

Make A Topographic Map

Topographic maps use contour lines to portray the shape and elevation of the land.

Objective

Make a simple topographic map of your own and, in the process, get hands-on experience in the way contour lines represent the features of the land.

Materials

- a small aquarium
- modeling clay
- a pitcher of water
- a metric ruler
- a pencil
- a permanent marker
- a sheet of tracing paper
- a clear plastic pane that is slightly larger than the top of your aquarium
- another flat piece of plastic that will easily fit inside your aquarium

Safety Notice: All applicable laboratory safety rules must be followed. Students should not perform any experimental activity without the teacher's supervision and express permission. Students must follow safety guidelines and wear appropriate protective gear.

Procedure

1. Create some topography that you can map. Build a small "mountain" out of the modeling clay. Place your modeling clay on the smaller piece of plastic. Using your fingers, begin to shape it into a mountain. Form it into a rough cone shape. Then, gently shape the sides of this cone into ridges and valleys, like those that might be found on a real mountain. You can make some steep slopes and some more gradual slopes, but try to keep the features of your mountain fairly simple.
2. When you've finished building your clay mountain, move it, and the piece of plastic it rests on, into the aquarium.
3. Add just enough water to the bottom of the aquarium to cover the plastic so that it reaches the bottom of your mountain. On the map you will create, this starting water level will represent sea level — zero elevation.
4. Using your marker and ruler, mark the outside of the aquarium in one centimeter increments, extending up as high as your mountain reaches.
5. Place your large transparent plastic pane over the top of the aquarium. Using the permanent marker, mark the position of the pane at the corners of the aquarium with brackets. This will help you replace your pane in exactly the same position again and again.

6. While looking straight down into the aquarium at the top of your mountain, use your permanent marker to draw a line on the plastic pane that exactly follows the base of your mountain where it meets the water — at sea level. This is your first contour line, and you will have an elevation of zero. Mark it with a zero.
7. Remove the plastic pane and add water to the bottom of the aquarium until it raises the water level just one more centimeter.
8. Using your brackets, align your plastic pane on top of the aquarium again. Again, while looking straight down, draw another line on the pane that matches where the mountain meets the water now. This second contour line should be inside your first one. It will have an elevation of one centimeter above sea level, so mark it with a one. (The further addition of water in one-centimeter increments is now just to help measure — the sea level does not change.)
9. Repeat this process of adding water and marking contour lines, one centimeter at a time, until you reach the top of your mountain. The last line you can draw before the water completely covers your mountain will be your final contour line.
10. Remove your transparent plastic pane with its contour lines and place it on a flat surface. Place your tracing paper over the pane and, being sure not to move the paper, trace the contour lines onto the paper with your pencil.
11. For your map, let your one-centimeter elevation increases equal 100 meters. So, where your contour line was marked one, mark it as 100 on your tracing paper map. Do the same thing with your other contour lines. Your contour lines will then represent elevations above sea level of 100, 200 and 300 meters and so on, up to the top of your mountain.
12. The lines that are closer together show where the slope of your mountain is steeper. To verify this, compare your map to your mountain. In your comparison, you can see that some of the contour lines bend outward. These broader lines represent ridges. Those that bend inward represent valleys or cuts on the sides of your mountain.

Conclusions

- When is it helpful to have a topographic map of an area?
