

# MAP READING 3

*Builder Level*



**RED**

## Purpose

**This badge introduces you to using map and compass together and will enable you to plot a Grid Bearing, Back Bearing, convert Grid Bearings to Magnetic and vice-versa and have a working knowledge of how to obtain a Resection.**

## Equipment required

1:25,000 scale topographical map, a protractor, a compass, pencil and paper.

## Review

Demonstrate to your Counsellor that you know the following.

### (MAP)

1. Ten Conventional signs.
2. Obtain a six-figure grid reference.
3. Identify and explain the following marginal information.
  - Title
  - Edition Number
  - Date of Map

### (COMPASS)

4. Show the correct direction after being given a bearing.
5. Show the correct bearing after being given a direction.

## Exploring

In the previous two Map Reading badges you have learned how to read a compass and how to read a map. For this knowledge to be really useful we have to be able to use these tools together.

The early explorers did it the hard way - they left home usually with a compass and drew the maps as they went. The early seafaring explorers only had the compass and had no way in determining how far they had gone on a certain bearing. It is because of this disability that they often accidentally ran into strange lands. Our own country is a prime example of this. The Dutch originally discovered Australia while trying to get to Indonesia. By leaving it too late to turn North, after rounding the Cape of Good Hope, they ran into our fine country. Captain Cook did the same thing (some time later) coming from the other side.

Before any expedition or hike can be undertaken a lot of preparation is needed. A lot of this work may be done from the comfort of your home or Cadet rooms at the church by using up-to-date maps. Maps will tell you how far it is from one point to another and what the country is like. From this you are able to work out the easiest way to get there. With cross-country hiking it is not always the case that the shortest distance between two points is a straight line. There could be cliffs to avoid, rivers/creeks to cross and having the safety of the group always foremost in your mind you may need to walk around some of these features.

We will now proceed to do a map exercise step-by-step. Go through this exercise as often as you need till you can carry out all the steps without having to refer to the instructions. Then you are able to tell your Counsellor that you are ready for the final test.

1. Locate the two six-figure grid references that your Counsellor will give you. (Counsellors please make them about 7 – 10 grid squares apart for easy working). Mark both spots with a pencil and draw a straight line connecting the two references.
2. Take your protractor to one of the points marked. Lay the protractor on the map and ensure that the 90 degrees line is parallel to the nearest Northing. Measure the angle of your bearing and write it in down below (Make sure  $0^\circ = N$ ). Add  $180^\circ$  if your protractor is laid on left side of Northing. This bearing is known as the **Grid Bearing** (all bearings taken from maps are known as **Grid Bearings**). Let us suppose that the **Grid Bearing** you have just obtained is 100 degrees.

3. Take your protractor and measure the bearing from the other Grid Reference that you were given. What is the difference between the two bearings?

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The Bearing that you have just measured would take you back to your starting point; therefore the Bearing is known as a **Back Bearing**. Another way to obtain a Back Bearing is to add (or subtract)  $180^\circ$  to your original bearing.

4. Your Counsellor will now give you four Grid References. Assume you are at the first Grid Reference given. Going through the above steps obtain the Back Bearings of each of the other three points. Draw in your Back Bearings and you will find that they should all meet at your starting point. You have just completed a **Resection**.  
Do this exercise again until your Counsellor is satisfied that you understand what you are doing.
5. Look at your 1:25,000 map, when was it made? In the same block of writing you will also find 'Map Reliability' which states that the topographical information is correct to a stated date. Write this date down.

6. Now look for the Magnetic Variation diagram. It is easy to spot as it consists of three near vertical lines, on top of which are the letters GN, TN and MN. These letters stand for GRID NORTH, TRUE NORTH and MAGNETIC NORTH. We are interested in GN and MN. Next to the MN line it states that the Grid/Magnetic angle is ... degrees ... minutes (sixty minutes = 1 degree). This is the variation between your map (grid) North and Magnetic (your compass) North.

What is this variation .....

What is the date under the diagram .....

7. Magnetic North is where the red end of the compass needle points, it changes East annually and the amount of the change is printed under the diagram.
  - a. What is the annual change on your map? .....
  - b. Does the angle become smaller or larger each year? .....
  - c. What is the Magnetic Variation between the date under the diagram and today?  
Is it East or West? .....

- d. Add your answer to the Magnetic Variation shown on the Magnetic diagram.

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These details are important because an error of one degree over one kilometre means an error of 100 metres on the ground. So on a 10 km hike, you could be out by one kilometre. The difference between being picked up or being lost!

**NOTE**

This variation must be applied when we are converting from map bearings to compass bearings and vice versa. The formulas are as follows.

**Grid to Magnetic subtract (GMS)**

**Magnetic to Grid add (MGA)**

**Doing**

- Using the maps you have, do the following:
  - Calculate the Magnetic Variation for today. ....
  - Lay out a compass course of at least three legs on your map.  
.....  
.....
  - Convert the Grid Bearings you have just plotted to Magnetic Bearings. Which bearings would you use to set your compass and why?  
.....  
.....
  - What are the Magnetic Back Bearings for the Bearings achieved under c.  
.....  
.....
  - Convert d. to Grid Bearings.  
.....  
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- As a GROUP plan a 15 km hike using map, grid bearings, magnetic bearings and then go and walk it to finish your badge.

**REFERENCES**

The patrol goes to camp. The Scouts Association of Australia.  
 Australian Road Atlas, published by George Phillip & O'Neil, Lands Department in your State.  
 Help available to Counsellors: Policemen, State Emergency Services,  
 Defence personnel (current and past), Local Army Cadet unit.

Ask your Counsellor to sign below and arrange for the presentation of your badge.

..... date .....