

# Navigation Course Notes

## Navigate using the 5 Ds - Description, Distance, Duration, Direction, Destination

### DESCRIPTION

Maps contain a wealth of information and are worthy of close study! They come in a variety of different scales. The smaller the number the greater the detail. Thus, a 1:2,500 map shows every field including its area, signposts etc, whilst a road map at 1:250,000 will only show roads, larger villages and towns. 1:25,000 is usually the best scale for this area as it shows field boundaries and all paths in a clear way. In the mountains where contours are important 1:50,000 or Harvey 1:40,000 may be more appropriate as they give a better impression of land form.

It is important to know the symbols used in maps, although the legend will help if you are in doubt. They help in navigation and inform you about what you are likely to see on the ground. For instance church symbols tell you whether the building has a spire or a tower or neither.

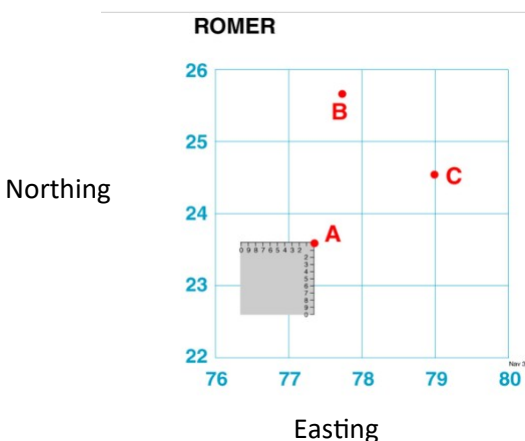
Points on the map have a unique reference called a grid reference. The UK is divided into 100km squares and each square has two letters. Our area has the suffix SX whilst neighbouring areas are SS, ST, SY and SW. Each 100km area is then gridded into 1km squares. Newton Abbot Ramblers usually use a six figure reference that defines a 100m square, whilst an eight figure number defines a 10m square.

The first part of a six figure grid reference is the two letters ie **SX** followed by the numbers that define the square. The first three numbers of the reference relate to eastings and the second three numbers relate to the northings.

When finding the position of a grid reference on a map, you may find it helpful to use a romer. This is the name given to a specialist tool for measuring distances and working out grid references on a map, and it was invented by a British army officer named Carrol Romer, in 1915.

To get to the first three numbers, look along the bottom of the map (go along the passage) and read the number before your point (**77**) then measure how much further along your point is (**3** on the romer), giving **773** as the first part of the number.

Then move up the side of the map (up the stairs) to read the number below your point (**23**) then measure how much further up the point is on the romer (**6**) giving 236. Thus, the complete reference is **SX 773 236**.



Blue grid lines are at 1km (1,000m) intervals

Grid reference of point A is SX 773 236

Try and work out the grid references for B and C.

For Coffinswell the grid reference of Appledore Cottage is SX 890 687. For more detail an eight figure reference can be used. Thus, for Appledore it would be SX8900 6867. Try doing the grid reference of your house or use the Newton Abbot Ramblers programme to find meeting points.

Contours are at 10m or 5m intervals on the 1:25,000 map – check the legend for which one is used on your map. The heights on maps in England and Wales all relate to “Ordnance datum” this zero point is the mean sea level (MSL) at Newlyn – have a look for it if you go to Newlyn; it is a brass bolt placed in the floor of the tidal observatory on the South Pier.

The heights shown on the contours also show the direction of the slope. If the numbers are the right way up, the slope is going up. If the numbers are upside down the slope is going down.

Contours not only show height, but also the shape of the land, how steep the land is, tops of hills and mountains, ridges, convex and concave slopes, valleys, saddles, flat areas etc.

When navigating the first thing to do is orient the map against features you can see. These are often called handrails or linear features eg roads, paths, streams, woods etc.

Consider your route and what you will see on the route. This needs a careful look! It is important to know where you are at all times. Collecting features are points that confirm you are on your route – this could be a number of field boundaries or the edge of a wood. Catching (or overshoot) features are ones that help identify if you have strayed beyond one of your destination (control or target) points. For instance – I must take the path on the left before I reach the wood.

## DISTANCE and DURATION

Distance can be measured from the map in a number of ways. Using the romer, by eye, with string or with a wheel. If you have a computer programme such as Anquet or Memory Map you can measure the distance electronically.

### Naismith's Rule

Currently Naismith's Rule is that walkers walk at 5km/hour on the flat over reasonable ground ie 1km takes 12 minutes. Generally Newton Abbot Ramblers walk at about 4km/hour (excluding breaks) ie 1km takes 15 minutes. Record your own rate over the measured 1km and use this for your walks.

Time to walk 1km	Rate of walking
12 minutes	5km/hour
13.5 minutes	4.5km/hour
15 minutes	4km/hour
17.5 minutes	3.5km/hour
20 minutes	3km/hour

When going **fairly steeply uphill** Naismith advises **adding 60minutes for every 600m** or 1 minute per 10m climbed.

When **going steeply down** Naismith advises **adding 30minutes for every 600m** or 0.5 minutes per 10m drop.

Consideration should be given to the type of terrain. Bog hopping or going on a pathless route through heather and bracken will be slower than walking on a road.

These figures are for guidance and are not absolutes, so judgement is required. However, knowing your usual rate of walking is a very useful navigation tool especially in poor light conditions.

### Pacing

Pacing is another useful tool. 1km is a long way and often when navigating a turn is needed in a shorter distance and timing would not be accurate enough. Pacing is best done as double pacing ie count the paces only when your right (or left) foot hits the ground. This should be checked when you are walking normally ie do not "pace out". The author of this document paces at 70 double paces for 100m (which is the same as used on a Fitbit) – depending on your stride your pacing is likely to be slightly different and you need to record your own pacing rate.

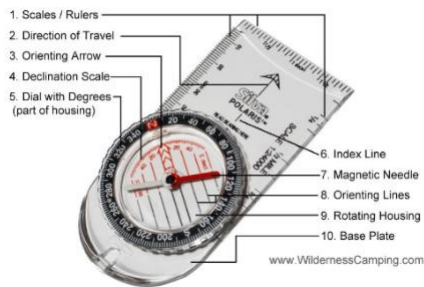
## DIRECTION

Ordnance Survey maps are all gridded with the gridlines running north-south and east-west. This “north” is called grid north. Rather confusingly there are two other “norths”. The first is true north ie the direction of the North Pole. The other is magnetic north which is the direction indicated by your compass needle. Magnetic north varies with time. Each map will tell you the difference between grid north and magnetic north and the rate it is changing. The good news is that grid north and magnetic north are, at the moment, almost identical so no adjustment is required.

### Care of a compass

The accuracy of a compass is affected by magnetic articles (eg a mobile phone, fastenings) or natural features (eg some rocks). Keep your compass and mobile phone separate and be careful using a compass on top of a tor as it may not be accurate.

### Parts of a compass



### Orienting a map with a compass

1. Put the map down on a flat surface and by looking around orient the map to the features you can see.
2. Set the dial of your compass to north (N and  $360^\circ$  ie  $0^\circ$ )
3. Put your compass on the map and holding the compass and map together rotate the map until the magnetic needle points exactly to north ie the side of the compass is parallel to the north-south gridlines. If the map has been well orientated in step 1 the amount of rotation will be small.

### Taking a bearing from the map

There is no need to have the map oriented to north. However, if it is it is you can see how your target relates to other features.

1. Start by looking at the map to see the approximate direction of the target you want to aim for eg south west – it is useful to do this to check the actual bearing is correct and not  $180^\circ$  out which is easily done.
2. Put your compass on the map with the edge of the base plate on the point where you are standing and align it with your target point. The base plate needs to be oriented in the direction of travel.
3. Turn the dial of the compass until the orienting lines under the compass needle are parallel to the map gridlines, with north pointing to the top of the map.

The bearing is now set. Check it agrees with your original approximate direction.

## DIRECTION (continued)

Follow the bearing by walking in the direction of travel arrow on the compass, keeping the magnetic needle on north. Look in the direction of travel and focus on landscape features you can head for (preferably not sheep!). Once you have gained the first point, look for the next feature on the bearing. Ensure the point you have chosen will be visible at all times as you walk towards it.

It can be helpful to work in pairs with both people using a compass with the bearing set. One person should be about 10m ahead of the other. The front person sets off in the direction set and the back person checks they are walking in the right direction, correcting them as necessary. This is particular useful in low light when features cannot be seen.

### To check if a feature you can see is the correct one or to take a bearing of a known feature

Point the compass at the feature and move the dial around until the north point is aligned with the magnetic needle.

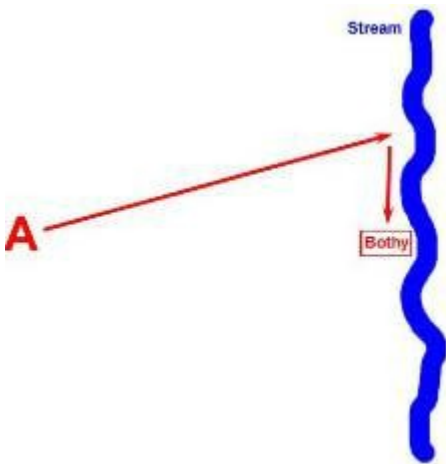
Put the compass on the map with the side of the base plate aligned with the point where you are standing and the feature. If correct, the orienting lines under the needle will be aligned with the gridlines, if wrong they will not be aligned.

### Navigation tips

#### Aiming off

Aiming off is used when the target lies on a linear feature such as a ridge, stream or track.

In the example shown below, the task is to go from point A to the bothy. The bothy is situated at the side of a prominent stream. If you head directly for the bothy but don't hit it straight on then you won't know which way to turn to locate the bothy. By intentionally 'aiming off' to hit the stream to one side of the bothy you will know which way to turn.



## DIRECTION (continued)

### Attack points

An attack point is a feature that is relatively close to your target, but is more significant and easier to find.

In the example shown below, the task is to go from point A to the bothy. The knoll is fairly close to the bothy and will be easier to find. Locate the knoll first and then head in a new direction to the bothy.

The knoll is the attack point in this example.



### Handrails

'Handrailing' can be used when there is a linear feature that will take you towards the target.

In the example shown below, the task is to go from point A to the summit. The edge of the forest is a linear feature which can be followed towards the summit.

