

An expanded tutorial on using map coordinates is available at www.MapTools.com

Additional map scales and other tools for measuring coordinates are available

Check with your local map store or visit www.MapTools.com

UTM Coordinates

The UTM coordinate system uses a square grid measured in meters or kilometers. On a 1:24,000 scale map the UTM grids on the map are 1 kilometer or 1000 meter squares. Other map scales may have different sized grids.

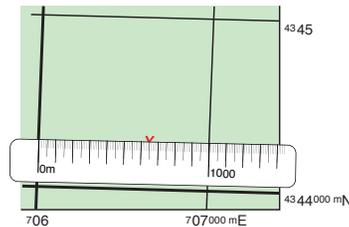
Some maps have grid lines on the map, others only have tic marks (usually light blue in color) along the edges and you will need to connect the tics to make the grid.

A UTM coordinate consists of two measurements. East-west position, the **eastings**, is given first followed by the north-south position, the **northing**. Easting values for the grids are shown across the top and bottom edges of the map. Eastings increase from west to east. Northing values for the grids are shown along the left and right edges. Northings increase from south to north.

Measuring UTM Coordinates

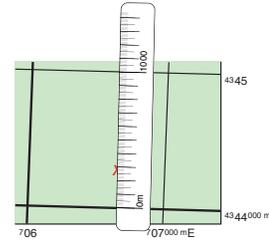
First get the easting to the nearest kilometer using the value printed on the map for the west edge of the grid. In our example the red X is located in the grid square with an easting of 706km E.

Use the ruler to measure the distance to the point from the west edge of the grid. In our example that is another 630 meters. Thus the easting is written either as 706.63km E or 706630m E.



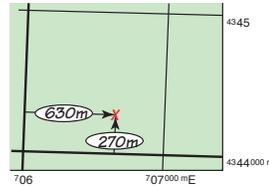
Get the northing for the grid square from the map, using the value for the south edge.

Measure the distance from the south edge of the grid to the point. In the example it's another 270 meters. Thus the northing is 4344.27km N or 4344270m N.



The complete UTM coordinates for the red X would be

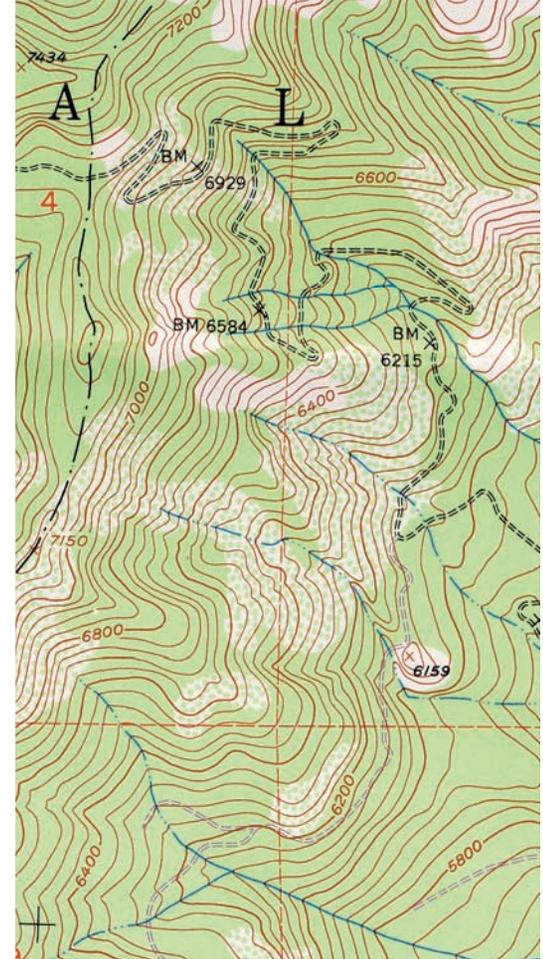
706.63km E 4344.27km N or
706630m E 4344270m N



Plotting UTM Coordinates

In our example your GPS would read
706630 E
4344270 N

Drop the right 3 digits on both the easting and the northing to get the coordinates for the 1km grid square. Locate the grid square on the map and use the ruler to measure the position within the grid square. On a 1:24,000 scale map it is nearly impossible to measure with more than a 10m accuracy.



Map Ruler Instruction Sheet



MapTools

1755 La Honda Rd #95
Woodside, CA 94062
www.MapTools.com

Made in USA
Printed on *Rite in the Rain*™
"all weather" paper.

Using Map Rulers

These rulers can be used to measure or plot latitude/longitude coordinates, UTM/MGRS coordinates, and to measure distances in either meters or miles.

You will find them useful when you are working with a GPS receiver and paper maps. Each ruler is designed for a specific scale map. **You must use a ruler that matches the scale of your map.**

Plotting and Measuring

Plotting a coordinate means taking a known coordinate, and placing a mark on the map at the position described by that coordinate. Measuring a coordinate means starting with a known point on the map and determining its coordinate values.

Latitude and Longitude

Latitude is used to represent north-south position on the earth. Lines of latitude or parallels are measured in degrees from zero at the Equator to 90° at the poles. Parallels of latitude are equally spaced, thus a degree of latitude represents a fixed distance on the ground, regardless of the longitude.

Longitude is used to represent east-west position on the earth. Lines of longitude or meridians are measured in degrees starting at the prime meridian, 0°, in Greenwich, England. They increase in both the east and west directions until they reach the international date line at 180°. Lines of longitude converge at the poles, thus a degree of longitude represents a varying distance on the ground, depending on the latitude.

Usually latitude and longitude are written in one of three formats.

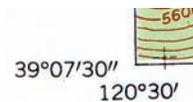
H DDD° MM' SS" is the most common format where the value is written as the hemisphere followed by degrees, minutes and seconds. There are 60 seconds in a minute, and 60 minutes in a degree.

H DDD° MM.MMM' is also common. Seconds are not used, rather minutes are written as a decimal number.

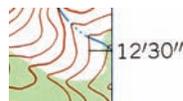
H DDD.DDDDD° is not a common map format, but is often used with computer systems. Neither minutes or seconds are used, rather degrees is written as a decimal number.

Locating the Lat/Lon Grid on Your Map

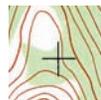
In the Continental United States, a USGS 1:24,000 scale topographic map sheet covers 7.5 minutes of latitude and longitude. Each corner of the map will indicate its lat/lon coordinates.



Along the edges of the map you will find tic marks and a minutes value every 2.5 minutes.



In the interior of the sheet you will find crosses that correspond to the 2.5 minutes marks along the edges.



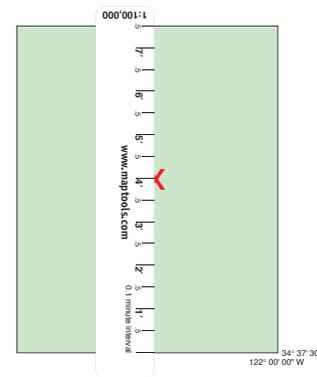
On a 7.5 minute map there are nine 2.5 minutes grids. You will need to draw the grid lines by connecting the edge

tics and the central cross marks with straight lines. Other map scales may have different grid sizes.

Plotting and Measuring Latitude

Place the ruler so that it spans the lines of latitude the point falls between. Orient the ruler north-south. The zero minute end of the ruler should be on the southern line of latitude, in the northern hemisphere. To measure the latitude of a point on the map, read the value from the ruler at the point, and add it to the latitude of the line at the zero end of the ruler.

On the map below, the ruler indicates the X is at the 4' mark, add this to 34° 7.5' for a resulting latitude of N 34° 11.5' or N 34° 11' 30". To plot the location of given coordinates, make a small tic on the map to indicate the line of latitude the coordinates fall on.

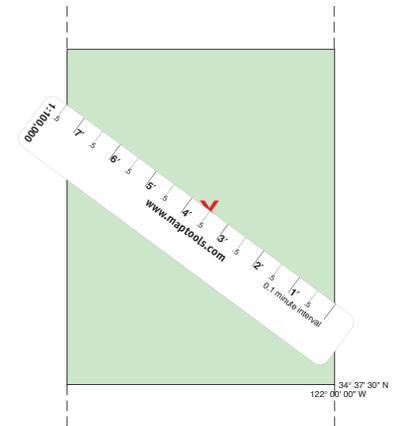


Plotting and Measuring Longitude

Place the ruler so that it spans the lines of longitude the point to be measured or plotted falls between. The ruler will need to be on a diagonal to fit. To measure the longitude of a point on the

map, slide the ruler vertically, keeping the ends on the lines of longitude marked on the map, until the edge of the ruler touches the point to be measured.

On the map below, the ruler indicates the X is at the 3.5' mark, add this to W 122° 0' 0" for a resulting longitude of W 122° 3.5' or W 122° 3' 30". Remember, in the western hemisphere, longitude increases from east to west. To plot a longitude coordinate, make a small tic on the map to indicate the line of longitude. The point of interest is located where the plotted lines of latitude and longitude cross.



Sometimes you may need to place the diagonal in the other direction or extend the lines of longitude above or below the map in order to properly position the ruler.

