CHAPTER 1

GEOGRAPHY: FINDING OUR PLACE IN THE WORLD

The Lord by wisdom hath founded the earth; by understanding hath he established the heavens. (Prov. 3:19)

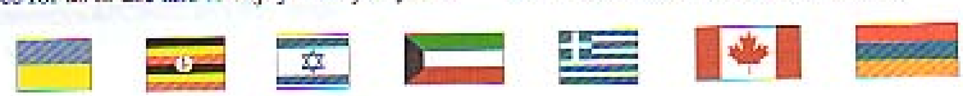
Bible verses such as the one above remind us that God created our world. Every mountain and valley is exactly where He wanted it to be. This planet did not "just happen." As we behold the earth's amazing design and provisions for life, our hearts should praise the Creator.

For thus saith the Lord that created the heavens; God himself that formed the earth and made it; he hath established it, he created it not in vain, he formed it to be inhabited: I am the Lord; and there is none else. (Isa. 45:18)

Isaiah tells us that God made the earth to be a home for man, and He supplied it with abundant resources for us to use and to enjoy. Every day man is learning more about the earth and its resources. Man uses this knowledge to help him provide for his physical needs and to build great civilizations. His challenge is to use the earth's resources in a way that honors the Creator.

WHAT IS GEOGRAPHY?

History and geography are both necessary to help us understand the world around us. Unlike history, which is the study of *time*, geography is the study of *place*. The basic tool of geography is a map, just as the basic tool of history is a time line. It is not enough, however, just to memorize a list of dates and places. Beyond the questions of when and where, we want to know how and why. Geography helps us to learn not only where places are but also how they differ and why.



SECTION REVIEW

1. What are the four types of distortion on flat maps?
2. Define an interrupted projection. Give two examples.
3. What is the main advantage of a Mercator projection?
4. Which projection does this textbook use for world maps? which projections for smaller-scale maps?

- What projection would you use to show the nation of Russia?

Map Relief

It was a simple plan. Attack the rebels from three directions and join at Albany, in the process cutting the colonies in half and crushing the rebellion. The plan seemed certain to succeed, at least while British general Gage sat in Boston, sipping his tea and looking at the map on the table. But the campaign soon ran into trouble. Gage had not known about the rough terrain in upper Maine. There British general Burgoyne's army became hopelessly entangled in the heavy forest. Continental troops, familiar with their own land, easily trapped him. In one day the redcoats lost an army, and the French had a reason to join the rebel cause. It was the turning point in the American War of Independence.

The Three-Dimensional Earth

Map projections show the general outlines of the earth. But these two-dimensional maps are not very helpful in describing surface features, such as mountains and valleys. Soldiers, road crews, and backpackers all need detailed information about the third dimension, *altitude*.

Any type of map that shows surface features is a physical map because it shows physical things. Physical maps that show specific changes in elevation are called relief maps. **Relief** refers to the height and depth of land features. Many relief maps include water features, such as rivers, and man-made features, such as dams.

How to Show the Third Dimension

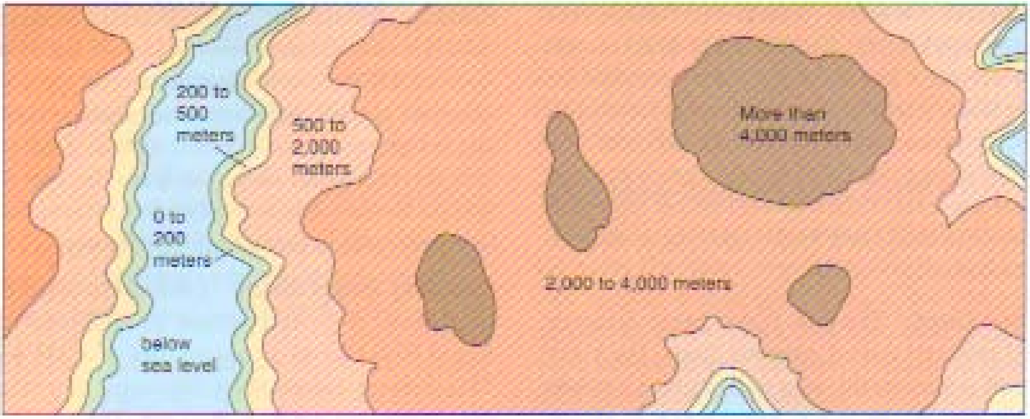
There are many ways for relief maps to show the third dimension of the earth's surface. Early maps included ink drawings of hills and mountains

Bench Marks

In describing elevation, a surveyor refers to distance above sea level. What does he do when he cannot see the sea? He relies on special monuments called "bench marks," which have been placed in key spots around the world giving the exact altitude of the location. If you have ever hiked to the peak of a mountain, you might have seen a bench mark. It looks like the head of a large nail.

So how did surveyors measure the original bench marks? Although the details are complex, the theory is simple. A surveyor stands in a place where he can see the ocean with a telescope (on his theodolite). By measuring angles, he can calculate the altitude of his position and nail a marker. Then he moves farther inland and views his first marker. On and on it goes. The surveyor carries an altimeter, too, to check his altitude. The *altimeter* measures air pressure, which becomes lower as you move up in elevation.

In the past, government surveyors hacked through dense woods to get a clear line of site. The work was difficult and time consuming. Now surveyors use satellites as reference points, making their work easier and more precise.



The relief map gives accurate information about all three dimensions. With it we can visualize the landforms and compare the elevations of those landforms. Relief maps also show us the general shapes, areas, distances, and directions of landforms.

SECTION REVIEW

1. What is the term for a map that shows the altitude of land features?
2. Explain the difference between a contour line and a contour interval.
3. What color shows land between 0 and 200 meters?

What color shows land below sea level? Why is this color never next to the sea?

Geographer's Corner

Reading a Topographic Map

Many people need more specific information about the topography of small areas. Among them are hikers, engineers, and land developers. Their solution is the topographic map. To someone who has never seen one before, it looks like a bunch of irregular lines with no apparent meaning. A trained map reader, however, can quickly visualize the entire terrain of a place. With a topographic map, a lost hiker can easily find his way again.

Unlike the colored relief maps in your textbook, topographic maps give all the contour lines at regular intervals. On the map on the next page, the contour interval is twenty feet, and the one-hundred-foot intervals are labeled. The direction of the slope is usually clear from the terrain around it. The land obviously slopes upward toward higher elevations. Where the lines are far apart, the slopes are gentle. But in areas where they are close together, the land rises steeply.

This is a portion of a United States Geological Survey (USGS) map of a part of northern Pennsylvania. The right side of the map lies along the seventy-seventh meridian. The left side lies near a longitude of 77°2′30″ W.

The map includes some standard symbols. Two exact altitude measurements are found at the bench marks (BM). Natural features, such as creeks and ponds, appear in blue. Green areas indicate woods. The map also shows highways, houses, and other buildings and marks a cemetery with a cross.

Ten-Millionth of the Distance to the Equator

During the Middle Ages a confusing system of measurements arose in Europe based on thumbs, elbows, feet, and other varying standards. After the rediscovery of Greek learning, French scientists wanted a better, more "rational" standard for describing the world around them. They decided to survey the entire meridian running from Dunkirk (the northernmost city on the coast of France) all the way to Barcelona (a southern city on the coast of Spain). Based on this survey they calculated the distance from the North Pole to the equator. One ten-millionth of this distance was called a *meter.*

France's proud accomplishment proved to be terribly inaccurate. (It was short by about two thousand meters, or 0.02 percent.) The definition of the meter was soon changed from its relationship to the earth to the length of the platinum bar that the Frenchmen had forged. Today's meter has an even more precise definition: the distance light travels in a vacuum in 1/299,792,458 of a second. Obviously, it no longer has any relationship to a measurement of the earth's surface.

well-designed grid enabled seafarers to plot their courses in a straight line. His system is still used today. The maps of this period were beautifully illustrated with sea creatures, ships, and other designs to fill in the large areas about which geographers had no information.

The Modern Age As European kings began to colonize and conquer the rest of the world, they demanded maps with more and more detail. European kingdoms, led by France, also commissioned extensive surveys of their own lands. These new maps included symbols for **topography** (detailed land features, including their heights) to help generals move their armies more quickly. When England became the world's leading sea power in the eighteenth century, it also became the world's leading mapmaker.

As modern nation-states began gathering more information about their climates, populations, and resources, they produced *thematic maps* to display their abstract findings. The United States was late in joining the map race. Since World War II, however, America has been producing hundreds of maps for its troops stationed around the world. The development of airplanes and satellites made it possible to create better, more detailed maps than ever before. The U.S. Geological Survey (USGS), founded in 1879, has created a wealth of detailed maps. Radar and infrared satellites have now mapped the ocean floors and the frigid poles.

Even though cartographers have produced very detailed and accurate maps of the earth, exploration continues. The jungles teem with millions of species that have never been cataloged. Millions, or even billions, of undiscovered animal communities dot the ocean floor. Despite many famous expeditions, many mountain peaks have never been climbed. Immense caves remain hidden, never trodden by human feet.

SECTION REVIEW

1. Define *geography.* What are its two main branches?
2. Who were the two greatest ancient geographers? What did they contribute to geography?
3. What contributions from the Age of Exploration are still used today?
4. What characteristics of modern maps distinguish them from maps of the ancient world and of the Age of Exploration?

Why has the United States become the leading mapmaker in the world?

THE GEOGRAPHIC GRID

A mistake would mean certain death. Navy vessels waited impatiently as the *Apollo 11* command module slammed into the upper atmosphere, moments before splashdown in the open sea. Were NASA's calculations correct?