

SEBEV Search & Rescue
“Saving Lives in Berkshire”

***Navigation Basics:
Map & Compass***

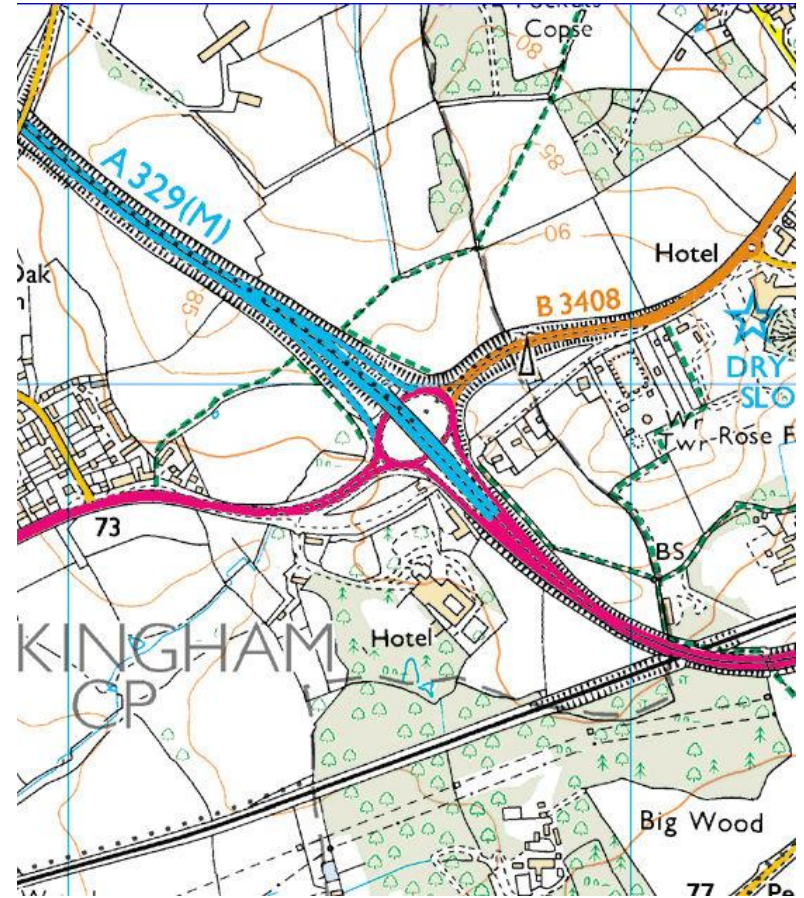
MAPS

What is a map?

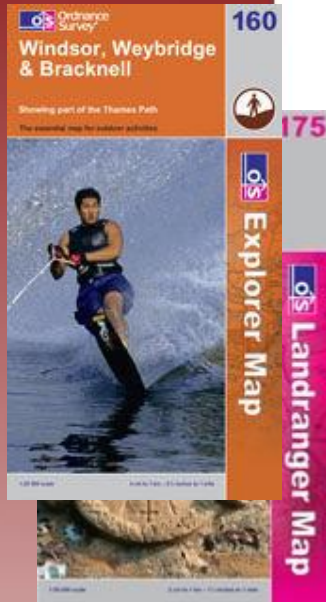
A map:

- *is a pictorial view of the ground*
- *displays information of use to the user*
- *uses standard symbols to represent objects*
- *has a key to decipher these symbols*
- *is drawn/printed to a scale (for example, 4 cm on the map represents 1 km on the ground).*

Comparison of the ground to the map



Some common maps



The most common maps in the UK are published by the Ordnance Survey:

- *“Explorer” at 1:25,000 (4 cm = 1 km) – orange cover*
- *“Landranger” at 1:50,000 (2 cm = 1km) – purple cover*

SEBEV makes most use of the Explorer map number 160 entitled “Windsor, Weybridge & Bracknell”

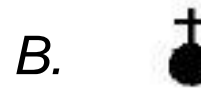
A street atlas is very useful when finding a place from which to hike – or to search. SEBEV relies on the Philip’s Street Atlas for Berkshire, for example.

On paper or on the computer?

- *The popular Ordnance Survey maps are also available to the public in digital format from vendors such as MemoryMap and Anquet.*
- *There are other vendors – through TVP, SEBEV has access to the Atlas mapping product.*
- *Advantages of digital maps include scaling (bigger printouts, easier on the eyes) and multiple disposable copies*
- *Disadvantages? You must have a computer, a colour printer, a power supply, and protection for the printouts if it is raining – and you are unlikely to have the legend or any scale included in the printout*

Exploring the Map's Legend

Identify the following:



Unique elements of the Explorer's legend

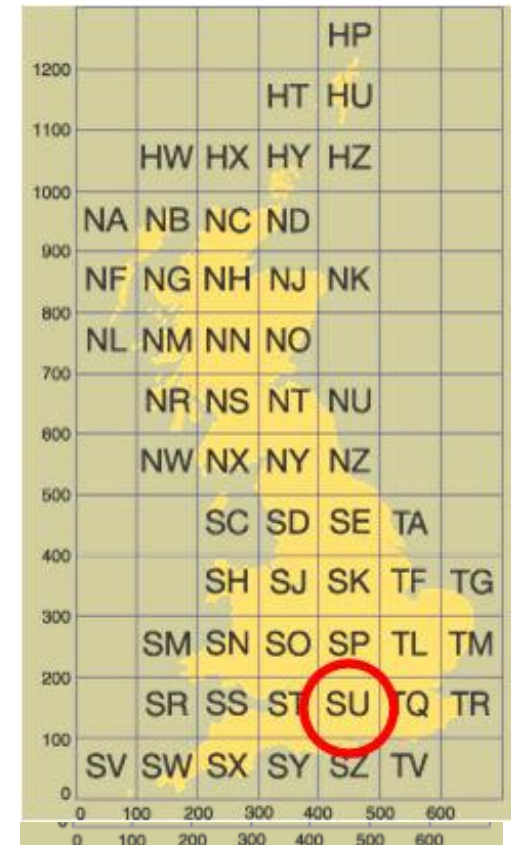
The elements which are unique to each maps are:

- *The title block*
- *The revision history in the Customer Information section*
- *The example used in the National Grid Reference System section*
- *The North Points*

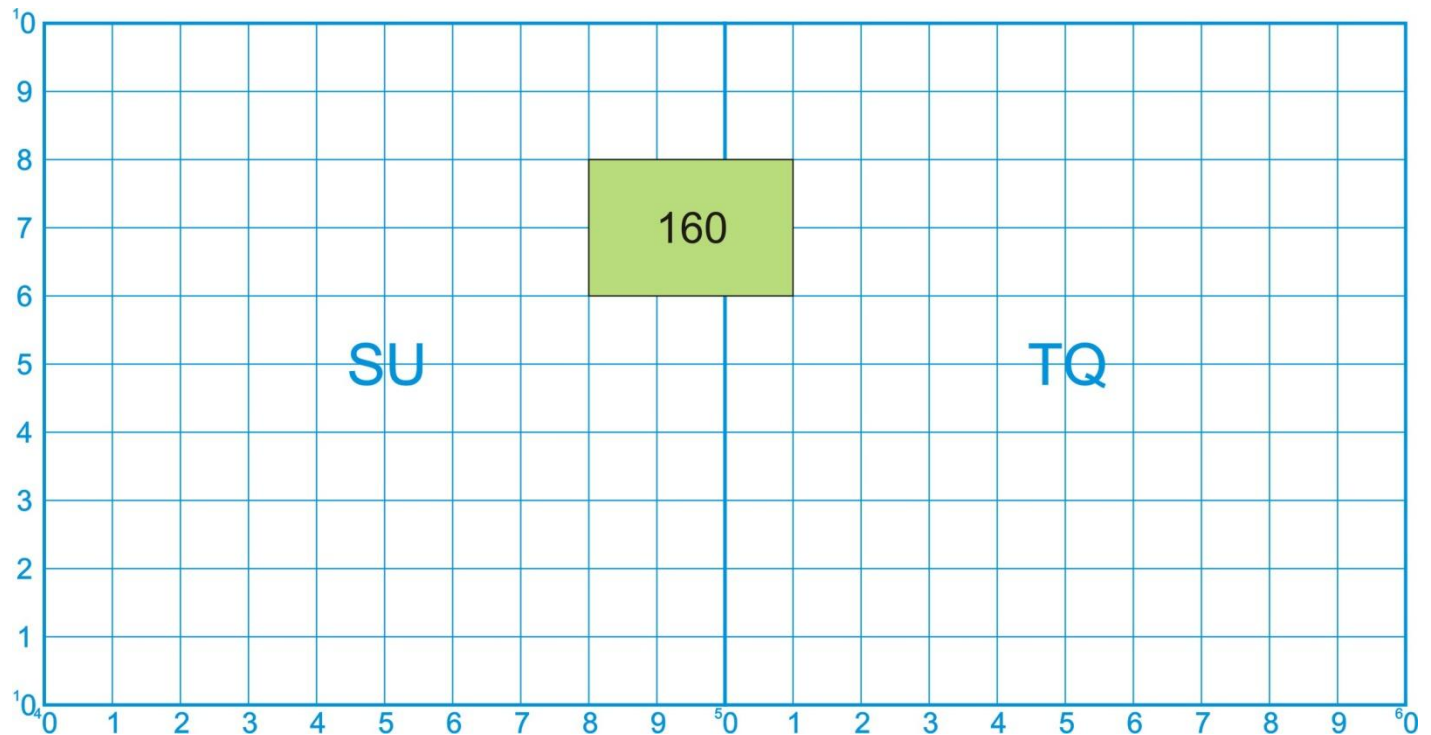
Other than these, the legend is identical across all of the 403 maps in the series.

The National Grid Reference System

- *The Ordnance Survey lays out a virtual grid across England, Wales and Scotland with its original West of the Scilly Isles.*
- *Each square on the grid is 100 km x 100 km.*
- *Each square which contains land is given a two-letter reference*
- *Square SU has its origin at 400 km East and 100 km North*
- *Bracknell is located in this square – but to describe this more accurately, we should first position our map...*

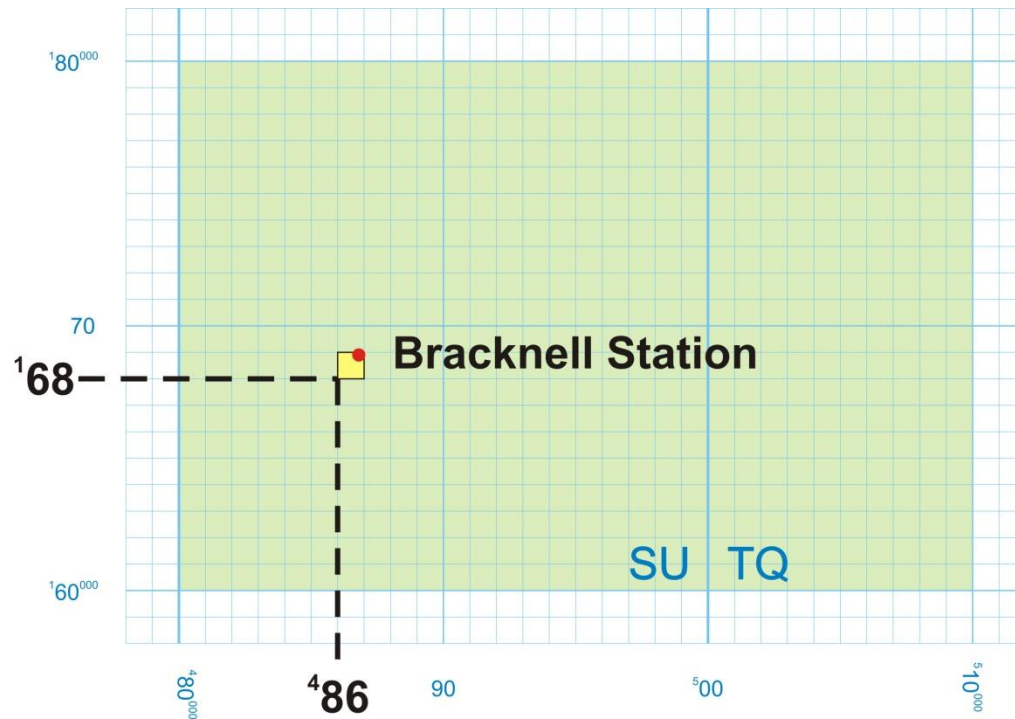


Where is map 160 located?



- *Look at the diagram in the legend*
- *2/3 of the way across the map, see SU and TU printed*
- *This is of importance when choosing how to quote the grid reference of a location*

1 km Accuracy



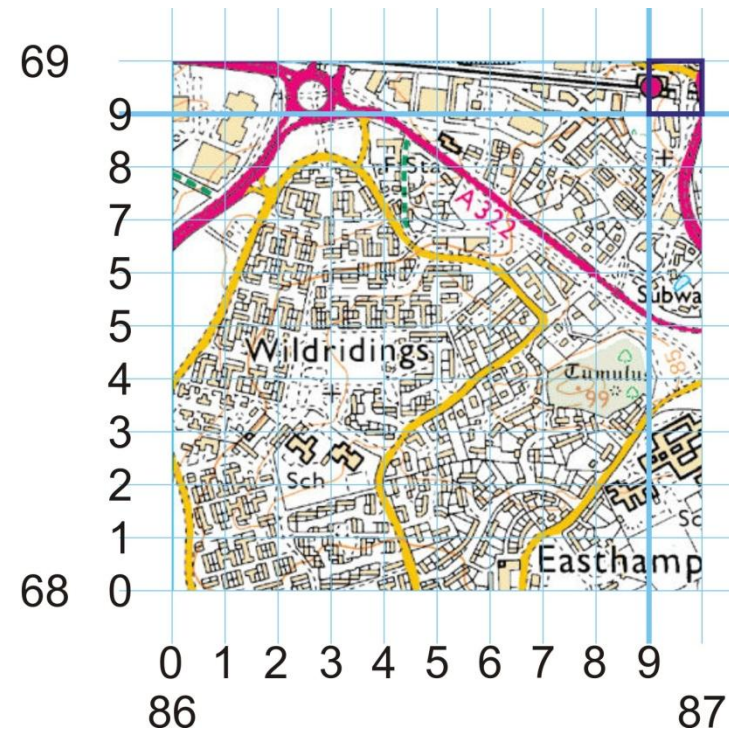
- *Bracknell station is represented by the red dot.*
- *It is located in the 1 km x 1 km square with its origin at ⁴86 E, ¹68 N*
- *In the bigger SU square, this can be quoted as **SU8668** – 8668 only appears once per lettered square*

A unique 6 figure grid reference

- When divided into smaller squares, the station sits in the square of origin 869E, 689N
- The unique grid reference for the station then becomes:

SU869689

- If you are only working on map 160, it is safe to give this as **869689** because this appears only once on this map



Grid reference quiz

What is the grid reference, including two letter prefix, for:

- 1. The church with spire north of Wokingham station?*
- 2. The Lower Star Post in the middle of the LookOut/Swinley Forest?*
- 3. The mast NW of junction 4 on the M4 (nr. West Drayton)*
- 4. The “trig point” just west of Touchen-end on the A330 South of Maidenhead.*

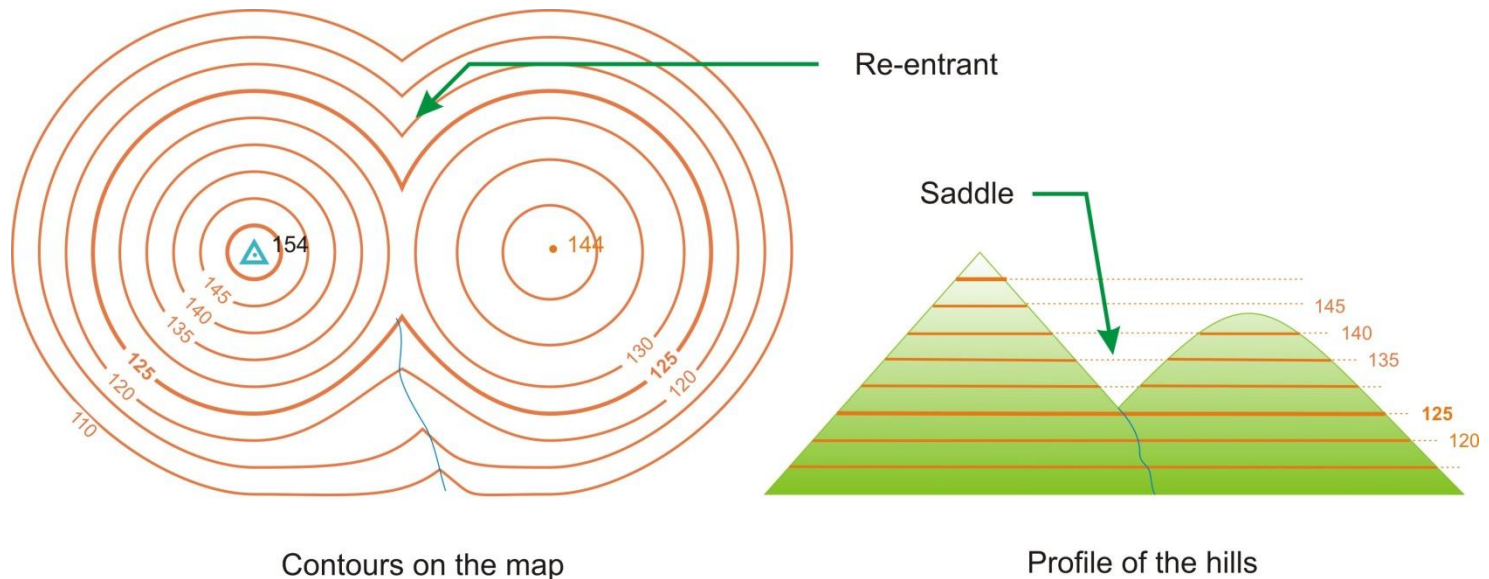
What features are located at:

- A. SU 868 734 B: TQ 029 612 C: SU 964 648*
D. SU 821 669 E: SU 834 698 F: SU 844 797

The shape of the land - contours

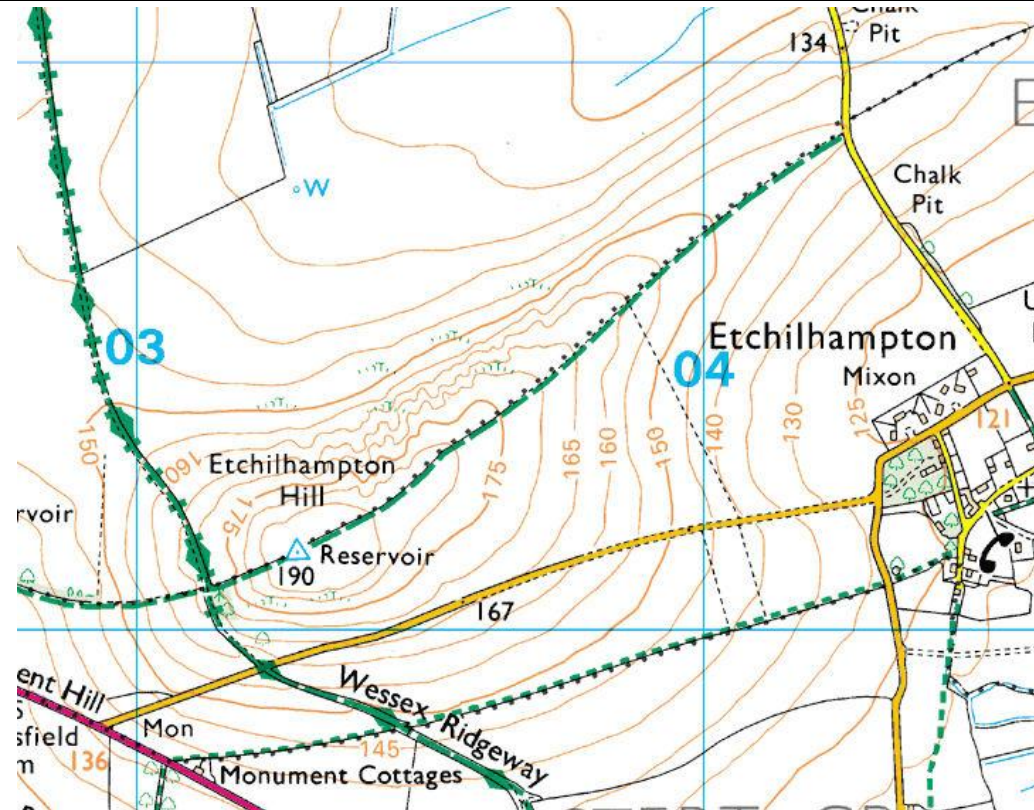
- *Contour lines on a map join areas of equal height above sea level.*
- *They are usually drawn at 5 metre intervals, with a bolder contour every 25 metres*
- *In very steep areas, where the lines might begin to merge, the interval is doubled to 10 metres*
- *The numbers indicating height are always printed so that the top of the number “points” to the top of the slope*
- *The height at a point can also be given by a triangulation pillar (a “trig point”) or by a spot height, measured from either the ground or from the air.*

Very simple hills



- *Not every contour's height is shown*
- *Note the bold contour and height at 125 metres*
- *For the rounded, convex slope, the contours are further apart*
- *A concave, increasingly steeper curve would have the contours getting closer with height*

A more interesting shape – Etchilhampton Hill



- *This hill has relatively steep flanks to the N, W, and S*
- *The NE slope is a pronounced ridge which the bridleway follows.*

Comparison

On the ground...



On the map...



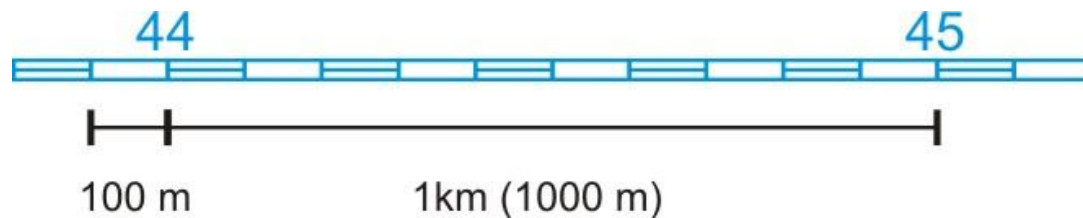
Contours Quiz

1. *What is the contour interval in mountainous regions?*
2. *If the contours merge into one, what is this feature?*
3. *If a track is getting steeper, would you expect the nearby contours on the map to be getting further apart?*
4. *Spot something odd here?*



Scales

- *Every map is printed to a scale. This is quoted on the cover (e.g. 1:25000 4 cm to 1 km) and is printed as a ruler at the bottom of the map.*
- *On the same scale map, the blue grid lines are 4 cm apart, equal to 1 km on the ground. At the map edges, the distance between them is broken into ten sections, each of 4 mm (100 metres on the ground):*



Measurement

- *Once you know the scale, you can measure distances off the map – and hence off the ground.*
- *Your compass will probably have a 1:25000 scale on it, where each tic-mark equates to 50 metres:*



- *The same compass will probably have a millimetre rule. You can also make use of a small ruler or a rule printed on some notebooks.*
- *Try to remember:*

$$4 \text{ cm} = 1 \text{ km}$$

$$1 \text{ cm} = 250 \text{ m}$$

$$4 \text{ mm} = 100 \text{ m}$$

$$1 \text{ mm} = 25 \text{ m}$$

Measurement Quiz

- 1. How long is the Olympic rowing lake west of Eton?*
- 2. How long is the driveway to Easthampstead Park House?*
- 3. A missing person is spotted on the A30 at SU943660 walking towards Camberley. The police take 75 minutes to reach her. If she was walking at just 1 km/h, where was she eventually intercepted ?*
- 4. If you could travel due North from the car park at SU964654, at what point would you reach a height of 75 metres? How far – as the crow flies?*
- 5. How far apart are the points given by grid references TQ011710 and SU941710 ?*

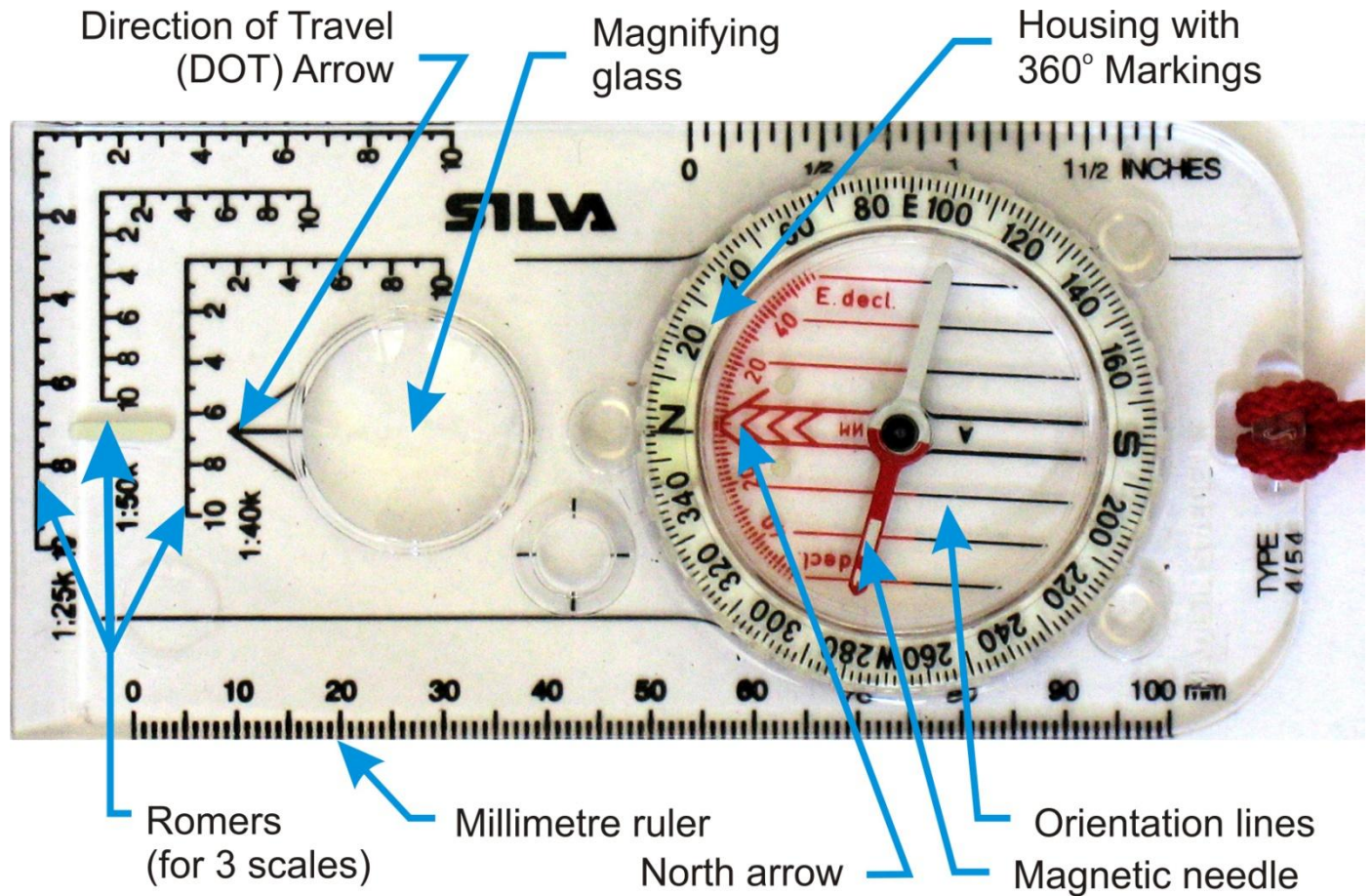
COMPASS

What is a compass?

A compass :

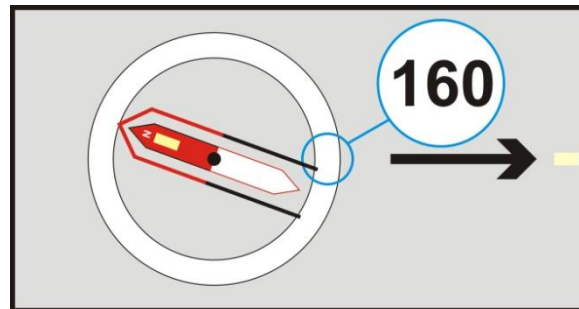
- is a device which uses a magnetic needle to point to the North and South poles.*
- allows the needle to turn freely in a housing on which are marked 360 degrees plus North (0°), East (90°), South, (180°) and West (270°)*
- may have a Direction of Travel arrow, orientation lines, scales, romers, prisms, and more...*

A Typical Compass and its Components



Taking a bearing off the landscape

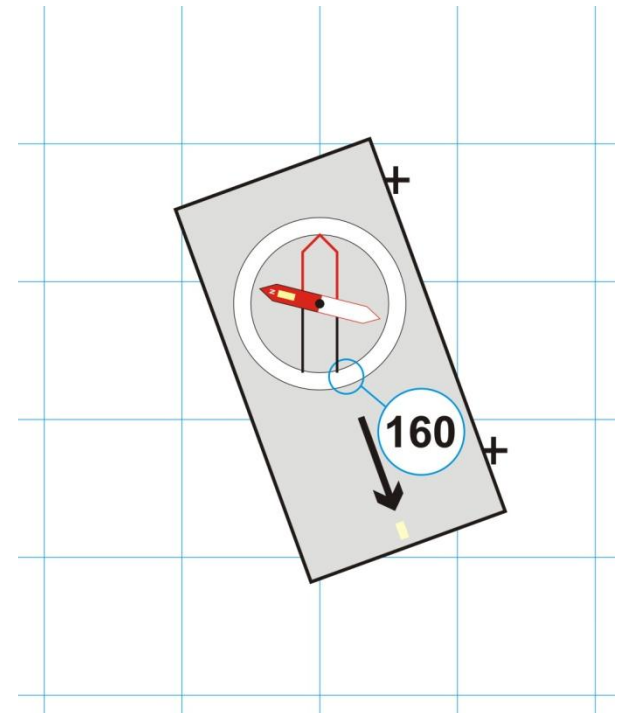
- *Hold the compass so that you and the DOT arrow are pointing towards the destination.*
- *Turn the housing until the North arrow is directly under the North end of the magnetic needle.*
- *The bearing is the figure on the bezel – 160 degrees in this case.*



Destination >

Taking a bearing off the map

- Lay the long edge of the compass between the two points – origin and destination – with the DOT arrow pointing towards the destination.
- Turn the housing until the North arrow and the orientation lines in the housing are parallel to (preferably on top of) one of the North-South grid-lines - the figure on the bezel is the required bearing – 160 degrees in this case.



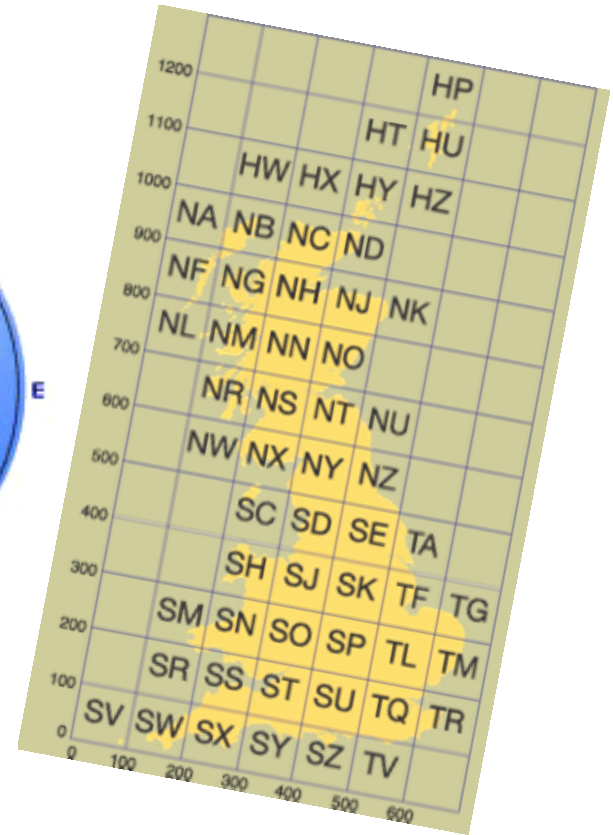
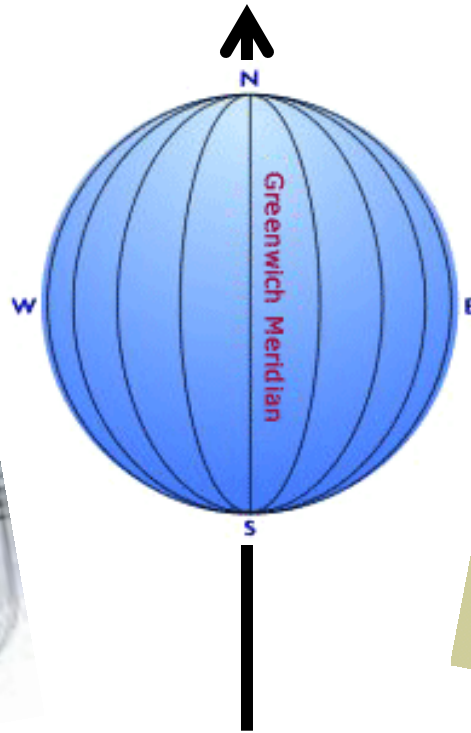
Using the compass to orient the map

- *With the North arrow in the housing pointing to the DOT arrow, place the compass on the map with its sides or the orientation lines over one of the blue grid lines running up and down the map. The DOT arrow must point to the top of the map.*
- *Rotate the map and compass together until the North end of the magnetic pointer is over the North arrow in the housing.*
- *The map is now correctly orientated – North on the map is pointing to magnetic North.*

Back bearings

- *Your bearing is the direction you are heading towards – your back bearing is the direction from which you have come. This is useful for exactly that – finding your way back to where you set out on the last bearing.*
- *A back bearing is always 180 degrees away. If you are heading at 95 degrees (roughly East), your back-bearing is 275 degrees (roughly West). If you are heading at 345 degrees, your back bearing is 165 degrees.*
- *To head back along your back bearing, you could simply turn until the **South** end of the needle is over the North arrow in the housing. As this could confuse someone taking over the navigation at some point, better to calculate the back bearing, and set this as the bearing on the compass in the usual way.*

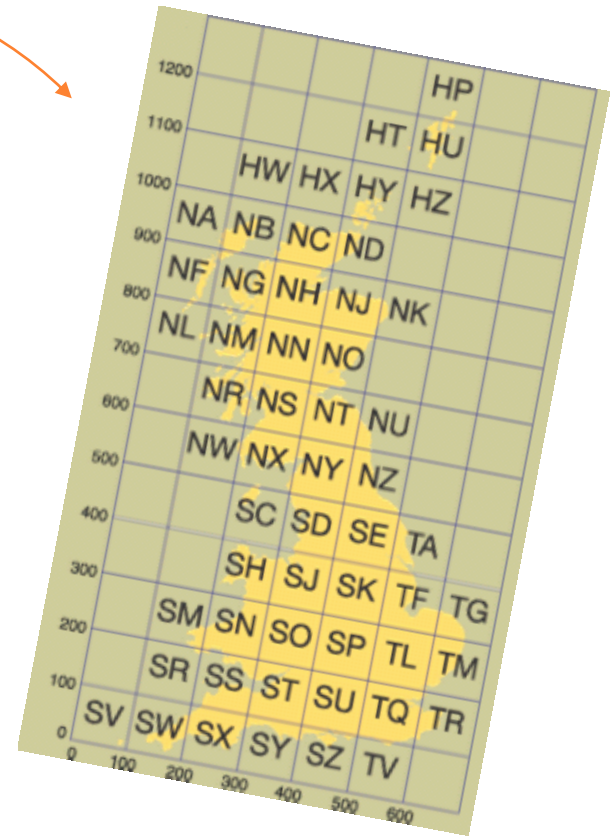
North – Magnetic, True, and Grid



North – Magnetic, True, and Grid



2°53'
(exaggerated)



Dealing with Grid Magnetic Variation

**From Grid to Mag, add
From Mag to Grid, get rid**

- *If you are given a bearing from the map (the grid), you must **add** the variation when using this bearing on your compass.*
- *If you are given a bearing from a compass, you must **subtract** the variation when using this bearing on your map.*
- *On a 2 km leg of a walk, the error introduced by ignoring the Grid Magnetic Variation is about 100 metres.*
- *In other countries, where the variation between their maps and Magnetic North can be as much as 20 degrees, this error would be considerable – even life threatening in adverse conditions*

Compass Quiz

- 1. From the map, what is the bearing down the Easthampstead Park driveway towards reception?*
- 2. On the ground, what is the bearing down the driveway from reception?*
- 3. How are these bearings related?*
- 4. From the map, you take a bearing from Bracknell station to Lily Hill House. Where should the North end of the magnetic needle be pointing?*
- 5. You recognise the mast by the Copped Beech hotel and take a bearing – 130 degrees. You can also see the church with a spire North of Wokingham station – it's at 228 degrees. Where are you?*