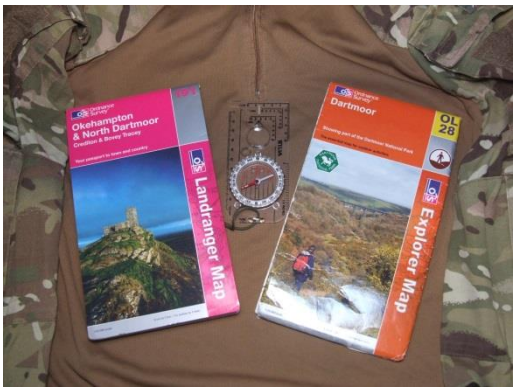
Navigation

Navigation is simply finding the way from point A to point B. If you are unfamiliar with the area then you are going to need a map and compass to get you walking in the right direction. Being competent at map reading will allow you to avoid areas with safety issues such as cliffs and difficult terrain.

Maps



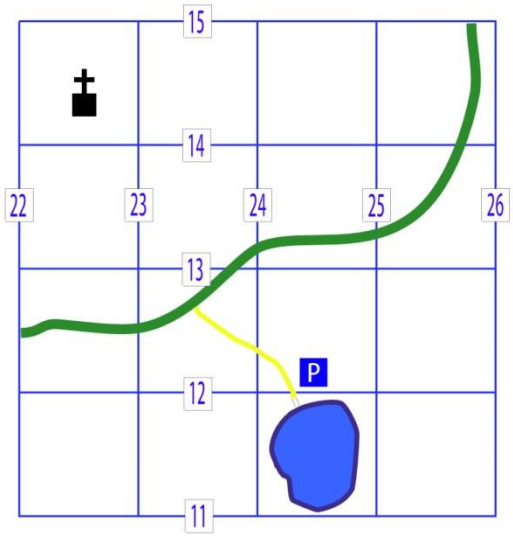
The Ordinance Survey 1:50,000 and 1:25,000 maps

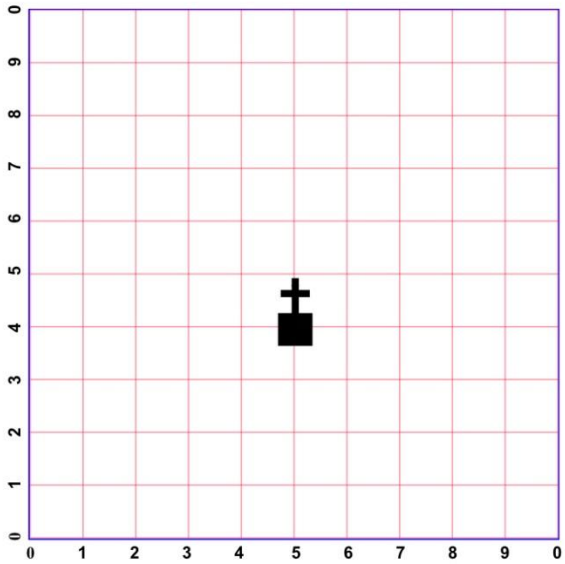
Ordinance survey are the agency that produce maps of every part of the UK. Each map has a sheet number in relation to the area that is covered. The maps are in metric and have a scale. This is what you might call the 'zoom'. The two common scales are 1:50,000 and 1:25,000. This means for a 1:50,000 scale map, every 1 centimetre on the map represents 50,000 centimetres (500 metres) on the ground. For a 1:25,000 scale, 1 centimetre on the map translates to 25,000 centimetres (250 metres) on the ground. This later scale gives more detail to the features of the land, and is more detailed than the 1:50,000 scale maps, so is ideal for navigating over terrain on foot due to the greater 'zoom' on the land.

Grid references

Each map has a grid printed on it. The vertical grid lines point towards grid north at the top of the map. Each square of the grid represents one kilometre. There are numbers printed with these squares. The numbers that go from left to right are called eastings, and the numbers which go from bottom to top are called northings. Each grid square is then further divided into tenths. These numbers allow any place on the map to be given a six figure grid reference to aide in its location. To work out a six figure grid reference of a known position, use the rule 'along the corridor and up the stairs'.

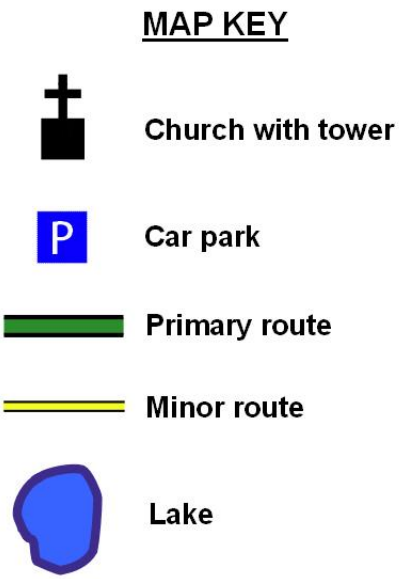
- Find the location on the map. (As an exercise, use the church symbol which is shown in the map diagram)
- Identify the grid square that contains the church
- Working from the left side of that grid square, make a note of the number on the grid line (the easting). The grid square containing the church starts at grid line number 22
- Next, divide the bottom line of the church grid square into tenths, working from left to right. Use a corner of a piece of paper to mark out the divisions, or use a protractor to be more accurate. You will see that in the single grid square diagram, the church is level to the easting number 5. Make a note of this number. We now have our first part of the grid reference, 225
- Now we need to work out the northing – that is the number going from bottom to top. On the diagram, by following the numbers up from the bottom, you will see that the grid square containing the church starts at number 14. Make a note of this number.
- This time, working upwards, divide the side of the church grid square into tenths. Make a note of what number the church is level with. You will see in the diagram that the church is level with number 4. So the second part of the grid reference is 144
- Put all the numbers together in the order that they were worked out and the grid reference for the church is 225 144





Map Symbols

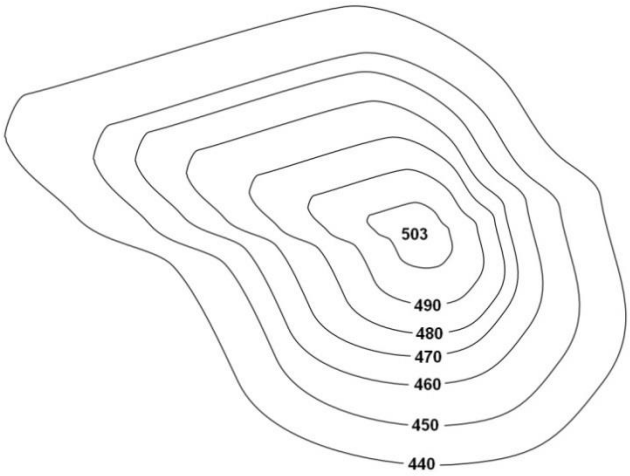
Towns, roads, rivers, forests and buildings are all printed on maps. These features and many others are shown as symbols, with a key to their meanings listed on the side of the map. It is important to become familiar with these symbols so that you can read a map in detail.



Contour Lines

Contour lines are what really bring the map to life. The lines represent the height of the land and gradient of the hills. The contour lines are in metric and generally go up by ten metres each time. The steepness of the hill is shown by how close the contour lines are together. Spaced well apart, the lines

would indicate flat ground or a gentle slope. Tightly packed together means a steep hill or near vertical face. The trick with contour lines is to look at them on the map and visualize the lines as the elevations that they represent.



Direction Finding

A Silva base plate compass

You are now able to work out a grid reference for your destination, but still need a way to identify what direction to walk in. The easiest method to use for direction indication is with a compass. There are various types of compass available, with the (Silva) base plate type being the most familiar. Any compass will show the four cardinal points, which are:

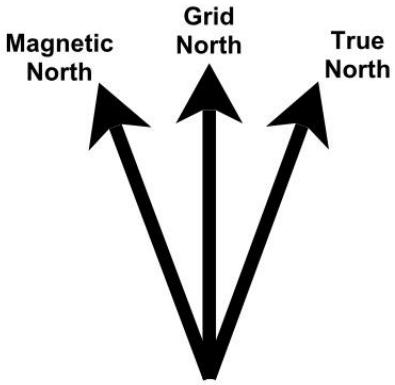
- North (0/360 degrees)
- East (90 degrees)
- South (180 degrees)
- West (270 degrees)

Magnetic Variation

There are three types of north:

- True North
- Grid North
- Magnetic North

True north relates to the direction of the North Pole and its direction is indicated by the North Star (Polaris). Grid north is the direction that the vertical grid lines on a map run and allows you to orientate the map correctly. The magnetized needle of a compass points to magnetic north. There are slight variations in the directions of true, grid and magnetic north. The one that you need to remember is the difference between grid north and magnetic north. This difference is called the 'Magnetic variation'. This variation is expressed in degrees and the amount changes occasionally. The amount of variation between grid and magnetic north is usually marked on the information section of maps, so adjustments can be made if needed when transferring bearings from map grid to compass or vice versa.



Taking a Bearing on a Map

Use a protractor (base plate) type compass and put it flat on the map. Place the long edge of the compass so it joins up the start and finish points for the chosen section of the journey. Make sure that the compass is pointing the correct way (heading towards your direction of travel). Turn the compass housing so that the vertical lines in the housing are parallel with the easting grid lines on the map. Now read the bearing showing on the compass. You now have the bearing to your destination. Remember to take into consideration the magnetic variation. Hold the compass flat in your hand and turn your body so that the red magnetic end of the needle sits within the arrow outline printed inside the compass housing. You are now facing in the correct direction of travel to get to your objective.

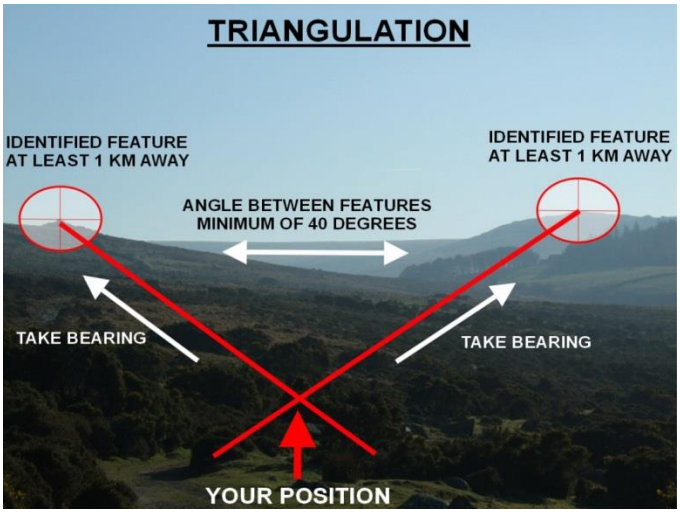
1: Line the base plate of the compass along the line of travel on the map

2: Rotate the compass housing so that it points to grid north

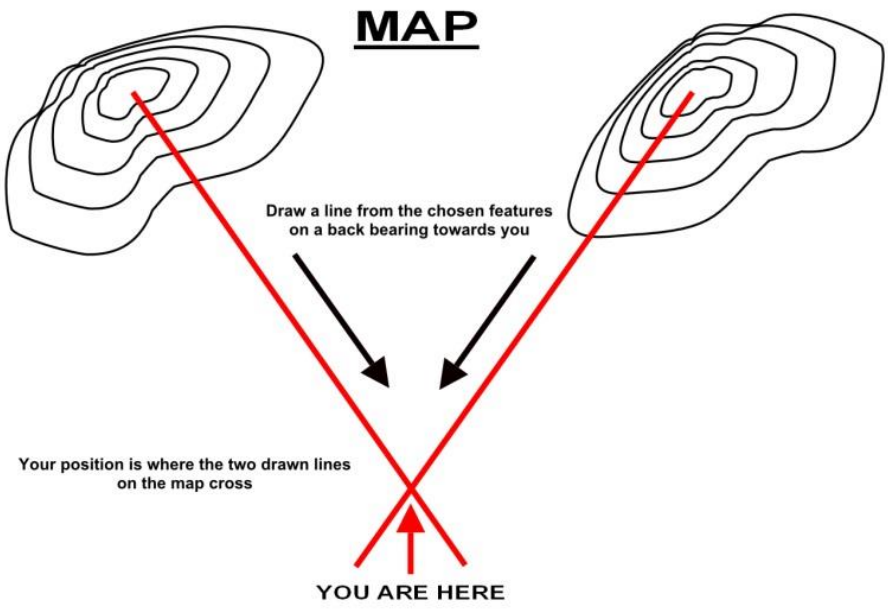
3: Turn the whole compass until the needle sits within the arrow outline. The compass is now set with your direction of travel

Triangulation

It is important to know your current position on the map before working out the bearing to your objective, otherwise, you will not know where you are starting from. If you have become lost, you can use a method called 'Triangulation'.



To use triangulation, look for two easily identifiable land marks such as a church or prominent hills. The features should be at least one kilometre away from you. One object should be roughly to your ten o clock arc, and the second object to your two o clock arc. As you stand looking at the two features, the angle between them should be no less than forty degrees. Go back to your map and orientate it to north and find the selected objects on it. Take a bearing of one of the objects from where you are standing. Now work out the back bearing (180 degrees opposite of the original) from the object and draw a line (in pencil) along this bearing on the map. Repeat the process for the second feature, and at some point on the map, the two lines that you have drawn should cross. Your current position is at this cross. Now you can work out the grid reference for where you are, and plan any further navigation from here.



Measuring Distance

The next issue is how to measure the distance to the objective. We know that each grid square is one kilometre long. When using the more detailed 1:25,000 scale map, one centimetre measured on the map represents 250 metres on the ground. This is useful to know as this allows us to work out how far we need to walk. The easiest way to measure the distance of a route is to use a length of thin string. Lay the string along the selected route on the map. Once the distance of the route has been measured with the string, hold the string against the distance scale which is printed at the bottom of the map and measure it. This will give you the distance of the route in kilometres and miles.

Pacing

Pacing beads

It is really important to keep check on how far you have walked so that you can identify where you are on the map. The method used for doing this is called 'pacing'. This technique is basically counting your paces. You first need to work out how many of your own paces are needed to cover a distance of 100 metres. I walk 60 paces over 100 metres at a normal speed over reasonable terrain. To keep a count of how many paces I have walked, I use pacing beads. This is a short length of para-cord with a knot tied in the middle. On one side of the knot are nine beads and on the other side are four beads. There is enough room on the cord to slide the beads up and down a few inches. When navigating, I have the pacing beads hanging from my belt. When I am walking along my route, I am counting my paces. Every time I reach sixty paces I slide one of the nine beads down. This bead represents 100 metres. I repeat this process until all of the nine beads have been moved. At this stage, I know that I have covered a distance of 900 metres. After I have walked the next 100 metres, I move one of the four beads on the other end of the cord. This bead represents a distance of 1000 metres (1 kilometre). I then repeat the whole process. Bear in mind that your speed of movement will have an effect on how accurate your pacing is. Carrying a heavy bergen, uneven ground and walking uphill will all have an effect on your gait. This will change how many paces it will take you to cover a distance of 100 metres.

Naismith's Rule

Time of travel can be calculated by using Naismith's rule. The average fit person should allow a walking speed of 5 kilometres an hour. Walking up hill will add time to this, so when planning out the route, allow an extra 30 minutes for every 300 metres of uphill walking.

Summery

So that is the basics of navigation. You can now work out a grid reference for a position, use a compass to take a bearing, and can work out your location if you become lost. You also know how to measure distances and estimate times of travel. However, the only way to become proficient in navigation is by getting out and practicing.