

The 33rd Kerrisdale Group

Guide to Map & Compass - Part 1

Traveling anywhere in the wilderness means determining where you want to go. Maps and guidebooks are the fundamental tools both for trip planning and while you are out on the trail.

Maps & Map Reading

A map is a two-dimensional representation of the three-dimensional world you'll be hiking in. All maps will have some basic features in common and map reading is all about learning to understand their particular "language." You'll end up using a variety of maps to plan and run your trip but perhaps the most useful map is a topographic map. A topographic map uses markings such as contour lines to simulate the three-dimensional topography of the land on a two-dimensional map. In the U.S. these maps are usually U.S. Geological Survey (USGS) maps. Other maps that you'll find helpful are local trail maps which often have more accurate and up-to-date information on specific trails than USGS maps do. Here's a brief overview of the basic language of maps.

Latitude and Longitude:

Maps are drawn based on latitude and longitude lines. Latitude lines run east and west and measure the distance in degrees north or south from the equator (0° latitude). Longitude lines run north and south intersecting at the geographic poles. Longitude lines measure the distance in degrees east and west from the prime meridian that runs through Greenwich, England. The grid created by latitude and longitude lines allows us to calculate an exact point using these lines as X axis and Y axis coordinates.

Both latitude and longitude are measured in degrees (°).

1° = 60 minutes

1 minute = 60 seconds

Therefore:

7 ½ minutes = $\frac{1}{8}$ of 60 minutes = $\frac{1}{8}$ of a degree

15 minutes = $\frac{1}{4}$ of 60 minutes = $\frac{1}{4}$ of a degree

Scale:

All maps will list their scales in the margin or legend. A scale of 1:250,000 (be it inches, feet, or meters) means that 1 unit on the map is the equivalent of 250,000 units in the real world. So 1 inch measured on the map would be the equivalent of 250,000 inches in the real world. Most USGS maps are either 1:24,000, also known as 7 ½ minute maps, or 1:62,500,

known as 15 minute maps (the USGS is no longer issuing 15 minute maps although the maps will remain in print for some time).

Standard topographic maps are usually published in 7.5-minute quadrangles. The map location is given by the latitude and longitude of the southeast (lower right) corner of the quadrangle. The date of the map is shown in the column following the map name; a second date indicates the latest revision. Photo-revised maps have not been field checked.

Map Size	Scale	Covers	Map to Landscape	Metric
7 ½ minute	1:24,000	1/8 of a degree	1 inch = 2,000 feet (3/8 mile) 2.64 inches = 1 mile	(1 centimeter = 240 meters)
15 minute	1:62,500	1/4 of a degree	1 inch = ~1 mile	(1 centimeter = 625 meters)

Map Symbols and Colors:

1. USGS topographic maps use the following symbols and colors to designate different features (see Figure 6.2)
 - Black - man-made features such as roads, buildings, etc.
 - Blue - water, lakes, rivers, streams, etc.
 - Brown - contour lines (see page 00)
 - Green - areas with substantial vegetation (could be forest, scrub, etc.)
 - White - areas with little or no vegetation; white is also used to depict permanent snowfields and glaciers
 - Red - major highways; boundaries of public land areas
 - Purple - features added to the map since the original survey. These features are based on aerial photographs but have not been checked on land.



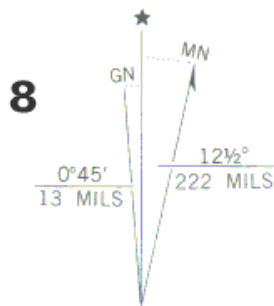
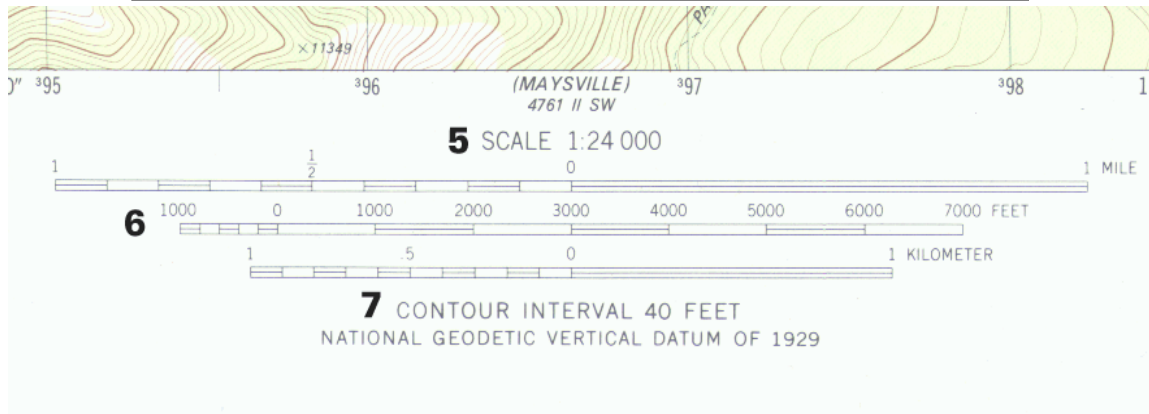
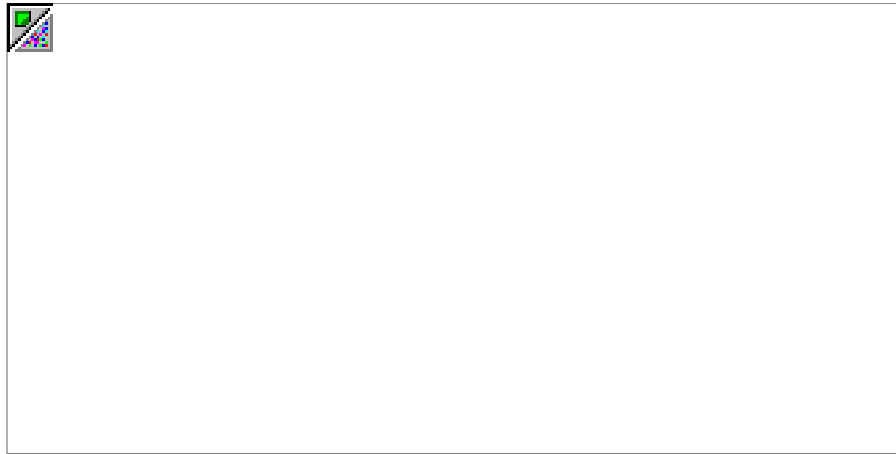


Map Legend

The map legend contains a number of important details. The figures below display a standard USGS map legend. In addition, a USGS map includes latitude and longitude as well as the names of the adjacent maps (depicted on the top, bottom, left side, right side and the four corners of the map). The major features on the map legend are show in Figure 6.3 and labeled below.

1. Map Name
2. Year of Production and Revision
3. General Location in State
4. Next Adjacent Quadrangle Map

5. Map Scale
6. Distance Scale
7. Contour Interval
8. Magnetic Declination
9. Latitude and Longitude



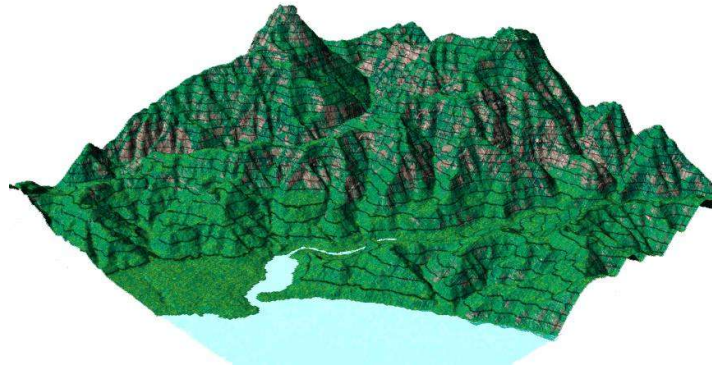
UTM GRID AND 1983 MAGNETIC NORTH
 DECLINATION AT CENTER OF SHEET

Contour Lines

Contour lines are a method of depicting the 3-dimensional character of the terrain on a 2-dimensional map. Just like isobars in the atmosphere depict lines of equal atmospheric pressure, contour lines drawn on the map represent equal points of height above sea level.

Look at the three-dimensional drawing of the mountain below. Imagine that it is an island at low tide. Draw a line all around the island at the low tide level. Three hours later, as the tide has risen, draw another line at the water level and again three hours later. You will have created three contour lines each with a different height above sea level. As you see in Figure 6.4, the three dimensional shape of the mountain is mapped by calculating lines of equal elevation all around the mountain, and then transferring these lines onto the map.

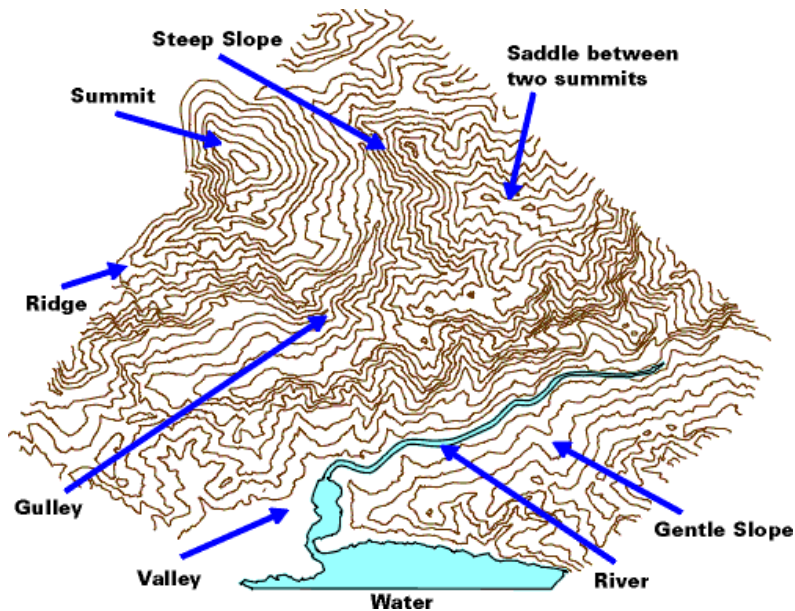
On multi-colored maps, contour lines are generally represented in brown. The map legend will indicate the contour interval—the distance in feet (meters, etc.) between each contour line. There will be heavier contour lines every 4th or 5th contour line that are labeled with the height above sea level. Figure 6.5 illustrates how a variety of surface features can be identified from contour lines.



3D View of Mountain showing how contours relate to height



Top View of Mountain showing contours



Drawn Contour Lines

- **Steep slopes** - contours are closely spaced
- **Gentle slopes** - contours are less closely spaced
- **Valleys** - contours form a V-shape pointing up the hill - these V's are always an indication of a drainage path which could also be a stream or river.
- **Ridges** - contours form a V-shape pointing down the hill
- **Summits** - contours forming circles
- **Depressions** - are indicated by circular contour with lines radiating to the center

Measuring Distances

There are a number of ways to measure distance accurately on a map. One is to use a piece of string or flexible wire to trace the intended route. After tracing out your route, pull the string straight and measure it against the scale line in the map legend. Another method is to use a compass (the mathematical kind) set to a narrow distance on the map scale like ½ mile and then "walk off" your route. It is a good idea to be conservative and add 5-10% of the total distance to take into account things like switchbacks that don't appear on the map. It's better to anticipate a longer route than a shorter one.