so that the contour line intervals will be consistent. The final contour will represent the peak of the topography. All contours should be either closed (meet up end to end to create a circle or amoeba shape) or go off of the map space (stop when it hits the boundary of the container).
7. Once every group has completed their map, ask them to share their 3-D landscape in a box and the 2-D topographic map and point out the geographic landforms they mapped.

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