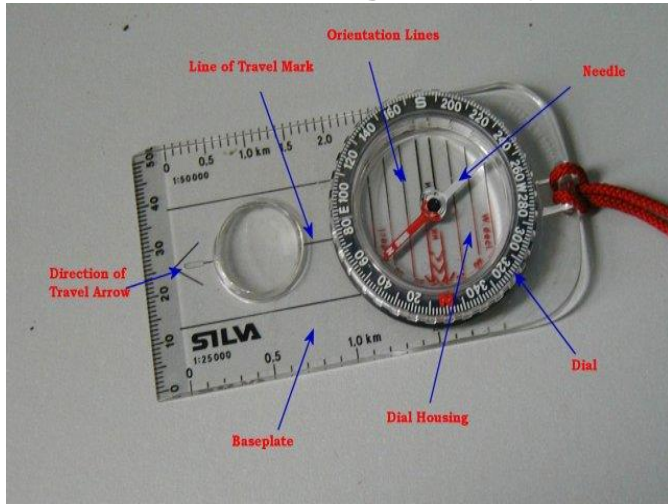


# Scout Skills - Navigation by Compass



**NOTE:** A compass is affected by magnetic and metallic influences. When using it keep it away from belt buckles, lamp posts and the like unless you want to end up off course!

## Setting a Compass Bearing

Setting a bearing on a compass ready for travel is as simple as turning a dial. Twist the dial so that the required bearing is indicated by the line of travel mark on the base plate. Now holding the compass flat in your hand turn your whole body around until the North end (Red) of the needle is aligned with the arrow below the needle. **DO NOT TOUCH THE DIAL** - move the whole compass around. The Direction of Travel arrow on the base plate will now be pointing along the desired bearing.

## Reading a compass Bearing

Point the Direction of Travel arrow on the base plate at the object you want the bearing of. Keeping the compass pointing the same way, twist the dial until the North (Red) end of the needle is

aligned with the arrow below the needle. Read off the bearing value on the dial that is next to the line of travel mark.

## Reading a Compass Bearing from a Map

Place the compass on the map so that the side edge of the compass runs along the line of the required bearing. If the two points marking the start and end of the bearing line are too far apart for the compass base plate use a ruler or piece of paper to join the points the place the compass along that line. Try to avoid drawing on the map as after much use you will find it difficult to read the map under all those bearing lines!

With the base plate aligned along the bearing turn the dial until the lines on the dial housing match up with the grid lines on the map. The arrow in the dial housing should be pointed towards North is upwards on the map. The bearing value is read adjacent to the line of travel mark on the base plate.

**Note this is a Grid Bearing.** To use this bearing for travel using a compass it must be converted to a Magnetic Bearing.

## Converting between Grid and Magnetic Bearings

### Which way is North?

A compass points to Magnetic North and maps are aligned on Grid North. There is yet another called True North.

- **Grid North:** the direction of a grid line which is parallel to the central meridian on the National Grid.
- **True North:** the direction of a meridian of longitude which converges on the North Pole.
- **Magnetic North:** the direction indicated by a magnetic compass. Magnetic North moves slowly with a variable rate and currently is west of Grid North in Illinois.

The difference between Magnetic North and the others varies throughout the world and over time.

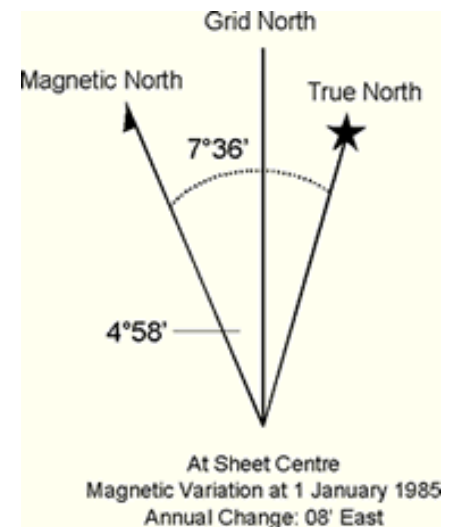
At the edge of all maps there should be displayed the lines to Magnetic North and True North and the angle between the two. [In northern Illinois, (downtown Zion 42.444249N - 87.838925W) magnetic north is approximately 3° 16' W of grid north (September 9, 2008). Read as 3 degree 16 minutes and changing by 5 minutes west annually]

- If Magnetic North is to the right of Grid North the difference should be subtracted to the bearing obtained directly from the map (Grid North value) to get a Magnetic North value.
- If Magnetic North is to the left of Grid North the difference should be added from the bearing obtained directly from the map (Grid North value) to get a Magnetic North value.

The reverse is so if converting a Magnetic Bearing obtained from pointing at a landmark to a Grid Bearing for use on a map.

- If Magnetic North is to the right of Grid North the difference should be added to the bearing obtained directly from the compass (Magnetic North value) to get a Grid North value.
- If Magnetic North is to the left of Grid North the difference should be subtracted from the bearing obtained directly from the compass (Magnetic North value) to get a Grid North value.

The same technique is used to convert to and from True Bearings. In this case the value used should also include the difference between True North and Grid North as well as the difference between Magnetic North and Grid North.



## Plotting a Compass Bearing on a Map

Set up the compass for the bearing required (*converting from magnetic to true bearing if necessary*). Place the side edge of the compass at the start point on the map where the bearing was taken and rotate it (*do not alter any of the settings but rotate the whole compass*) about that point until the lines on the dial housing match up with the grid lines on the map. A line drawn along the side edge of the compass is the bearing required.

## Walking a Compass Bearing

When using a compass to determine the line of travel you identify a landmark ahead and walk toward that rather than always looking at the compass. Try and pick a landmark that is distinctly recognizable. A solitary tree in the distance or power pylon for instance. Bear in mind that it may look different from a new vantage point as you travel. Pick something stationary - setting a line of travel on a lump at the brow of a hill which later turned out to be a sheep lying down was fine until it got up and walked away!

Should you be in terrain devoid of landmarks use other members of your team - send them out to a point on your line of travel and then walk up to them. Repeat the process as necessary.

Be aware that slopes and undergrowth will make you deviate from the straight line you think you are following. Always check and recheck your course from the known position.

Since you are part of a group don't rely on one person to do all the navigating. A second person checking the course may save you miles of walking if a mistake happens.

## Hints for Compass walk at night or poor visibility

- When doing a compass walk you identify a landmark ahead and walk toward that rather than always looking at the compass. At night or in poor visibility this is not always possible and so torches and lights should be used as landmarks.
- When taking the bearing to the next marker use a flashlight to point along the direction of travel. Let another member of the team pace out the distance along the flashlights beam. This way you can direct him and correct deviations due to the nature of the terrain.
- If the distance is too great for the torch to penetrate, or too far that the team will be split up, do it in stages. Send the pacer out as far as you can see then use him as the start point for the rest of the distance. i.e. shine the flashlight from him along the bearing to pace off the rest of the distance.
- Make use of 'Back Bearings' (original bearing plus 180 degrees) to check that you haven't deviated from the course. Use the torch of the start point as marker to get a bearing off.
- Be aware that slopes and undergrowth will make you deviate from the straight line you think you are following. Always check and recheck your course from the known position.

## Navigation - How far?

### Distances

So you know which direction you are going but how do you know how far you have gone to make that next course change?

When planning the route the easiest way is to always make course changes at a recognizable landmark. This is not always possible or desirable as it may mean walking extra distance. Common ways of judging how far you have travelled are:

- **Counting paces** - this method just involves counting how many steps you take to cover a measured distance. To help you keep count there are various devices on the market that do it automatically for you.
  - You do however need to know how far you travel for each of your paces.
  - Do a calibration walk by walking along a known distance and counting the paces or measuring how far you travelled in 20 or more paces with a measuring wheel or tape.
  - Pace length is  $\text{Distance} / \text{number of paces}$ .
  - Ideally you should calibrate over a reasonable distance or number of paces to average out any differences in pace length. Note also that the distance you travel on the flat is different than that travelled on a slope or uneven terrain.
  - Once you have your pace length calculated then the rough distance you travelled is  $\text{number of paces times pace length}$
- **Triangulation** - this method involves taking the bearing of two or more landmarks. You are at the point on the map where the two bearings cross.
  - See [Reading a Compass Bearing](#) for how to take bearings and [Plotting a Compass Bearing on a Map](#) for transferring the bearings to a map.
- **Use a Global Positioning System (GPS) unit.** These units use satellites to automatically triangulate your position and can calculate distance travelled from one point to another.