Introduction to
Map Reading
What is a map?

A map is simply a drawing or picture of a landscape or location. Maps usually show the landscape as it would be seen from above, looking directly down.

As well as showing the landscape of an area, maps will often show other features such as roads, rivers, buildings, trees and lakes.

A map can allow you to accurately plan a journey, giving a good idea of landmarks and features you will pass along the route, as well as how far you will be travelling.

Understanding your map needs

There are many different types of maps. The type of map you would choose depends on why you need it. If you were trying to find a certain street or building in your home town you would need a map that showed you all the smaller streets, maybe even footpaths in and around town.

If you were trekking across a mountain range you might need a map that shows a bigger area of land and tells you the heights and steepness of the mountains.

If you were a pilot flying from London to Edinburgh you might need a map that has the whole of the country on a single page, with only the locations of towns and cities on it. Whichever type you choose, there are a few basic features usually found on any map, which will be explained in this leaflet.
Map scale: What it means

To create an accurate picture of a landscape on paper everything has to be made much, much smaller. This is done by ‘scaling down’ the actual size of the land.

The map below shows Great Britain. The size of the island has been ‘scaled down’ so it will fit on this sheet of paper. The map is too small to contain a lot of detail and doesn’t have many names on it, as there isn’t much room.
Understanding your map 1. The basics

There are some basic features that most maps will include:

- **Roads** tend to be marked in different colours depending on the type of road depicted. Roads on a map range from thick blue lines, showing motorways, to dashed lines, indicating an unfenced minor road.
- **Footpaths** are marked on Ordnance Survey maps in various colours. On a 1:25 000 scale OS Explorer Map the public rights of way are marked in green and on a 1:50 000 scale OS Landranger Map they are marked in magenta. There are various types of public rights of way and public access, so please check the map key for full information. It is important to be aware that footpaths that are shown in black are not necessarily public rights of way.
- **Woods** are shown in green with a coniferous or non-coniferous tree shape printed over the top.
- **Buildings** are marked by small black squares. However, some particular buildings have their own special symbols, such as churches and windmills. Any of these buildings can be useful landmarks, helping you to check your position on the map.
- **Rivers and streams** are shown as blue lines. The width of the line is representative of the watercourse width (if the width of a river is more than 8 metres it is shown as two blue lines with a light blue area between). Rivers and streams can be extremely useful in determining your position on a map.
- **Scale** tells you how much the land has been scaled down to fit on the paper. If the scale of a map is 1:50 000 then everything on the map will be 50 000 times smaller than it is in reality.
- **Your Ordnance Survey map** will also contain other features and information that will be explained, along with the features above, in the key of the map.

The choice of map depends on what you want to do with it. There are different sorts of maps used for different things, and different scales of maps work better in different situations. When walking in the UK moors and mountains, we generally have the choice either Ordnance Survey, Harveys or the BMC Mountain Maps at scales of 1:50 000, 1:40 000 or 1:25 000. On a 1:25 000 map 1 cm on the map represents 25000 centimeters or 250 meters on the ground.
Understanding your map 2. Grid lines explained

Ordnance Survey maps are covered in a series of faint blue lines that make up a grid. The lines have numbers accompanying them that allow you to accurately pinpoint your location on a map. Once you have located where you are, the grid system makes it simple to give others (such as mountain rescue) an accurate description of your location. This description, which will be a series of numbers, is known as a grid reference.

Grid references

Before you begin to look at grid references it is important to be aware that all the numbers going across the face of the map, for example, left to right, are called eastings (this is because they are heading eastward), and similarly, all the numbers going up the face of the map from bottom to top are called northings (again because they are heading in a northward direction).

There are two main types of grid reference:

- **4-figure** – for example, 1945, this indicates a single kilometre square on an Ordnance Survey map.
- **6-figure** – for example, 192454, shows a point within a square.

4-figure map references

When giving a 4-figure grid reference you should always give the eastings number first and the northings number second, very much like when giving the reading of a graph in school – you must go along the corridor/hallway (horizontal) and then up the stairs (vertical).

For example, the number 2 in the diagram opposite is 19 across and 45 up and therefore the 4-figure grid reference is 1945.

The numbered squares on the diagram above would have the following 4-figure grid references:

1 = 18 45
2 = 19 45
3 = 18 44
4 = 19 44
6-figure map references

Having worked out the basic 4-figure grid reference, for example, square 3 below, imagine this square is further divided up into tenths. Using the example opposite, the grey box is in the square 1844. More accurately it is 7 tenths across and 8 tenths up within the grid square 1844 and therefore has the 6-figure map reference 187448.

The shapes on the diagram opposite would have the following 6-figure grid references:

- = 187448
- = 185443

National Grid lines

As well as numbered grid lines, Ordnance Survey maps have codes made of two letters. These two letter codes can be found printed in faint blue capitals on Ordnance Survey maps. The whole of Great Britain is divided into squares of 100 km and each square is given two letters. There will be a diagram within your map’s key showing you which areas of your map fall into different squares of the National Grid.

When you quote your six-digit grid reference you should put the two letters of the area you are in before the numbers. This means that there is no doubt or confusion about your location. For example, you may be at grid reference 509 582 in south-west Scotland. The complete grid reference you should quote would be NX 509 582 (without the letters the numeric reference would be repeated in every 100 km square).
Understanding your map

3. Reading contours and relief

Understanding the shape of the land by looking at a map is a very useful skill and can be essential if you're going to be walking in mountainous terrain. The height and shape of the land is shown on a map using ‘contour lines’. These lines appear as thin orange or brown lines with numbers on them. The number tells you the height above sea level of that line.

A contour line is drawn between points of the same height, so any single contour line will be at the same height all the way along its length. The height difference between separate contour lines is normally 5 metres, but it will be 10 metres in very hilly or mountainous areas. The map key will tell you the contour interval used.

The picture shown illustrates how a landscape can be converted into contour lines on a map. An easy way to understand and visualise contour lines is to think of them as high tide lines that would be left by the sea. As the water level drops it would leave a line every 10 metres on the landscape. These marks would be contour lines.

Being able to visualise the shape of the landscape by looking at the contour lines of a map is a very useful skill that can be developed with practice. It will allow you to choose the best route for your journey. When reading contour lines on a map it’s helpful to remember the numbering on them reads uphill. It might be useful to imagine that to read contour line numbers you have to be stood at the bottom of the hill looking up it, otherwise the numbers would be upside down.

Other useful things to look out for when reading contour lines are rivers, which usually flow into valleys, or areas with very few contour lines, which will be flat.

The key to navigating accurately is to watch out for changes in the terrain and to match these with the map. If you spot something such as a steep bank, and you see this reflected on the map (a narrowing of the distance between contour lines) this helps confirm your position.
Understanding your map  5. Using your compass

Decide on the route of your walk and identify your starting point on the map. Place your compass on the map. Make sure the ‘direction of travel arrow’ is pointing in the direction of your route across the map. The easiest way to line the arrow is to place the side of the base plate so it crosses your starting point and the next destination of your journey.

Carefully holding the compass base plate still, you will need to turn the compass housing so the index line and orientating lines match up with the eastings (the vertical, north–south lines) on your map. Holding the map flat and the compass still, you need to rotate your body so that the compass needle settles in line (opposite) with the index line. To fully orientate your map you will need to make some adjustments for magnetic variation.

Adjustments for magnetic variation

One thing to remember is that your compass does not point to the true north – except by coincidence in some areas. The compass needle is attracted by magnetic force, which varies in different parts of the world and is constantly changing. The magnetic variation throughout Great Britain currently ranges from 2º to 6º. The amount of variation changes every year, so check your Ordnance Survey map to work out the most current value.

You can properly orientate the map by carefully turning the compass housing 4º clockwise (for example, depending on where you are in Great Britain) and then turning your body again to realign the magnetic needle with the index line. Your map is now oriented to the north.

A word of caution

Compass readings are also affected by the presence of iron and steel objects, so be sure to look out for – and stay away from – pocket knives, belt buckles, railroad tracks and so forth when using your compass.

Top Tips for using your compass:
• keep distances short
• don’t forget to compensate for grid north
• hold the map to point north
• use other people to help
• look for something on the horizon which won’t move!
Using land features

As an alternative to using a compass to orientate your map, you can use your eyesight. This method will only work if you are in an area with visible prominent features or landmarks.

First, locate yourself next to a feature or landmark and place your finger on the map at the point where you are standing. Then begin to rotate the map so that other features and landmarks on the map begin to line up with the actual ones you can see. The map is now orientated with the land, although not as accurately as it would be using a compass.

And finally...

OK, so now you can read a map. But before you put on your boots and pack your rucksack, take the time to read through the following handy tips and safety points to ensure you get the most from your adventures.

1. Pre-plan your route

Before you set out, take the time to plot your route and mark it on your map. This will ensure your eyes are immediately drawn to the correct part of the map. If it's your first expedition with a map and compass, start with a short route in an area you're familiar with.

2. Make sure you have the right equipment

• A map of the area you are exploring, and map case will help to protect your map from bad weather.
• A compass with a base plate and a circular, rotating housing.
• A pencil, in case you decide to plan and orientate a new route.
• A watch, to make sure that you can keep track of time.
• And enough food and water to see you through your journey.
• Check the weather forecast in advance so you have appropriate clothing with you.

3. Tell someone where you're going

Always remember to tell either a family member or a friend where you’re going and when you expect to be back.

4. Abide by the Countryside Code

• Be safe – plan ahead and follow any signs.
• Leave gates and property as you find them.
• Protect plants and animals, and take your litter home.
• Keep your dog under close control.
• Consider other people.

Top tips for walking safely

• Think about your route; - What hazards might you come across? - What is the terrain like?
• How long might it take?  •  What is the weather forecast?