

WHAT ARE LANDFORMS?

Think about the shape of the land where you live. Is it flat or rolling? Are there valleys or mountains? Often, we overlook the landforms that are around us. **Landforms** are the natural features that make up Earth's surface. Even if we don't notice them, they are important. They affect us whether we know it or not.

Sometimes disasters in the news remind us of how landforms affect people. Earthquakes are deadly events that are linked to landforms. An **earthquake** is the shaking of Earth's surface due to changes taking place beneath it. Earthquakes can trigger landslides, like the one shown in **Figure 1.1**, mudslides, and tsunamis.

landforms the natural features that make up Earth's surface

earthquake release of energy through Earth's crust due to changes taking place beneath it

FIGURE 1.1 A landslide caused by an earthquake

I wonder if landslides happen in some places more than others? ↓



LANDFORMS AND DAILY LIFE

In the past, especially, the landforms in a region affected people's way of life. They influenced the kind of food that was available and how people obtained it. Landforms affected how people travelled and the kinds of structures they built for shelter.

Today, landforms continue to affect the size and layout of our buildings and communities. The forces that created shields and mountains also helped to create the deposits of minerals that we now depend on, for example, gold, nickel, and iron ore. **Figure 1.2** shows the major landforms around the world. A **shield** is the flat, rocky base created when an ancient mountain region has been worn away. Mountains are areas of land that rise high above the surrounding land. Movements under Earth's surface create high, flat **plateaus**.

shield the base rock of an ancient mountain region that has been worn away, leaving a flat, rocky landform region

plateau a high, flat region that has been lifted up by movement of Earth's surface

plain a large, flat to gently rolling region

Plains are generally flat to gently rolling stretches of land. Valleys are depressions in the land created by running water, moving ice, or the movement of land. We use these fertile regions to grow food. We enjoy using the features of different landforms for recreational activities, such as skiing and camping.

The land supports us and provides the resources that we need. But the land is always changing. Most of the changes are taking place over millions of years and are too slow for people to notice in one lifetime. But sometimes the changes are sudden and severe. They may cause great damage or even loss of life.

Major Landform Regions around the World



FIGURE 1.2 This map shows the major landform regions in the world. Because valleys occur in all the other types of landforms, they are not shown separately on this map.



LANDFORM TYPES

The large landforms that make up most of Earth's surface are mountains (including fold and volcanic), plateaus, plains, shields, and valleys. Locate each of these examples of a landform region (**Figure 1.3**) on the map on page 19 (**Figure 1.2**). What patterns can you see? These patterns can give us clues about how landforms were created, how they are changing, and how they might affect humans.

What connection can I find between different landform types and their locations on Earth?

FIGURE 1.3 (A) plain, Australia; (B) volcanic mountain, Japan, Asia; (C) valley, Italy, Europe; (D) fold mountain, Nepal, Asia; (E) shield, Canada, North America; (F) plateau, United States, North America





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ELEVATION ON MAPS

Maps have only two dimensions: length and width. Map-makers use colours and contour lines to show the height of landforms. Contour lines are lines on a map used to join places of equal height above sea level, the average level of the ocean's surface. They show the difference between the highest and lowest areas.

USING CONTOUR LINES TO SHOW ELEVATION

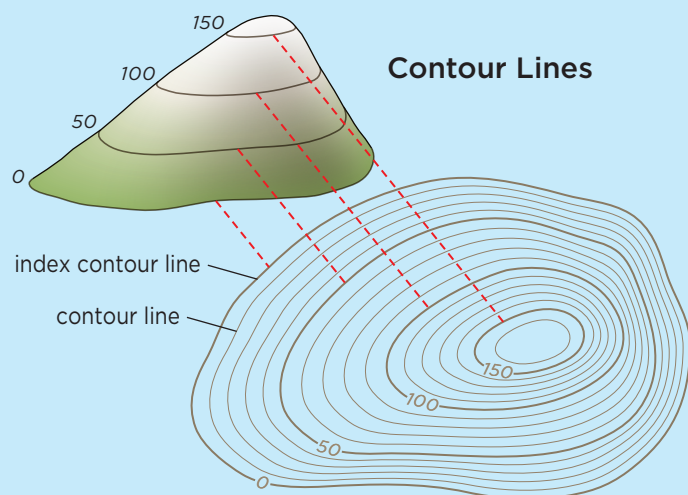
Elevation is the height of a location or object above sea level. Topographic maps use contour lines to show elevation (**Figure 1.4** and **Figure 1.5**). They show the surface features of an area in great detail. For example, these maps can show waterways, populated areas, and place names. Topographic maps use symbols and colours to represent characteristics of the area, such as roads and forests.

Any place along a contour line is at the elevation represented by that line. Any place not on the line is either higher or lower than that elevation. Index contour lines are contour lines with numbers that indicate the height above sea level. You can use them to figure out the elevation of the other contour lines.

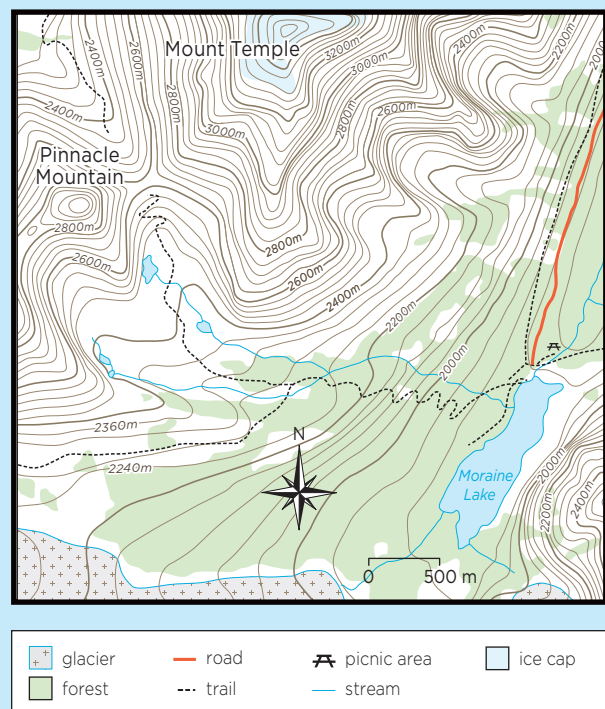
Map-makers decide on a contour interval for their maps and then draw lines at these intervals. A contour interval is the difference in elevation between two consecutive lines. For example, if the contour interval is 5 m, they draw a contour line at 5 m above sea level and at each increase or decrease of 5 m. On a contour map, lines close together show a steep slope while lines far apart indicate a gentle slope.

FIGURE 1.5 Topographic map representing an area near Lake Louise, Alberta

FIGURE 1.4 Contour map of a hill



Lake Louise, Alberta



USING COLOURS TO SHOW ELEVATION

Some maps use colour to show elevation (**Figure 1.6**). Different colours show different categories of height, such as 0 to 100 m, 100 to 200 m, and so on. Often, dark green shows the lowest land elevations, and light green or brown shows the higher elevations.

Colours on maps mean different things depending on the kind of map. For example, look at **Figure 3.23** in Chapter 3. It is a map that shows the change in the size of a forest over time. The forests are shown in two different colours of green. However, the green colour on an elevation map only shows a level of elevation. It does not describe the type of vegetation. For example, on some elevation maps much of the Sahara Desert is shown in green. This is because the land is at low elevations, not because the area is fertile.

Elevation Map of Thailand

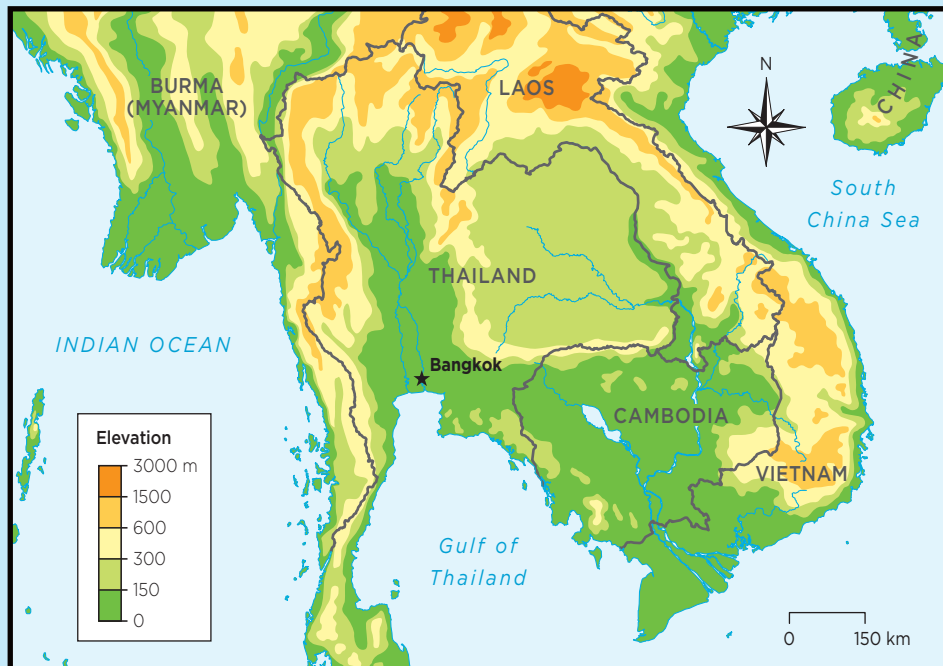


FIGURE 1.6 This map of Thailand uses colour to show elevation.

HOW TO READ ELEVATION ON A MAP

Look at the topographic map in **Figure 1.5**. What is the contour interval for this map? Why are some contour lines on the map thicker than others?

STEP 1

STEP 2

Are the slopes of the land steep or gentle? Do they change? How can you tell? Describe the shape.

What other symbols can you see on the map? What are some human activities in this area?

STEP 3

STEP 4

Suppose you were standing on the shore of Moraine Lake talking to a friend on your cellphone. Describe the scenery all around you to your friend.

volcano an opening in Earth's crust from which molten rock or magma escapes to reach the surface

magma extremely hot fluid or semi-fluid material under Earth's crust

lava molten rock flowing from a volcano

FIGURE 1.7 A fold mountain

I wonder why these mountains look the way they do?

MOUNTAINS

There are mountains on every continent on Earth. There are several types of mountains, (you can see examples of volcanic and fold mountains in **Figure 1.3B** and **Figure 1.3D**) but they are all formed by huge movements in Earth's crust. The crust is the top layer of rock on the surface of Earth. Fold mountains are the most common type of mountain (**Figure 1.7**). They are created by powerful forces folding and buckling the rock layers of Earth's surface.

Volcanic mountains are created by volcanic eruptions. A **volcano** is a mountainous landform through which fluid and semi-fluid material from far beneath Earth's surface escapes. This material is called **magma**. When it reaches Earth's surface, it is called **lava**. Sometimes it piles up in layers. When it cools, it becomes a mountain. Sometimes, a mixture of rock and ash spews from the mouth of a volcano. If it builds up and hardens in the shape of a cone around the volcano's mouth, it creates a mountain.



SHIELDS

Shields are areas of very old rock that make up the continents. They were formed from ancient mountain regions that have been worn down over millions of years. Shields exist on every continent in the world.

The Canadian Shield (**Figure 1.3E**) is the largest landform in Canada. Sometimes the rock of shields is exposed. Sometimes it is covered by vegetation.

VALLEYS

A valley is an area of low land between areas of higher land. Valleys often have a river or stream flowing through them in the direction of the slope. They are created in several ways.

A V-shaped valley is created when rivers and streams run over the surface of the land and carry away materials. A U-shaped valley is created when ice moves over the rock or land and carries away materials. Sometimes forces within Earth move layers of rock, forming cracks. The land that falls between the cracks can become a rift valley.

PLAINS

There are plains on every continent. Plains are usually at low elevations. Some were formed at the bottom of what were once seas. As you can see by looking at **Figure 1.3A**, they are generally quite flat. However, plains can also have areas of gently rolling hills. Plains are well suited to agriculture and farming, such as the Interior Plains of Canada.

PLATEAUS

Plateaus are large areas of mainly flat land found at high elevations (**Figure 1.3F**). While both plains and plateaus are quite flat, plateaus occur at higher elevations than plains. Plateaus are found in mountainous regions, sometimes between two mountains. Plateaus are created by movements under Earth's surface that lift the land. Another name for plateaus is tablelands.

CHECK-IN

- SPATIAL SIGNIFICANCE** Sketch each of the five major landform types. Add labels to identify what you consider to be the characteristics of each landform type. Be prepared to defend your choices.
- PATTERNS AND TRENDS** Work with a partner. Review **Figure 1.2** on page 19. Discuss the patterns in the locations of each landform type. Also identify the reasons why it might be useful to know the patterns of landforms in the world.
- INTERRELATIONSHIPS** Think of the ways that the landforms near your home affect you and your activities in the community. Explain your ideas in a labelled diagram, a paragraph, podcast, or a photo essay.