

# Navigation with a map and compass

The map contains a scale 'picture' of our surroundings. The compass informs us which way is North. By putting the two together we can align the map to the real world and so make sense of what a map is telling us.

## ***Alignment of the map***

Although not strictly necessary, it is often very useful, helping you ensure that you are going to head off in the correct direction when you have set your compass.

- To set the map, lay it on a flat surface.
- Place the compass on the map and align the orienting arrow in the housing of the compass with the vertical grid lines
- Holding the compass firmly on the map, turn both until the RED end of the needle is on top of the orienting arrow.
- It does not matter at this stage where the base plate is pointing. The map is now aligned with the real world. Keep it that way for the next part.

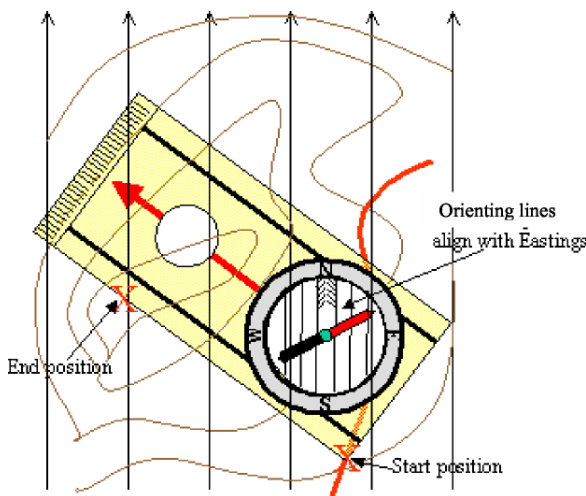
## ***Bearing setting***

Place the compass on the map in the direction you wish to go (look at the arrow on the base plate), so that the edge of the compass passes through both the starting point and the destination point.

Turn the compass housing until it lines up with the grid lines (Easting's).

Read off the compass bearing. (the number on the top dial which is next to the direction arrow)

Add the magnetic offset (declination).



## **Check.**

Spending 30 seconds or 1 minute checking that you have set everything correctly will save a lot of time when compared to getting lost or taking the wrong route.

To check the work done so far, pick up the compass and turn the whole compass until the RED end of the needle is over the top of the orienting arrow in the housing. Now look and see where it points. Look at the map and see what is near the start position - tracks, streams, bridges, hills etc. Since we have oriented the map, the position of these items should be visible in the same direction as indicated on the map.

- Now ask your self some questions.
- Should you be walking along a path, road or stream?
- Should you be walking up or down the hills, or on the flat?
- Can you see any streams or bridges near by?
- Are there any other things that you can check to make sure that you are going to follow the compass in the right direction?

Common mistakes include: using the wrong end of the needle (Red points North, not white); turning the housing so that the orienting arrow points down the map rather than to the top of the map; and using the base of the compass to point from your destination to the start (rather than the other way around which is correct).

## ***Estimating distance***

By timing how long you have walked along a route it is possible to work out how far you have travelled.

Firstly though, we need to know how fast you are travelling. Your fitness, the terrain and how much you are carrying, will determine how fast you walk. An adult walking along a good flat path can keep up a pace of around 5 kilometres per hour or about one kilometre every 12 minutes. However this can drop to 2 kilometres per hour with a pack on your back and walking along a forest path. As you can see from these figures, there is a wide variation. This variation gets worse if one is climbing up and down hills. The following table gives some ideas as to speeds over various terrains.

### **Naismith's Rule**

Light easy going - 5 km per hour.

Easy going - 3 km per hour.

Heavy going - 1½ km per hour.

Thick bush, heavy going - ½ km per hour.

Climbing 500m add 1 hour.

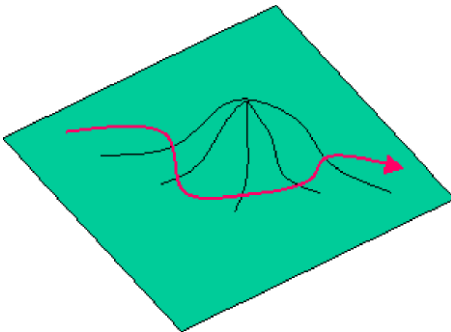
Descending 1000m add 1 hour.

For every hour after 5 hours add 1 hour (for fatigue).

(1/3 reduction for fit experienced walkers).

You have now set the compass to the bearing you needed. If you now make sure the north arrow and orienting arrow of the compass are lined up together, then the direction of travel arrow will be pointing in the way you want to go.

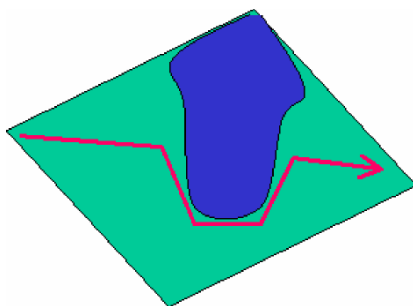
## ***Navigation Methods - Contouring***



You can waste a lot of energy when following a compass bearing that involves repeatedly climbing up hills and then losing height.

The technique of contouring uses the compass only as a general direction reference point. In practice you follow a contour on the map, staying at the same height as you negotiate the hills between you and your objective.

## ***Navigation Methods - Detouring***



Detouring takes you off your direct compass bearing, to avoid a large obstacle such as a bog, that may not be accurately marked on the map, or is simply in the way.

While detouring, keep the direct bearing to your objective set on your compass and as you skirt around the obstacle, measure the distance you have taken away from the bearing. Once past the obstacle, return to your bearing traversing the same distance to return you to the original line

## ***Navigation Methods - Bearing Off***

If you are heading towards a linear feature such as a road, fence or river, and you want to find a point like a cattle grid, gate or bridge, use a technique called bearing off. To do this, you aim to miss the target. Sounds strange? Well, here's an explanation.

If you head directly towards a target, you will probably miss. Say you want to find a gate located on a road. You set your bearing to head directly for the gate. On the way, you move around a few obstacles, which only compounds the error in your compass bearing. So you arrive at the road, but you don't know whether the gate is to your left or right.

So aim, say, 4° to one side of the target. By aiming to one side of the target, you will always know what direction to travel to find the target. But make sure you aim off far enough to allow for the error in your compass bearing. One way to allow for error is to aim off by 4°, then round off to the next furthest mark on the compass dial.

For example, if the gate I am travelling to is supposed to be at 105°M, I would aim North a little, so subtract 4° to get 101°, but round to the next furthest marking, which is 100° (my compass has 2° markings). If I'd rounded to 102°, the error in my bearing could have taken me to the other side of the feature, and I'd get geographically embarrassed.

Another example. The feature I want to get to is supposed to be at 260°M. I would aim North a little, so I'd turn the dial to 264°. Since 264° is already on one of the markings on the dial, I'll leave it there.

Remember that bearing off or aiming off only works if the feature that you are looking for is located on or near a linear feature such as a road, fence or river. Also, it doesn't matter whether you aim North of your target or south of your target, as long as you aim to miss.

## ***Navigation Methods - Following a Bearing***

Never make the mistake of following your compass. Use it as a navigation tool, not a walking guide. If you keep following your compass, you may end up far off track because you will keep walking around trees and boulders, looking for creek crossings and finding gates in fences. A better way to navigate is to use your compass to find a landmark or feature that is clearly visible, that also happens to be on (or close to) your bearing. For example, use boulders, huts, bridges, nearby mountains. Once you have selected the object, put the compass away and walk towards the object. When you reach it, repeat the process.

Whatever you use, make sure the object you pick is between yourself and the place you are heading. This way, when you arrive at that object, you know that you are heading in the right direction to get to your destination. Then you can repeat the process to get closer to your target. Another hint - don't pick a "landmark" which is ambiguous. For example, from a long way off, you may see one tree that looks a lot taller than the other ones. When you get up close, all the trees are tall, and it's hard to pick which one was the tallest one. Similarly, from a long way off, that rock may seem to have a lot more moss on it than the others around it. However, when you get up close, all the rocks have moss on them, in different shades of green, and you can't quite pick the rock you were aiming for.

## ***Navigation Methods - Back Bearing***

Every now and then, take a back bearing to make sure you are in the right direction from where you came. To do this, simply turn the whole compass (leave the dial alone) until the white or black half of the compass needle is above the red arrow on the base of the dial. If you look along the Direction Of Travel arrow, you should see the place or feature that you came from. If not, move yourself so that you can!

## ***Finding your position***

You can find your position along a track, ridge, stream or any prominent linear feature using the method below. First orientate your map North/South, then lay one long edge of the base plate along a line intersecting your rough position and a prominent landmark.

Rotate the housing until the orienting arrow aligns with the North/South lines on the map and the needle rests in line with the orienting arrow. If one end of the base plate rests on the landmark, your position must lie along the line of the long edge of the base plate. The figure will make this clear, I hope! If you can identify two landmarks, then you don't even need to be following a terrain feature.

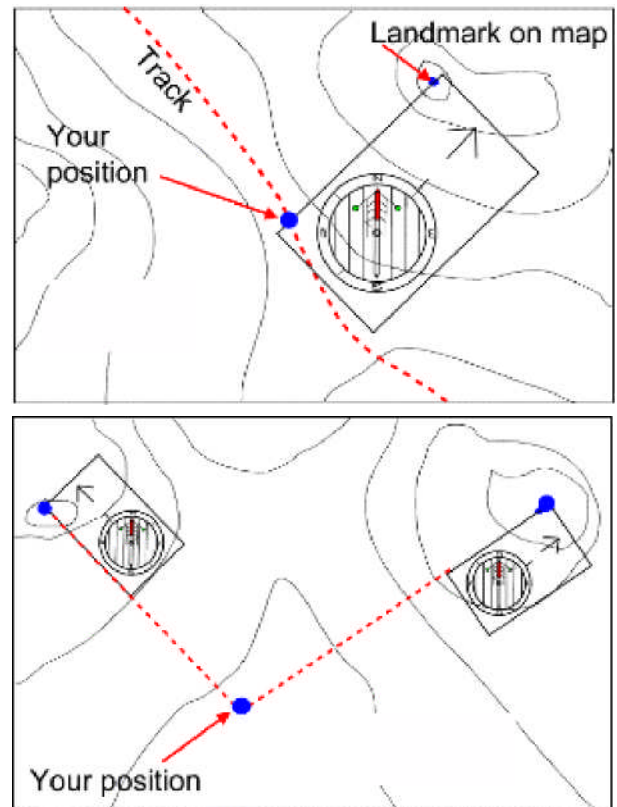
Simply take a bearing off one, and pencil in your line of position on the map.

Then take a bearing off the second, and pencil in that line of position. Your location is the intersection of the two lines. The figure shows how this works.

If you can take a bearing off a third landmark and pencil in that line of position, so much the better. Your true position should lie somewhere inside the triangle formed by the three lines of position (there will always be a slight discrepancy!)

Once you have identified your location with lines of position, perform a 'reality check'. If the lines cross at a stream, and you are standing on a ridge, something is definitely wrong!

A cardinal rule of navigation and map reading is this - never make the map fit your readings or vice versa! If in doubt, take your readings again - and again - until you are sure of them - and only then follow them!



## ***Hints on how not to get lost***

- Providing that you operate the compass away from metal objects it will always tell you the truth.
- You will also need a good map to work out how the land lies (unfortunately, maps are not always accurate! but a recent map is preferable).
- Understanding how far you have travelled and when you are supposed to reach the next visible reference point, should warn you of when you are on the wrong route.
- Whenever you come to an easily recognisable feature in the terrain, for example a bridge over a stream, check your position on the map
- Remember that the sun rises in the east, moves through the south and sets in the west. Check that the direction you have been walking in is correct. If you want to walk North it is no good if the sun is in your face.
- Are you walking up or down hill? Look at the map and check if this agrees.
- Remember water always flows down hill. On the map the source of water will be on the higher ground, nearer the top of the hills.
- When lost stay where you are and take stock of the information you have. Where were you last sure of your location? How far have you walked since then? Redo the compass bearing and see if you made a mistake there. Above all else do not admit to taking a navigation course!

## ***Did you know?***

- The SOS distress signal was discontinued in February 1999