

Lesson 4—How to Read a Topographic Map

Key teaching points

A **topographic map** is a representation of a three-dimensional surface on a flat piece of paper. The digital elevation model on the poster is helpful in understanding **topographic maps**.

Contour lines, sometimes called "level lines," join points of equal elevation. The closer together the contour lines appear on a **topographic map**, the steeper the slope (assuming constant contour intervals).

Topographic maps have a variety of uses, from planning the best route for a hike to determining a location for a school or an airport.

How this lesson relates to the geographic themes

Location and place—Using a topographic map can give students a clear understanding of the physical and manmade characteristics of a location. The topographic map allows for a clear understanding of such physical features as mountains and canyons.

Relationships within places—Using the topographic map, students can see why some things are where they are. They can see how people have adapted to the physical characteristics of a particular location.

Movement—Students can begin to understand how the topography of a location influences the transportation and communication within that area and with the rest of the world.

Materials you need for this lesson

A copy of Activity Sheet #4 for each student.

Suggestions for teaching this lesson (3, 35-minute sessions)

On the poster is a **topographic map** of Salt Lake City. This lesson will help students learn how to read that map.

Learning to use a **topographic map** is a difficult skill, because it requires students to visualize a three-dimensional surface from a flat piece of paper. Students need both practice and imagination to learn to visualize hills and valleys from the contour lines on a **topographic map**.

A digital terrain model of Salt Lake City is shown on the poster. This three-dimensional drawing, created from computerized data, is a helpful transition step for students as they learn to visualize the shape of the land from contour lines.

1. *Discuss the word "topographic."* Remind students that there are many different types of maps. Tell them that they are going to learn about a specific type of map—the **topographic map**. Begin the lesson by introducing students to the word "topographic." Write the word on the board. Tell students the word is derived from two Greek words—"topo," meaning "place," and "graphos," meaning "drawn or written." Ask students if they can use that information to figure out what "topographic" might mean. Then ask a student to look up the word in the dictionary to see whether the guess was correct.

2. *Hand out Activity Sheet #4.* The top illustration introduces students to contour lines. Point out that a contour line joins points of equal elevation. Think of it as an imaginary line on the ground that takes any path necessary to maintain constant elevation.

First, have the students look at the side view of the hills. (Bottom of the illustration)

Ask students to answer these questions and fill in their answers on Activity Sheet #4:

Which is higher, hill A or hill B?
(Answer: hill B)

Which is steeper, hill A or hill B?
(Answer: hill B)

3. Compare a **topographic map** to a picture of the same place. Now have the students look at the **topographic map** of the same two hills. Say, "The lines you see on this map are called contour lines. Can you see why they are sometimes called 'level lines'?" Ask the students to trace with their fingers around the 40-foot contour line on the map. Then ask them to look at the picture of the hill and draw their fingers around the 40-foot contour line.

Then ask the students to draw their fingers along the 20-foot contour line on the topographic map. Then draw their fingers along the 20-foot line on the picture of the hill. This exercise will help those students who are kinesthetic learners.

Ask students to answer this question and fill in the answer on Activity Sheet #4:

- How many feet of elevation are there between contour lines?
(Answer: 10 feet)

Show the students that some contour lines are thicker than others. These "index contours" include labels to make it easier to read elevations from the maps.

Ask students to answer these questions and fill in the answers on Activity Sheet #4:

- How high is hill A?
(Answer: about 42 feet)
Hill B?
(Answer: about 54 feet)

- Are the contour lines closer together on hill A or hill B?
(Answer: hill B)

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Help students understand that the closer the lines, the steeper the slope. Have students point out other places on the map that have a very steep slope.

4. Introduce students to other information shown on a **topographic map**. Now have the students look at the picture on page 2 of the activity sheet.

Have students identify and circle these features on the illustration 2 of Activity Sheet #4:

- A church
- A bridge over the river
- An oceanside cliff
- A stream that flows into the main river
- A hill that rises steeply on one side and more smoothly on the other.

Have students identify and circle the same features on illustration 3 of Activity Sheet #4.

- Draw the map symbol for a church.



- Draw the map symbol for a bridge.



- Put an X on the oceanside cliff.
- What is the elevation of the contour line at the top of the cliff?
(Answer: 100 feet)

- Locate a stream that flows into the main river. Draw a pencil line down that stream. Put an X where the stream joins the main river. On a real **topographic map**, streams are shown in blue and contour lines are shown in brown.

5. Discuss how **topographic maps** are used. Maps are developed for special purposes. **Topographic maps** are used in a variety of ways.

How might you use a topographic map if you were selecting:

- A route for a hike.
(Choose route that's not too steep. When planning a long hike, you may want to see whether water is available or whether it should be carried in. Woods tint may indicate whether the route is shaded.)
- The best location for an airport.
(Make sure airplanes have plenty of room to take off and land before the ground rises. Do not let students suggest building in a swamp, in the woods, or in a built-up area.)

- A route for a new road.
(Find a shallow grade rather than a steep one. Do not allow them to cross too many rivers because bridges are expensive.)

6 .Working with the **topographic map** in the map packet. Now that your students have a basic understanding of how **topographic maps** work, here are some questions to ask them about the **topographic map** in their map packet:

- What is the approximate elevation of the State capitol?
(Answer: 4,500 feet)

Would you be walking uphill or downhill to go from the State capitol to Pioneer Park?
(Answer: downhill)

- Suppose you lived by Fremont School. Find at least three ways you could get from your house to the State capitol. List things you would see along the way.

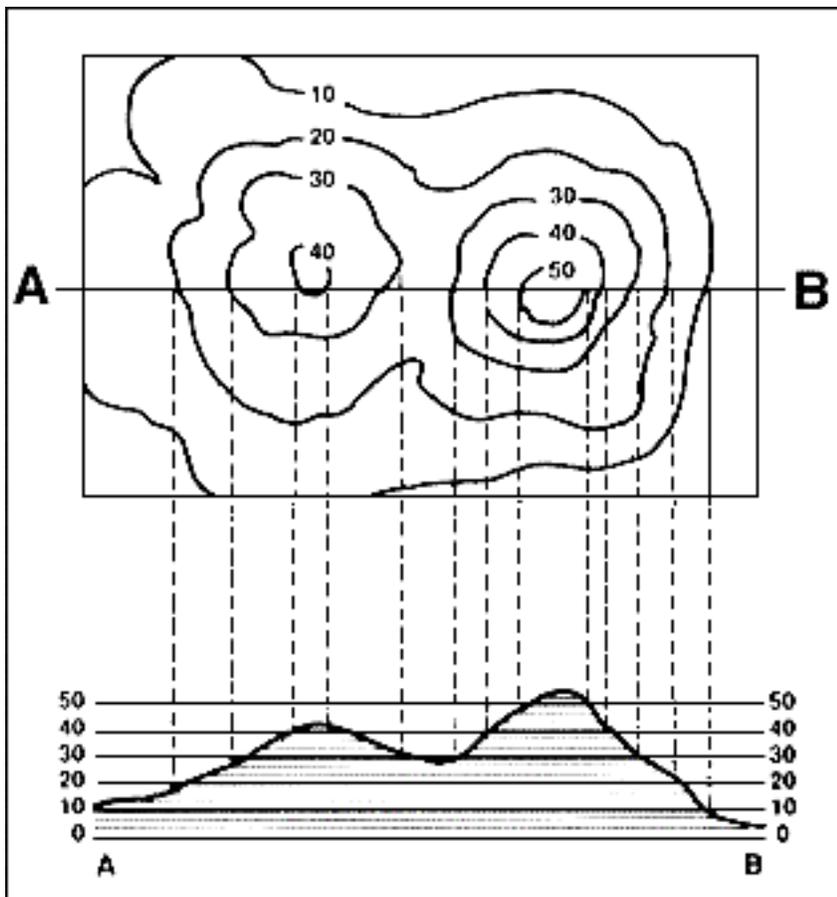
Additional activities for follow-up

The **topographic map** shows that Salt Lake City has a Pony Express Monument near the State capitol. Have your students learn more about the Pony Express and why this monument is located in Salt Lake City.

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Activity Sheet #4—How to Read a Topographic Map

One special kind of map is called a **topographic map**. It has contour lines to show the shape and elevation of the land. They are sometimes called "level lines" because they show points that are at the same level. Here's how contour lines work:



The top of this drawing is a contour map showing the hills that are illustrated at the bottom.

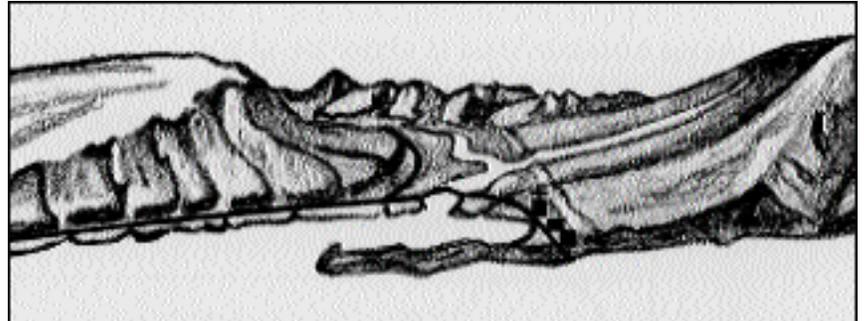
On this map, the vertical distance between each contour line is 10 feet.

1. Which is higher, hill A or hill B? _____
2. Which is steeper, hill A or hill B? _____
3. How many feet of elevation are there between contour lines? _____
4. How high is hill A? _____ Hill B? _____
5. Are the contour lines closer together on hill A or hill B? _____

Activity Sheet #4, page 2

Look at this picture. It shows a river valley and several nearby hills. On the illustration, locate the following things:

- A church
- A bridge over the river
- An oceanside cliff
- A stream that flows into the main river
- A hill that rises steeply on one side and more smoothly on the other.



Here is a **topographic map** of the same place. Find the items you located on the illustration on the topographic map.

Circle the symbol for a church.

Draw a church symbol here.

Put a square around the map symbol for a bridge.

Draw a bridge symbol here.

Put an X on the oceanside cliff.

What is the elevation of the contour line at the top of that cliff? _____

Locate a stream that flows into the main river. Draw a pencil line down that stream. Put an X where the stream joins the main river. On a real **topographic map**, streams are shown in blue and contour lines are shown in brown.



Activity Sheet #4, page 3

Find the hill that rises steeply on one side and more smoothly on the other. On the **topographic map**, draw a path up the gentler slope of the hill to the highest point. (Hint: remember that when contour lines are close together, the ground is very steep.) Draw a path showing a very steep way up the hill.

Tell how you might use a **topographic map** if you were selecting:

1. A route for a hike. _____
2. The best location for an airport. _____
3. A route for a new road. _____

Use the **topographic map** in your map packet to answer these questions:

What is the approximate elevation of the State Capitol? _____

Would you be walking uphill or downhill to go from the State capitol to Pioneer Park? _____

Suppose you lived by Fremont School. Find at least three ways you could get from your house to the State capitol. _____

List things you would see along the way. _____

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