4 Topographic

Reading Preview

Key Concepts

- How do mapmakers represent elevation, relief, and slope?
- How do you read a topographic map?
- What are some uses of topographic maps?

Key Terms

- topographic map
- contour line
- contour interval
- index contour

Target Reading Skill

Using Prior Knowledge Before you read, write what you know about topographic maps in a graphic organizer like the one below. As you read, write what you learn.

What You Know
1. Some maps show where mountains and plains are. 2.

What You Learned
1. 2.

Lab zone Discover Activity

Can a Map Show Relief?

1. Carefully cut the corners off 8 pieces of cardboard so that they look rounded. Each piece should be at least 1 centimeter smaller than the one before.
2. Trim the long sides of the two largest pieces so that the long sides appear wavy. Don't cut more than 0.5 centimeter into the cardboard.
3. Trace the largest cardboard piece on a sheet of paper.
4. Trace the next largest piece inside the tracing of the first. Don't let any lines cross.
5. Trace the other cardboard pieces, from largest to smallest, one inside the other, on the same paper.
6. Stack the cardboard pieces beside the paper in the same order they were traced. Compare the stack of cardboard pieces with your drawing. How are they alike? How are they different?

Think It Over

Making Models If the cardboard pieces are a model of a landform, what do the lines on the paper represent?

An orienteering meet is not an ordinary race. Participan compete to see how quickly they can find a series of locatio called control points. The control points are scattered over large park or state forest. Orienteers choose a set number control points, and then visit the points in any order. In th sport, your ability to read a map and use a compass is oft more important than how fast you can run. In a major me there may be several hundred orienteers on dozens of teams.

At the start of an orienteering meet, yo would need to consult your map. But the ma used in orienteering are different from road ma or maps in an atlas—they're topographic maps.

FIGURE 14
Orienteering
Orienteering helps people develop the skill of using a map and compass.

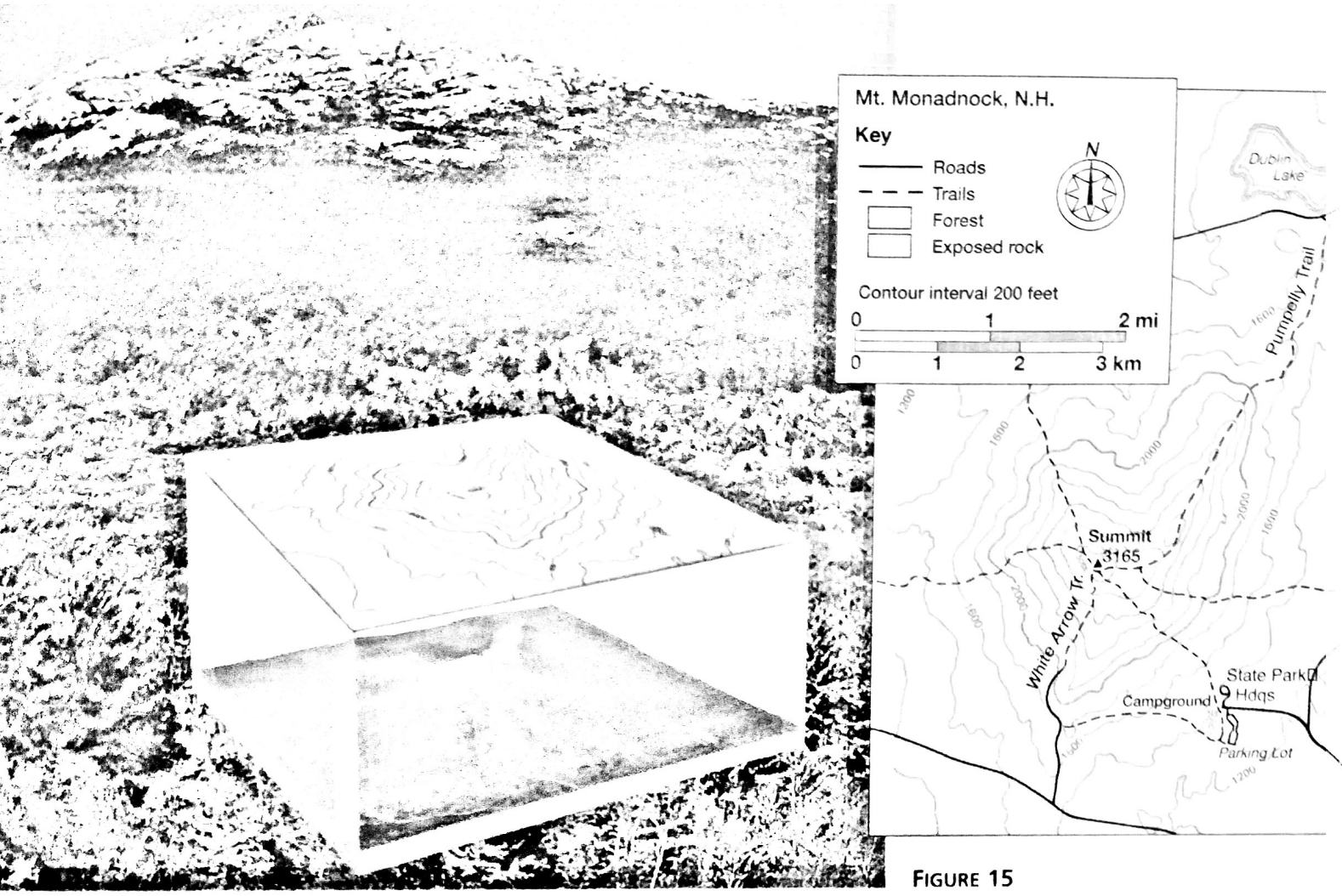

FIGURE 15
Contour Lines
The contour lines on a topographic map represent elevation and relief. **Comparing and Contrasting** *What information does the topographic map provide that the photograph does not?*

Mapping Earth's Topography

A **topographic map** (tahp uh GRAF ik) is a map showing the surface features of an area. Topographic maps use symbols to portray the land as if you were looking down on it from above. Topographic maps provide highly accurate information on the elevation, relief, and slope of the ground surface.

Mapmakers use contour lines to represent elevation, relief, and slope on topographic maps. On a topographic map, a **contour line** connects points of equal elevation. In the United States, most topographic maps give contour intervals in feet rather than meters.

The change in elevation from contour line to contour line is called the **contour interval.** The contour interval for a given map is always the same. For example, the map in Figure 15 has a contour interval of 200 feet. If you start at one contour line and count up 10 contour lines, you have reached an elevation 2,000 feet above where you started. Usually, every fifth contour line, known as an index contour, is darker and heavier than the others. **Index contours** are labeled with the elevation in round units, such as 1,600 or 2,000 feet above sea level.

Reading Checkpoint **What do all the points connected by a contour line have in common?**

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For: Topographic Map activity
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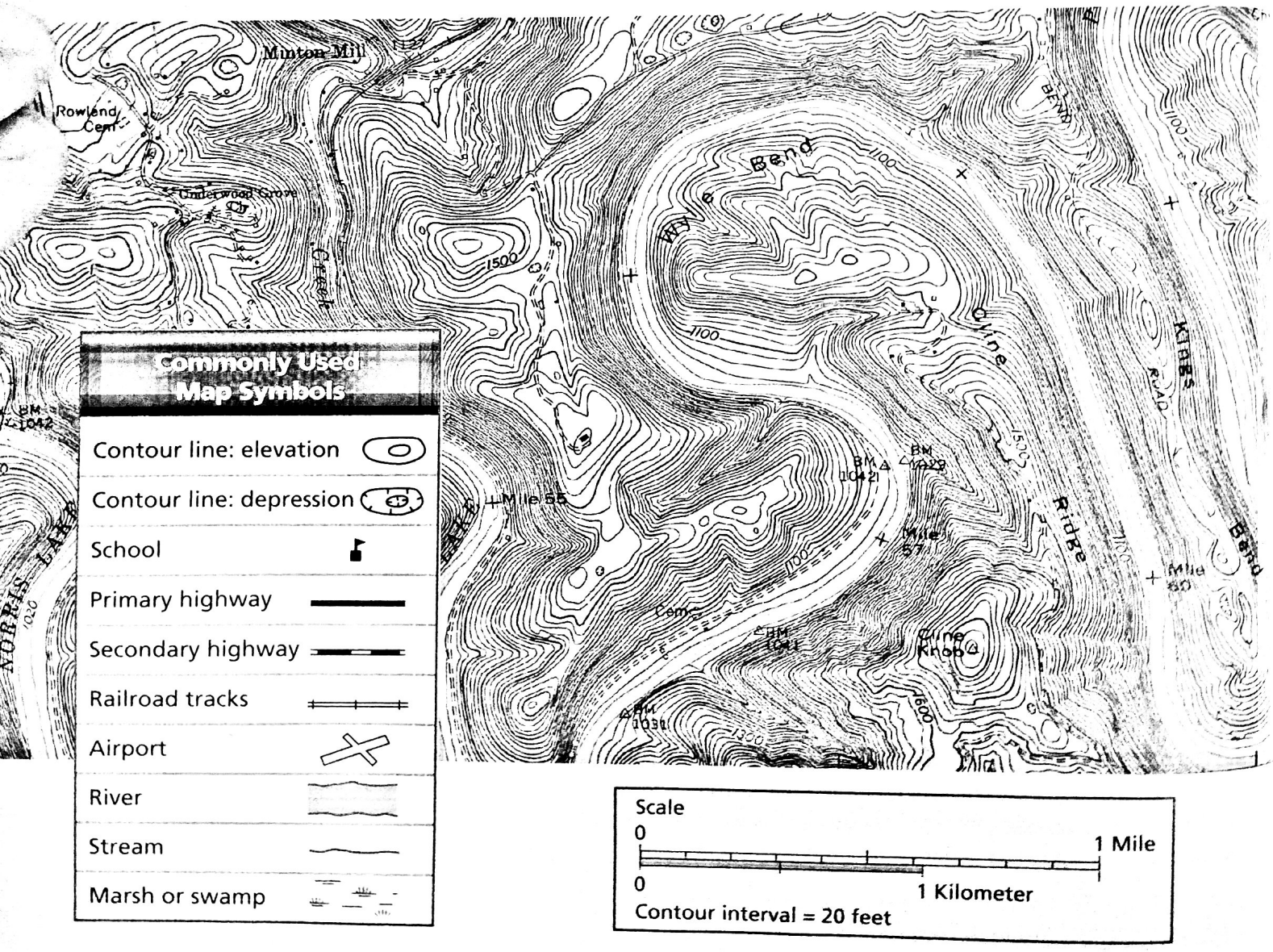
Web Code: cfp-2014

Reading a Topographic Map

Looking at a topographic map with many squiggly contour lines, you may feel as if you are gazing into a bowl of spaghetti. But with practice, you can learn to read a topographic map like the one in Figure 16. **To read a topographic map, you must familiarize yourself with the map's scale and symbols and interpret the map's contour lines.**

Scale Topographic maps are usually large-scale maps. Large-scale maps show a close-up view of part of Earth's surface. In the United States, many topographic maps are at a scale of 1 : 24,000, or 1 centimeter equals 0.24 kilometers. At this scale, a map can show the details of elevation and features such as rivers and coastlines. Large buildings, airports, and major highways appear as outlines at the correct scale. Symbols are used to show houses and other small features.

FIGURE 16
Topographic Map
The different types of symbols on topographic maps provide data on elevation, relief, slopes, and human-made features. This United States Geological Survey map shows part of Tennessee.

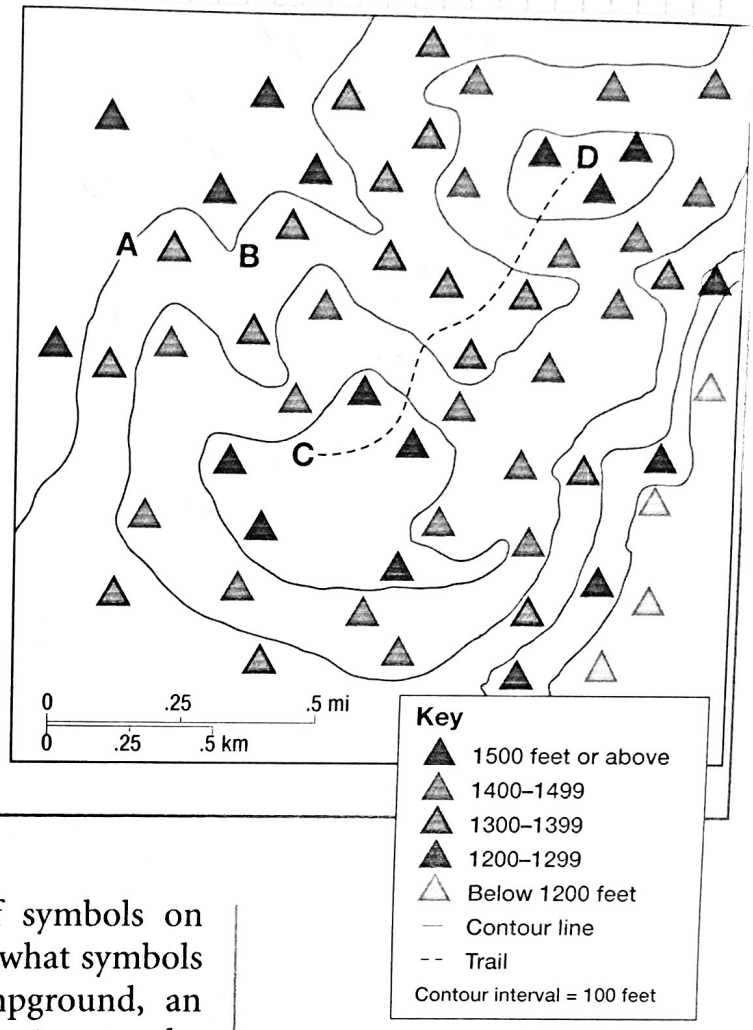


Math Analyzing Data

Mapping Elevation Data

The map shows the elevation data points on which the contour lines are based. Study the map and the map key, then answer the questions.

1. **Reading Maps** What is the contour interval on this map?
2. **Reading Maps** What color are the lowest points on the map? What range of elevations do these points represent?
3. **Reading Maps** What color are the highest points on the map?
4. **Applying Concepts** What is the elevation of the contour line labeled A?
5. **Inferring** Is the area between B and C a ridge or a valley? How can you tell?
6. **Interpreting Data** Describe how elevation changes along the trail from point D to point C.



Symbols Mapmakers use a great variety of symbols on topographic maps. If you were drawing a map, what symbols would you use to represent a forest, a campground, an orchard, a swamp, or a school? Look at Figure 16 to see the symbols that are often used for these and other features.

Interpreting Contour Lines To find the elevation of a feature, begin at the labeled index contour, which is a heavier line than regular contour lines. Then, count the number of contour lines up or down to the feature.

Reading contour lines is the first step toward "seeing" an area's topography. Look at the topographic map in Figure 16. The closely spaced contour lines indicate steep slopes. The widely spaced contour lines indicate gentle slopes or relatively flat areas. A contour line that forms a closed loop with no other contour lines inside it indicates a hilltop. A closed loop with dashes inside indicates a depression, or hollow in the ground.

The shape of contour lines also help to show ridges and valleys. V-shaped contour lines pointing downhill indicate a ridge line. V-shaped contour lines pointing uphill indicate a valley. A stream in the valley flows toward the open end of the V.

Reading Checkpoint How are hilltops and depressions represented using contour lines?

Lab zone Skills Activity

Interpreting Data

Study the topographic map in Figure 16. Where are the steepest slopes on the map found? How can you tell? What is the difference in elevation between the river and the top of Cline Knob?

FIGURE 17
Using Topographic Maps
Topographic maps provide the data necessary for the planning of highways, bridges, and other large construction projects.

Uses of Topographic Maps

Topographic maps have many uses in science and engineering, business, government, and everyday life. Suppose that you are an engineer planning a route for a highway over a mountain pass. Your design for the highway needs to solve several problems. To design a safe highway, you need a route that avoids the steepest slopes. To protect the area's water supply, the highway must stay a certain distance from rivers and lakes. You also want to find a route that avoids houses and other buildings. How would you solve these problems and find the best route for the highway? You would probably begin by studying topographic maps.

Businesses use topographic maps to help decide where to build new stores, housing, or factories. Local governments use them to decide where to build new schools and other public buildings. Topographic maps have recreational uses, too. If you were planning a bicycle trip, you could use a topographic map to see where your trip would be flat or hilly.

Reading Checkpoint How do businesses use topographic maps?

Section 4 Assessment

Target Reading Skill Using Prior Knowledge Review your graphic organizer and revise it based on what you just learned in the section.

Reviewing Key Concepts

1. a. **Defining** What is a topographic map?
   b. **Explaining** How do topographic maps represent elevation and relief?
   c. **Calculating** If the contour interval on a topographic map is 50 meters, how much difference in elevation do 12 contour lines represent?
2. a. **Reviewing** What do you need to know about a topographic map in order to read it?
   b. **Comparing and Contrasting** Compare the way steep slopes are represented on a topographic map with the way gentle slopes are represented.
   c. **Inferring** Reading a map, you see V-shaped contour lines that point uphill. What land feature would you find in this area?
3. a. **Listing** What are four main uses of topographic maps?
   b. **Problem Solving** Suppose that your community needs a large, flat site for a new athletic field. How could you use a topographic map of your area to identify possible sites?

Writing in Science

Giving Directions Write a descriptive paragraph of a simple route from one point on the map in Figure 16 to another point. Your paragraph should provide the starting point, but not the end point. Include details such as distance, compass direction, and topography along the route. Share your paragraph with classmates to see if they can follow your directions.