Sunshine State Standards
SC.D.2.3.2: The student knows the positive and negative consequences of human action on the Earth's systems.

BEFORE, you learned
• Different maps provide information about natural and human-made features
• Latitude and longitude are used to find places on Earth
• All flat maps distort Earth's surface

NOW, you will learn
• How contour lines show elevation, slope, and relief
• What rules contour lines follow
• What common symbols are used on topographic maps

KEY CONCEPT
Topographic maps show the shape of the land.

FCAT VOCABULARY
Add a word triangle for topography to your notebook.

VOCABULARY
contour line p. 213
elevation p. 213
slope p. 213
relief p. 213
contour interval p. 214

EXPLORE Topographic Maps
How can you map your knuckles?

PROCEDURE
1. Hold your fist closed, knuckles up, as shown in the photo.
2. Draw circles around the first knuckle. Make sure the circles are the same distance from each other.
3. Flatten out your hand. Observe what happens. Write down your observations.

WHAT DO YOU THINK?
• How does the height of your knuckles change when you clench your fist, then flatten out your hand?
• What do you think the circles represent?

MATERIAL
washable colored pen

Topographic maps use contour lines to show features.

Imagine you are on vacation with your family in a national park. You have a simple trail map that shows you where to hike. But the map does not tell you anything about what the land looks like. Will you have to cross any rivers or valleys? How far uphill or downhill will you have to hike?

To answer these questions, you need to know something about the topography of the area. Topography is the shape, or features, of the land. These features can be natural—such as mountains, plateaus, and plains—or human-made—such as dams and roads. To show the topography of an area, mapmakers draw a topographic map.
A topographic map is a flat map that uses lines to show Earth’s surface features. Distance and elevation can be given in feet or meters. Take a look at the topographic map of Mount Hood on this page. The wiggly lines on the map are called **contour lines**, and they show an area’s elevation, slope, and relief.

1. The **elevation** of a place is how high above sea level it is. An area can range from a few meters to several thousand meters above sea level. The numbers on the contour lines show the elevations of different points in the Mount Hood area.

2. The **slope** of a landform or area is how steep it is. The more gradual the slope, the farther apart the contour lines on the map. The steeper the slope, the closer together the contour lines.

3. The **relief** of an area is the difference between its high and low points. For example, subtracting the lowest elevation on the map from the highest gives you a measure of the area’s relief.

**CHECK YOUR READING**

What is the difference between elevation and slope?

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**Mount Hood Topographic Map**

**A topographic map shows the land as if you were above the land looking down on it.**

1. Contour lines show the mountain’s peak as seen from above. The **elevation** here is given in meters.

2. Contour lines close together show a steep **slope**. Lines farther apart show a more gentle slope.

3. The different elevations on a map indicate an area’s **relief**.

**READING VISUALS**

What is the elevation of the top of Mount Hood?
Contour lines follow certain rules.

Contour lines on topographic maps can help you visualize landforms. Think of the following statements as rules for reading such maps:

- **Lines never cross.** Contour lines never cross, because each line represents an exact elevation.

- **Circles show highest and lowest points.** Contour lines form closed circles around mountaintops, hilltops, and the centers of depressions, which are sunken areas in the ground. Sometimes, the elevation of a mountain or hill is written in meters or feet in the middle of the circle.

- **Contour interval is always the same on a map.** The contour interval is the difference in elevation from one contour line to the next. For example, the contour interval on the map below is 10 feet. This means that the change in elevation between contour lines is always 10 feet. The contour interval can differ from map to map, but it is always the same on a particular map.

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**Ely, Minnesota, Topographic Map**

These index contour lines mark an elevation of 1400 feet. Notice that index lines are darker than the other contour lines.

The contour interval on this map is 10 feet.

Closed circles indicate the tops of land features. One circle includes the elevation (1427 feet).

Study the hill with the number 29 on it. Use the contour interval and index contour lines to calculate the highest point of this hill.
• **Index contour lines mark elevations.** The darker contour lines on a map are called index contour lines. Numbers that indicate elevations are often written on these lines. To calculate higher or lower elevations, simply count the number of lines above or below an index line. Then multiply that number by the contour interval. For instance, on the Ely map, one index line marks 1400 feet. To find the elevation of a point three lines up from this index line, you would multiply 10 feet (the contour interval) by 3. Add the result, 30, to 1400. The point’s elevation is 1430 feet.

**CHECK YOUR READING** What information do index contour lines provide?

Besides contour lines, topographic maps also contain symbols for natural and human-made features. Below are some common map symbols that the United States Geological Survey (USGS) uses on its topographic maps.

<table>
<thead>
<tr>
<th>Topographic Map Symbols</th>
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<tbody>
<tr>
<td>🌊 Marsh or swamp</td>
</tr>
<tr>
<td>🌿 Vegetation</td>
</tr>
<tr>
<td>🏞️ Lake or pond</td>
</tr>
<tr>
<td>🚶‍♂️ Hiking trail</td>
</tr>
<tr>
<td>🏞️ Stream</td>
</tr>
<tr>
<td>🚪 Railroad tracks</td>
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</tbody>
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The USGS provides topographic maps for nearly every part of the United States. These maps cover urban, rural, and wilderness areas. Hikers and campers are not the only ones who use topographic maps. Engineers, archaeologists, forest rangers, biologists, and others rely on them as well.

### 6.3 Review

**KEY CONCEPTS**

1. How do contour lines show elevation, slope, and relief?
2. Why do contour lines never cross on a topographic map?
3. How would you show the top of a hill, an area of vegetation, or a hiking trail on a topographic map?

**CRITICAL THINKING**

4. **Apply** For an area with gently sloping hills and little relief, would you draw contour lines close together or far apart? Explain why.
5. **Compare and Contrast** How would a road map and a topographic map of the same area differ? What information would each provide?

**CHALLENGE**

6. **Synthesize** Work with a group to make a topographic map of the area around your school. First decide how big an area you will include. Then choose a contour interval, a map scale, and symbols for buildings, sports fields, and other features. Let other students test the map’s accuracy.