



NAVIGATOR BADGE

The Navigator Staged Activity Badge covers various navigation ("finding your way") techniques. This includes using map and compass, both separately and together.



Ordnance Survey Maps

The primary supplier of maps in the UK is **Ordnance Survey**. The origins of this organisation go back to 1746 and the Battle of Culloden. It was realised that a lack of good mapping caused issues when trying to plot the location of armies and so on. The desire for good maps led to the Principal Triangulation of Great Britain in 1783, leading to Ordnance Survey being created in 1791 under the Board of Ordnance (the Ministry of Defence at the time).

Today, Ordnance Survey is a public owned company, run by the government. If you look on non-Ordnance Survey maps, you'll see that they are copyright whichever company has produced them. Only Ordnance Survey maps carry "Crown Copyright".

The National Grid

A	B	C	D	E
F	G	H	J	K
L	M	N	O	P
Q	R	S	T	U
V	W	X	Y	Z

The National Grid is the division of the United Kingdom into squares to make it easier to survey for the purpose of producing maps. It was put together in 1919, and has been modified a few times since.

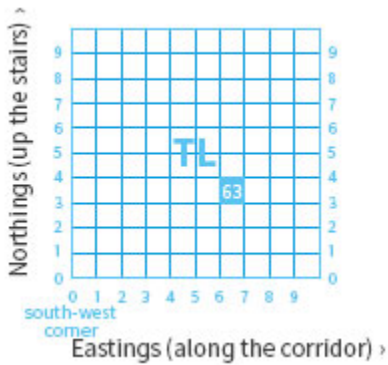
The principle of the National Grid is the division of the UK into squares of decreasing size, showing increasingly "zoomed in" views. The picture to the left shows the highest level - each square here is 500km. The letters identify each square.

The next level divides each 500km square into five-by-five 100km squares. These are also identified by a letter, preceded by the letter of the 500km square they belong to. See image right. It's easiest to see the division if you look at the grid over Scotland. Scotland is covered by the 500km "N" grid, and the 100km grids NA, NB, NC, and so on inside that.

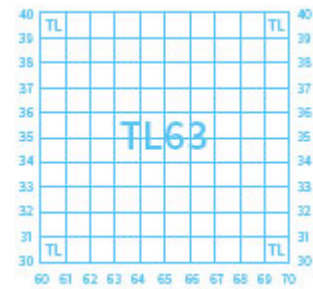
Each 100km grid is then divided up into 10km squares. These are numbered from 0 to 9 on both the North-South axis (with 0 being to the South), and the East-West axis (with 0 being to the West). The bottom left (South-Western) corner of each of the 100km squares thus has a coordinate of 0,0, up to the top right (North-Easter) having a coordinate of 9,9. The way the 100km grid is broken into 10km squares is shown below.

Finally, each 10km square is divided into 1km squares. When you look at an Ordnance Survey map, these are the squares you see in blue.

				HP		
			HT	HU		
	HW	HX	HY	HZ		
NA	NB	NC	ND			
NF	NG	NH	NJ	NK		
NL	NM	NN	NO			
	NR	NS	NT	NU		
	NW	NX	NY	NZ	OV	
		SC	SD	SE	TA	
		SH	SJ	SK	TF	TG
	SM	SN	SO	SP	TL	TM
	SR	SS	ST	SU	TQ	TR
SV	SW	SX	SY	SZ	TV	



Each one of the 1km squares can be looked up by a grid reference, listing each of the grid squares it belongs to from the 500km level down. In the examples here, the 500km square is "T", the 100km square inside that is "L", the 10km square inside that is East-West 6, North-South 3 (63). On the 1km grid, you'll see that the East-West grid numbers 60 to 70, and the North-South shows 30 to 40. These represent one-tenth increments of the 10km grid - so



the bottom-left is "6-0, 3-0", with the top-right being "6-9, 3-9" (because we reference the bottom-left corners; "7-0, 4-0" is the bottom left corner of the 10km grid square up and right of the one we're looking at).

All of this goes together to form a four-figure grid reference. The bottom-right square of the 10km grid would be TL6030. Six figure grid references can be formed by measuring where a point is within a 1km square

Some compasses (see later) include grid measurement tools for this. You can also imagine a 10x10 grid overlaying the 1km grid you are looking at for an estimated reference (see right). There are other tools for working out 6 (and higher) grid references.



Six Figure Grid Reference							
T	L	6	3	1	3	4	6
500km	100km	10km easting	1km easting	(100m easting)	10km northing	1km northing	(100m northing)

The 500km and 100km are not always stated, usually when the map you are using is already known. But if they are not stated, and the map is not known - you will not know which map to look for to make sense of any grid reference you are giving.

You can also use numbers to represent the 100km grid. If you refer to the previous page, you'll see that not all of the 100km grid squares have letters in - some are blank, and the diagram certainly doesn't cover every 100km square of every 500km square. This is because not every 100km square has anything worth mapping in it. For the squares that are mapped, a number coordinate is given, from 0,0 giving the bottom left hand corner of square SV. Square TL therefore can be give the 100km number reference of 52, making our **eight** figure reference **56312346**.

Printed Maps

Now we know how the National Grid works, how does this match up with maps we can buy from our local outdoor shop?

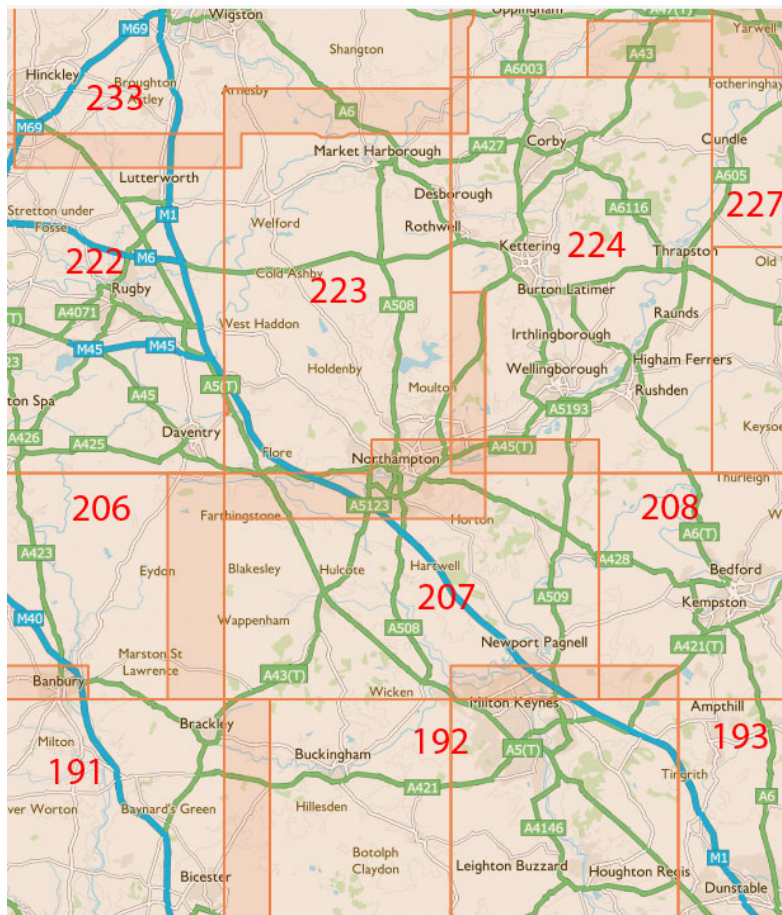
Ordnance Survey publishes maps that are convenient. If you're walking in the Yorkshire Dales, you want a map of the Yorkshire Dales - not some abstract set of sheets that might only partially cover the area you are interested in.

When you get a map, there are several things you need to look at:

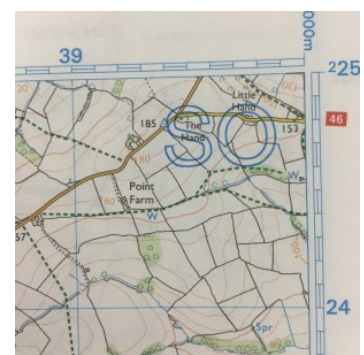
- Area covered. For a given activity, you might need more than one map to cover all of the area you need.
- Scale needed. Different scales (how "zoomed in" a map is) are useful for different activities. Choose the right scale for the activity you are doing.
- Date published. The older a map is, the less accurately it is likely to be. Features such as roads, footpaths, buildings, and so on change on a fairly regular basis. An out of date map can be more of a hindrance than a help. Magnetic North also changes - see later.

Area Covered

Published maps do not usually follow the National Grid sheets. Instead, they map useful areas. Consider the following diagram that shows all of the OS Explorer map sheets published around Northampton.



As you can see, the maps overlap, are sometimes odd-shaped, and definitely don't form a nice, regular grid.



When we look back to our grid reference notes, we know that the National Grid letters are important when describing which part of the grid the numbers refer to. So how can we tell which lettered grids a published map covers? Easy - they're printed on the map! The blue hollow letters printed onto a map refer to the National Grid. If a printed map covers more than one (for example, if the map covers an intersection between lettered National Grid sections), then you will need to look for all of those letters when using grid references.

In the example above, showing SO, you can also see a small "2" next to the start of the northing grid reference (the top corner shows ²25). That preceding "2" shows the vertical 100km grid reference of SO, as we discussed earlier regarding eight figure grid references.

Map Scales

Map scale tells you how "zoomed in" a map is. The two most common scales used in outdoor pursuits are 1:50,000 (or 1:50k), which is the scale used by Ordnance Survey's Landranger maps, and 1:25,000 (or 1:25k), which is the scale used by OS Explorer maps. Many other map scales are used, from 1:200,000 (or thereabouts) road atlas scales, to 1:15,000 and lower for more detailed views for pursuits such as orienteering.

Scale can be translated as "if I measure *this* on a map, it represents *n* times that measurement in real life". So, for example, on a 1:25k map, if you measure 1cm on the map that is equal to 25,000cm in real life.

No-one drives, rides, or walks in terms of centimetres, though. So to make better sense, we should convert those 25,000cm into some more realistic units. Kilometres, for instance.

We know that there are 100cm in 1 metre, and 1,000m in 1km. To convert centimetres to metres, we must therefore divide by 100; and to convert metres to kilometres we divide by 1,000.

$25,000\text{cm} = (25,000 \text{ divided by } 100) \text{ metres} = 250\text{m}$

$250\text{m} = (250 \text{ divided by } 1,000) \text{ kilometres} = 0.25\text{km}$.

We now know that 1cm measured on the map is equal to 0.25km in real life. So if we measure 4cm on the map, that is 1km in real life.

We can do a similar calculation for 1:50k: $1\text{cm} = 50,000\text{cm} = 500\text{m} = 0.5\text{km}$, so 2cm map = 1km real.

You should be able to see a relationship there: 25,000 is half of 50,000, and 1cm measured on a 1:25k map represents half the real life distance as measuring 1cm on a 1:50k map.

The Right Scale?

The right scale to choose is the scale which shows as much or as little detail as you need, for whatever you are going to be using the map for. 1:200k maps are good for seeing roads, and therefore makes it a good scale for road atlases, but they do not show enough detail for much else. 1:50k maps are great for relatively long distance activities that aren't going off the beaten track too much - sightseeing by road (more than the "getting from A to B" that road atlases offer), cycling routes, and so on. They aren't too bad for planning long distance hikes, but don't offer enough detail to keep you safe during a hike. 1:25k and lower are good for hiking, and 1:15k and lower are good for orienteering.