AT THE EDGE MOUNTAINEERING

"Your greatest failure is not to try"

INTRODUCTION TO MAPS

This is the first Part in my online navigation course from At The Edge Mountaineering. Over the next few Sections and Parts, we will explore different elements of navigation from starting out, to more advanced techniques that will set you up to head out into the hills and mountains independently or as part of a group.

To put these skills into practice and to learn more, take a look at my Navigation Course I offer.

All **confirmed bookings** will receive a **10% discount** code to use on **Harvey Maps** products from their site.

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Introduction to Maps Part 1: Scales

Understanding maps and scales can be difficult to master to begin with but is very important when it comes to planning walks and navigating in the hills and mountains. A map with too much detail can make it difficult to read and distracts you from the important information. Too little detail and it becomes just as difficult to navigate with due to not having enough information to figure out where you are!

So how do I know which map to choose? Firstly, let's look at what maps are available to us.

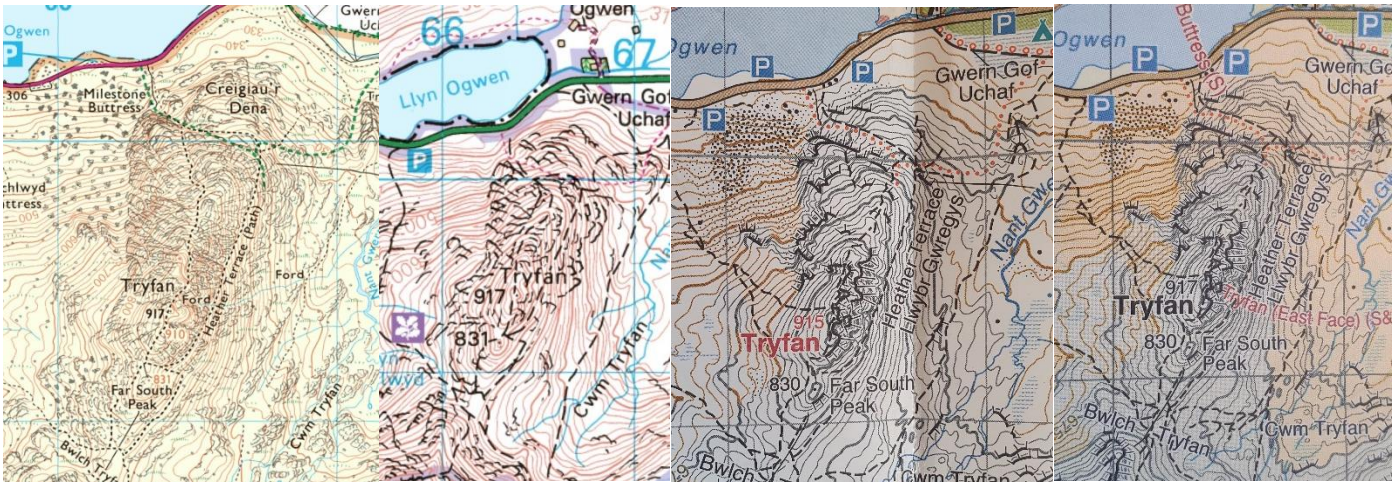
A map is a bird's eye view of an area, depicting the land in 2D to allow the user to navigate in any conditions. In the UK, the two main map producers are Ordnance Survey and Harvey Maps.

Ordnance survey, or OS, produce maps for the entire UK in two main scales: 1:25,000 and 1:50,000. (More on scales later) They use a contour interval of 5m or 10m.

Harvey Maps produce maps for select areas of the UK specifically for hill walkers. These mainly focus on the popular hill and mountain areas with more areas being added regularly. The main map scales for Harvey's Maps are 1:25,000 and 1:40,000. They use a contour interval of 10m or 15m.

Map Scales:

Like with a scale model, maps are scaled so that a measurement on the map equals an actual measurement on the ground but scaled up. For example, on a 1:25,000 scaled map, 1cm measured on a map using a ruler equals 25,000cm (250m) on the ground.



From Left to Right:

1. *OS map **1:25,000** scale (**1cm** = 25,000cm (250m) / **1mm** = 25m / **4cm** = 1km)*
2. *OS map **1:50,000** scale (**1cm** = 50,000cm (500m) / **1mm** = 50m / **2cm** = 1km)*
3. *Harvey map **1:25,000** scale (As with OS scale)*
4. *Harvey map **1:40,000** scale (**1cm** = 40,000cm (400m) / **1mm** = 40m / **2.5cm** = 1km)*

Notice the level of detail compared to the map scale. The larger the scale (1:25,000) the more detail is shown. The smaller the scale (1:50,000) the less detail is shown but more of an area is shown.

Imagine you are hovering only 100m above the ground and looking straight down. You will see far more detail and a smaller area than if you were, say, 500m above the ground. This is how map scales work, in a nutshell.

The level of detail shown on OS and Harvey maps is very similar. However, there are a few major differences and several subtle ones too, which we will cover later in this article.

Choosing a map:

Deciding on which map to choose depends on what you are doing in the hills and mountains. Above is a selection of the most popular types of maps used in the hills and mountains:

(*Top: Left - Right*)
OS Landranger Map **1:50,000**
OS Explorer Map **1:25,000**
OS Explorer Active Map (Laminated) **1:25,000**

(*Bottom: Left - Right*)
Harvey Superwalker Map (XT25) **1:25,000**
Harvey British Mountain Map **1:40,000**

OS **1:25,000** scale maps offer the most detail and cater for a wide variety of activities in the hills and mountains. They are great for micro and night navigation, and for navigating in featureless terrain due to the greater level of contour information (10m intervals).

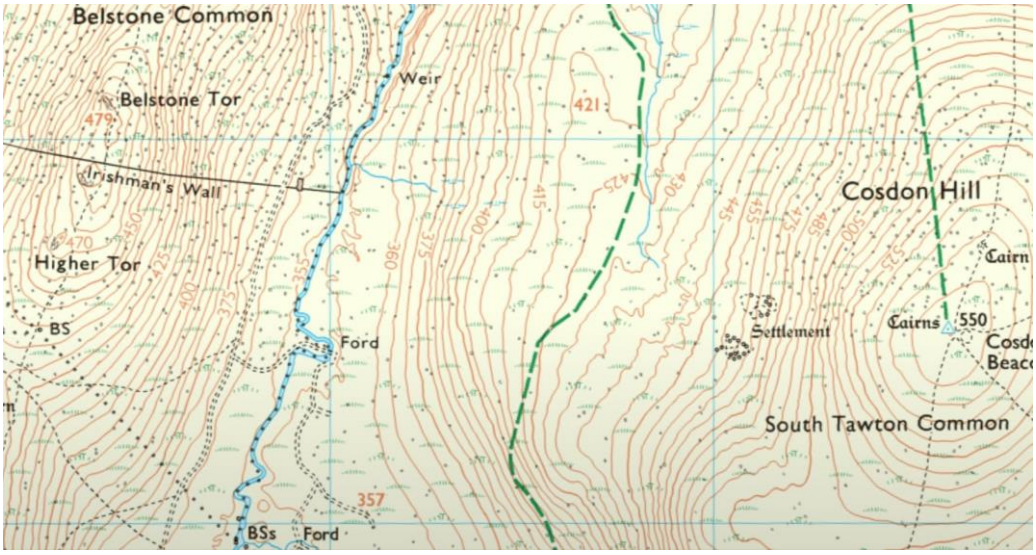
However, with lots of detail, this sometimes clutters the map and takes away the focus on the smaller contour features.

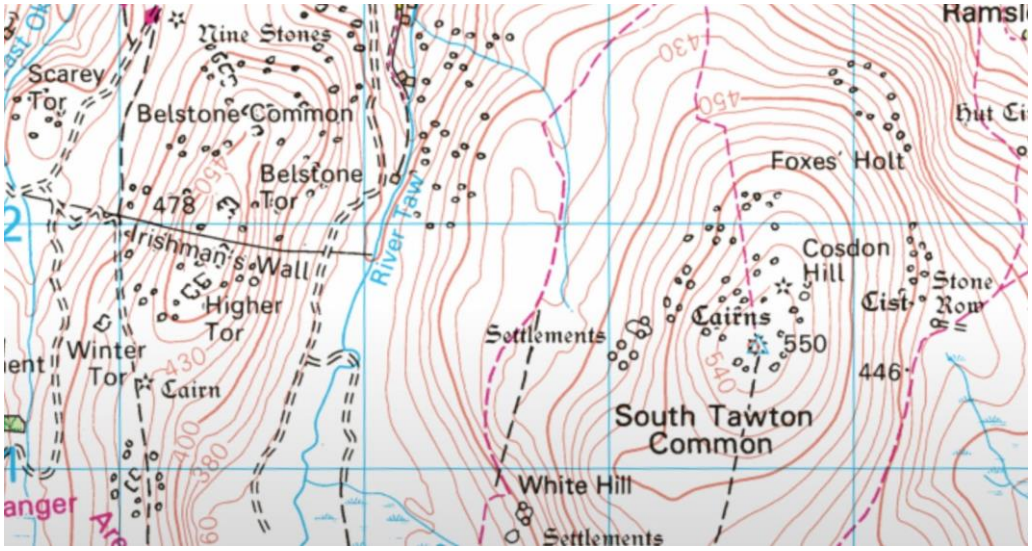
OS **1:50,000** scale maps takes away a lot of the details and focuses mainly on the larger contour features and other major features seen on the ground. This scale is perfect for winter navigation when snow can cover the smaller features such as footpaths, smaller contour features and rocky ground.

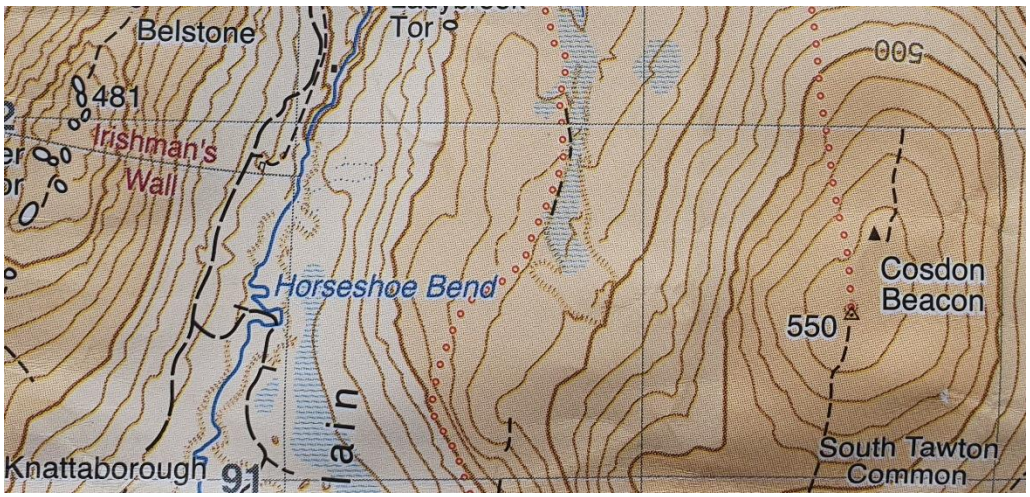
Harvey British Mountain Maps **1:40,000** scale is tailored more towards climbers and mountaineers who will not necessarily need to navigate to small features. They show enough detail and contour info but have de-cluttered the map by removing rocky details, for example, that are not necessary for navigation. Another example is that the contours are grey on rocky ground and crags are clearly marked. The major climbing crags are marked in red to help climbers and mountaineers find their climb.

However, the 15m contour interval does take away some of the finer detail and makes navigation across featureless terrain more difficult.

Take a look at the three examples below to see how the different map scales show more or less detail. Notice the difference in detail from Cosdon Hill/Beacon to Belstone Tor.







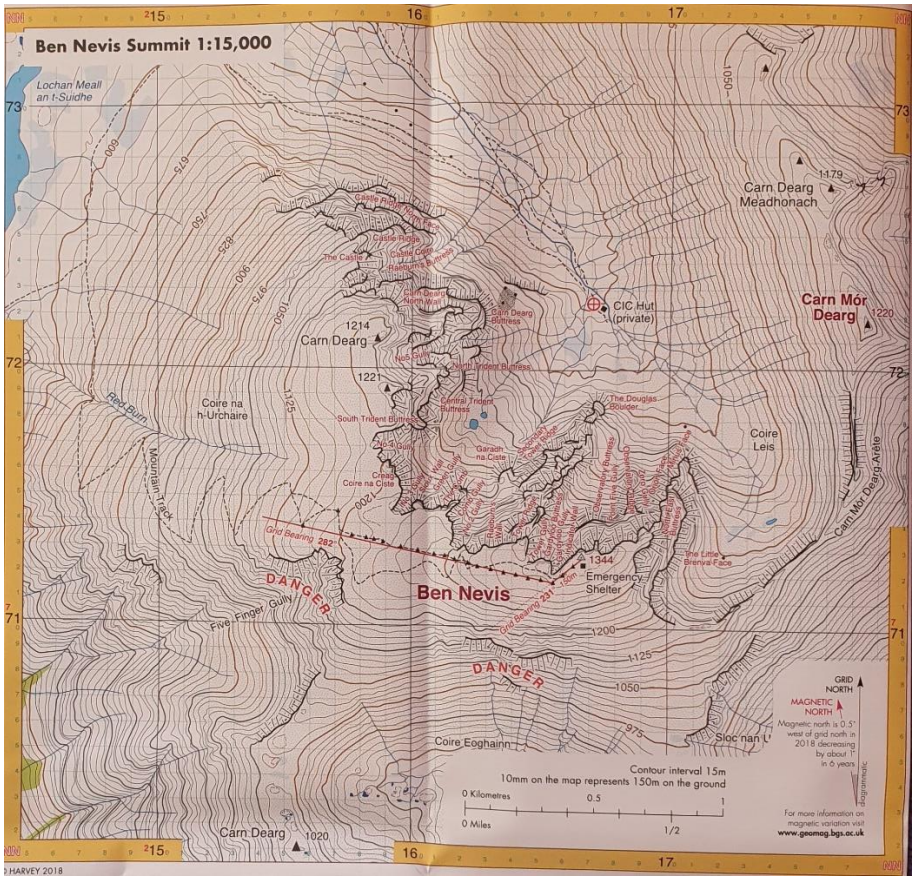
When deciding on a map, have a think about what your intended use is. This may sound silly, "it's obviously to navigate with", I hear you cry, however have a look at a few examples below:

- Featureless terrain/Winter navigation: **1:50,000**
- Night navigation or micro navigation: **1:25,000**
- Long distance walk/expedition: **1:40,000 / 1:50,000**
- Complex ground: **1:25,000**

I will note here though, that it is worth taking two maps with you whenever you are out in the hills and mountains and this generally involves taking two different scales of map of the same area. This gives you the option to change between scales when appropriate and also gives you a spare map in case one gets lost to the elements!

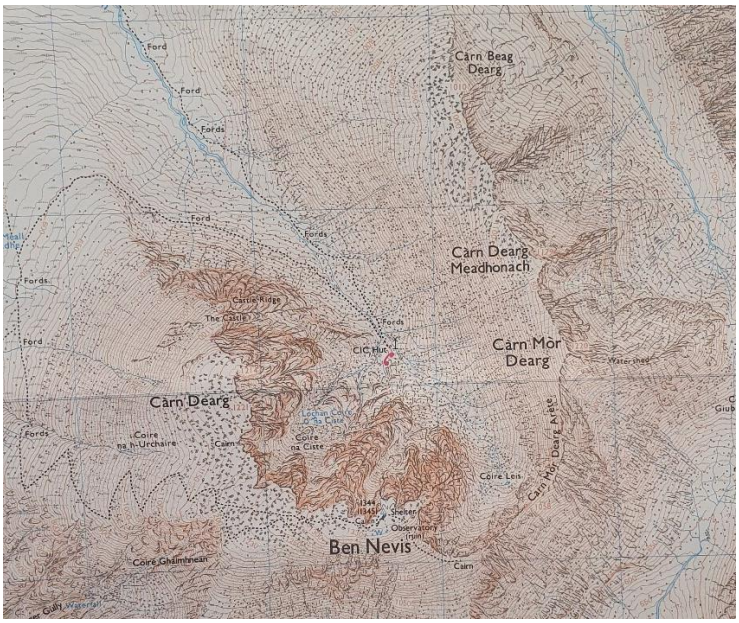
For example, if I am doing a multi-day walk and wild camp in the Lake District, I would take a **1:50,000** OS map or **1:40,000** Harvey map as it covers the entire area I will be covering (so I won't need multiple maps) and then a **1:25,000** map covering the area I will be wild camping in as this will show a greater level of detail as I may be required to navigate that area in darkness/poor visibility and the greater level of detail will help me to find my camp site.

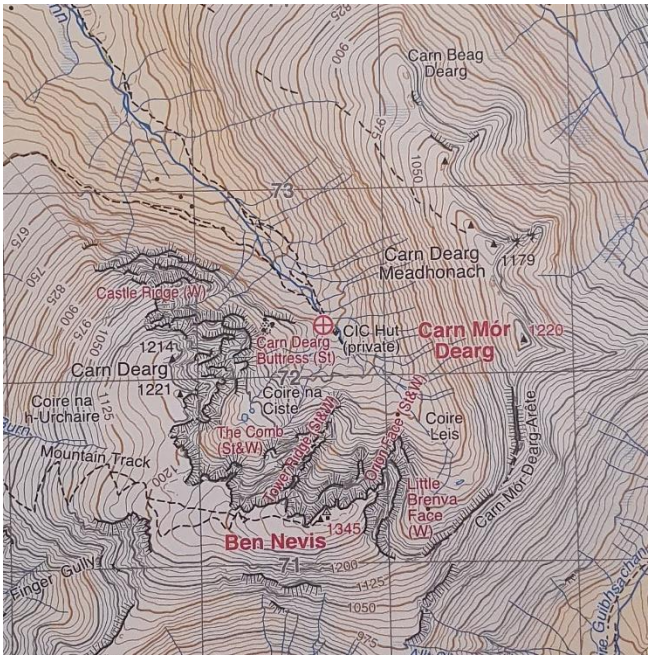
Harvey Maps differ to OS maps in many ways and one of these ways is on their **1:40,000** British Mountain Maps. Not only does their scale sit between the **1:25,000** and **1:50,000** but they also include contour colouring at differing altitudes to help visualise the major landforms and also the inclusion of larger scale areas on the reverse of their maps for the most popular peak or peaks.



The image above shows Ben Nevis enlarged to **1:15,000** offering more detail to help navigation.

*The Lake District Harvey British Mountain Map includes a **1:20,000** scale map of both the Scafell Pike area and the Summit of Pillar on the reverse of the main **1:40,000** maps*





These two images show Ben Nevis again but this time showing how a 1:40,000 Harvey Maps (right) who use contour colouring to help visualise major landforms, compared to 1:25,000 OS maps (left). Notice the lack of cluttering in the Harvey Map and see how contour features are more clearly defined.

It is very important to know what scale of map you are using as this will have an impact when it comes to measuring distance (we will cover this in a later article). ALL maps will have the scale printed on the cover and on the map itself.
So just be aware.

Both Harvey Maps and OS Maps have a wider range of maps and scales that they produce, from road maps and cycling maps to National Trail maps and bespoke mapping. What we have focused on in this article is their more popular maps which most of us will use regularly.

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INTRODUCTION TO MAPS 1.2:

SYMBOLS AND FEATURES

Welcome to **Part 2** of my **Introduction to Maps.** In this Part we will look at map Symbols and Features, what they are and how to use them.

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Symbols and Features

As mentioned in Part 1, a map is a two-dimensional, or birds eye view of an area. To visualise the main features on the ground, symbols are used to help us understand what is around us. From the shape of the land and type of terrain, to railway stations and even phone boxes (remember them?), symbols show, in great detail, all the information we need as navigators.

There are hundreds of symbols and abbreviations used on maps, and the symbols used by OS are not the same as those used by Harvey Maps, so as to not overwhelm you, I have condensed this article down to the main points:

- What are symbols
- How do we use them?

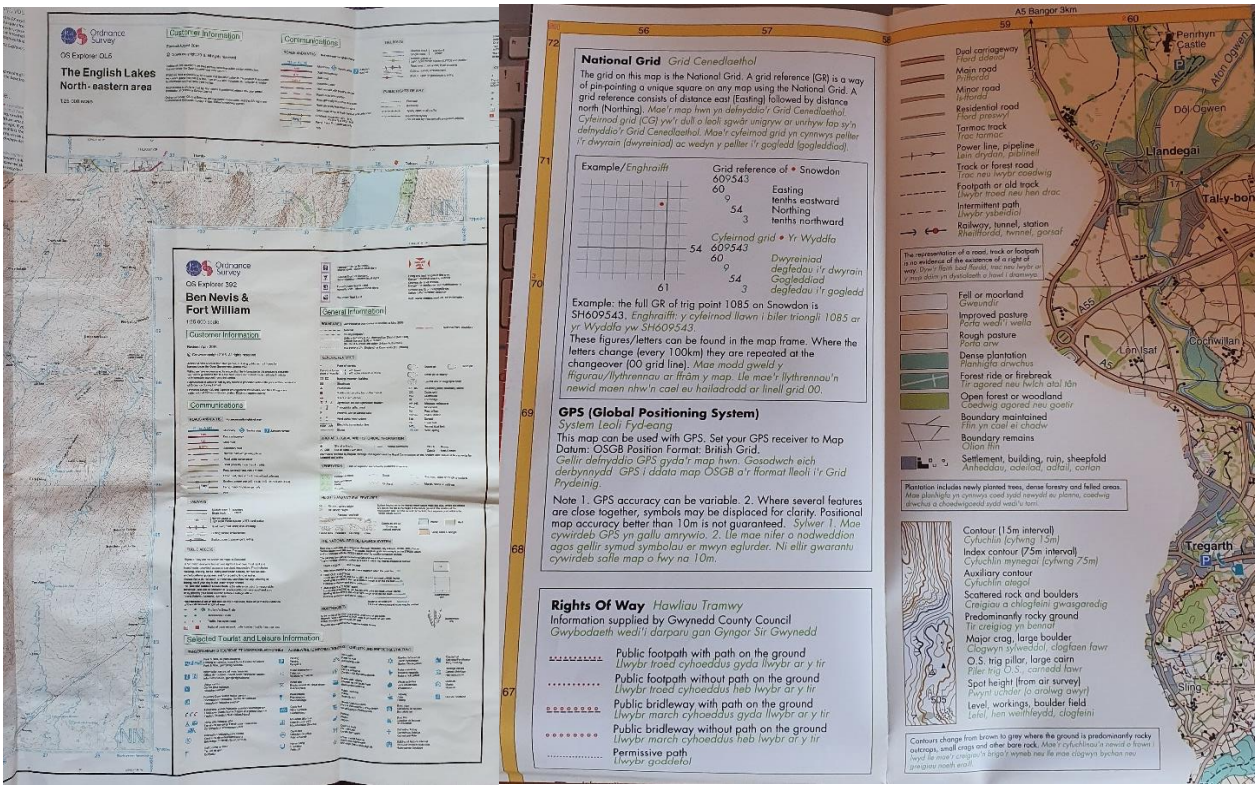
Map Legends

Open up a map for the first time and the lines and symbols will not make much sense at first. What are those blue lines? What is that triangle with a dot in the middle? And what are those dashed lines?

The answer to these questions can be found in what is known as the Map Legend or margin of information. This is a list of all the signs and symbols found on the map and a good starting point to learning how to read a map.

On OS maps, the legend is usually found at the side, in a corner or the top of the map.

On Harvey Maps it is either on the reverse of the map or in a corner.



Above images:

1. ***Left**: OS maps showing the legend at the top of a map and at the side*
2. ***Right**: Harvey map showing the legend in the corner*

The legend will also give you more information about the map, such as the year it was printed, the north points and magnetic declination (more on this in a later article), the map area, scale and sheet number.

Learning the Legend

At first glance, it may seem like an endless task to try and learn all the symbols in a map legend. So to begin with, I will break the legend down into three types of features to try and help you learn some of the key symbols as a starter. These features are:

- Linear Features
- Spot Features
- Area Features

For your own reference, I have highlighted below where you can download the legend for both OS maps and Harvey Maps so you can learn symbols for yourself.

Download OS map legends:
1:25,000 OS Explorer Legend
1:50,000 OS Landranger Legend

Download Harvey Map legends:
Super Walker Legend
British Mountain Map Legend

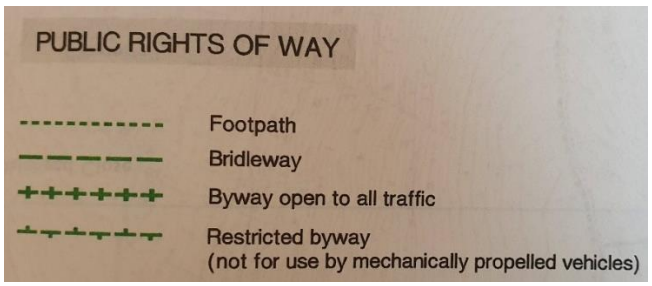
Linear Features

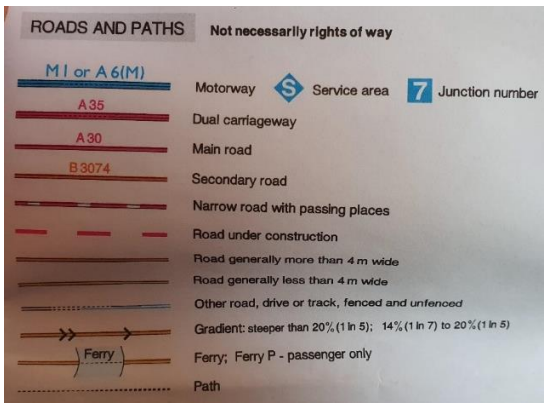
Linear features are 'lines' on the map that you can use to follow. They are commonly referred to as 'handrails' (much like a banister on the stairs is used to 'lead' you up them as something to 'hold on to').

Examples of linear features (or Handrails) are:

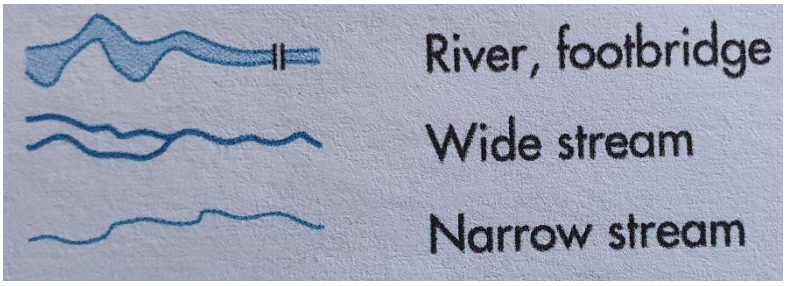
- Rivers and streams
- Roads and tracks
- Footpaths and other public rights of way
- Boundaries
- Major landforms such as ridge lines

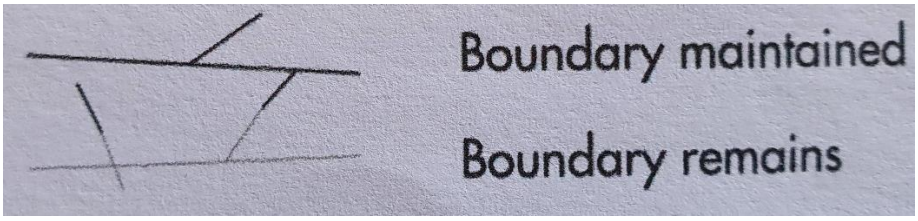
Example of OS Linear features

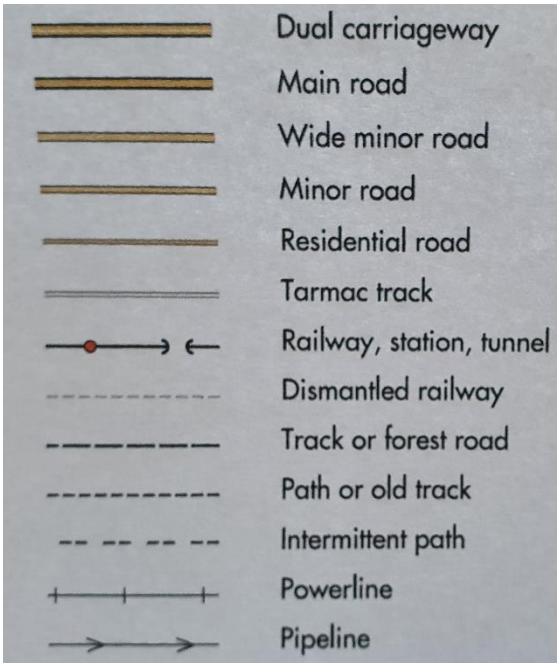




Example of Harvey Maps Linear features







At a basic level, we use handrails to orientate the map to the ground and relating the features on the map to those on the ground. I will cover this in more detail in a later article.

Spot Features

Spot features are small points or single point features that pinpoint a particular location.

Examples of spot features include:

- Small lake or pond
- Track junctions
- Triangulation Pillar (Trig Point)
- Footbridge
- Buildings

Area Features

Area features are large features. Examples include:

- Lakes
- Woodland and forests
- Marshes
- Slopes

I have purposely not added examples above for Spot and Area features as I want to encourage you to look at the Legends of maps and find them for yourself. Below is an image from a Mountain Training Publication (Hillwalking) which shows examples of all three types of features. Have a guess at what types of feature are numbered. Answers at the end of this article.

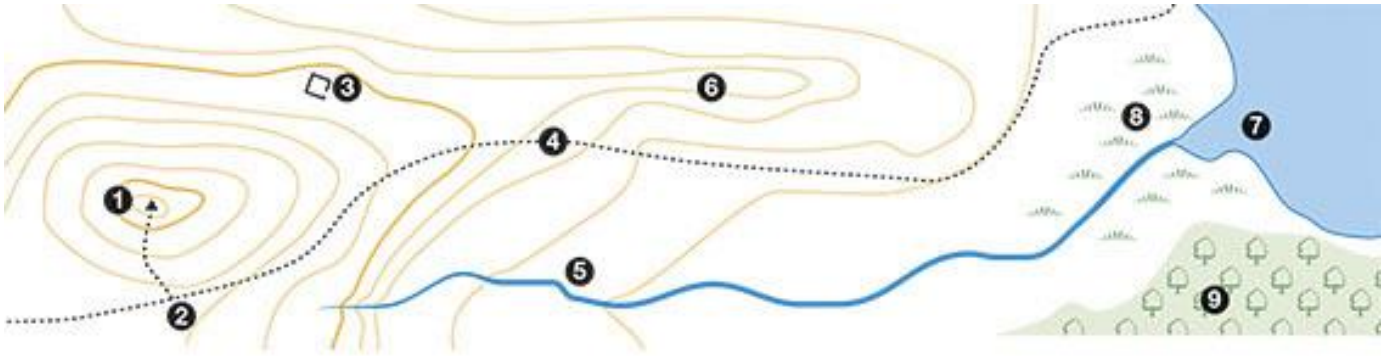
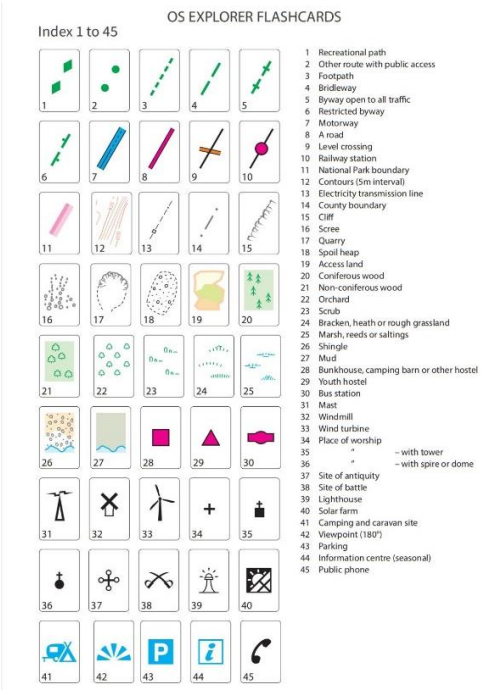


Illustration from 'Hillwalking' © MTUK/VG 2015

To learn more about OS map symbols, take a look at their Flash Cards


OS EXPLORER FLASHCARDS

Index 1 to 45

1 Recreational path
2 Other route with public access
3 Footpath
4 Bridleway
5 Byway open to all traffic
6 Restricted byway
7 Motorway
8 A road
9 Level crossing
10 Railway station
11 National Park boundary
12 Contours (5m interval)
13 Electricity transmission line
14 County boundary
15 Cliff
16 Scree
17 Quarry
18 Spoil heap
19 Access land
20 Coniferous wood
21 Non-coniferous wood
22 Orchard
23 Scrub
24 Bracken, heath or rough grassland
25 Marsh, reeds or saltings
26 Shingle
27 Mud
28 Bunkhouse, camping barn or other hostel
29 Youth hostel
30 Bus station
31 Mast
32 Windmill
33 Wind turbine
34 Place of worship
35 " – with tower
36 " – with spire or dome
37 Site of antiquity
38 Site of battle
39 Lighthouse
40 Solar farm
41 Camping and caravan site
42 Viewpoint (180°)
43 Parking
44 Information centre (seasonal)
45 Public phone

Once you are able to identify a few symbols for each type of feature, you can begin to develop the basic skills to navigate along footpaths. These symbols and features are the key to learning navigational techniques to aid you following a route. Two of these techniques are '**Collecting**' and '**Catching**' features.

Collecting Features

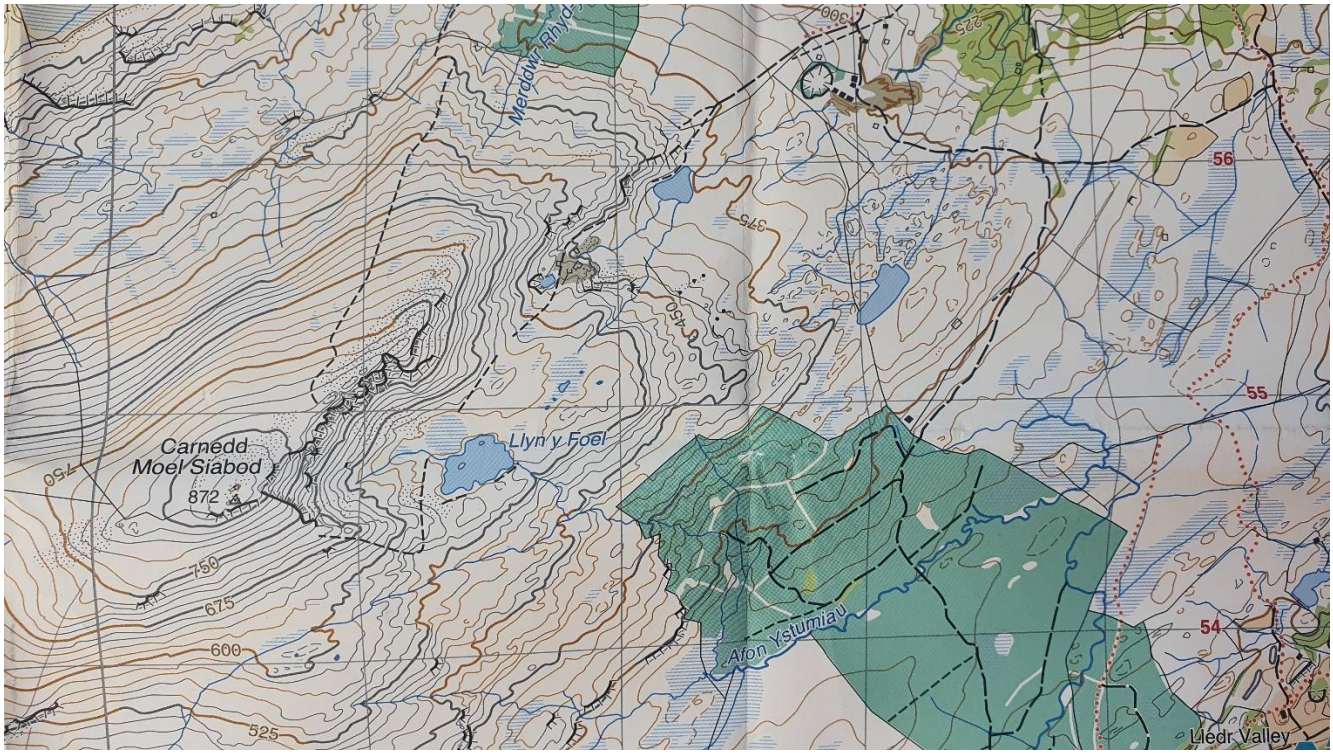
This is a technique used to help keep you on track and know where you are. It involves looking at your route on the map and identifying symbols along your route that you will pass by. As you pass by these features on your walk, you 'collect' or 'tick off' these features. This helps you visualise your walk and enables you to stay on track as you know what features to look out for.

Catching Features

These are effectively a 'back stop' (like in cricket) or a safety net to 'catch' you if you have gone too far. Take a look at your route and look beyond your objective to find a large obvious feature that isn't too far away (a few hundred metres). This could be a large area feature (such as a woodland or even change in direction of the slope) or maybe a linear feature such as a stream or a footpath. As the saying goes; "If you get to this feature, you've gone too far"

I will go into more detail about **Collecting** and **Catching** features in a later article.

Finally, take a look at this extract below from Harvey Maps Superwalker XT25 - Snowdonia North. Use the Downloadable Harvey Maps legend and see how many features and symbols you can find in this area.



Answers to 'what types of feature' image:

1. *Spot*
2. *Spot*
3. *Spot*
4. *Linear*
5. *Linear*
6. *Linear*
7. *Area*
8. *Area*
9. *Area*

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INTRODUCTION TO MAPS 1.3:

GRID REFERENCES AND THE GRID SYSTEM

Part 3 in my **Introduction to Maps** will look at the UK Grid System, Grid References and why they are important to navigation.

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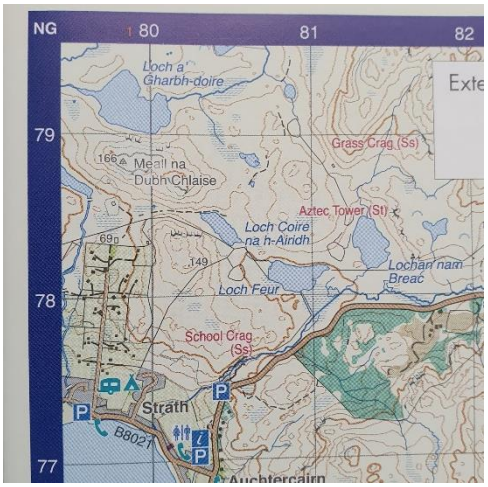
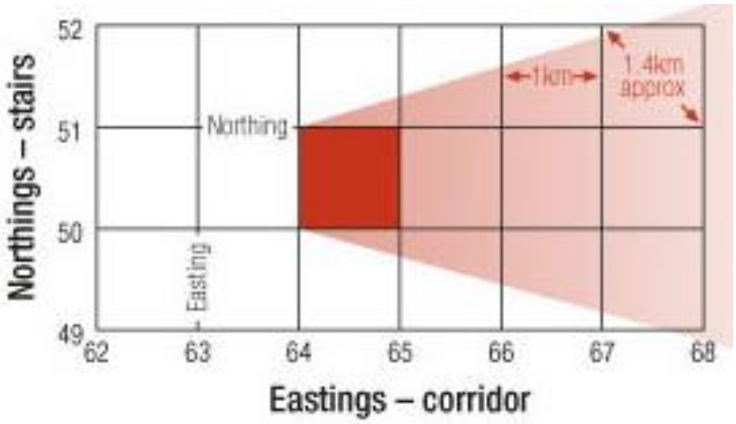


Grid References

UK maps are overlay-ed with blue lines running vertically (North - South) known as Eastings as they are spaced going across the map, and horizontally (East - West) known as Northings as they are spaced going up the map.

These lines create squares known as GRID SQUARES. A single Grid Square is 1km x 1km and roughly 1.4km across the diagonal. They are useful for the following points:

- Plotting positions on the map using Grid References
- Measuring distances (This will be covered in a later article)
- Taking bearings with a compass (This will be covered in a later article)



Mountain Training Navigation in the Mountains Publication Image

Using this grid, we can identify and pin point large and small features on the map. These are known as Grid References. As walkers and climbers, we focus on two types of grid references:

- 4-figure grid references (known as 4- fig)
- 6-figure grid references (known as 6-fig)

4-figure Grid References

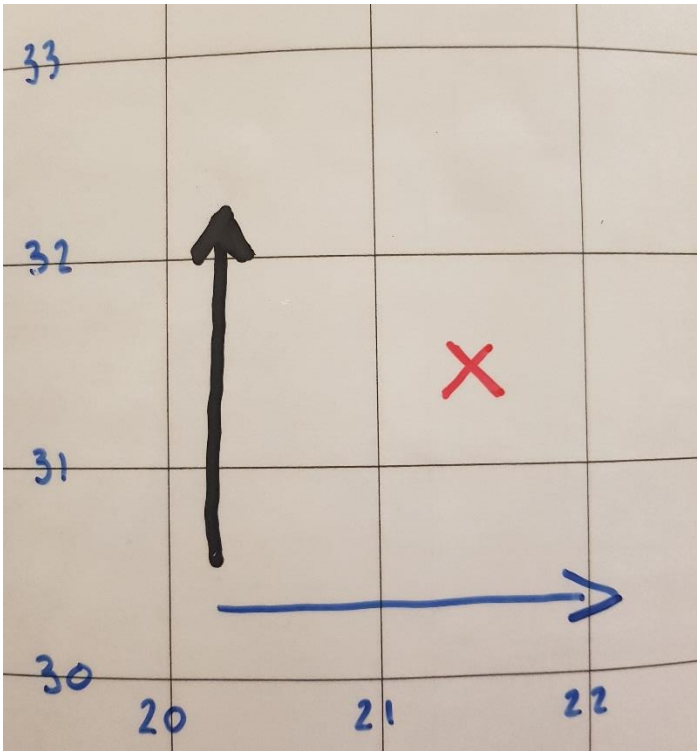
Eastings and Northings are numbered, and these are used to create the Grid Reference. The numbers refer to the square to the right (Eastings) and above (Northings). A 4-figure Grid Reference is used to identify a single 1km x 1km Grid Square. Easting are read first, followed by the Northings or the saying "Along the Corridor and Up the Stairs" (see image above).

Using the image above, the 4-figure grid reference of the red square would be:

64,50

See the below image for another example. Working with the saying "along the corridor and up the stairs", the 4-figure grid reference for the **Red X** is:

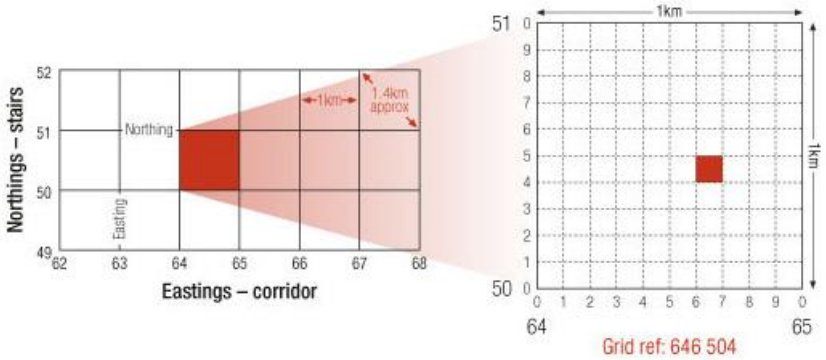
21,31



6-figure Grid References

4-figure grid references are perfectly adequate to locate features on a map, for example saying the Trig Point is located in grid square 84,59. However, this may be too vague to pin-point small features on a busy map or if you want to give your exact location to rescue services.

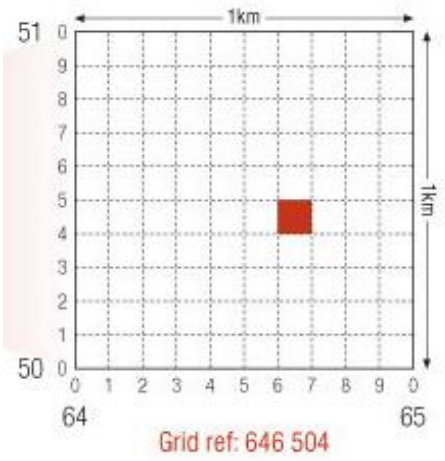
For a more precise location, we can further divide a 1km x 1km grid square into 100m x 100m squares.



Mountain Training Navigation in the Mountains Publication Image

We can do this visually by eye or by using navigational aids such as a compass or a romer (more on these navigational aids further down).

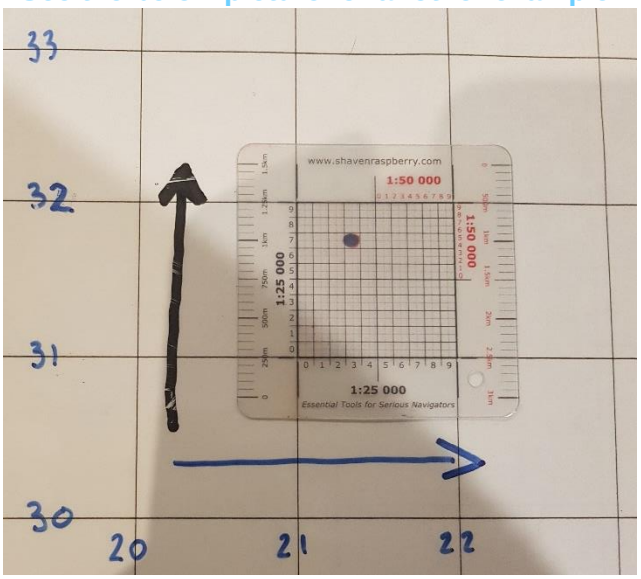
By subdividing a grid square into 10 more Eastings and Northings we use the same concept as before to gain our 6-figure grid reference. See the above and below image for an example:



Mountain Training Navigation in the Mountains Publication Image

To find the 6-figure grid reference for the red square, we go "along the corridor" to get to "**64**". We then divide the square into 10 and continue along the corridor. In this example the Red square is "**6**" (because it's to the right of 6). We write this down as **646,___**. Continue "up the stairs" and we get to "**50**". Divide the square into 10 again and "go up the stairs". In this example we reach "**4**" (because it's above the 4). We now have our complete 6-figure grid reference which we write down as **646,504**

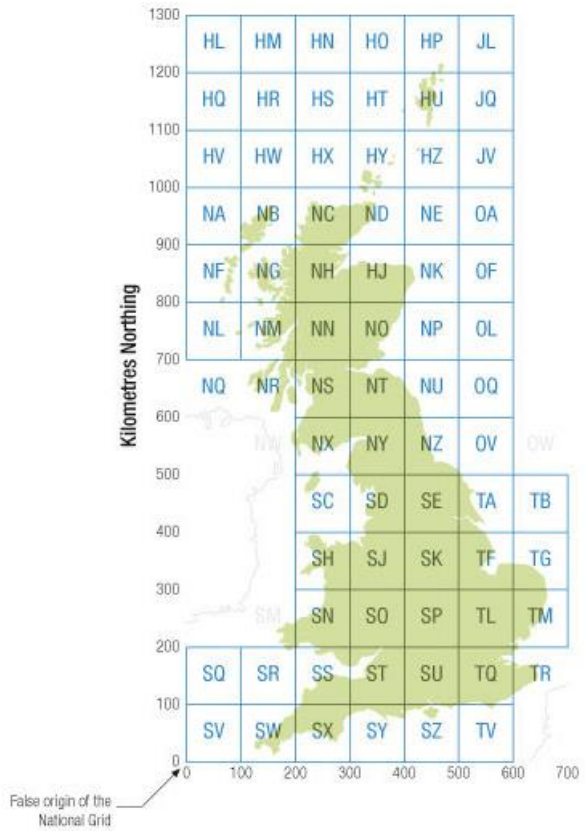
See the below picture for another example:



The location of the black dot is in grid square **21,31**. This is an accuracy of 1km x 1km. To further pinpoint it's position to a greater accuracy of 100m x 100m we give the 6-figure grid reference which is **213,317**

The UK Grid System

As mentioned, the entire UK is divided up into a grid based system of squares. These smaller squares are part of the bigger national grid system with squares measuring 100km x 100km. Each of these squares are defined by two-letters, for example SH, NG etc. There are about 50 of these 100km x 100km squares that cover the mainland of the UK, each with their own two-letters to identify them. These letters are particularly important when it comes to giving Grid References, to Mountain Rescue in an emergency for example.
All of these 100km x 100km squares are broken down into the smaller 1km x 1km grid squares and labelled 00 - 99. This means that the same Grid Reference can relate to ALL of the roughly 50 100km x 100km squares covering the UK mainland. By using the two-letter prefix, we can narrow down that grid reference to a particular area. (see below image)

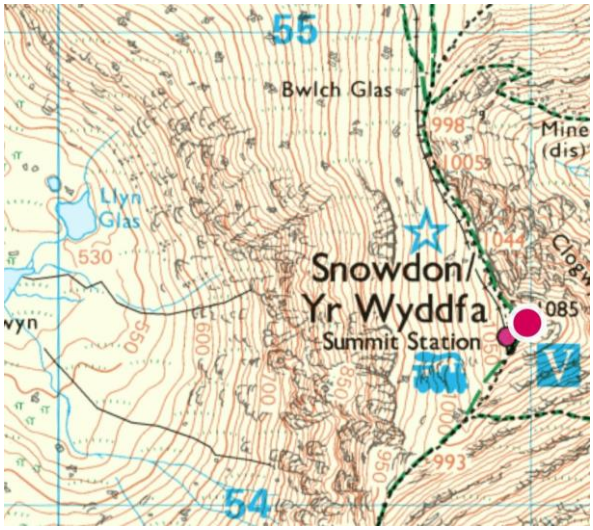


iii. 100 kilometre squares that cover Great Britain with their reference letters

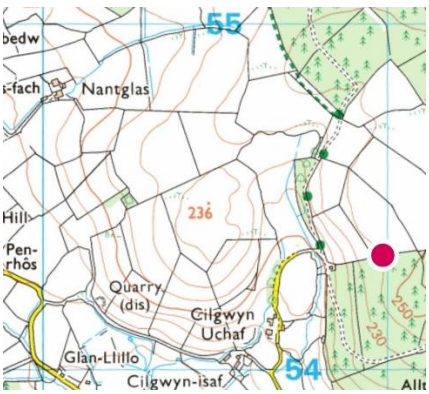
Mountain Training Navigation in the Mountains Publication Image

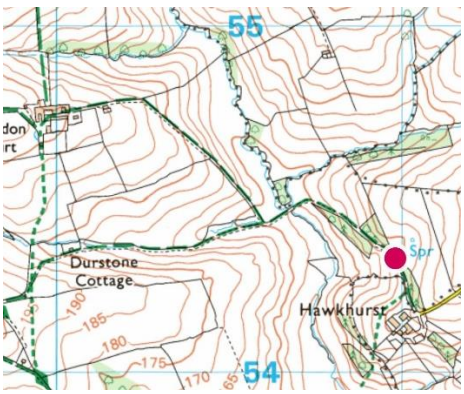
Let's use the Trig Point on the summit of Snowdon as an example:

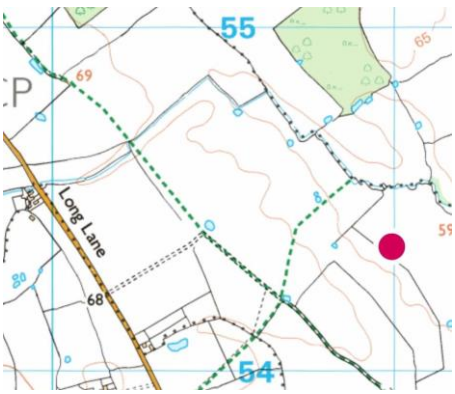
The 6-figure grid reference is **609,543** (The red dot in the image)



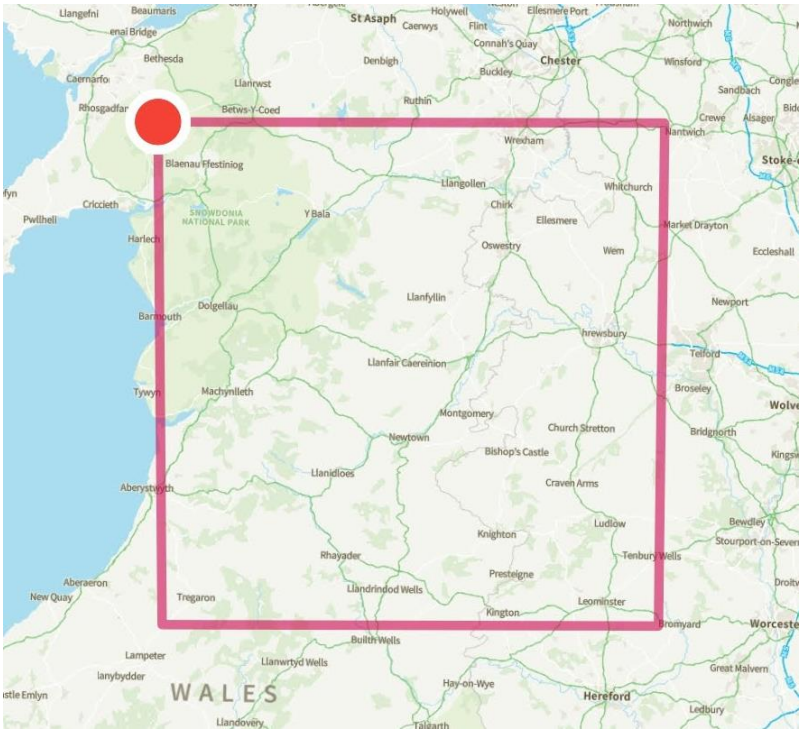
However, all these places below (red dot) share the exact same grid reference **609,543 :**







The four corners of the below square are the locations above, all sharing the same grid reference.



The only way we can narrow the grid reference down to the summit of Snowdon and make it unique is by using the two-number prefix at the start of your grid reference.

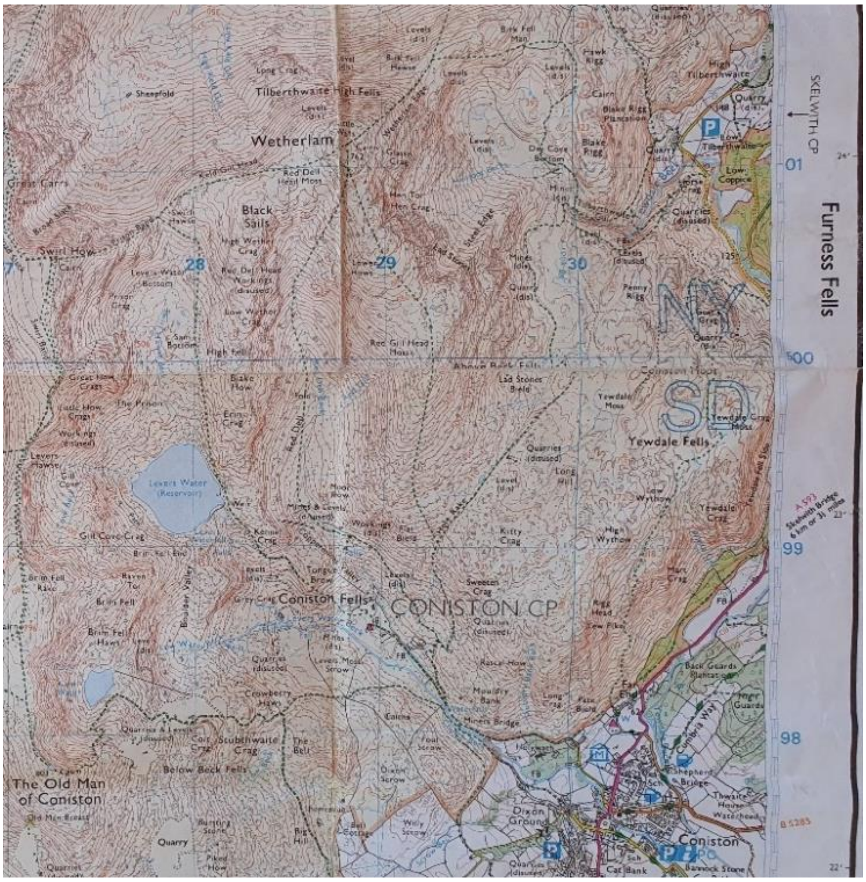
The correct grid reference for Snowdon's summit is:
SH 609,543

The two-letter prefix is really important when giving your location to the emergency services as mentioned. All maps will have the two-number prefix printed on them, either in the corners or printed in the legend.

However, some maps may sit between TWO two-letter prefix areas so it is really important to know whether your map does this or not and find out where to find the prefix.

Take the South-Western area of the Lake District for example.

The prefix changes between The Old Man of Coniston in the South, to Wetherlam in the North. See the image below:



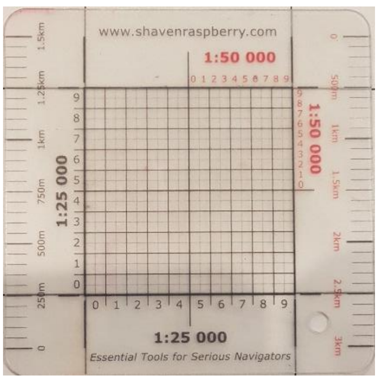
Notice how it changes from **NY** in the north to **SD** in the south. It is clearly defined at the edge of the map.

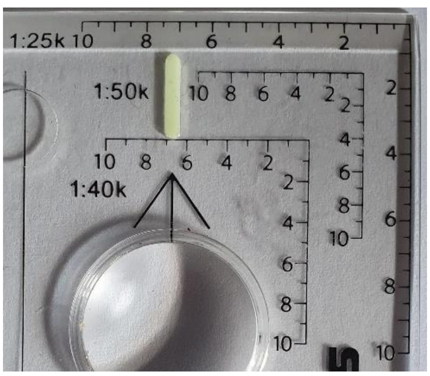
In a scenario where you get injured off the summit of the Old Man of Coniston at Grid Reference **SD** 272,978 but you give the emergency services **NY** 272,978, the location you have given them is 100km to the North! it puts you at roughly 20km North East of Lockerbie, in Scotland!

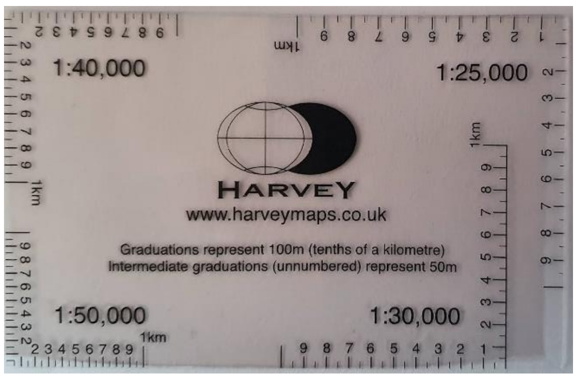
Ensure you know what prefix to add to your grid reference in case you need to use it to pin point you position in an emergency.

Using Romers

I mentioned briefly about using romers to aid you in 6-figure grid references. Romers add a visual aid to help break down your 1km x 1km grid square into the 100m x 100m squares used for 6-figure grid references. See below for some examples of romers and how to use them:

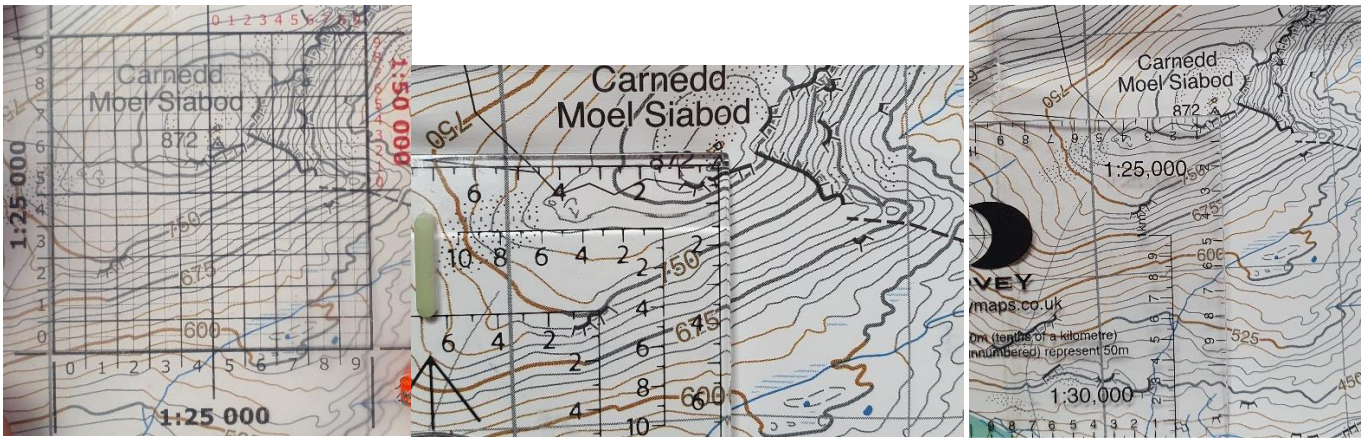






- **Image 1:** Compass romers (*Use the corner of the romer in relation to scale of the map; 1:25k, 1:50k, 1:40k*)
- **Image 2:** Harvey Maps pocket romer (*use the corner in relation to scale of map*)
- **Image 3:** Shaven Raspberry pocket romer (*Place it over the whole grid square*)

Image examples of how to use the different romers to find the grid reference of the Trig Point on the summit of Moel Siabod in grid square **70,54**:



Answer: **705,546**

AT THE EDGE MOUNTAINEERING

"Your greatest failure is not to try"

INTRODUCTION TO MAPS 1.4:

RESOURCES AND CARE OF MAPS

Part 4 of my **Introduction to Maps** series looks at navigational aids, resources and how to look after your map.

HARVEY
Working Together

NNAS
a step in the right direction

MOUNTAIN TRAINING
ASSOCIATION

Navigational Aids

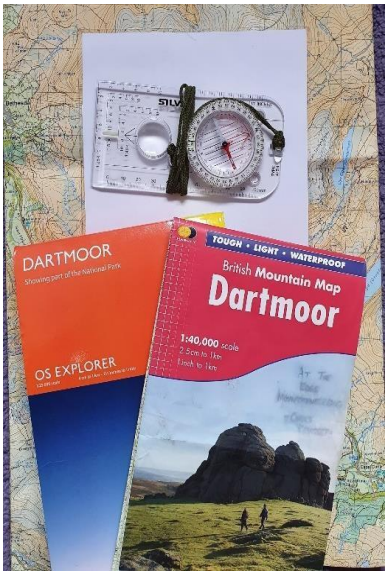
Learning to navigate can be difficult to grasp to begin with. What with all the symbols and techniques to learn, bits to remember and all the maths! With all this in mind, navigational aids are there to help with this, to take away the stress and to make navigation easier and quicker!

As my navigation series continues, I will refer back to some, if not all, of the following navigational aids and resources. Take this time to get familiar with them and even purchase a few. I use all the following navigational aids, either with my own personal navigation or when running a course.

The Basics:

Before heading out into the hills and mountains, there are two navigational aids which are compulsory:

- **A Map** *(of the area you are in)*
- **A Compass**



And I will stress here: **"And the knowledge of how to use them!"**

Without the knowledge of how to use a map and compass, they are both useless to you. If you are unsure, seek professional instruction through a **navigation course** to help you learn the basics.

I will cover the compass in more detail in my next article.

When navigating, we can measure distances both on the map and on the ground using measurements, time and our own stride length, known as pacing (*more on measuring distance in a later article*).

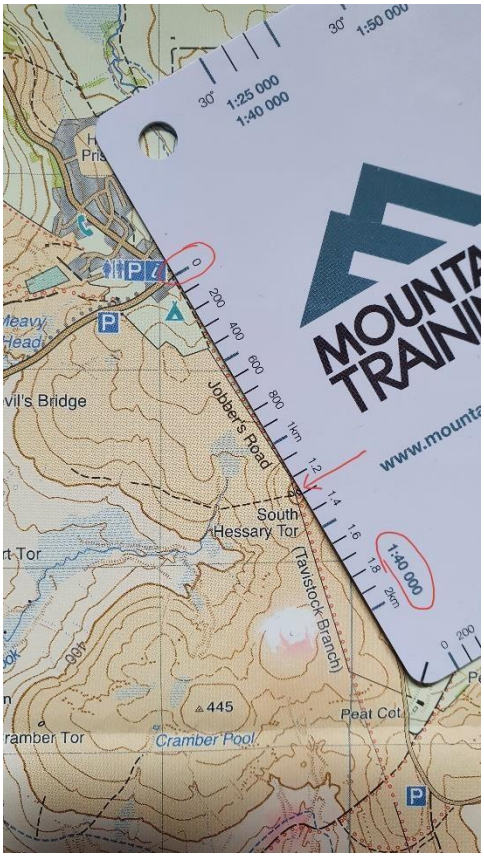
- **Measurment:** using a ruler or roamer to measure distance on a map.
- **Time:** How long it takes you to walk a set distance on the ground.
- **Pacing:** How many paces it takes to walk a set distance on the ground.

To work out distances, we can use a number of aids:

- **Ruler** *(with millimetre increments)*
- **Compass roamer**
- **Distance Cards**
- **Wrist Watch** (with stopwatch/timer) **Or a Stopwatch**
- **Phone Apps and GPS devices**

These aids can be used on the hill or at home when planning a route. The compass is the most versatile aid here as most base plate style compasses have a millimetre ruler on the side as well as roamers.

Distance cards have scale rulers marked on the side to help you measure distances in relation to the map scale you are using.

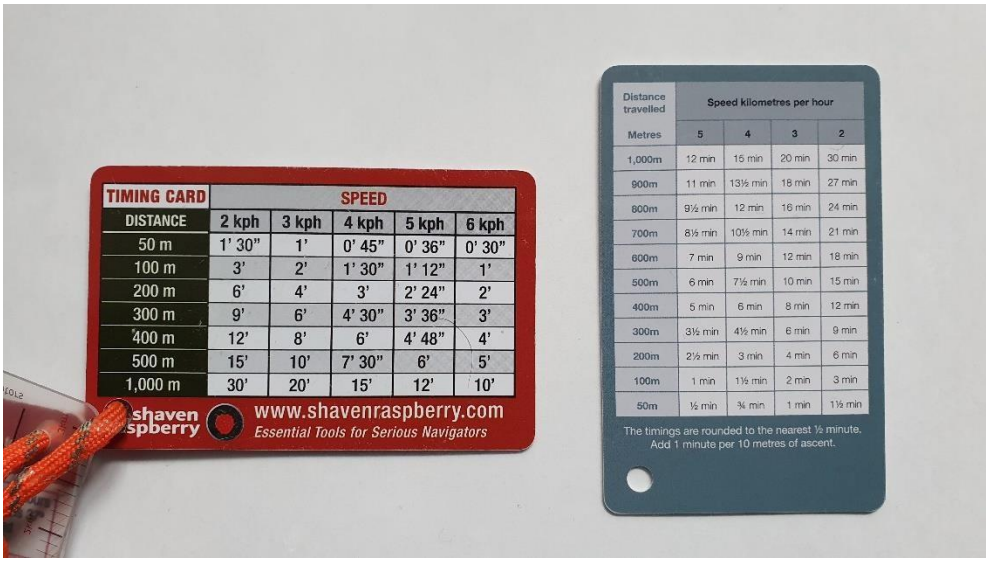


In the above picture, a distance card is used to measure how far it is from the road to South Hessary Tor on a 1:40,000 scale Harvey Map. The answer: **Just under 1.3km**

Timing Cards and Stopwatch:

Knowing the distance, we can use our walking speed to measure how long it will take us to walk that distance.

But remembering all the data we need to calculate time can be difficult and confusing. There are a number of 'cards' we can purchase, or you can create your own. Below are two examples of Pacing Cards to help you work out timings:



TIMING CARD	SPEED				
DISTANCE	2 kph	3 kph	4 kph	5 kph	6 kph
50 m	1' 30"	1'	0' 45"	0' 36"	0' 30"
100 m	3'	2'	1' 30"	1' 12"	1'
200 m	6'	4'	3'	2' 24"	2'
300 m	9'	6'	4' 30"	3' 36"	3'
400 m	12'	8'	6'	4' 48"	4'
500 m	15'	10'	7' 30"	6'	5'
1,000 m	30'	20'	15'	12'	10'

shaven spberry www.shavenraspberry.com
Essential Tools for Serious Navigators

Distance travelled	Speed kilometres per hour			
Metres	5	4	3	2
1,000m	12 min	15 min	20 min	30 min
900m	11 min	13½ min	18 min	27 min
800m	9½ min	12 min	16 min	24 min
700m	8½ min	10½ min	14 min	21 min
600m	7 min	9 min	12 min	18 min
500m	6 min	7½ min	10 min	15 min
400m	5 min	6 min	8 min	12 min
300m	3½ min	4½ min	6 min	9 min
200m	2½ min	3 min	4 min	6 min
100m	1 min	1½ min	2 min	3 min
50m	½ min	¾ min	1 min	1½ min

The timings are rounded to the nearest ½ minute.
Add 1 minute per 10 metres of ascent.

These cards are great aids as it takes away all the mental maths! With the example above, we measured a distance of **1.3km**. If we were walking at a speed of **4kph**, using the cards above we can work out it will take us **19mins 30seconds.**

A wristwatch with a stopwatch function will help you with keeping time on a walk. Even better, if you have a timer function, you can set the time it will take you to walk the distance you have measured, start the countdown timer and the alarm will inform you that the time is up.

TOP TIP: Attach your watch to the strap of your rucksack or chest strap. This way you won't have to keep rolling up your sleeve to see and set times if it is wet and/or cold!

Pacing Beads:

These are used to help you keep track of how far you have 'paced'. Usually, you will have 10 beads attached to some string that you can move up and down the string. Each 'bead' represents 100m paced. So

after every 100m paced, you move a bead down the string. This helps you to keep track of distance travelled. In the above example, I have 'paced' 200m.

To recap, we have so far looked at the following navigational aids:

- **Distance Cards**
- **Timing Cards**
- **Pacing Beads**

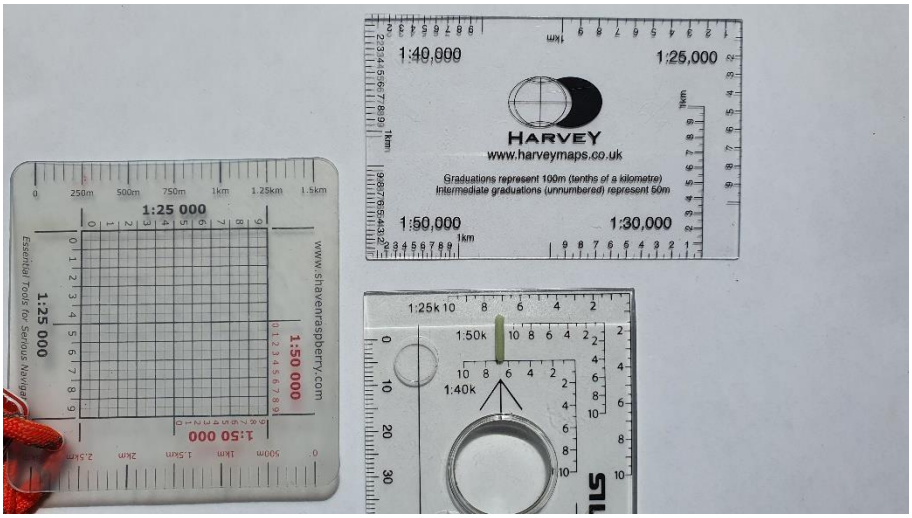
These are the main navigational aids most walkers will carry with them whilst navigating. They are small, lightweight and fit into a jacket pocket easily. One way to keep them altogether and organised is to attach them to each other and/or to the lanyard on a compass. I usually attach the Pacing Beads directly to my rucksack strap for ease of use.

Other Navigational Aids:

The above aids are the bread and butter of navigation. They are generally used the most whilst out navigating and help us to plan our routes. These next few navigational aids are to help you further whilst out navigating and simplify your planning:

- **Roamers**
- **Notebook** (Ideally waterproof)
- **Writing Implements**
- **Pointers**

Roamers



As mentioned in my previous article, roamers assist you with 6-figure grid references. These are handy at home with your initial planning of a route but rarely used on the hill themselves. However, they have their uses on the hill if you need to give an accurate grid reference to the emergency services. You can get specific roamer cards but most compasses have scale roamers printed to them.

Notebook and Writing Implements

Not to state the obvious, but these are for writing notes and details of your planned walk. For example, if you are navigating along a complicated route, you can write down specific details of that route so you don't forget (*more on navigation strategies in a later series*).

Notebooks are also useful to write down any information about your group (such as medical details or next of kin details), information about a casualty and your location in case you need to inform mountain rescue.

Having a waterproof notebook means it can be used in any weather without the paper turning to mush! Another option is to laminate a sheet of white paper to use as a fold-able, portable whiteboard.

Take a variety of writing implements with you too. A pen might not work when wet and a pencil nib may break. So having a pair of each will ensure you can write down anything at any time. Below is a selection of pens and pencils I take with me:

- **Permanent and Non-permanent marker (fine tip):**

Used to annotate a laminated map (*more on 'why only laminated' later*) or write on a piece of laminated paper. Either circle checkpoints, draw on my route, mark dangers or add detail about the route.

- **Pencil:**

Same as above but on a paper map. Back up to a pen.

- **Biro pen:**

Used to write notes in a notebook.

- **China-graph pencils:**

Used as the same as a permanent/non-permanent marker.

Pointers:

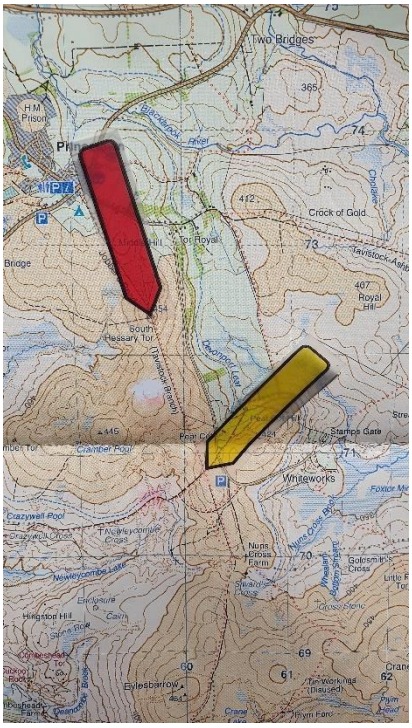
These are handy little aids to help you 'point' at small features on the map or to mark your last known location, so you are not scrolling over the map to find where you were!

You may be asking "why do I need a pointer?". Take a look at your finger. Now point to a small feature on a map. Do you notice the large area your finger takes up? To be more accurate, we use pointers. Below are some examples:

- **Sticky notes** (Stationary style 'bookmarks', see below image for example)
- **Corner of a compass or navigation card.**
- **Pen or pencil tip.**
- **Blade of grass or small stick.**

As you can see with the above examples, anything thin and pointed will be efficient.

But a point to note with the sticky note pointers. I use these to stick on to my map to mark my last known position so I can instantly see it when looking back at the map.



TOP TIP: If using sticky note arrows, point the arrow at your last known position in the direction you will travel. This will help you work out which way you are going and helps with orientating your map.

Phone Apps

Modern technology today is both a blessing and a curse. Mountain Rescue call outs over the last few years have increased, and technology has played a part in this. People head out into the hills and mountains with only a smart phone to navigate, only to have the battery die, the phone getting lost or damaged or just having no idea how to use it.

I want to embrace technology as it is so dominant in our lives and is a great resource, however it will **NEVER** replace a traditional paper map and compass, nor should it be relied upon!

Instead, technology should be used alongside a map and compass with the knowledge of how to use them and their limitations.

The main Apps on the market at the moment, and ones I use regularly are:

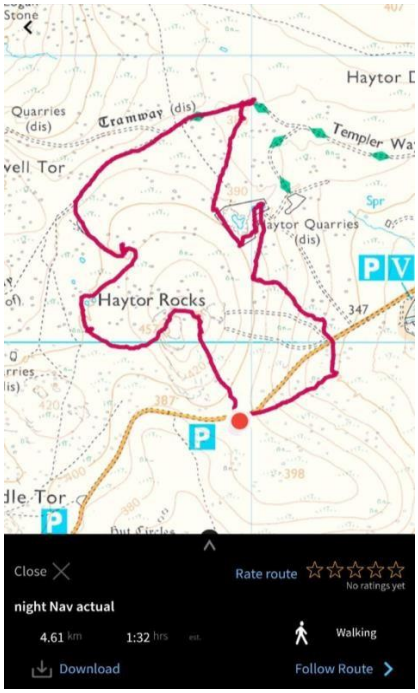
- OS Maps
- OS Locate
- Viewranger

OS Maps and Viewranger are subscription apps. You pay a yearly subscription to access maps of the country and to use all the features of the app, such as route plotting and the ability to download and print the maps.

OS Locate is a free app which gives you a Grid-Reference of you location.

Mobile phone apps should **NEVER** replace a traditional map and compass.

I use these apps to CONFIRM my position and decisions when out navigating. This means I have used all my skills in navigating FIRST and am using the app to visually see if I am right or not. I DO NOT rely on the app alone, I cannot emphasise this enough.



Care of Maps

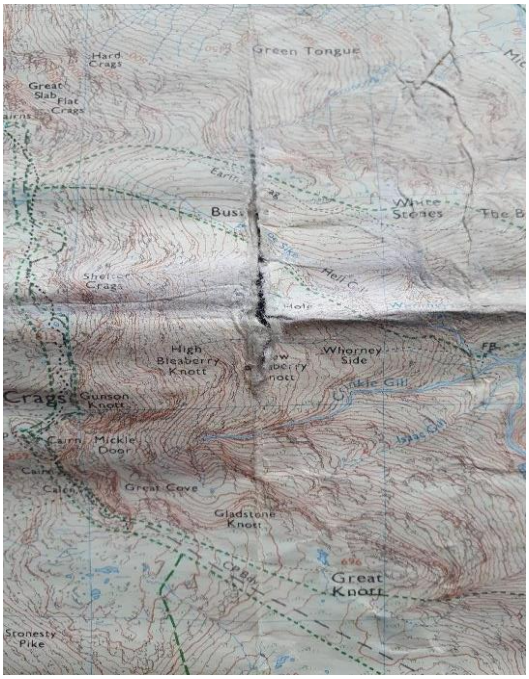
Look after your map and it will last a long time and lead you on many future adventures! Ruin it, and you are potentially in a dangerous situation on the mountain! So how can we look after our map?

Firstly, the UK weather is not always reliable! The best way we can protect our map from the elements is by using a **map case**. These are waterproof, see-through plastic cases in which we can place our map. They come in all sorts of styles and sizes. I prefer a small, non-slip plastic which is transparent on both sides.

TOP TIP: Get a style of map case which is see through on both sides. You can have your route on the map on one side and your timing card and notes on the reverse, or another scale of map.

How good are map cases? Several years ago, I was training a Ten Tors team on Dartmoor. The group lost their map! A month later, I was back on the moor training the same team doing a reverse of the previous route. We found the map!! It had spent a month on the moor but was still in perfect condition.

One problem with the constant folding and un-folding of a map is that it can create damage along the folds, especially on the maps you use the most! This can create holes and fading, meaning you lose detail on the map. See the below image:



There are several ways we can prevent this:

- **Cut out small areas of maps and laminate them (***Image 1 below***):**

This is great if you use the same area(s) often and prolongs the life of your map. However, you need to ensure you keep the important details such as Grid numbers and map prefix.

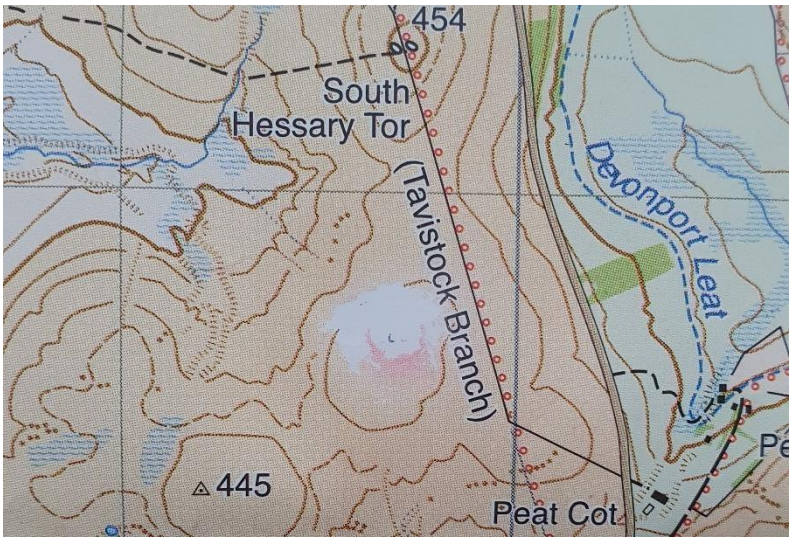
- **Use mapping software to select and print off areas (***Image 2 below***):**

Now days, you can print off A4 size areas of maps and laminate them. This saves you cutting up your maps! However, you must ensure you have a good quality printer and paper. Another important factor is to ensure the scale of the map is not changed in the printing process. Once printed, measure the size of the grid squares and adjust the printer settings accordingly. As a reference:

- A grid square on a 1:25,000 scale map is 4cm x 4cm
- 1:50,000 grid square measures 2cm x 2cm

The final options are to buy laminated or waterproof maps. Ordnance Survey produce a range of 'Active Maps'. These are paper maps that are already full laminated. These are great for writing on as you can rub the ink off later without ruining the map. However, they are bulky, don't fold well and once the lamination has been damaged, water can get to the paper underneath and damage the map further.

Harvey Maps are printed on Polyethylene and are completely waterproof and tear resistant. They fold down small, fit into a jacket pocket and are completely weatherproof. However, I would not recommend writing on them, even with non-permanent ink. When it comes to rubbing the ink off, you may rub the map detail away too! (*See image below, notice the blank white patch where detail has been rubbed away*)

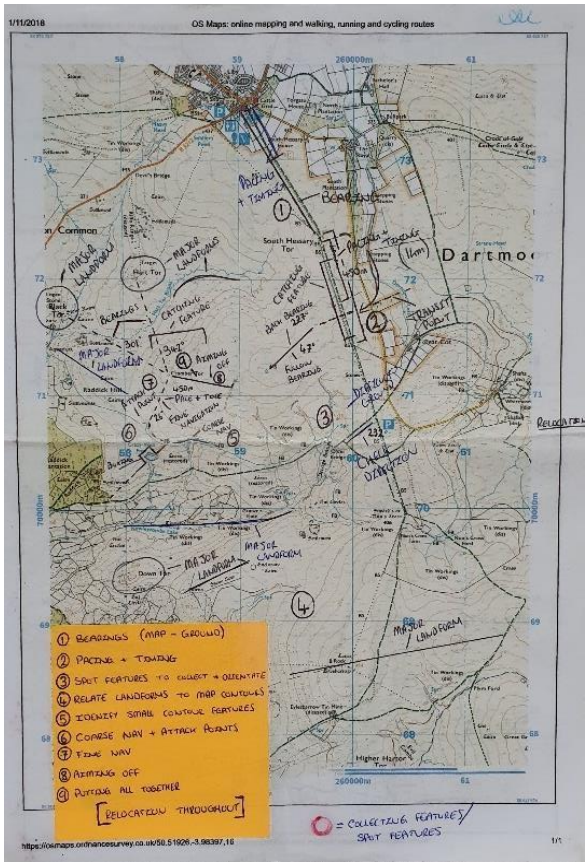


Using pens (marking) maps

I personally don't mark any full size maps that I have purchased, if I can help it and within reason. Using inks or even a pencil can cover detail on the map. Over time, these markings can clutter the map even more. My only exception to this rule is OS Active Maps as the ink rubs off easily and doesn't ruin the map itself.

However, there are times when I will want to permanently mark a map. I may want to add notes to a map. For example, I might want to highlight an error on the map or mark areas of particular danger to avoid in the future.

If I want to mark a map, for example when running a navigation course and want to note down key learning outcomes, then I will print off a map of the area, annotate it and laminate it. This saves you ruining your purchased paper maps.



Recap and resources:

I have compiled a list below of all the navigational aids I have listed in this article. Use it as a tick list to create your own navigational toolbox. Over time, you may discover more resources and aids to help you navigate, for example a **GPS device.** I have purposely not mentioned these here as they are a more advanced navigational aid that require training to use properly and can easily be used wrong or relied upon. I may cover GPS devices in a later article.

List of navigational aids and resources:

- Map (of the area you are in)
- Compass
- Ruler *(with millimetre increments)*
- Distance Cards
- Wristwatch (with stopwatch/timer) Or a Stopwatch
- Phone Apps and GPS devices
- Roamers
- Notebook (Ideally waterproof)
- Writing Implements
- Pointers

AT THE EDGE MOUNTAINEERING

"Your greatest failure is not to try"

INTRODUCTION TO MAPS 1.4.1:

THE COMPASS

Part 4.1.1 of my **Introduction to Maps** series takes a look at the compass, what it is and how we use it for navigation.

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a step in the right direction

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The Compass

The compass is a versatile tool for us navigators. Coupled with a map and it provides assistance with navigation techniques:

- Measuring distance on a map
- Helping to plot grid references
- Taking a bearing from the map and the ground
- Walking on a bearing
- Orientating the map
- Checking the direction of handrails
- Taking an aspect of slope

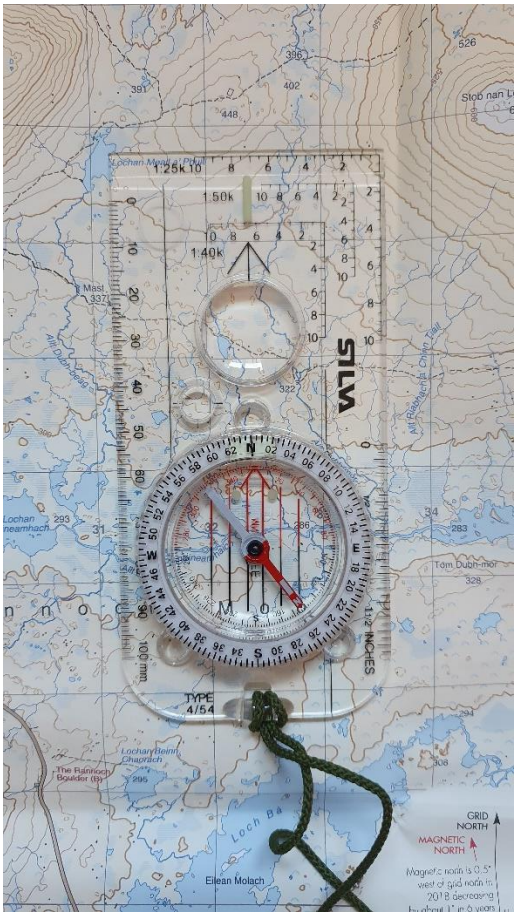
These navigational techniques will be covered in a later series, but first, let's take a look at what types of compass there are.

Types of Compass

The three types of compass we are likely to use in the hills and mountains are as follows:

- **Base Plate**
- **Sighting**
- **Electronic**

Base Plate



This is the most common compass we use in the hills and mountains and the one I will focus on in this article. They are lightweight and robust. The two main parts to a base plate compass are the magnetic needle housing and a transparent base plate.

Sighting Compass

They usually come as either mirrored or prismatic. They are good for sighting a bearing on a distant object and walking on a bearing, however, due to their small base, they lack the versatility of a base plate compass when it comes to taking bearings from the map, measuring distances and grid references.

Electronic

These types of compass are usually incorporated into watches and GPS devices but it is possible to buy a dedicated electronic type compass. They are useful for checking direction, however that is about as far as their use goes. Without having a base plate, you are unable to take bearings from a map with them. As with all technology, they must not be relied upon due to batteries running out and damaging them. With this in mind, it is always a good idea to carry a backup, non-electronic compass

Parts of a Compass

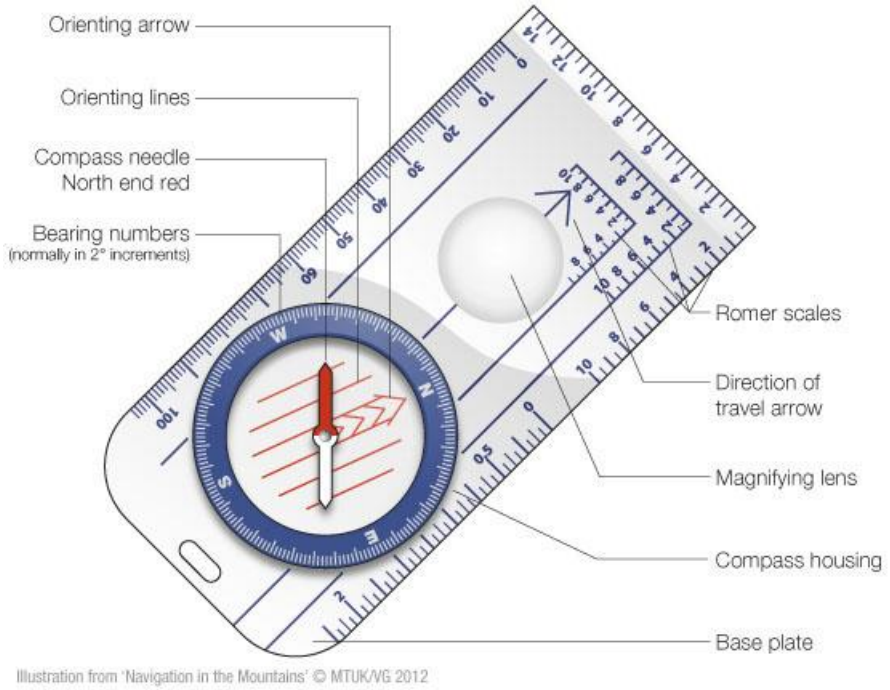


Illustration from 'Navigation in the Mountains' © MTUK/VG 2012

The above image is from the book '**Navigation in the Mountains**' and shows a compass with it's main parts labelled. We will go into more detail below:

Orienting arrow and Orienting lines:
These are situated in the rotating compass housing and are used to take a bearing. The orienting lines are parallel lines either side of the orienting arrow.

Compass Needle:
This is the magnetic needle that freely rotates within the compass housing. One end of the needle is coloured, usually red, and it is this point that points to magnetic north.

Bearing Numbers:
Around the edge of the compass housing are numbers. These are used to give a bearing reading. They will either be in degrees or mils:

- Degrees: There are 360 degrees going up in 2-degree increments.
- Mils: There are 6400 mils going up in 50 mil increments. Used by the military for artillery and more accurate than degrees, however we, as civilian navigators, will never need that level of accuracy, but mils can still be used for bearings.

Romer Scales:
We have covered these in Parts 3 and 4 of my Introduction to Maps series. They are used to measure distance and grid references. The common romer scales found on a compass are:

- 1:25,000
- 1:40,000
- 1:50,000
- *1:63,360 (this scale is found on older compasses and is no longer of use)*

Direction of Travel Arrow:
This arrow is used to point you in the direction of your bearing or to an object in the distance.

Magnifying Glass:
This is used to look at the detail of a map, for example small contour features that may be behind other symbols.

Compass housing:
This is a rotating bevel that houses the magnetic needle and has the bearing numbers along it's edge. It is usually filled with an oily substance to help dampen any vibrations to settle the magnetic needle quicker, giving more accuracy.

Base Plate:
Base plate compasses come in many sizes but the most versatile is a 10cm long base plate. It is transparent to be able to view map detail underneath, has the romers printed onto it, along with a millimetre ruler for measuring distances and thin black lines to help with taking a bearing.

Other features:
Most base plate compasses also come with the following features to aid in navigation:

- **'Glow in the dark' strips:** These will help navigating at night. They are usually situated on the north needle, direction of travel arrow and either side of the orienting arrow.
- **Rubber 'feet':** These help stabalise the compass on a map case when taking a bearing
- **Lanyard:** Used to attach the compass to a zip or map case to prevent you from dropping the compass

Using a compass and considerations

A compass works by relying on the magnetic needle. When taking a bearing and relying on the compass to navigate, metallic objects can interfere with the magnetic needle and give you false readings.

When using a compass ensure you do not hold it too close to the following:

- Metal zips on your jacket
- Metal water bottles
- Mobile phones, cameras or any electrical device.
- Magnetic clips used on some water bladders to attach the hose to a rucksack strap
- Walking poles

Other considerations when using a compass is to be aware of the environment around you. Metal gates and fences and vehicles can all alter a compass needle giving false readings. And certain types of rock are known for their magnetism, such as gabbro, found on the Isle of Skye.

Be aware of how and where you store your compass too. Don't store your compass in the same pocket as your mobile phone, for example, as prolonged exposure to another magnet can depolarise your compass. This means, the north arrow will no longer point north but instead, reverse polarity and point south.

At home, after you have bought a new compass, stand in the middle of a room or your garden, away from any other magnets, metal and electronics and see where North is. Use this as a reference point every time you get your compass out to take out with you. That way you can ensure your compass still points north and hasn't reversed polarity.

The Three Norths

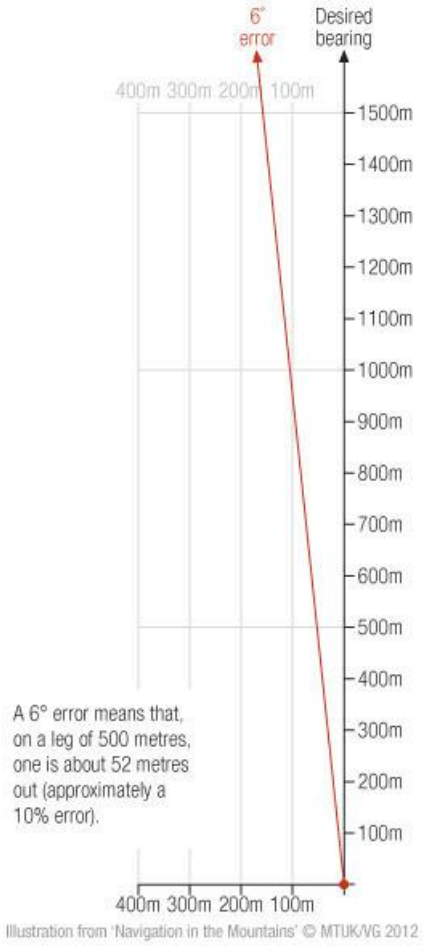
How many Norths? In navigation, we refer to three Norths:

- **True North:** The geographic North where the Earth spins on it's axis
- **Magnetic North:** A point where Earth's magnetic field lines are perpendicular to the surface. This is what your compass needle points to.
- **Grid North:** This is what the vertical grid lines (Eastings) on a map point to. It varies ever so slightly to true north.

The difference between magnetic north and grid north is known as magnetic variation.

Magnetic Variation

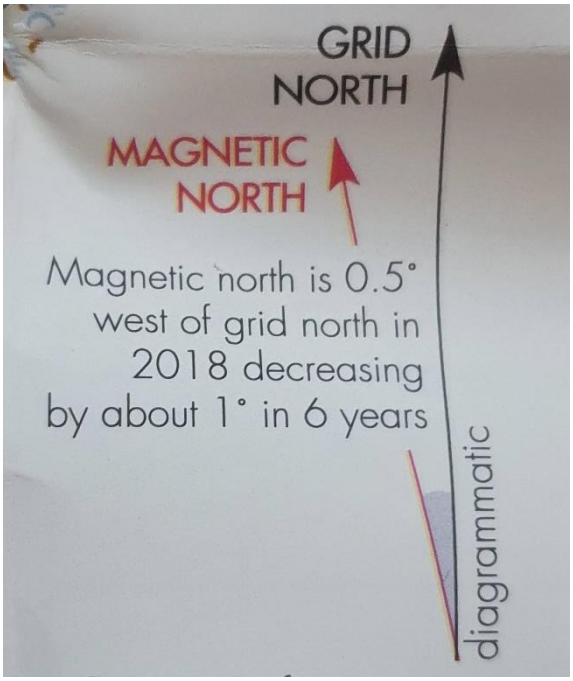
Magnetic North is constantly moving eastwards. Information of it's movement is printed on all OS and Harvey Maps. This is important as slight inaccuracies in bearings can create errors on the ground. See the example image below.



The above image is an exaggeration but entirely possible if if magnetic variation hasn't been taken into account.

As it stands in 2020, the magnetic variation in the UK is minimal but changes from the East of the UK to the West. It is still important to work out the variation and adjust your bearing accordingly.

Working out Magnetic Variation

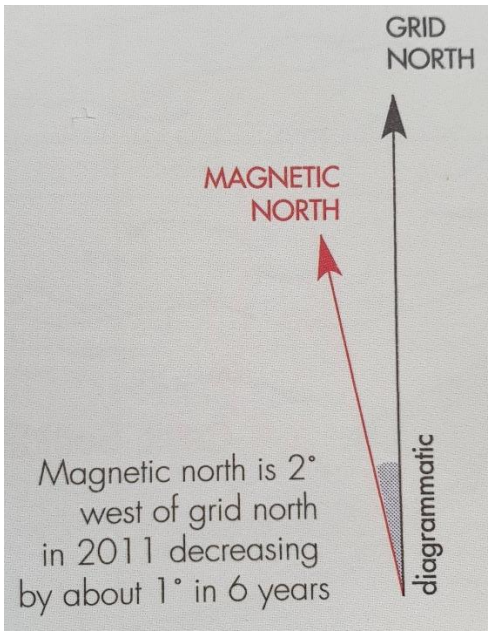


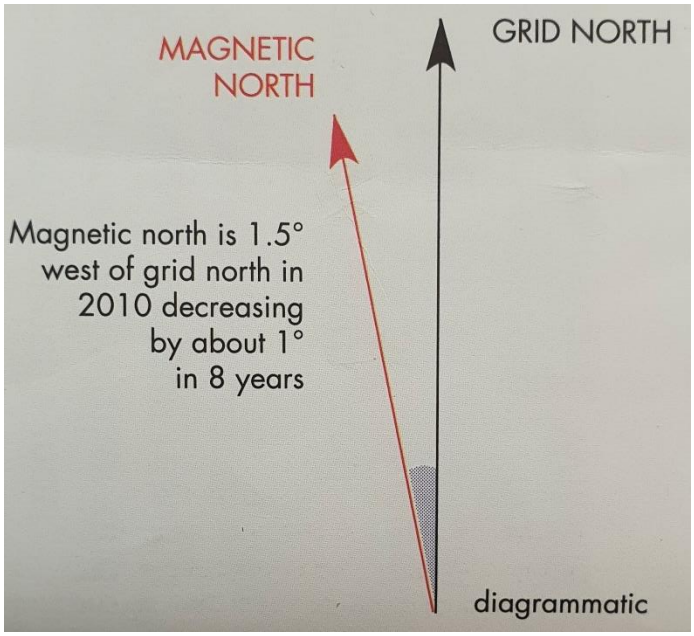
Take a look at the above image. It states:

Magnetic north is 0.5 degrees west of grid north in 2018 decreasing by about 1 degree in 6 years

This means the difference in 2018 between grid and magnetic north is half a degree. In 2021, the difference will be 0. However, in 2024, magnetic north will be 0.5 degrees EAST of grid north.

The two images below give more examples but come to the same conclusion.





Knowing the magnetic variation, we can add or subtract the variation to our bearing to give us an accurate bearing and minimise errors.

Grid bearings are taken from the map

Magnetic bearings are taken off an object on the ground, in the distance.

With the above in mind:

- From a grid bearing to magnetic bearing you **ADD** the magnetic variation.
- From magnetic to grid bearing you **SUBTRACT** the magnetic variation

A popular rhyme to remember this is:

Grid to Mag ADD, Mag to Grid GET RID

One point to note here though: In the next few years, magnetic north will cross grid north from the EAST into the WEST. When this is the case, the above rhyme will not be of use as it will be reversed.

But for now, ensure you know the magnetic variation of the map and the area you are in and adjust your bearing accordingly.

(We will cover how to take a bearing in a later article)

This brings us to a close of my **Introduction to Maps** series.

If you haven't already done so, check out the complete question and answer sheets. There is a little reward for completing this course waiting for you!