

Leadership Training

Unit 6 Navigation

Part 3

N_v_g_____n Part 3

- It's ok, you can use that word!
- I can do it.
- I will learn how to.
- It's NOT too hard, I can learn.
- Bushwalkers need navigation –
- even me!

The Compass

You may already know a bit about one of these.

This is a magnetic compass.



Who feels very confident using a compass?

Who feels sort of ok using a compass?

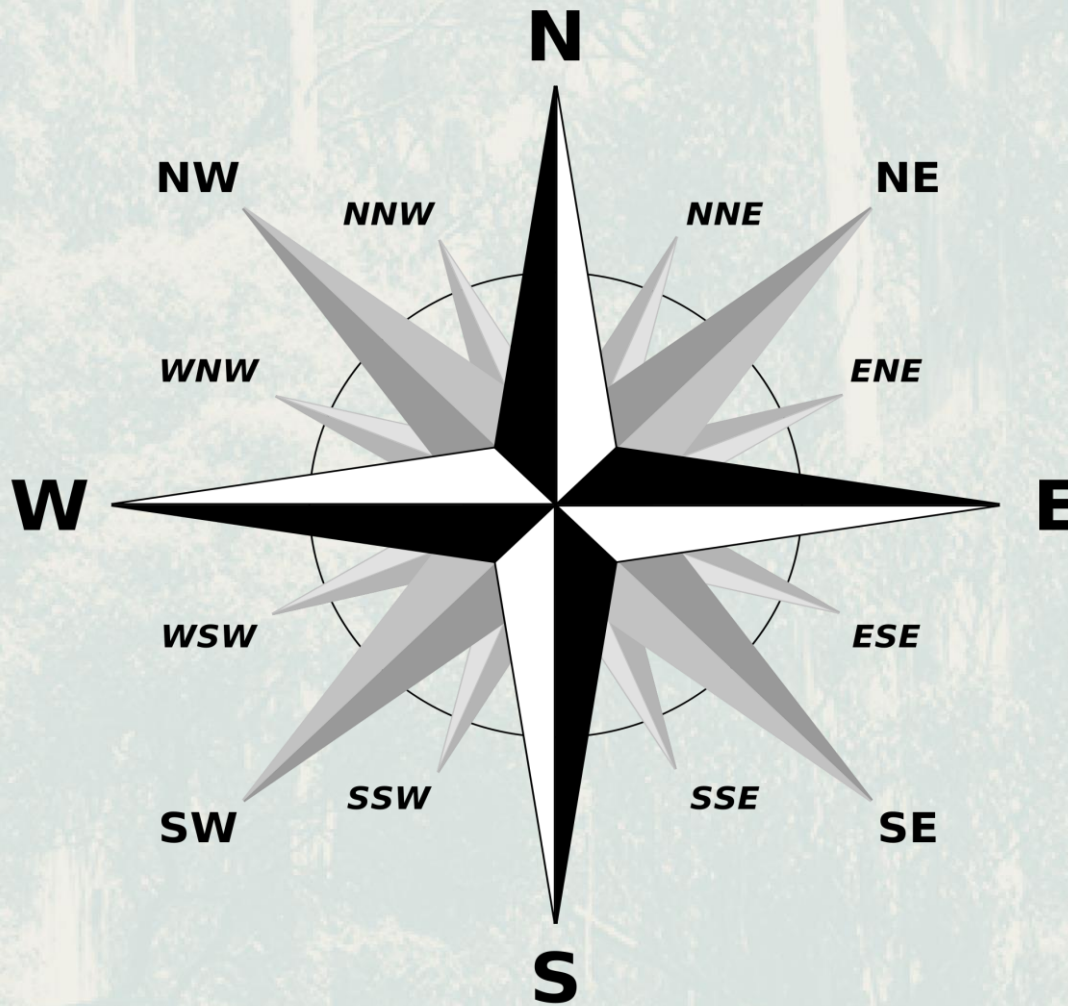
Who feels worried about using a compass?

Let's try to demystify it for everyone.

The pivoting magnetised metal needle always points to the North Magnetic Pole. Stand clear of metal objects eg cars, metal fence posts when using your magnetic compass.

Be aware that some rocks can influence your compass too. Mt Jim (Bogong High Plains) is one such place.

Cardinal points of the Compass

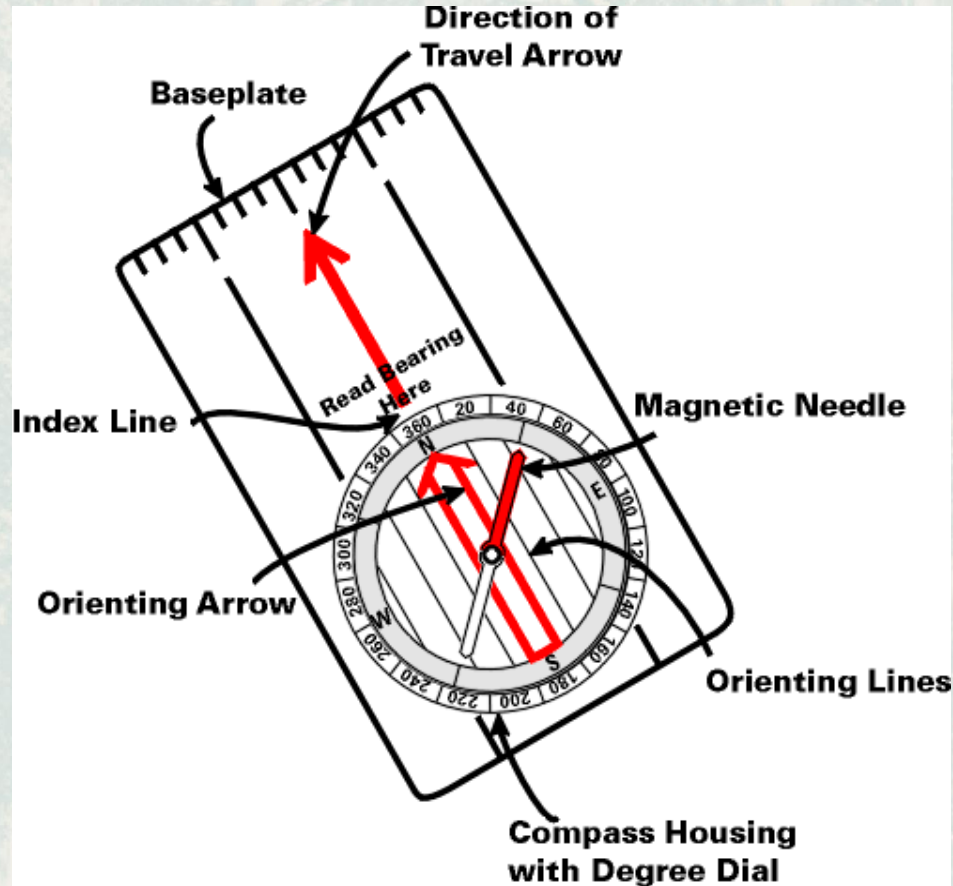


In bushwalking, we use bearings in degrees, and all bearings will be somewhere between 0° and 360° .

We usually move clockwise around the circle, from North.

Remember Never Eat Soggy Weetbix (NESW), and you have the cardinal points of the compass.

Features of a Compass



Bearings Pt 1

A bushwalking type compass, with a rotating housing, can be used as a protractor for obtaining grid bearings on a map.

Using your compass to reach a destination
(Ref Map Reading Guide, P17-18)

Set your compass to a bearing of 163°
(step 1, page 18.)

Hold the compass level in front of you,
with Direction of Travel Arrow pointing ahead.

Turn your body to align the red end
of the needle with the N on the dial.
(Step 2, page 19)

Is everyone facing the same direction?

We would now pick out a feature on the bearing line and we'd walk to that feature.

Step 3, page 19.

This is the procedure to follow to walk on a compass bearing. Keep track of the distance covered on that bearing.

Walking on a Bearing

This is used in featureless country but is also important when descending a spur.

A spur is easy to lose particularly if it flattens out or divides.

After facing the direction of travel obtained from the map, look ahead to a distinct object, e.g. a rock or large tree, and walk towards it. When you get there, repeat with another object.

Use your compass to:

- Check the direction of a creek (or track etc) to confirm your direction of travel
- Confirm a decision at a track junction
- Navigate in poor visibility / foggy conditions

Obtaining a Compass Bearing

How do we actually obtain the compass bearing?

We use the map and the compass together!

The purpose of a bearing is to give an accurate indication of direction from one point to another.

Use the compass to orientate your map

If you are unable to identify the surrounding features you can use the compass to orient the map:

Lay the map flat and place your compass so the baseplate side edge lies along any grid north line and the direction of travel arrow is also pointing to grid north

Rotate the map and compass until the north point of the compass needle is east or west of the index line by the amount of the Grid

Magnetic angle shown in the map's margin

Work on your own or with a neighbour.

Follow these steps to complete Exercise 6.

Exercise 6

1. Look for your position on the map and the position of your next objective.
2. In this case you are at GR 284776 (circled track intersection) and wish to walk to Mt Warby.
3. Lay your compass edge along the route to be taken with the direction of travel arrow pointing to your destination.
4. Turn the housing so that the parallel lines in it are parallel to the grid lines on the map pointing north.
5. Read the grid bearing on your compass.
It is **150** deg.
6. Subtract 11 deg – (Correct for Warby map as of 2016)
This will give a magnetic bearing of **139** deg.

Exercise 6 continued

7. Hold the compass correctly and turn around so the magnetic needle is aligned with the housing arrow. You are now facing the direction of travel.
8. Now find the magnetic bearing from Mt Warby to knoll GR287754 (**Hill 440**), $188 - 11 = 177$ deg.
9. Then from the previous knoll to a saddle at GR 276756 (**370 feature**), $278 - 11 = 267$ deg.
10. From the saddle to knoll GR 277768 (**Hill 430**), $359 - 11 = 348$ deg.
11. From there back to the intersection at the start $43 - 11 = 32$ deg.
12. How far have you travelled, (as the crow flies)?
_____ km.

Hint:

- Metal objects eg cars, fence posts, power poles, transmission lines can all affect the accuracy of a compass reading
-
- Stand well clear of such items when using a compass

Bearings Pt 2 Norths

The earth is a sphere (almost).

- True North – Earth spins on this axis
- Magnetic North –direction of the north magnetic pole
- Grid North – direction of vertical lines overlaid on map (Eastings)

Grid convergence is the angular difference in direction between Grid north and True north

In Map reading we only use Grid north and Magnetic north

Your compass points to Magnetic North, so there are differences between the magnetic bearing and the grid bearing.

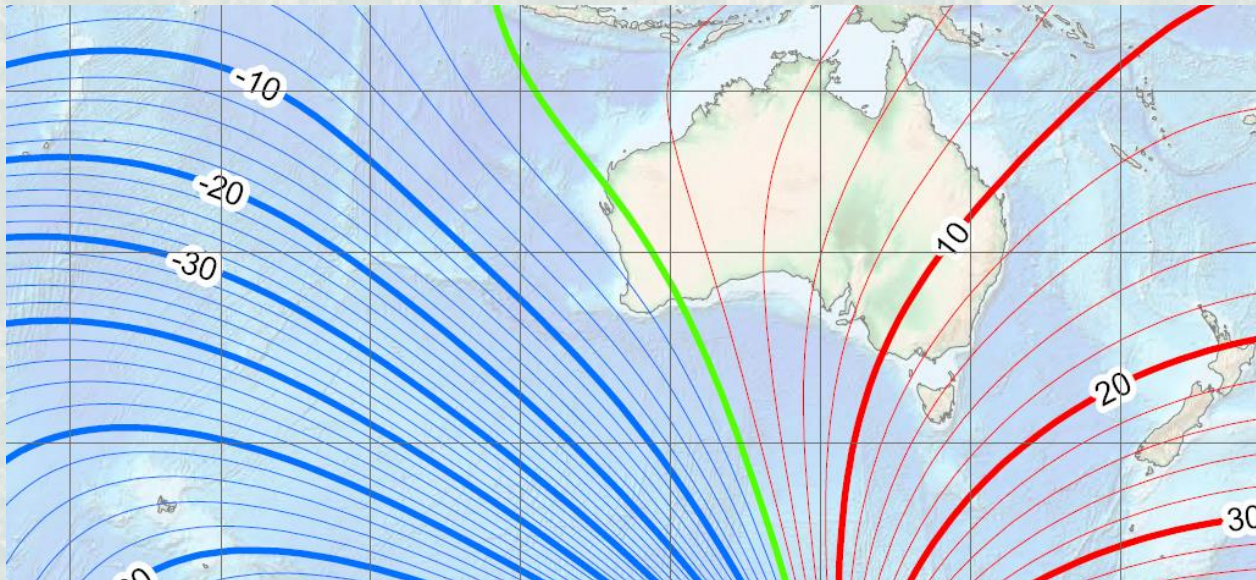
Magnetic Declination and Variation

Magnetic Declination is the difference between true north and magnetic north, which varies from place to place and changes by a small amount over a long period of time.

In Victoria the magnetic declination is between 9 and 14 degrees, and is varying at a rate of less than 1 minute per year.

For the Warby map 8125-3-1 the magnetic declination in 2016 is $11^{\circ} 27'$. For map work use 11° .

Magnetic variation over Australia



Contour interval 2 ° Red: positive (east) blue: negative (west) Green: zero

Map published January 2010

Bearings Pt 3

The angle between Grid north and Magnetic north is shown on the map as the Grid Magnetic angle

After taking a Grid bearing with your compass, you need the Grid magnetic angle to adjust this bearing to determine the actual magnetic bearing to walk on.

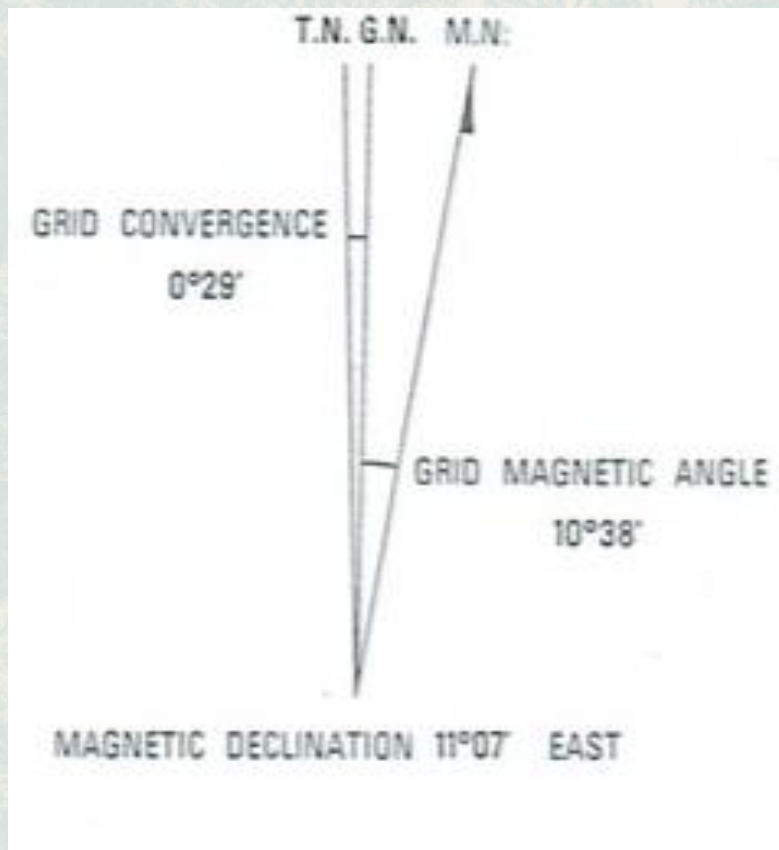
The websites

<http://services.land.vic.gov.au/maps/imf/search/Topo30Information.jsp> is one place to find current Grid/Magnetic angle for 1:25000 maps.

<http://www.ga.gov.au/oracle/geomag/agrfform.jsp> This site will provide the current Magnetic Declination for use with most maps.

Grid magnetic angle

Example: Warby map shows Grid Magnetic Angle of $10^{\circ}38'$ in 1995. Today in 2016 it is $10^{\circ}58'$.



2016 Grid Magnetic Angle $10^{\circ}58'$

2016 Magnetic Declination $11^{\circ}27'$ EAST

There are various mnemonics to help remember how to convert.

Some navigators use GMS, Grand Ma Sucks to remember Grid to Magnetic **Subtract**

The sports car, the MGA = Magnetic to Grid **Add**.

These only work for variation to the EAST!

Questions?

Remember, just like for maps, the more you use your compass to take bearings, the better you will become in using it.

Trying to learn how to get a bearing in the pouring rain with your map flapping in the wind is really hard.

Have a go – at every opportunity. Ask other leaders when you're on walks with them.

Push yourself and become more confident. Everyone can do it.

Datum

The marginal information also indicates the Datum used. Simply, this is a point where all horizontal measurements are taken to ensure all maps are coordinated.

If you use a GPS as well as a compass you must ensure that the GPS is set to the same datum as the map being used.

E.g. if using a map with the AGD 1966 datum e.g. the Warby map, set the GPS to this datum, otherwise the GPS reading will be out by 200m

Datum

More recent maps with WGS84 and MGA 94 will be coordinated with a GPS.

However, check the GPS setting is the same.

The topic of datum and GPS is covered in more detail the Advanced course.

Instructional Videos

Walking and taking a bearing:

An instructional podcast on walking and taking a bearing. Completed as part of a sports science degree at Bangor University Wales so the calculation are different from those in Victoria.

<https://youtu.be/tHKTADTrxTU>

True North, Grid North Magnetic North and magnetic variation

The instructor explains the difference between these different norths. He then goes through some examples of how to convert from one to another.

<https://youtu.be/6nQffr-UIkM>

Topographical Maps basics

Greg takes you through the basics of a topographical map and shows how to describe your position on one.

https://youtu.be/c_hNgPYK8-o

Extension Activity

Have a go now using the exercises using a Route Plan Card in your folder. or www.outdoorleaderonline.org Cpt 3

If you finish doing all the bearings and grid references early, add more information to the Route Plan Card.

Distance, height gained and lost and other information ensures your planning is detailed.