

Where is the epicentre?

Purpose:

The purpose of this activity is to engage students in using mathematical constructions to locate a position on a topographical map.

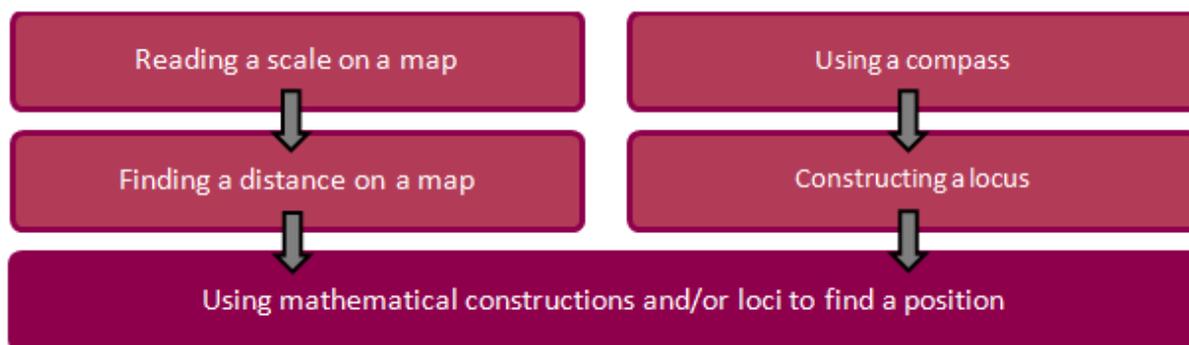
Achievement Objectives:

GM3-5: Use a co-ordinate system or the language of direction and distance to specify locations and describe paths.

GM3-1: Use linear scales and whole numbers of metric units for length, area, volume and capacity, weight (mass), angle, temperature, and time.

Description of mathematics:

The background knowledge and skills that should be established before and/or during this activity are outlined in the diagram below:



Reading a scale on a map

The scale on a map is 1:10 000 (one unit on the map is equivalent to 25 000 units on the ground). How many cm on the map will be needed to represent 800 m on the map?

Finding a distance on a map

Use the map (<http://traveltrade.newzealand.com/en/data/files/discover-new-zealand/maps-and-transport/documents/north-island/>) to find the distance between Rotorua and Whangarei, 'as the crow flies'.

Using a compass

Use a compass to construct a circle of radius 7.0 cm.

Constructing a locus

Show the set of points that are 7.0 cm from the centre of a sheet of A4 paper.

Using mathematical constructions and/or loci to find a position

Find the position on a sheet of A4 paper, in portrait layout, that is 18 cm from the top right hand corner and 12.5 cm from the bottom edge.

This activity may be carried out with step by step guidance, or by allowing the student to follow their own method of solution. The approach should be chosen in sympathy with students' skills and depth of understanding.

Activity:

Seismometers have been installed in many schools around New Zealand. When an earthquake is recorded, there are two main peaks in the series of squiggles the seismometer makes. The distance between those peaks can be used to tell how far away the the epicentre of the earthquake was. In one event, three North Island schools detected an earthquake and found the epicentre to be:

- 100 km from Napier
- 60 km from Gisborne
- 180 km from Taupo

Find the epicentre of that earthquake.

nb A useful map of the North Island can be found on the following link:

<http://traveltrade.newzealand.com/en/data/files/discover-new-zealand/maps-and-transport/documents/north-island/>

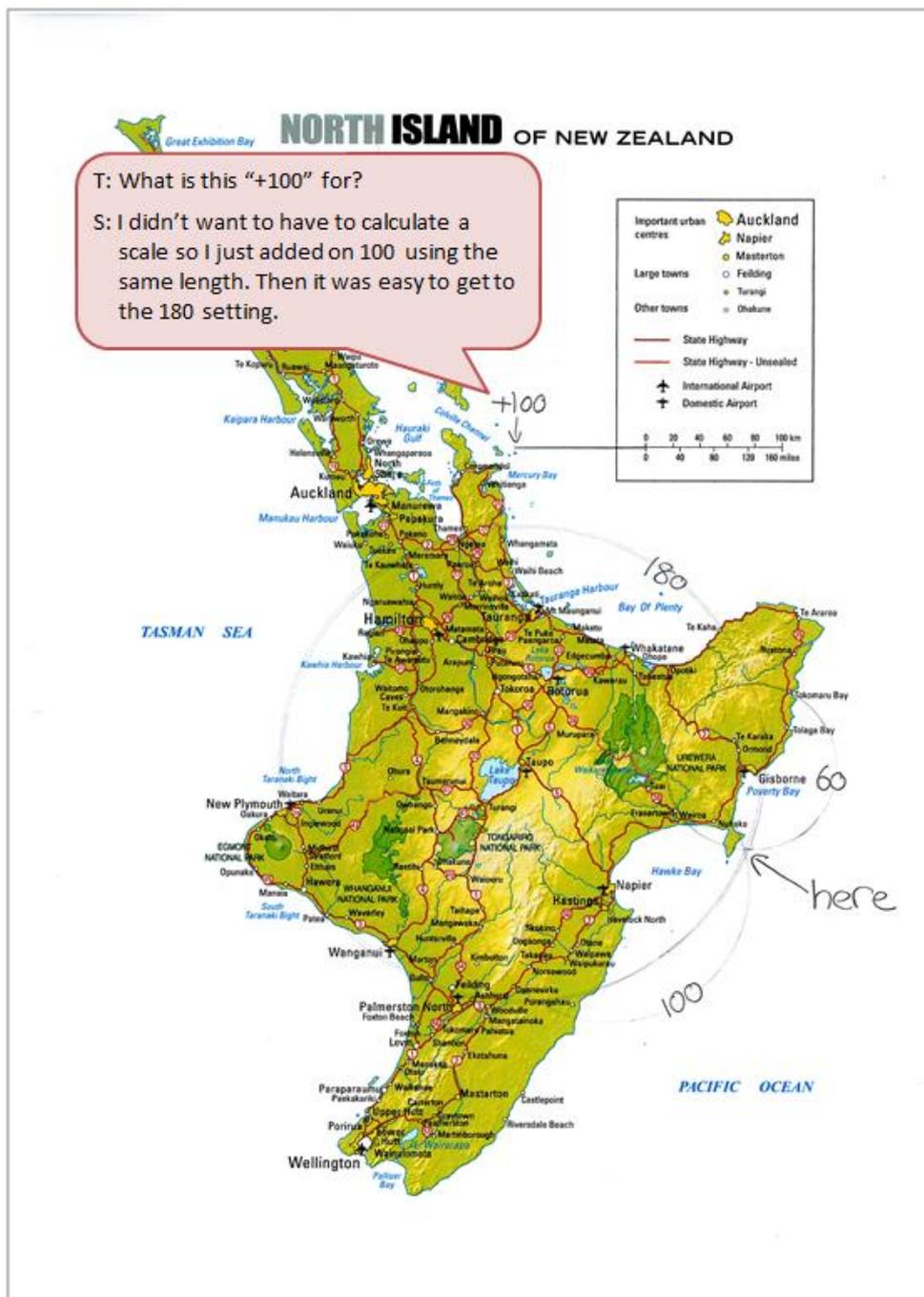


The procedural approach

The student is able to use construction techniques, with guidance, to locate a position on a map.

Prompts from the teacher could be:

1. Use the scale of the map of the North Island to set a compass to 100 km.
2. Construct the set of points that are 100 km from Napier on this map.
3. Use the scale of the map to set a compass to 60 km.
4. Construct the set of points that are 100 km from Gisborne.
5. Use the scale of the map of the North Island to set a compass to 180 km.
6. Construct the set of points that are 180 km from Taupo.
7. Locate the epicentre of the earthquake.



The conceptual approach

The student is able to use construction techniques and deduction, to locate a position on a map.

Prompts from the teacher could be:

1. Use the map and the distances given to consider an area of interest where the earthquake epicentre is roughly located.
2. Use the scale and a compass and/or a ruler to home in on the epicentre of the earthquake.

