

A special type of map is a **contour map**, designed to reveal the nature of local **topography** (the natural land surface). Contours are lines that are drawn to represent a consistent height above sea level. The spacing between the lines helps the map reader to determine the height of mountains and the depth of valleys, as well as the slopes that lead up to mountain peaks or down to the valleys. The farther apart the contour lines, the gentler the slope. Contour maps are useful for hikers as they make their way through rough terrain, and for engineers or developers as they determine the best place to construct buildings or homes.



Contour Map. The map above shows the topography of the Swamp Canyon Trail in Bryce Canyon National Park, Utah. (Reference: U.S. Government National Park Service)

SCALE

Scale is an important conceptual tool for geography. Generally, it has two meanings:

- **Size of the unit studied** – Geographers refer to phenomena as they exist on different levels from small to large. For example, they may refer to a problem, such as drought, on a **local scale**, **regional scale**, or **global scale**. If the drought is highly localized, with other areas around the place under study being drought-free, it is an entirely different problem from a drought that affects an entire region. A situation may begin as a local phenomenon, but become regional, or even global, as time goes by. For example, when Mount St. Helens in Washington state erupted in 1980, the immediate concern was for the area just around the mountain. However, as ash and rock continued to flow, a cloud of volcanic matter traveled first to the region, and eventually to other areas of the globe. Many scientists argue that volcanic eruptions should be studied on a global scale, because they often affect faraway places.
- **Map scale** – Scale also tells us the mathematical relationship between the size of an area on a map and its actual size on the surface of the earth. Scale is a feature of every map, so it is important for understanding what is shown on the map. A map may show a small area of the earth, such as one town or city, so that every feature – such as a street or a building – appears much larger than it would on a map of a larger area. A map

with a smaller scale shows a region or continent, and a map of the entire world is on a smaller scale still. The level of detail that a map shows depends on its scale. When it is important to know specifics, such as which way to turn on a small street, large-scale maps are best. If it is more important to show broad patterns or general relationships, small-scale maps are more helpful. Most maps include the scale in the legend, and it may be presented as a fraction (1/10,000), a ratio (1:10,000), or a graphic bar scale as pictured below.



With both definitions, scale implies the degree of generalization represented. Geographers may ask broad or narrow questions, and the maps they need depend on the questions they have. Scale affects our perceptions of accuracy and truth. For example, a map of the United States that shows population density by state will make the state appear to have an even population distribution within its borders. A map on a larger scale (for example, county by county) will reveal that some areas are more densely settled than others. Likewise, a map of the United States that shows the average income of people who live in each state will disguise the fact that people in some areas of a state are wealthier than others. A map that shows average income by zip code would illustrate the variations within the state. Even though we may separate scale into local, regional, and global levels, in reality the levels interact in a **local-global continuum**, in which phenomena at one level influence those at other levels.

TIME ZONES

Longitude plays an important role in calculating time. The earth is divided into 360 degrees of longitude (180° west of the **prime meridian**, and 180° east). The prime meridian is set by international agreement on a line of longitude that runs through Greenwich, England, and lines of longitude are spaced 15° apart in both directions (east and west) from it. A **time zone** is a region that has adopted the same standard time, usually referred to as the **local time**. Because the sun hits the earth at different times as it spins on its axis, time zones are meant to make time more uniform. Most adjacent time zones are exactly one hour apart, and by convention compute their local time as an offset from **Greenwich Mean Time**, or the standard time at the prime meridian. For example, 12 p.m. is midday everywhere, a time when the sun is high in the sky. Likewise 12 midnight is night everywhere, since the sun is shining on the other side of the earth. This uniformity can only be reached if time zones – and clocks – change as one travels on either side of the prime meridian.

Standard time zones are defined by geometrically subdividing the earth into 24 sections bordered by meridians each 15° of longitude apart. The local time in neighboring zones is then exactly one hour different. Time zones often stray from the meridians for practical purposes, such as following political borders so that people in the same country (or state) follow the same standard time. For example, the People's Republic of China has only one time zone, although the country's borders stretch east to west across many meridians. Many areas have also adopted **daylight savings time**, which pushes the clock forward one hour in the spring in order to allow people to enjoy more sunlight in the afternoon during the warm spring and summer months, especially for people after they get off work. The clock is then set back to the original standard time in the fall.

One consequence of the organization of the world into time zones is that somewhere on the globe the date has to change. This occurs at 180° longitude, also called the **International Date Line** that divides