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Basic Navigation Using Map and Compass



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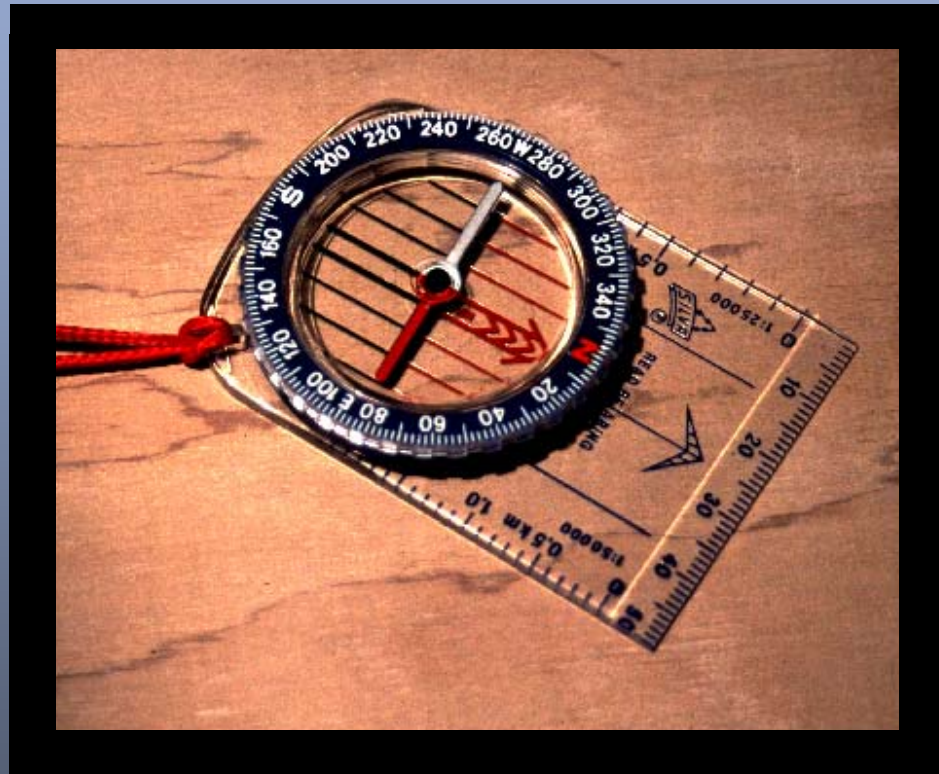
Learning Outcome 2:

Be able to use a map and lightweight walking compass for practical navigation

The Compass

There are a variety of different compass styles

This is a Silva compass

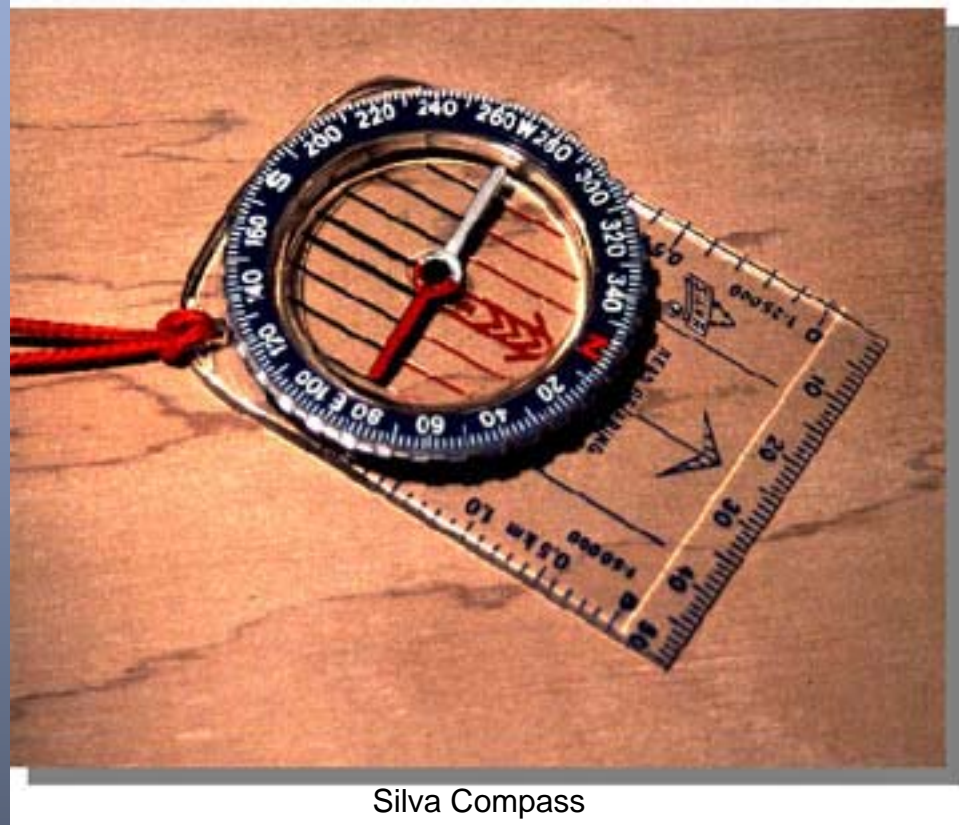


The Compass

- They were originally discovered by the Chinese 5000 years ago.
- They are made in a variety of forms for use on land, above and below the sea and in the air.
- Examples of activities in which they are used are:
 - Hill walking
 - Cycling
 - Driving
 - Sailing
 - Flying
 - Mountaineering
 - Surveying
 - Military
 - Scuba diving
 - Orienteering

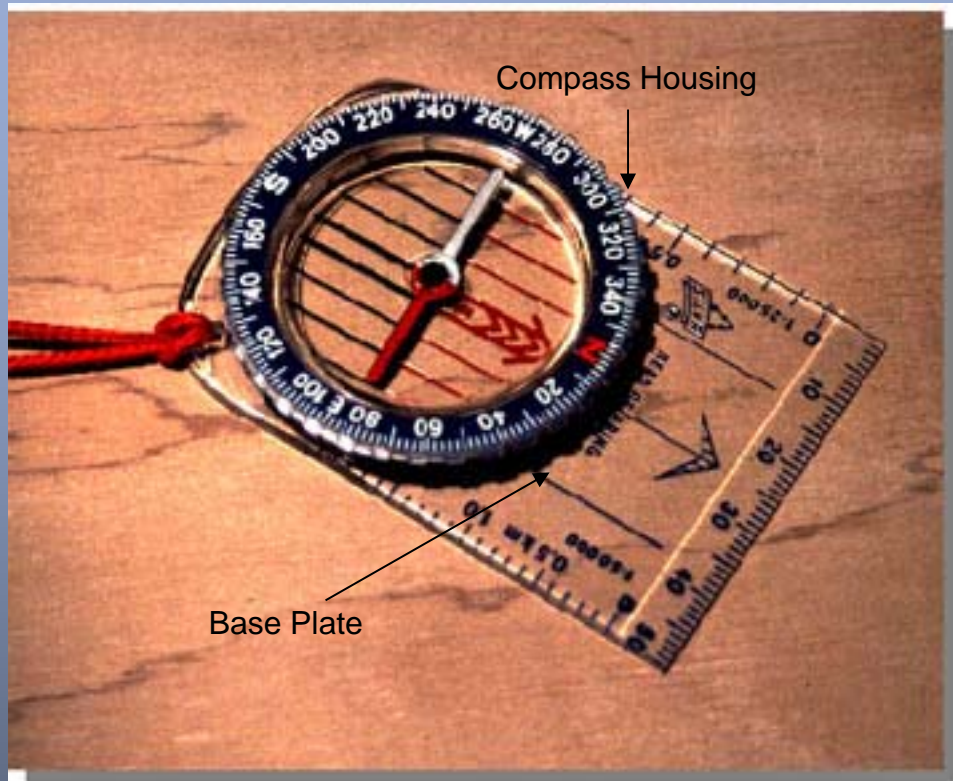
Parts of the Compass

- The compass can be broken down into various components.
- We will look at each component separately to define its use.



Silva Compass

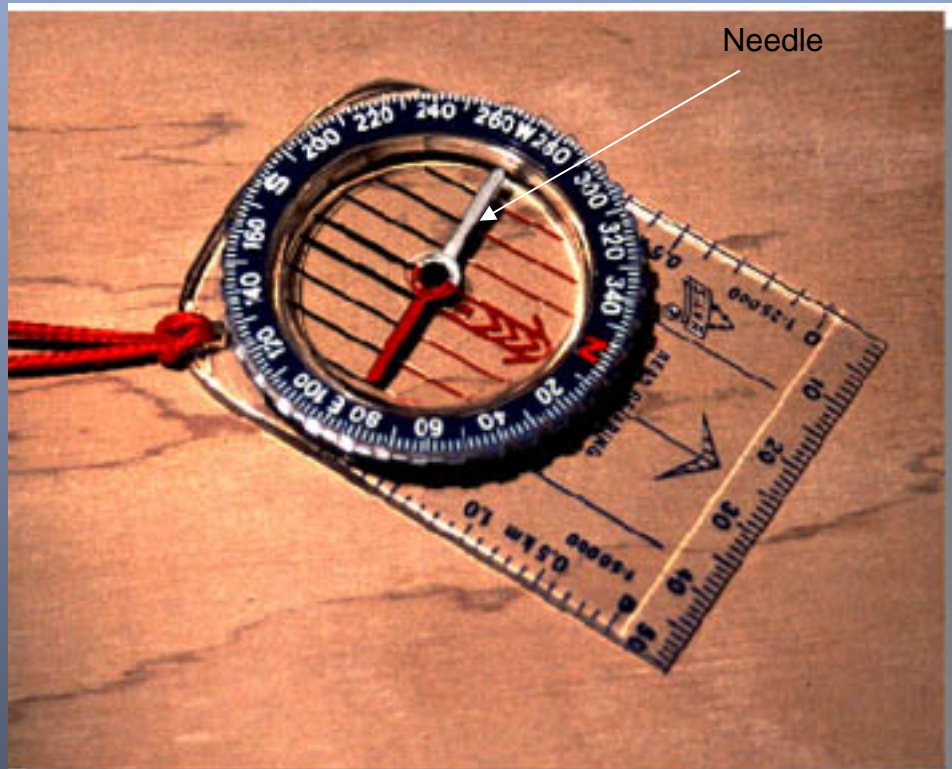
Base Plate and Compass Housing



Silva Compass

- The Base Plate is the mounting for the housing and displays a variety of information, e.g. scale ruler.
- The Compass Housing contains a magnetic bar, called the **Needle** and defines the points of the compass on a rotating bezel.

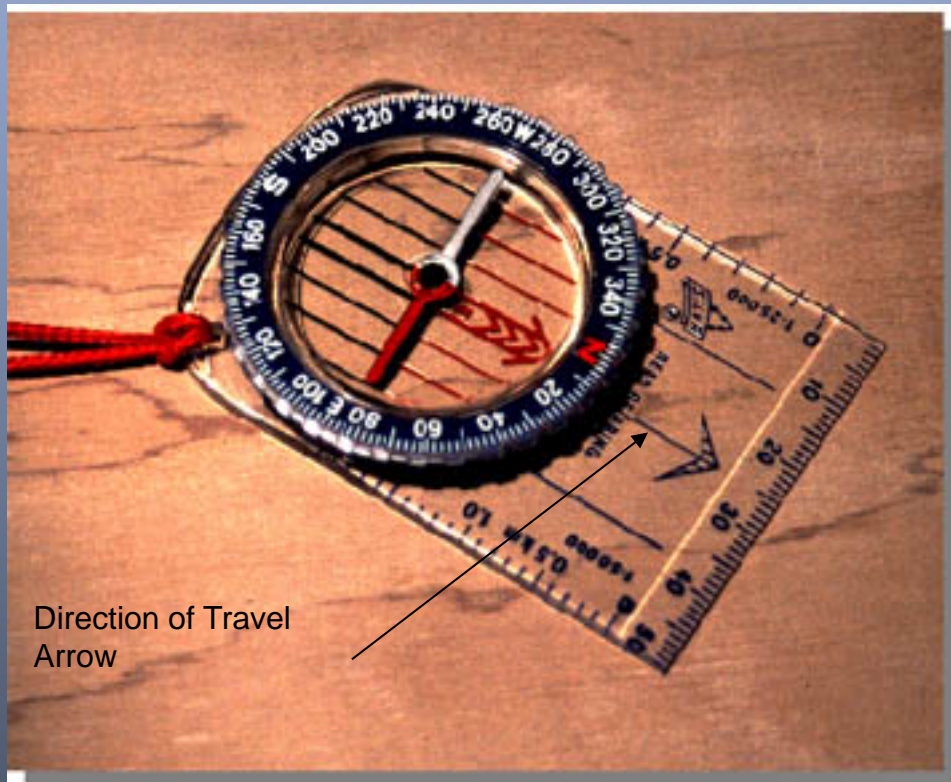
The Compass Needle



Silva Compass

- The Needle is suspended in liquid which enables it to move freely, always settling with the red end pointing **North**.
- Some needles are luminous to help navigation in the dark.

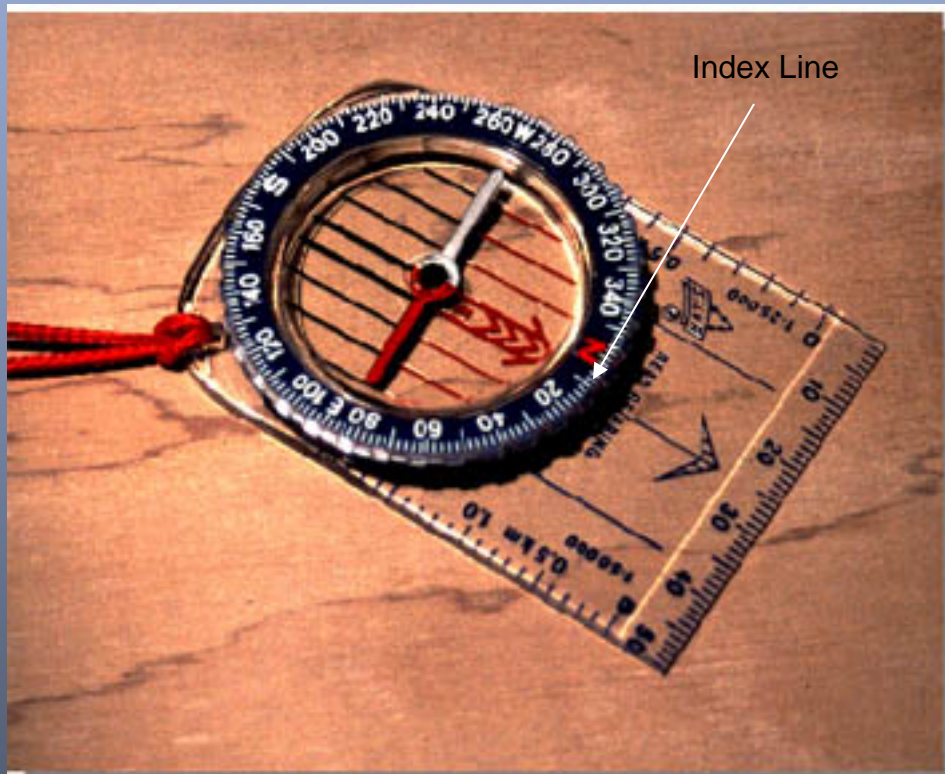
Direction of Travel Arrow



Silva Compass

- The **Direction of Travel Arrow** indicates the direction along which you wish to travel or take a bearing.
- The arrow is fixed within the base plate.
- The sides of the base plate run parallel to the arrow.

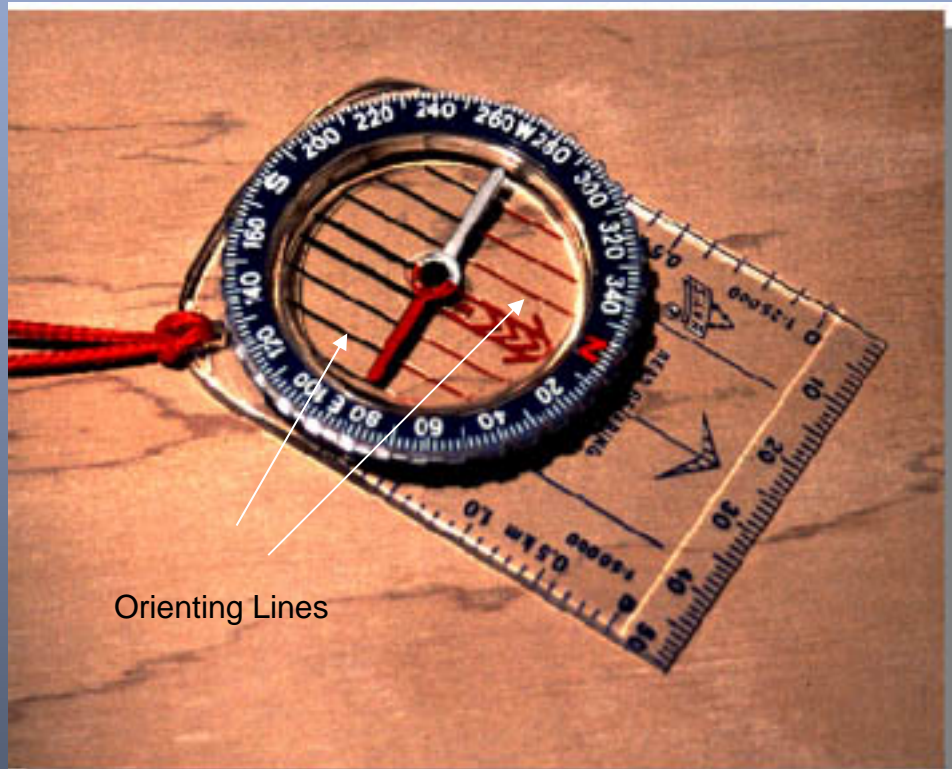
The Index Line



Silva Compass

- The Index Line is a fixed line within the compass housing and is in line with the direction of travel arrow.
- The index line marks the bearing you set by rotating the bezel.

Orientating Lines

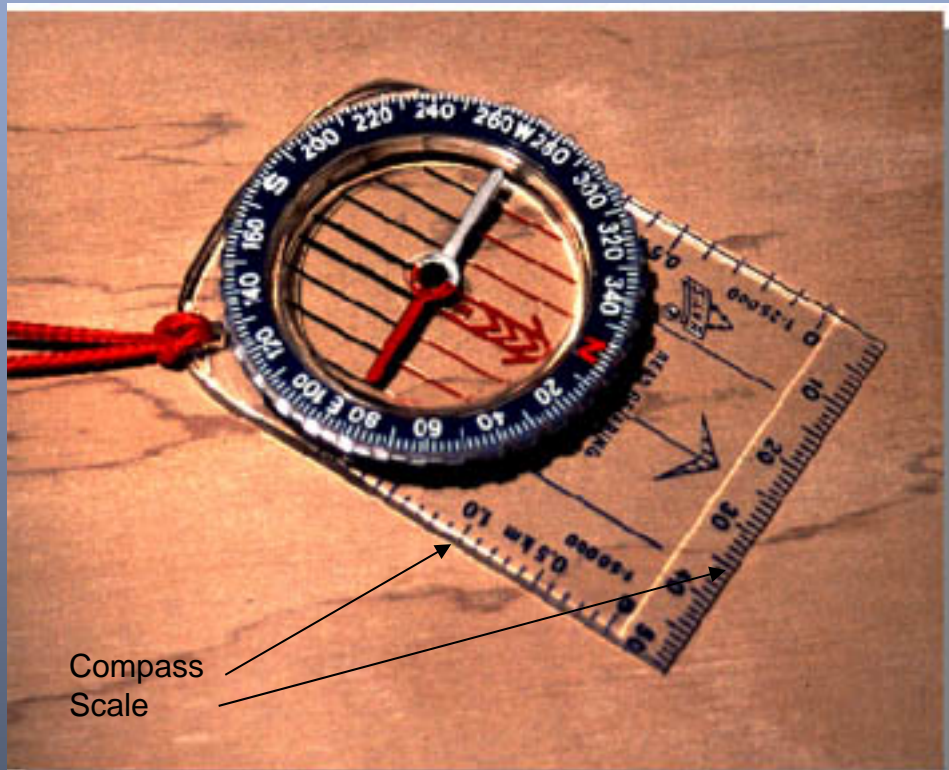


Orientating Lines

Silva Compass

- The Orientating Lines are displayed within the rotating compass housing and are designed to be aligned parallel with the **Eastings** on a map.
- The orientating lines on some compass models show one half of the lines in red to depict north.

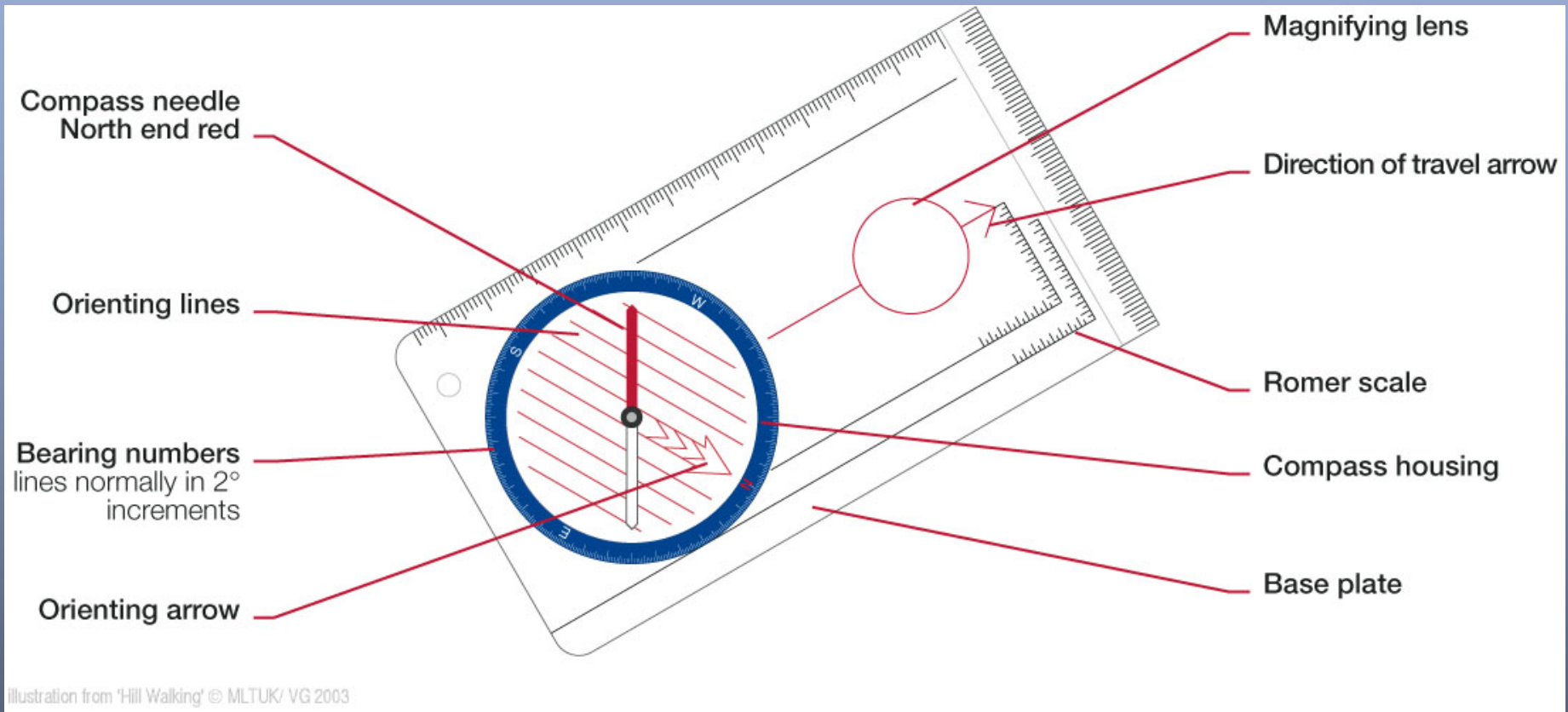
Compass Scale



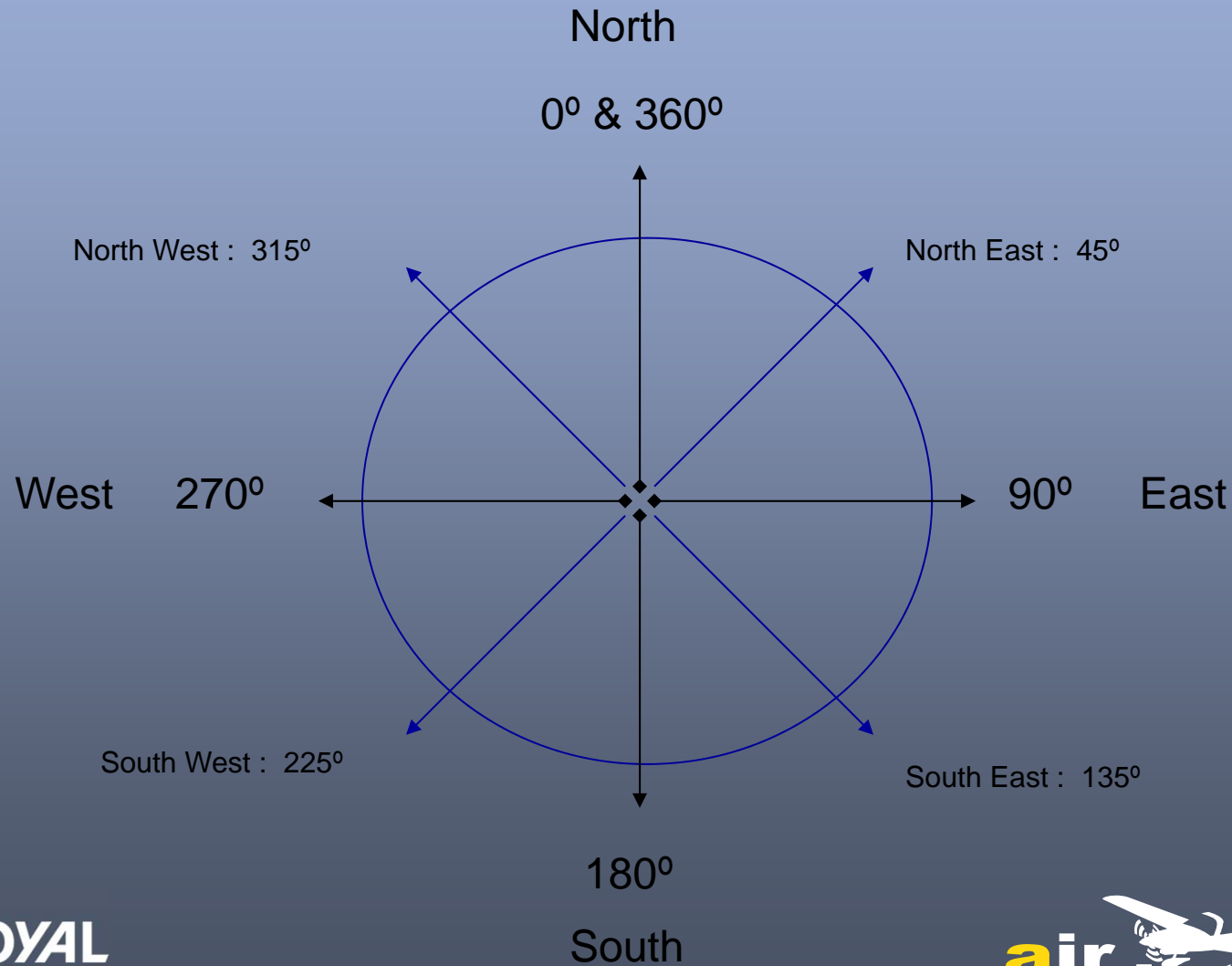
Silva Compass

- Nearly all compasses have a centimetre scale along the edge of the base plate to enable you to measure distances.
- Used in conjunction with the scale at the bottom of the map, the Compass Scale enables you to calculate the distance on the ground.

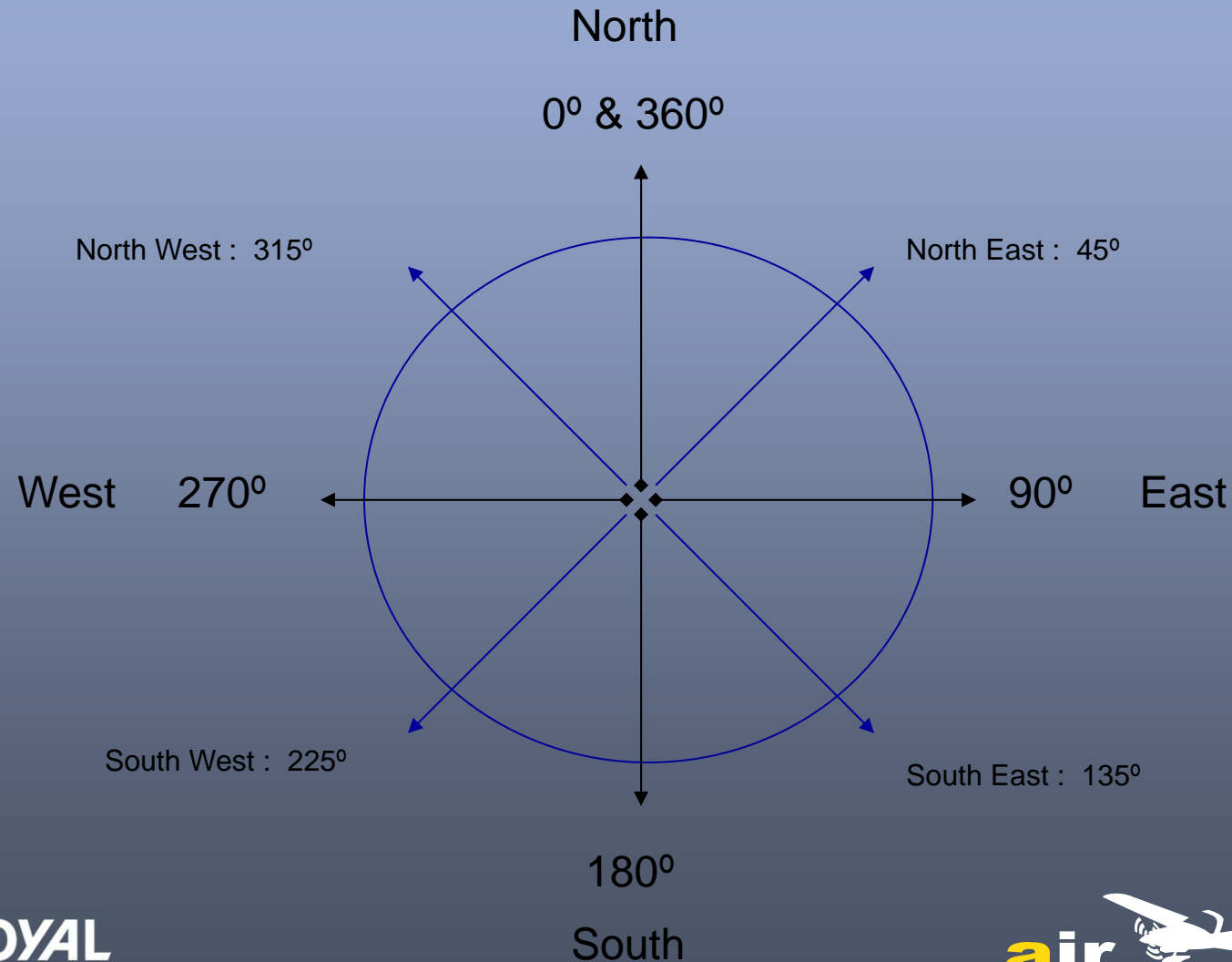
Baseplate Compass



Cardinal Points (Compass Points)

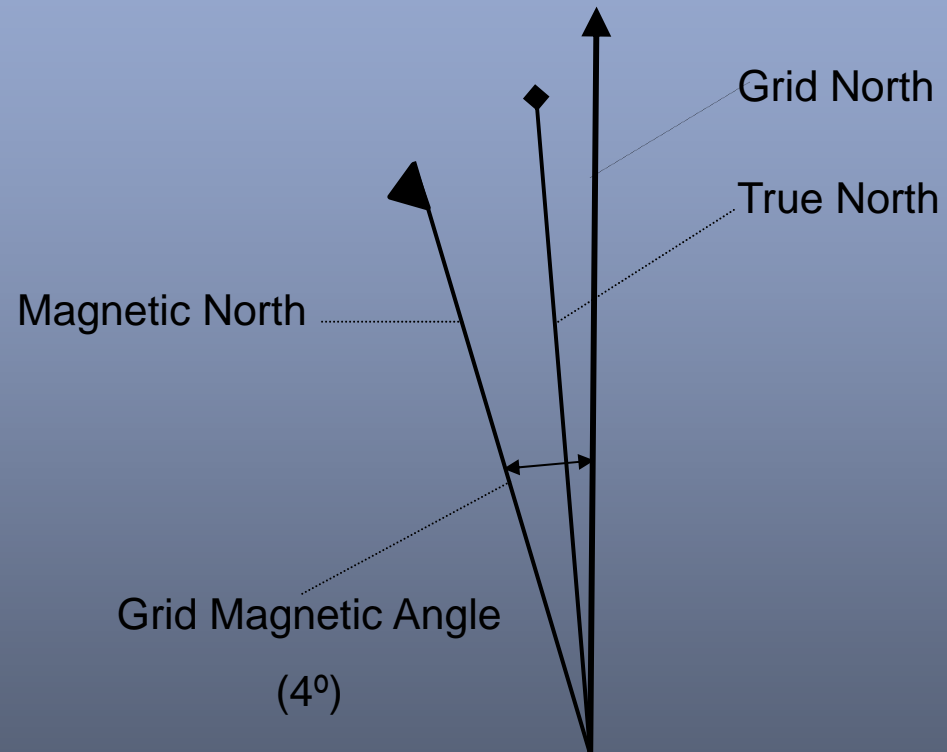


Bearings are taken in degrees – the cardinal points are divided up into 360° and measured clockwise



Grid Magnetic Angle

- The difference in degrees between **Magnetic (Mag) North** and **Grid North** is referred to as the **Grid Magnetic Angle** (usually 4° West in UK).



Map and Compass Work

Mag to Grid..... **GET RID**

Grid to Mag.....**ADD**

(usually 4° West in UK)

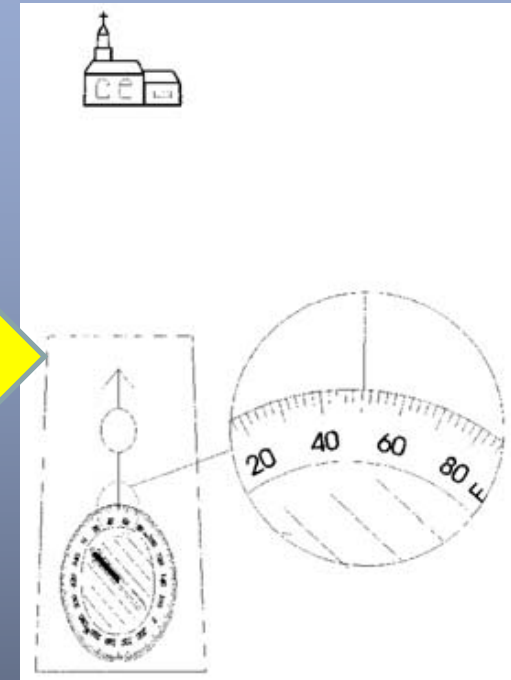
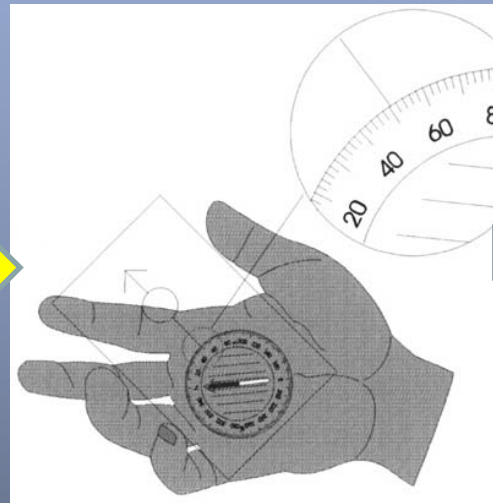
Map and Compass Work

- When working from the map we deal with Grid Bearings.
- When following a compass on the ground we work with **Magnetic Bearings**.
- There is a simple system which enables us to convert **Grid to Mag** and **Mag to Grid**.
- The system refers to whether we add or subtract the Grid Magnetic Angle to convert the bearing.

Points to note

- Stand clear of metal objects when using the compass. They will cause the needle to deviate and create inaccurate bearings. Objects as small as watches can make a difference.
- Hold the compass as flat as possible to allow the needle to move freely.
- Look after your compass – try to avoid dropping or knocking it.
- Store away from other compasses and electrical equipment.
- Your compass may need replacing if a large air bubble forms in the compass housing.

Setting a compass heading



Map to Ground

Grid to Mag.....ADD

Map to Ground

- Select a start and finish point on the map.
- Line up the edge of the compass with the line along which you intend to travel.
- Keeping the base plate static – rotate the compass housing until the orienting lines are parallel with the Eastings and the red 'N' is pointing to North on your map.

Map to Ground

- Read the bearing shown on the housing from the index line.
- Remember – Grid to Mag.....Add.
- Add the Grid Magnetic Angle shown at the top of the map (usually 4° West in UK).
- You now have your magnetic bearing of the course you have chosen. The next step is to orientate yourself.

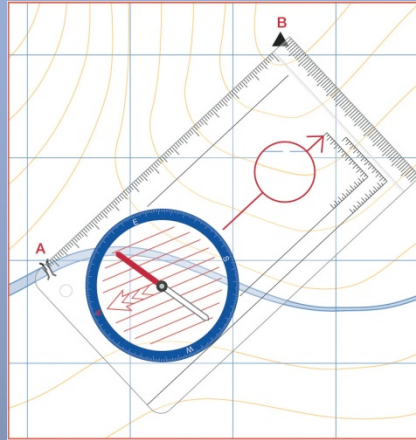
Orientating

- Hold your compass level and steady.
- Turn your body until the **red end** of the needle is in line with the **red 'N'** on the housing.
- The direction of travel arrow is now pointing along the route you chose from the map and you are ready to travel.

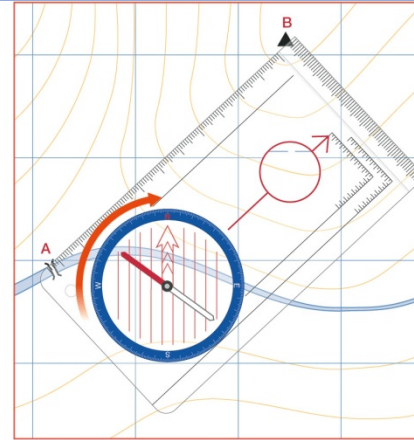
Following the Compass Bearing

- Hold your compass level and steady.
- Ensure that the red end of the needle is in line with the red 'N' on the housing every time you refer to the compass bearing.
- Follow the direction of travel arrow. You will find it easier to line up the direction arrow with a physical feature on the ground (e.g. tree, pylon, tower). Use this as a reference point which you can move towards. This is easier than following the compass every inch of the way.

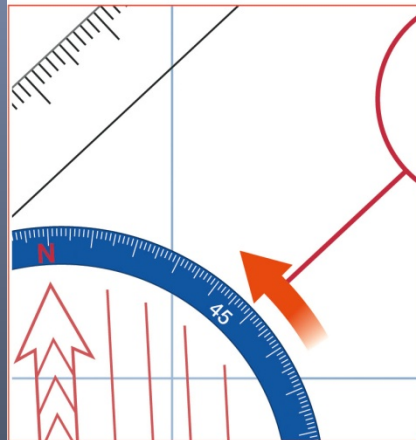
Map to Ground



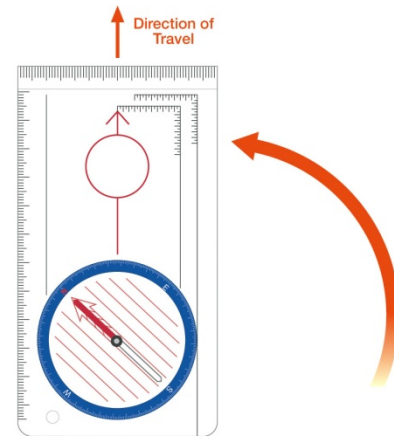
A Align the compass along the required route on map



B Rotate the compass housing to align the orienting lines with the north-south grid lines on the map



C Rotate the compass housing to compensate for magnetic variation



D Remove the compass from the map, rotate the compass so that north end of the needle and the orienting arrow are aligned and then proceed following the direction of travel arrow

Ground to Map

Mag to Grid..... GET RID

Ground to Map

- Select the feature on the ground to which you wish to take a bearing.
- Hold the compass steady and level.
- Point the direction of travel arrow at the feature.
- Rotate the housing until the red end of the needle is in line with the red 'N' on the housing.

Ground to Map

- This is your Mag bearing which you can either travel along or convert to a grid bearing.
- To plot on the map you should first locate your own position and mark it.
- Convert the Mag bearing to a Grid bearing by Mag to Grid.....Get Rid. (Usually 4° West in UK.)
- Subtract the Grid Magnetic Angle.

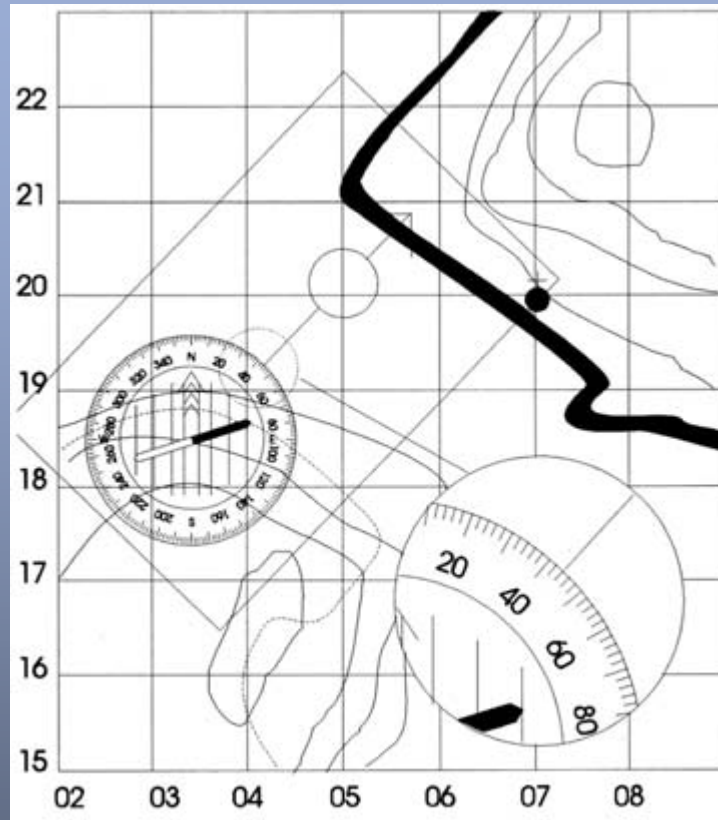
Ground to Map

Place the compass on the map and keeping the bearing set on the housing, rotate the whole compass until the orientating lines are parallel to the Eastings on the map. The edge of the compass should run through your position and show the bearing on the map.

Ground to Map

By turning your body until the **red** end of the needle is in line with the **red 'N'** on the housing you have now orientated yourself and the map.

Ground to Map



Take a bearing – deduct the magnetic variation – rotate the compass to get the orientating lines parallel to the grid lines – you are somewhere on that line

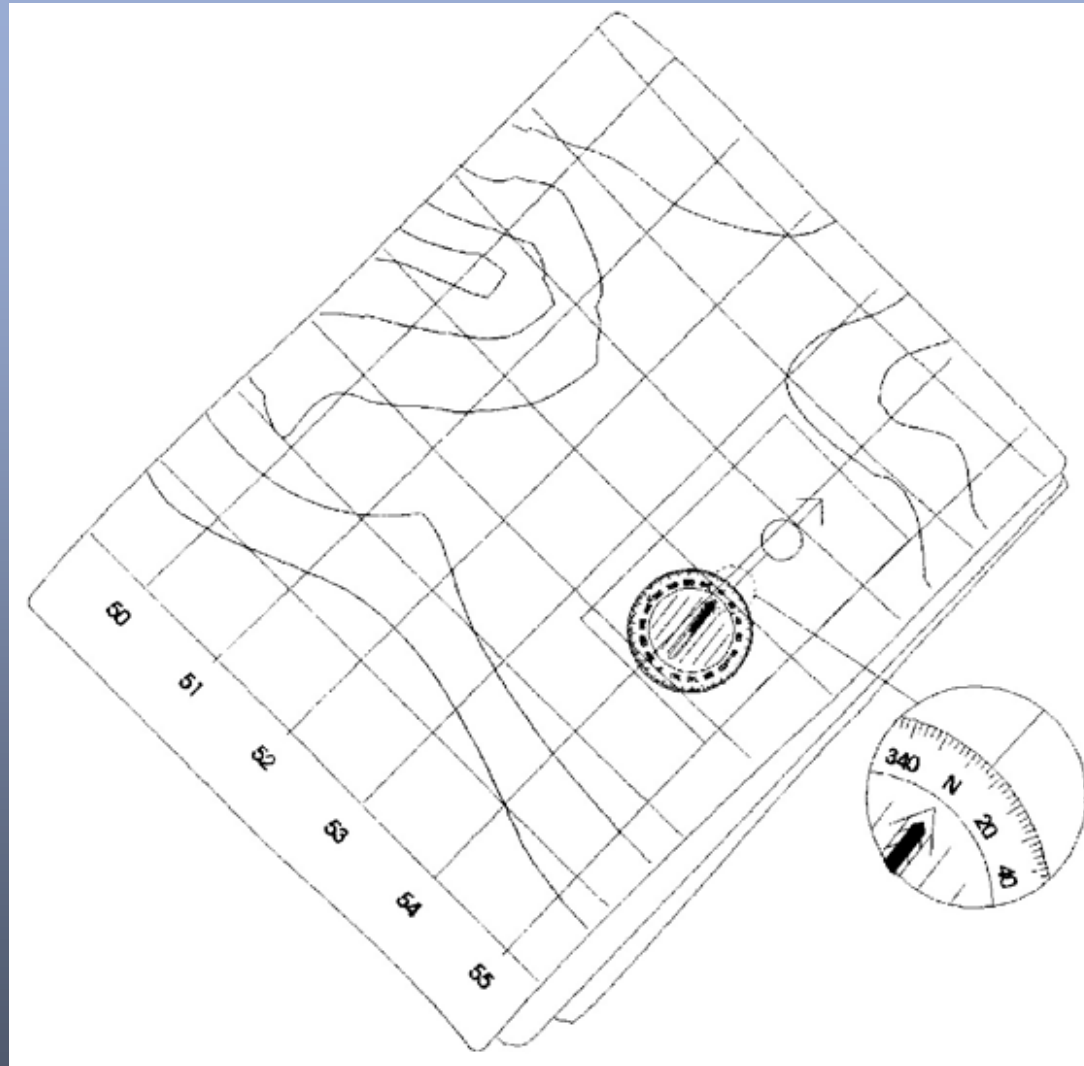
Resection



Now take 2 bearings from other features

Your position is the centre of the triangle

Setting the map with a compass



Quick Orientation

You can orientate yourself and the map to the ground at any time using this easy system:

- A. Lay the compass on the map.
- B. Line the edge of the compass and the orientating lines up with the Eastings.
- C. Turn your body until the red end of the needle is in line with the red 'N' on the housing.

You and your map are now facing North.

Compass and map

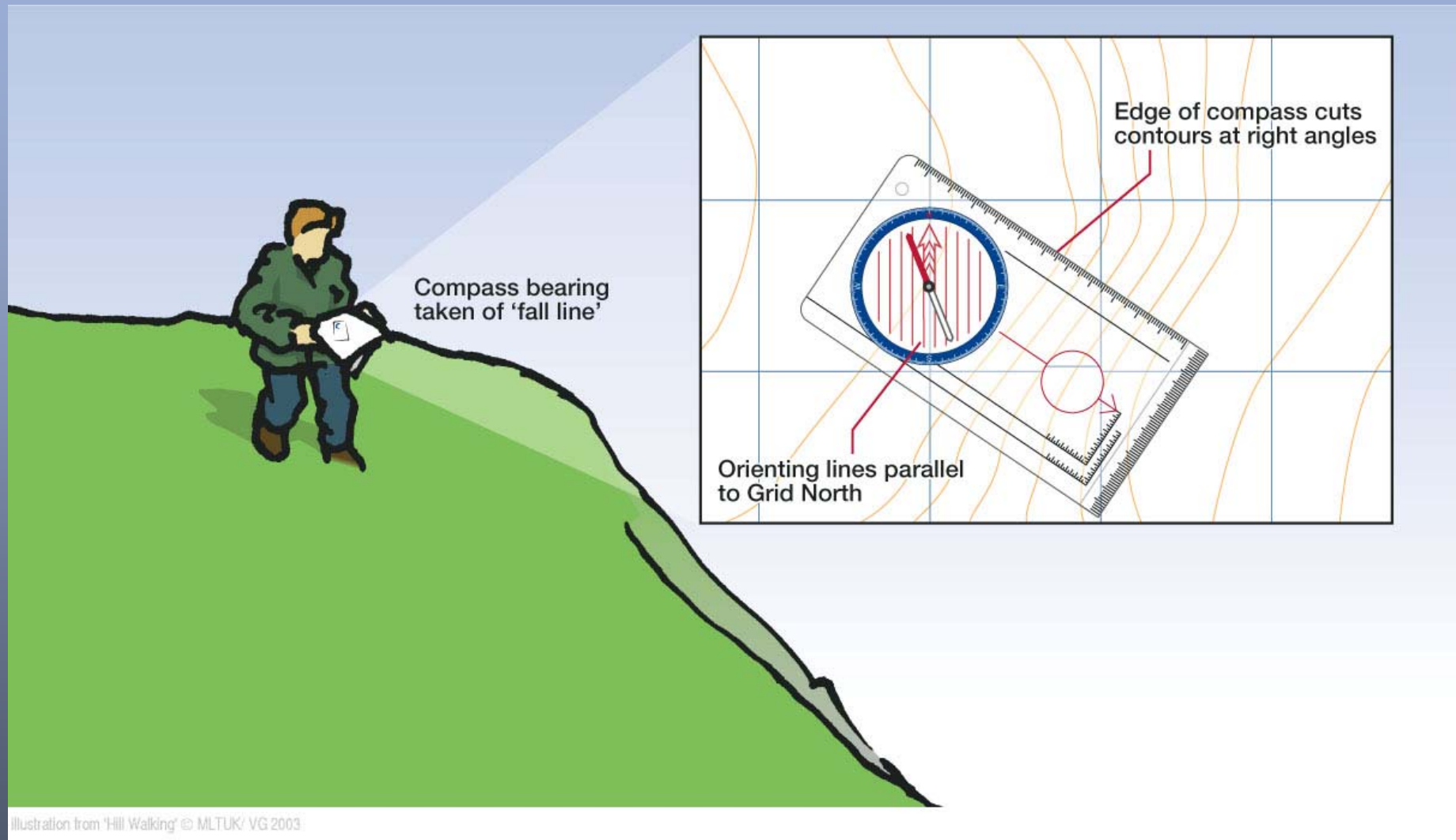
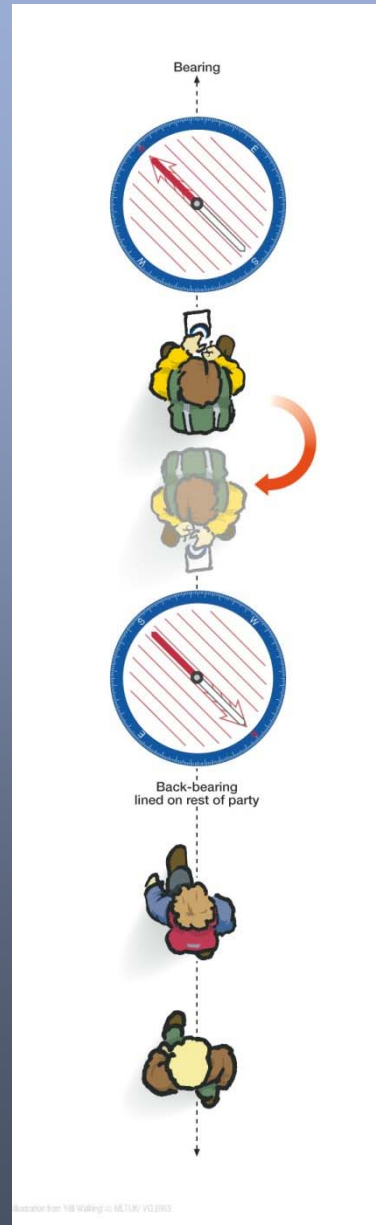
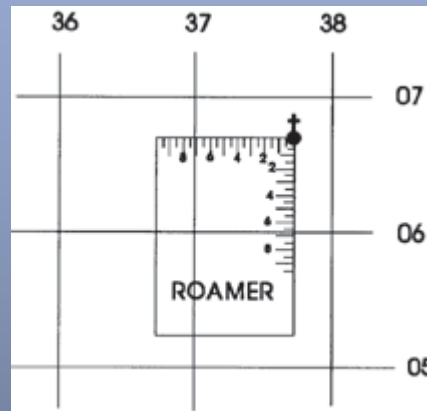


Illustration from 'Hill Walking' © MLTUK/ VG 2003

Back bearing

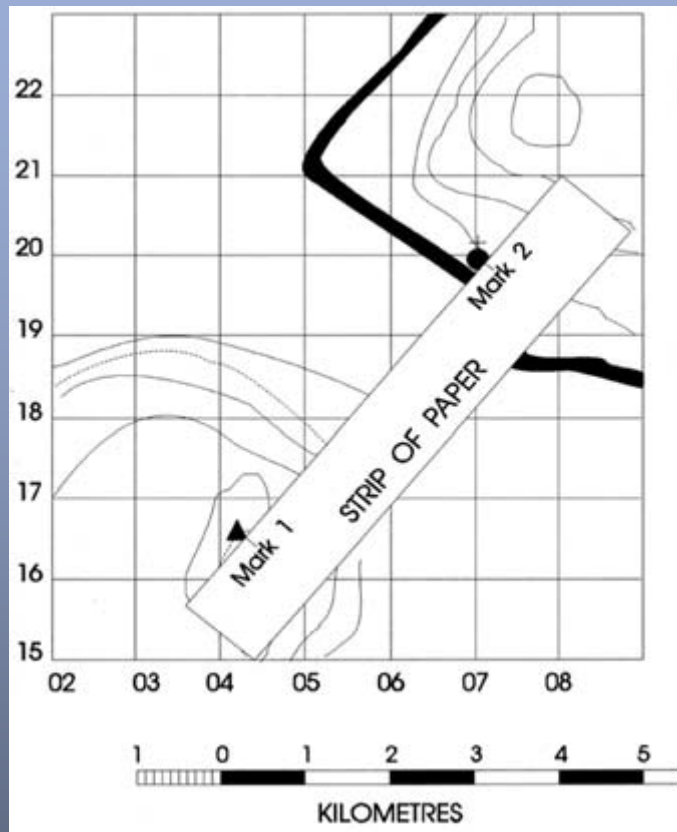


Scales and Roamer

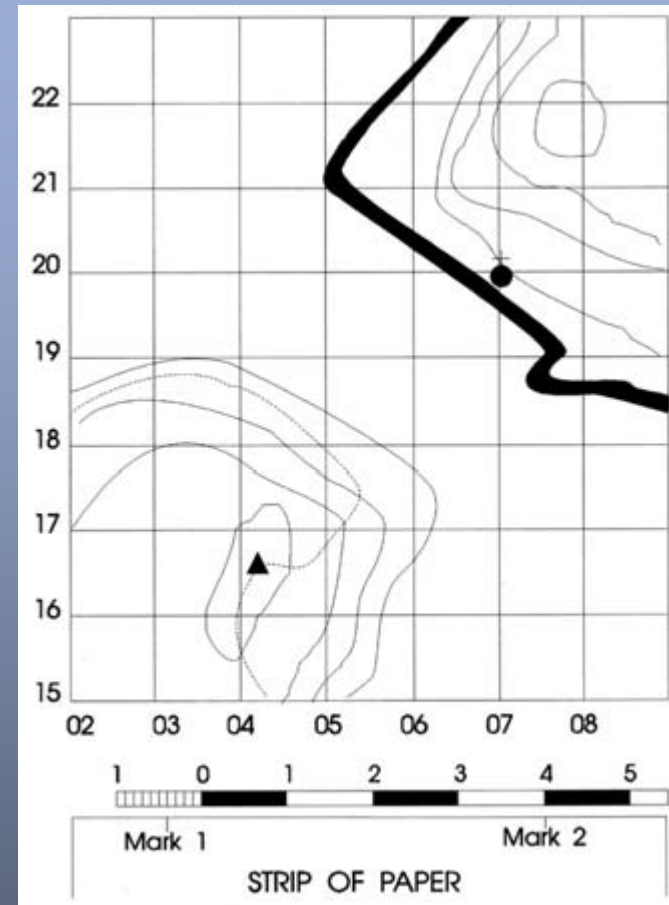


Read the lowest number

Measuring distances on a map



Mark the position of the 2 features



Place the straight edge of the paper against the scale and read off the distance

How GPS works

