

3B Topographic Mapping

How do you make a topographic map from a 3-dimensional surface?

Topography is the shape of the surface of an area and includes the elevations of land formations like mountains. The topography of a region is represented by a topographic map.

A topographic map is the two-dimensional representation of a three-dimensional land surface. Scientists use these types of maps to understand the effects of geologic processes on Earth's surface. Topographic maps show the difference in elevation through the use of contours. Contour lines connect points of equal elevation. Contour lines are drawn at specific intervals known as the contour interval. Once the contour lines are present, details are added to show land use using standard mapping symbols.

In this investigation, you will use a model land surface to make a contour map.

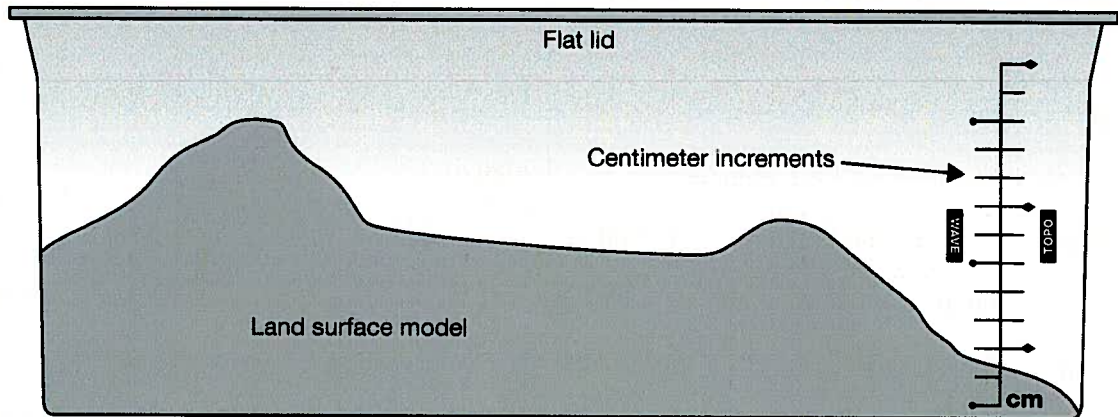
Materials

- GeoBox with the topo form (white land surface model) and topo lid (the flat lid)
- Container to hold water (or use a bucket from the stream table)
- Beaker to transfer water between containers
- Overhead projector markers (thin)
- Pencil
- Colored pencils
- Tracing paper
- Water colored with food coloring
- Metric ruler
- Topographic maps of local area

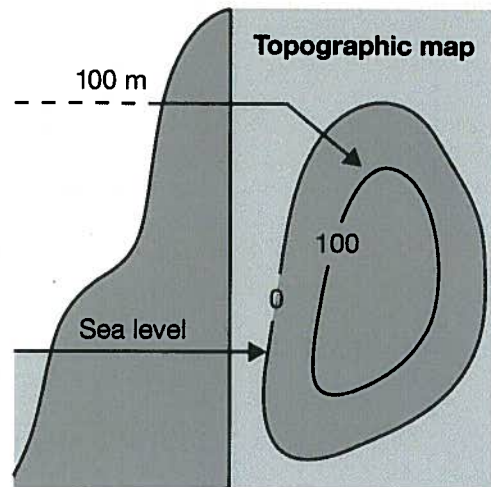
1. Making a topographic map

1. Note that the GeoBox has a sticker on the side. Each mark on this sticker represents one centimeter. Pour water into the GeoBox up to the first centimeter line.
2. Place the topo lid on the GeoBox. Stand over the GeoBox so that you are looking down on the topo form. With the overhead projector marker, first make a boarder for your map by outlining the lid. Then, outline the perimeter of the land surface onto the lid. This will be considered "sea level," or the 0 meter contour line.
3. Now, using your marker, number each centimeter above sea level. Use the sketch below to help you with this step.
4. Remove the topo lid and add water until the water level reaches the 1-centimeter mark. Replace the lid. Trace the "coastline," the line along which the water and land meet, onto the lid. All points on this line are

1 cm above sea level. They form a contour line, a line of equal elevation.



5. Add water to the level of the 2-centimeter mark. Replace the lid and again, trace the “coastline.” All points on this line are 2 centimeters above sea level.
6. Continue this procedure until the topography is covered with water.
7. Now you have a contour map of your land surface. Use the tracing paper to trace what is on the lid. Each partner makes his/her own contour map. The elevation for each contour represents 100 meters. Draw the contours as solid lines. Indicate the elevation as shown in the graphic at right.



2. Labeling your map

1. Each partner will now finish his/her own map, which is now on tracing paper. Add details showing land-use using the USGS topographic map symbols (see next page). Make sure the following features are on your map. With your group or with the whole class, define any terms you do not understand.
 - Geographic north
 - A contour interval
 - A fractional scale
 - A verbal scale
 - A bar scale
 - A river

- A depression
 - An airport
2. Color in areas on your map where appropriate. Water is shown in blue. Densely populated areas are shown in gray or pink. Wooded areas are in green and open areas in white. Individual buildings are solid black shapes.
 3. When your group is finished, write a title on your map. Also, write your name or your group's name on the map.

3. Thinking about what you observed

a. What is the direction that your river is flowing?

b. What is the difference in elevation between the start and end of the river?

c. What is the overall total change in elevation in your map?

d. What is the highest elevation in your map?

e. By looking at your map, what area is the steepest? *Remember: Look at the contours to see how close or far away they are from each other.*

4. Exploring on your own

1. Obtain a topographic map of your local area. See if you can find where you live and some of the landmarks around you.
2. Besides scientists, who might be interested in a contour map? Why would it be useful to those people?

3. See if you can find out where the closest benchmark is in your local area. A benchmark is a place where the exact elevation is known. A marker is placed in the ground at that spot. There is an **X** on the marker with the exact elevation inscribed in it. (Hint: Benchmarks are noted on topographic maps.)

Topographic Map Symbols

Boundaries

City 

Small Park 

Buildings and related features


Building 

School 

Athletic field 

Forest headquarters 

Airport 

Well (other than water), windmill or wind generator 

Picnic area 

Campground 

Winter recreation area 


Contours

Contour line 

Depression 

River mileage marker 


Railroads

Railroad, single track 

Railroad, multiple track 


Rivers, lakes and canals

Perennial river 

Perennial lake/pond 

Roads and related features

Primary highway 

Secondary highway 

Trail 

Highway or road with median strip 

Vegetation

Woodland 

Shrubland 

Orchard 

Vineyard 

U.S. Geological Survey used in compiling this information.