# Topographic Maps

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## Making a Topographic Map

What is a topographic map? what is an isoline or contour line? What type of characteristics does a topographic map show us? If you are wondering about the answers to these questions, you will find them when making a topographic map of a landform you have created.

**Directions:**

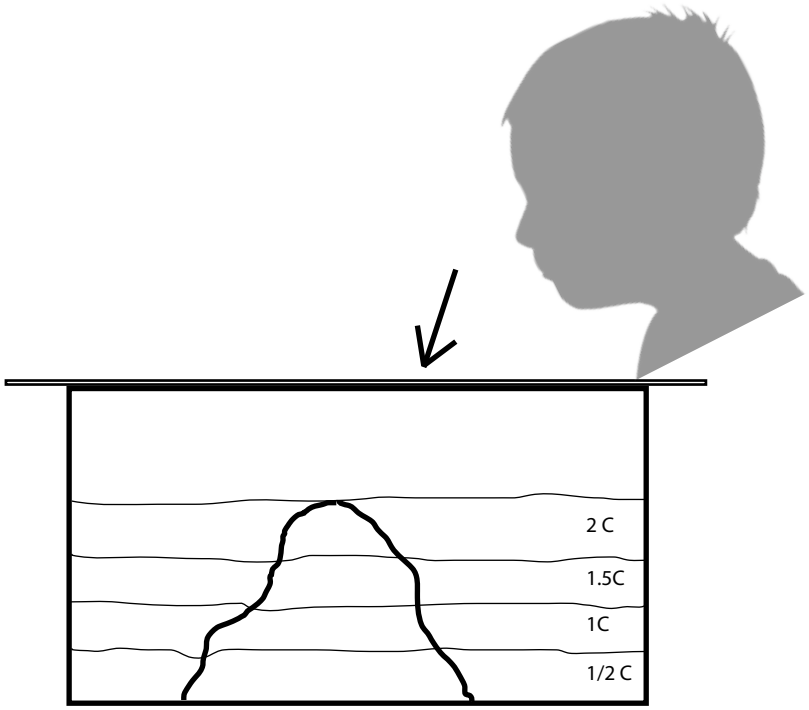
1. Using the modeling dough or clay provided, design a landform. Check your landform design with your instructor.

2. Place the landform inside the plastic container. Using a measuring cup, add 1/2 cup of water to the basin.

3. Place a transparency sheet on top of the container.

4. Looking down on the basin, use an overhead pen and trace around where the water meets the landform. This will represent an isoline or contour, a line showing equal elevation.

5. Add another 1/2 cup of water to the system. Repeat the drawing process. Continue to to repeat this step until the water covers the landform or the container gets filled.

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### VOCABULARY

**Contour interval**

**Contour line**

**Contour map**

**Elevation**

**Isoline**

**Relief**

**Scale**

**Topographic map**

**United States Geological Survey**

### Inside This Packet



### MATERIALS NEEDED

Clay or modeling dough

Measuring cup

Pitcher

Plastic shoe box container

Plastic transparency sheet

Overhead projection pen

Water

### Students should be able to:

Design a landform

Make a topographic map of the landform

Understand the basic concepts of reading a topographic map

# Topographic Maps Worksheet

Name: _____ Date: _____

## Follow Up Questions

Compare your map to the landform and think about the following:

1. Where is the steepest section of land? How does this relate to the contour lines?

2. Where is the most gradual change in the landform? How does this relate to the isolines?

3. What other features do you notice on the landform and how does this relate to the contour map?

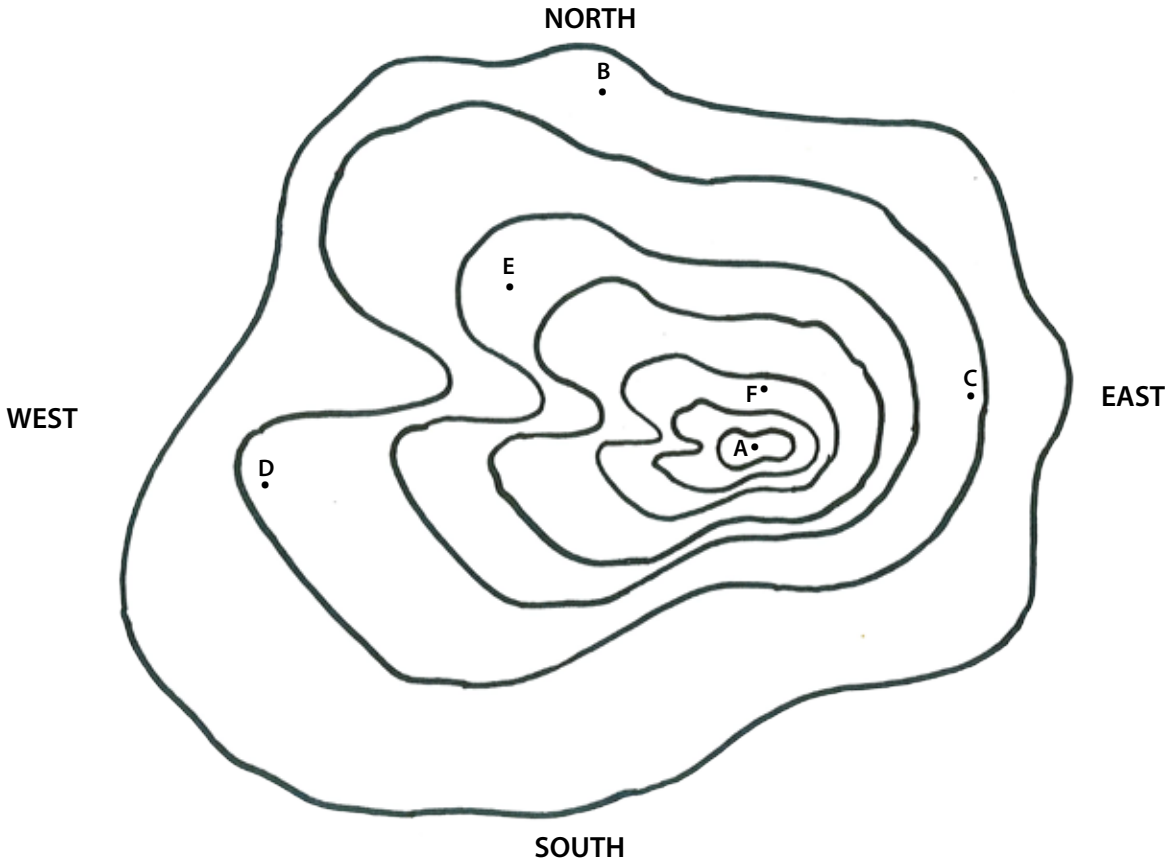
4. How does slope compare to the steepness of the landform? What is slope?

5. Why do you think we use contour maps? What type of information does a contour map provide for us?

6. Do the isolines or contour lines ever touch or cross? Why?

# Topographic Maps Worksheet

Use the topographic map to answer questions 7 - 10.




7. If the first layer of your model is sea level, what elevation is each of the following points? (Contour Interval = 10 ft.)

**A** _____ **B** _____ **C** _____ **D** _____ **E** _____ **F** _____

8. Which is the steepest slope on the hill? (north, south, east, west?) How do you know?

_____

_____

_____

_____

_____

9. What is the difference in elevation between the second and fourth layers of the map?

_____

_____

_____

_____

_____

10. If you were to build a house on this hill, where is the flattest part of the landform? Draw a house in this area on the topographic map.

_____

_____

# Isotherm Maps Worksheet

## Making an Isotherm Map

You have now spent some time mapping isotherms in your classroom. Use the knowledge you learned to answer the following questions.

1. Using the map of the classroom isotherms, explain any interesting patterns.
   (Note: heat sources, sinks, doors, windows, etc)

2. What is the interval of the map?

3. Why don't isotherms cross or touch?

4. What changes as the height of the classroom isotherm map changes?

5. Other interesting observations:

# Drawing Isotherms : Sample #1
## with temperatures only
## °C

Door

Windows

| | | | | |
|---|---|---|---|---|
| 20° | 21.5° | 21° | 20.5° | 19.5° |
| 21° | 22° | 22° | 21.5° | 21° |
| 22° | 22.5° | 23° | 23° | 22° |

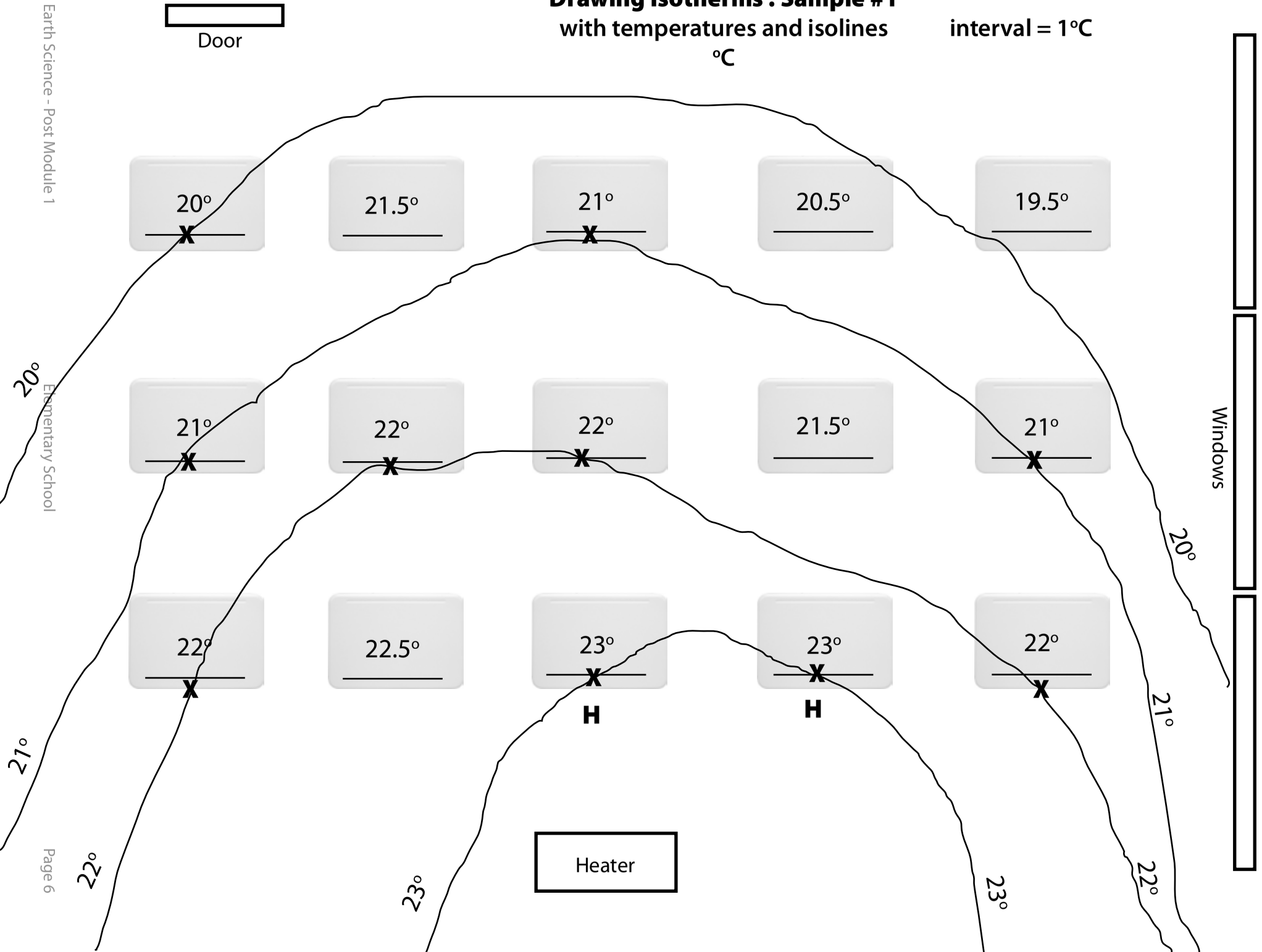
Heater

# Drawing Isotherms : Sample #1

with temperatures and isolines

°C

interval = 1°C



# Information for the Teacher

## Modeling Dough Recipe

**Ingredients:**

1 cup flour
1/2 cup salt
1 cup water
2 tablespoons oil
2 tablespoons cream of tartar

Mix flour, cream of tartar, salt and oil, then slowly add water. Cook over medium heat, stirring until the dough stiffens. Turn out onto wax paper and let cool. Knead the modeling dough with your hands until proper consistency. Use as is, or divide into balls and add a few drops of food coloring.

*Note: Plasticine does work best. If using the modeling dough, allow it to dry completely before using.*

## Extension idea 1: Climate Change

Fill up a clear cup with water and add an ice cube. Now fill the cup of water up as much as possible without overflowing the cup. What will happen to the water level as the ice cube melts? Write down your prediction. Watch and see what happens. Describe what happens. What happened to other students examples?

## Extension idea 2: Climate Change

Use one of the landforms that might represent the Liberty Island in New York Harbor, where the Statue of Liberty is located. Create a small model of the Statue of Liberty and place this on the landform. Fill up an ice cube tray with snow and place the snow on the highland area to melt. Notice what happens on the coastline with the snow melting. Start again and fill up the ice cube tray with water, add the water to the system and decide what will happen with the water level. Make predictions about the water level before testing the model.

## Helpful Websites

Take a look at real life data presented by NASA/Goddard including temperature change over cycles of seasons and time. The site also includes other informational science data and photos of Earth.
**http://earthobservatory.nasa.gov/**

Easy to follow instructions for creating a contour map.
**http://www.education.com/science-fair/article/create-a-contour-map/http://www.nycswcd.net/files/Topo%20Maps.pdf**

Instructions for building a topographic model.
**http://www.ucmp.berkeley.edu/fosrec/Metzger1.html**

Explore the highest elevation point in each of the 50 states using maps or by satellite images. Just click on a point and use the zoom and pan tools in the upper left corner of the map window. Switch between maps and satellite images using the buttons in the upper right. The map above shows the highest mountain or highest elevation point for each of the 50 states.
**http://geology.com/state-high-points.shtml**

# Information for the Teacher

## Isotherm Map Directions

Hand out the sample fictitious classroom map with data. Ask the students to draw Isotherms using the data with an interval of 1 degree Celsius. Remind them that isotherms should never touch or cross, they represent a line of a constant temperature. To check their work they should find higher values on one side of their lines and lower values on the other side of the line. Discuss the students findings and show them the actual isotherm map. Answer any questions the students may have and proceed to the next activity.

1. Develop a map of the room with doors, windows, where the desk or tables are located and other details.

2. Divide the classroom into 15 evenly spaced zones. Divide the class into teams of two.

3. Place thermometers at the 15 locations on the floor.

4. Wait 5 minutes and then record the temperatures at the 15 locations. Place the data accurately on the classroom floor map.

5. Raise the thermometers to the desk level height. Label another classroom map, " desk top level". Let the thermometers sit for 2 minutes. Record the temperatures at this level and transfer to the classroom map.

6. Place the thermometer on a meter stick and raise them into the air for about 2 minutes. Quickly read the thermometers temperature and record the results. Place the data on a new classroom map and label this map ceiling area.

7. Make copies of the three maps for each team. Complete one map together using the following directions.

8. Find the low point and the high temperature reading. Label the L for low and the high temperature H.

9. Subtract the value of the low from the high reading to determine an easy interval.

10. Work from the low temperature reading to the high temperature reading. Choose the most even lowest value possible and begin drawing an isotherm so that any exact temperatures will be on the line. Lower temperature values will be outside of the line and higher values will be inside the line. The isotherm will curve but not have sharp points. (If this step seems confusing try the sample data sheet #1 first and check your responses).

## New York State Standards

Communicating, comparing and contrasting, creating models, gathering and organizing data, generalizing, identifying variables, inferring, interpreting data, manipulating materials, observing, predicting

**Standard 1:** Mathematic Analysis: Key Idea 1: M1.1, m1.1c
Key Idea 2; m2.1, m2.1a, m2.1b
Key Idea 3: M3.1a

**Standard 1:** Scientific Inquiry: Key Idea 1: s1.1, s1.3
Key Idea 2: s2.1, s2.1a, s2.3
Key idea 3: s3.1, s3.2

**Standard 4:** The Physical Setting: Key Idea 3: 3.1c, 3.1d, 3.1e, 3.1f, 3.1g, 3.2a, 3.2b

**Standard 6:** Key Idea 2
Key idea 5

**Standard 7:** Connections: Key Idea 1

**General Skills:** i, ii, iii, iv, vi, viii, xii, xiii, xiv, xv, xvi, xvii, xix, xxi