LESSON 7:

MAPPING A MOUNTAIN

Students will create a mountain model and use that to create a topographic map.

OBJECTIVES

- [x] How do we create a representation, or model, of a mountain on a flat piece of paper?

SUPPLIES

TEACHER PURCHASES

- None

LESSON KIT #7

- Construction Paper (1 sheet of each color for every student)
  - dark red
  - red
  - orange
  - yellow
  - lime green
  - dark green
  - blue
  - purple
- Sticky foam squares (mounting squares) (1/4 sheet for each student)

OTHER SUPPLIES

The remaining supplies for this experiment can be found in the following locations in your bin

PENCIL BOX

- Scissors (1 per student)
- Pencils (1 per student)
- Markers (share amongst students)

FOLDER

- 12-24 pieces of printer paper (for planning and sketching)

LESSON 7:
MAPPING A MOUNTAIN

Students will create a mountain model and use that to create a topographic map.

HOOK

2-3 min

Have you ever taken a trip with family or friends and hiked a mountain? What was that like? What types of things did you see along the way and how long did it take to summit - or get to the top? Discuss as group.

DISCUSSION

3-5 min

Mountain climbing, or even very large hill climbing, is not an easy task! Sometimes these landforms get steep very slowly and you don't get too tired as you're walking, but it may take all day to get to the top and see the view.
Sometimes the mountain is very steep the whole way up and it takes all day because it's very physically difficult and you get tired quicker.

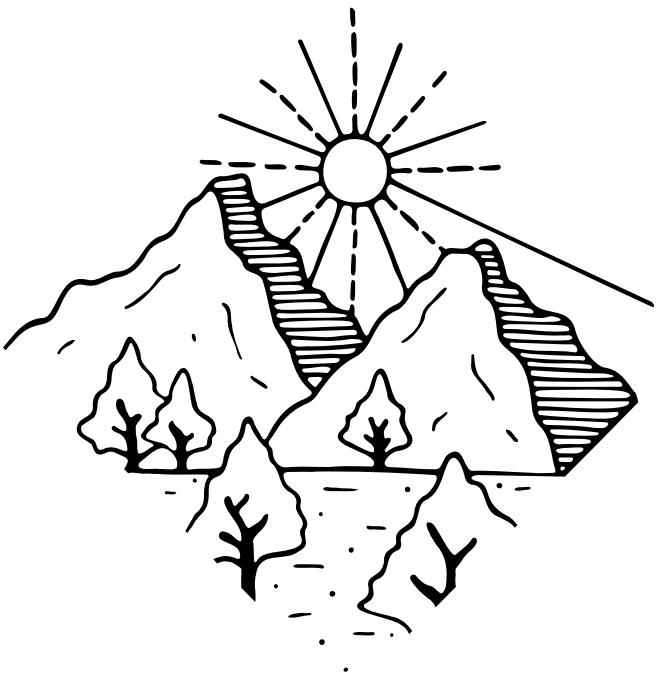
Many hikes up mountains take place in National Parks. How can the parks prepare people for the hikes up the mountain if they are not there with each visitor to describe the hike? A map can show a hiker how to get to certain places - by going north, south, east, or west. But, can a piece of paper show how steep or difficult to hike a mountain is?

HYPOTHESIS

3-5 min

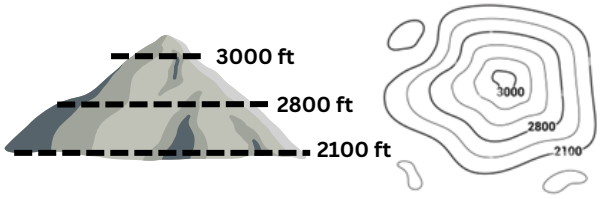
How can National Park Service experts use a piece of paper to show the steepness of a trail on a mountain?

If you want, you can hand out pieces of blank paper to students and have them try to draw a map of a mountain. Later, you can compare and contrast these ideas to an actual topographical map.

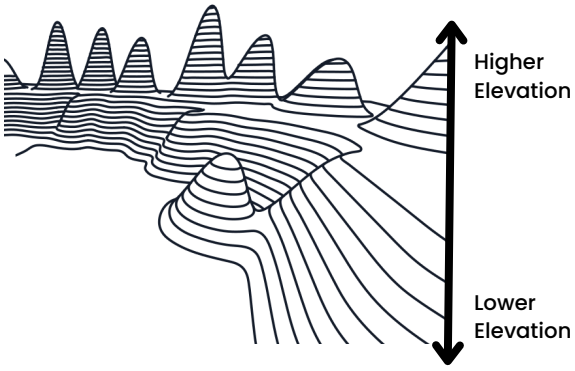


LESSON 7

Contour Map Examples



A contour map shows what each layer of a mountain would look like if you cut it into slices



Introduce the concept of elevation. Elevation is how high above sea level something is. All land has elevation– some areas are even below sea level!

EXPERIMENTATION

20-25 min

Maps of mountains are called contour maps. These maps include special lines to tell the hiker what to expect. A hiker will have to be knowledgeable on how to read these lines. Another name for a map like this is a topographic map. Topographic maps are a little larger and more detailed and they also show lakes, rivers, and other landforms.

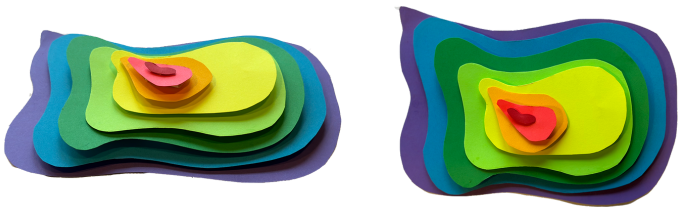
Imagine you could slice a mountain into layers and trace each layer with a giant pencil. This exactly how contour maps are made.

Explain that scientists don't actually slice mountains into layers, instead they use special instruments to see what these layers might look like.

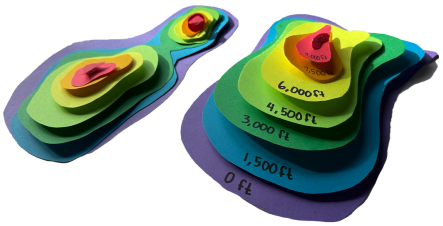
Many contour maps are in black and white– the outermost lines represent the shortest parts of the mountain, and the innermost lines represent the tallest parts of the mountain. Sometimes, each layer is a different color to help us see the height more clearly. Red is the tallest part of the mountain, and violet is the lowest.

Today, we are going to make our own three-dimensional contour maps!

Experiment Examples:

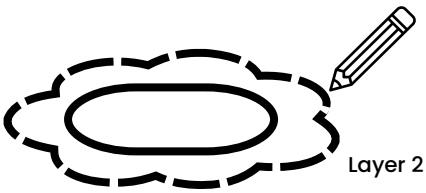


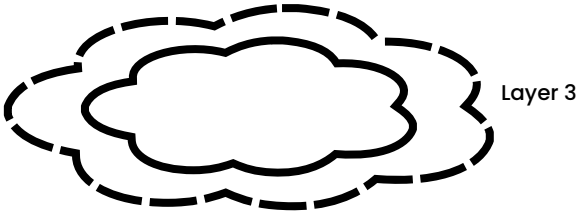
The mountains we make may be three-dimensional– but when you look at them from above, they look flat! This is the concept behind a contour map!

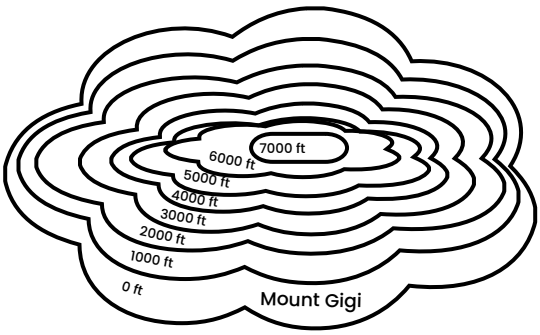


You can be creative with the shape of your mountain! Maybe it has multiple peaks, or areas where the slope is steeper (or more gradual) than the surrounding areas!

LESSON 7







From above, your 3D mountain looks like a 2D contour map!

EXPERIMENTATION

Step One

Cut out the peak of your mountain using the dark red paper. Remember, this is the tallest– and also smallest– part of your mountain.

Step Two

Lay your dark red shape on top of the light red piece of paper. Trace a shape sightly larger than the dark red shape and cut it out. This is the second highest layer of your mountain.

Step Three

Lay your light red shape on top of the orange piece of paper. Trace a shape sightly larger than the dark red shape and cut it out. Repeat this process for the remaining pieces of paper until you have 8 layers (go in this order: dark red → light red → orange → yellow → light green → dark green → blue → violet).
The shapes will change over time– be creative with the shape of your mountain!

Step Four

Using the sticky foam squares, stack the layers of your mountain. You will likely need 2-3 squares on the lower layers, and you may need to cut a square in half for the top layer if your peak is smaller than the sticky square.

Step Five

Stand directly above your contour map and look down at all the layers. Do you see how, from above, our 3D map looks flat? This is how we're able to map a mountain on a flat piece of paper! Hikers know how to read these maps, and it helps them on their excursions!

Step Six

Make sure to give your mountain a name! If you want, you can label the elevation on each layer of your map, or add features like rivers and trees!

LESSON 7

EXTENSION

Older students can do the Math and create labels for each layer in feet - so if the "mountain" was divided evenly, each line might go up 20 feet or 100 feet, depending on how tall they want want their mountain to be.

Students can also try to recreate their mountains as a flat contour map by drawing on a sheet of paper.

Students can also try to draw contour maps for other types of mountains and try to visualize what they would look like in three dimensions!

OBSERVATION & EXPLANATION

10-15 min

Contour maps show lines of elevation. Elevation is usually measured in feet and it describes how high above sea level a landform is. So, how tall was your "mountain" from the place you built it upon?

Our paper mountain is a model. We cannot build something that is as tall as a real mountain, so we have build a smaller model to understand the bigger idea. A flat contour map is an even simpler representation of a mountain than our 3D models.

Scientists use models all the time! Just like we can use construction paper to understand a huge mountain, scientists use simple models to understand big or complicated concepts. Can you think of some models that scientists use?

Ask the students to think about some features of their mountains. If there's time, some students can share with the class.

- How steep is your mountain?
- How hard would your mountain be to hike? What about to sled or ski?
- What other features might your mountain have? Does it have trees or rivers? Is it snowy or dry?
- Where in the world is your mountain located?

CONCLUSION

5-7 min

Fill out Hypothesis/Observation/Conclusion charts on the white board together as a group. Instruct students to clean their stations. Make sure to leave the classroom the way you found it.

ASSESSMENT

3 min

Students may write this answer on their sheet of paper or verbally tell the instructor as they leave:
Why is it helpful for hikers to have a contour or topographic map?

iSTEAM After School

LESSON 7

SCIENTIST'S WORKSHEET

Tip: Can draw or write the following down on whiteboard!

Hypothesis	Observation	Conclusion
How can National Park Service experts use a piece of paper to show the steepness of a trail on a mountain?	What is elevation? How does a contour map show elevation?	Was your hypothesis correct?