Geolab 8

MAP ELEVATIONS

The elevation of landforms such as hills and valleys is always shown on topographic maps. The height of the land above the surface of the ocean is its elevation. The ocean surface is known as sea level.

Landforms may be generally divided into three types according to their elevation above sea level. These are:

(a) Mountains—landforms over 300 m.
(b) Hills—landforms less than 300 m.
(c) Plains—very low elevations.

Geolab 8 - Exercise

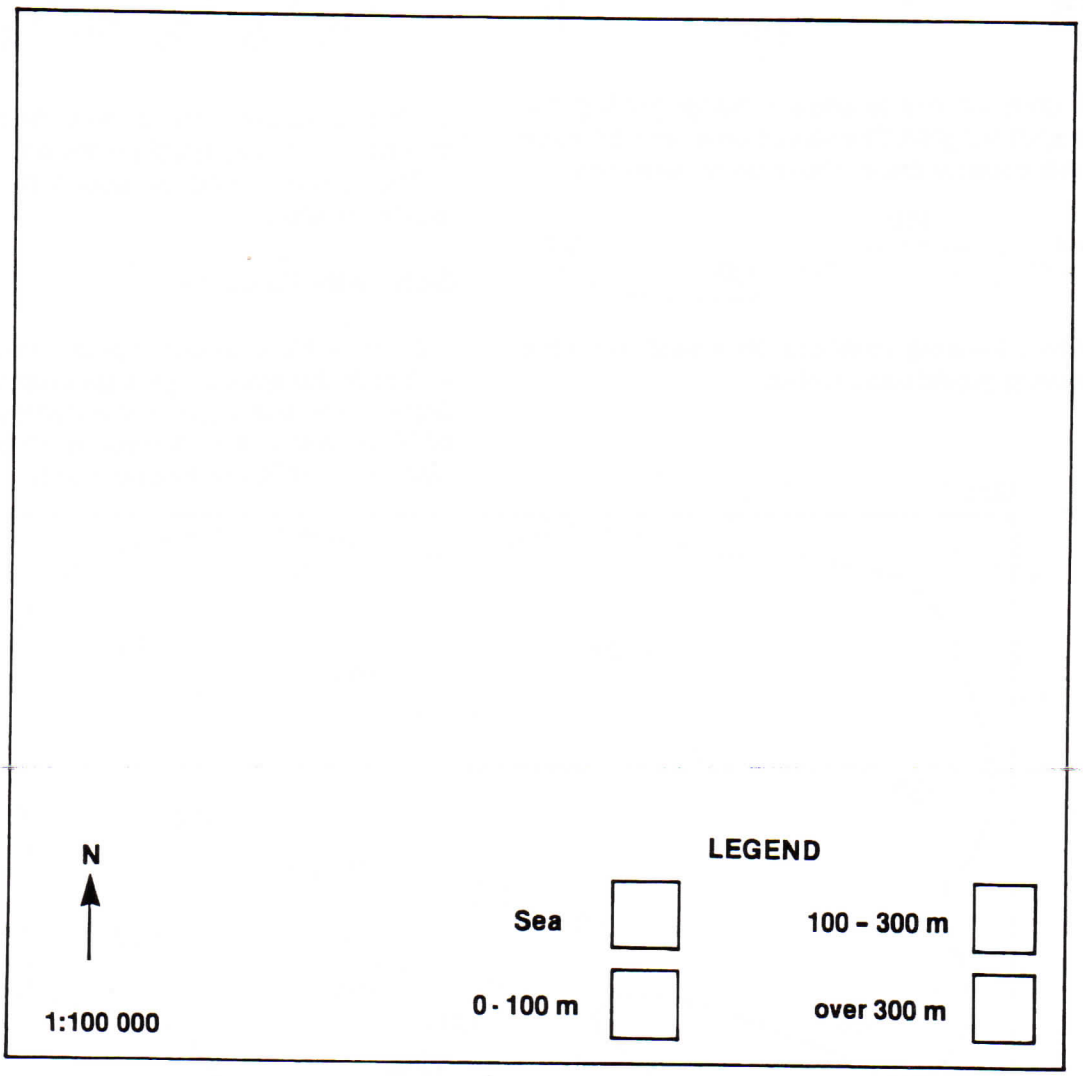
On a blank piece of paper copy the map frame and legend.

1. Colour in the legend on your map. Choose the most suitable colour for each legend square from the following list—brown, green, yellow, blue.

2. Draw a map showing an island and its landforms described below. Use a scale of 1:100 000.

An island has an oval shape. It runs in a northeast to southwest direction for a distance of 10 km. *The widest part of the island is* 7 km. *The north and east shores are bordered by a plain which has an average width of* 1.5 km. *A narrow plain appears around the southern tip of the island. Two steep volcanoes rise to an elevation of over* 300 m *in the centre of the island. Each volcano has a diameter of* 1 km. *The remainder of the island is a hilly area. It has an elevation between* 100 *and* 300 m.

3. Shade in your map landforms according to the colours in your legend.



Geolab 9

SPOT HEIGHTS AND CONTOURS

A single dot is the simplest method of showing elevation above sea level on a map. This dot has the elevation printed beside it. The dot is known as a spot height.

Contours are lines on a map that join places of the same elevation above sea level. They are better than spot heights for showing elevations. Contours are also form lines because they show the form or shape of the land surface.

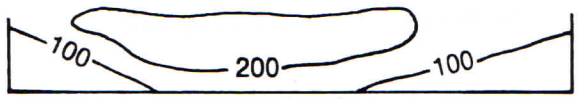
Four spot heights are shown below, each having an elevation of 100 m above sea level.

A contour line is shown below joining the four spot heights. The elevation at any position on this contour line is 100 m above sea level.

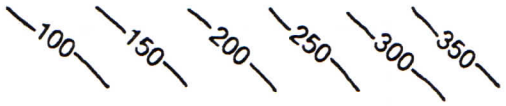
When drawing contours on a map keep the following guidelines in mind.

1. A contour line joins places of the same elevation above sea level.
2. Contours never cross or touch other contour lines, except when they show a vertical slope.

3. Contours never end except at the edge of the map or by joining up with themselves.



4. A standard contour interval is always used. This means that there is an equal height interval between contour lines.



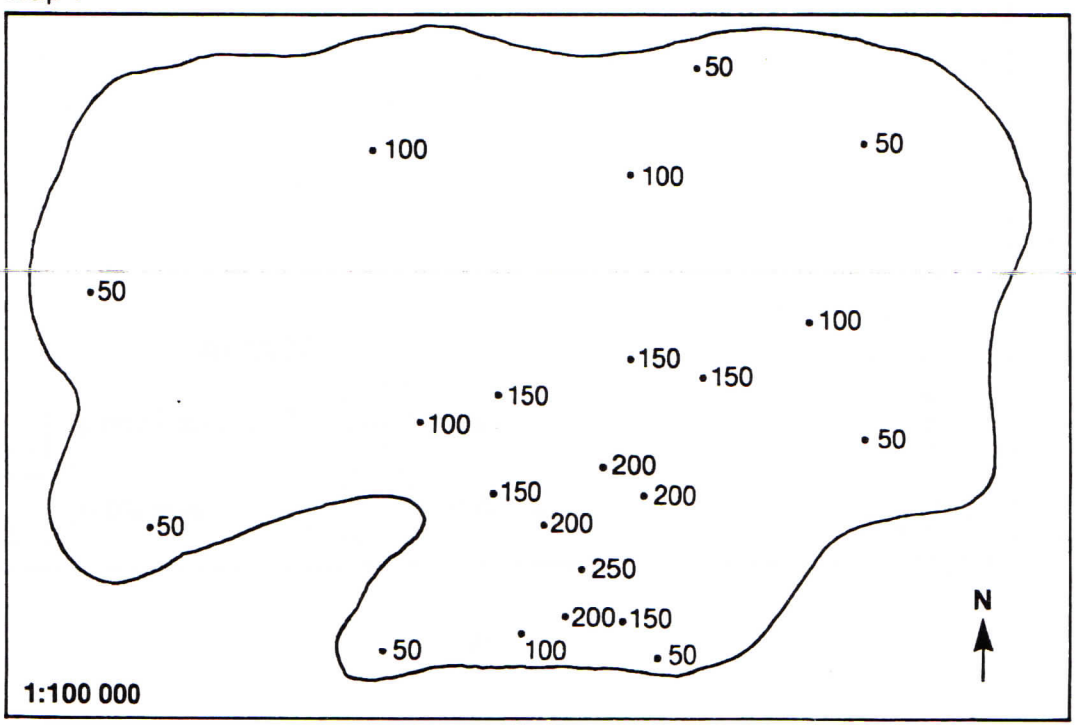
5. The elevation above sea level of some contours on a map must be shown.

The previous diagram shows how a contour line is labelled.

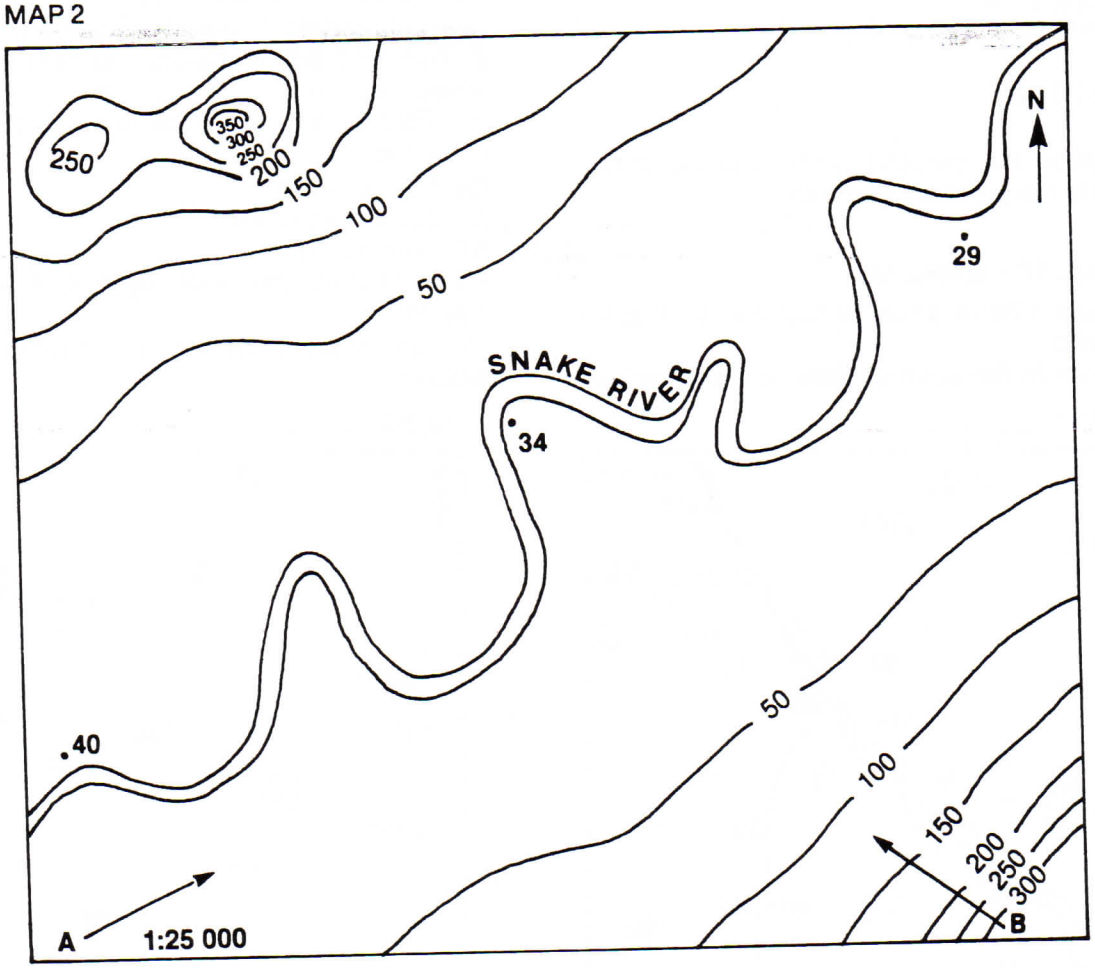
Geolab 9 - Exercise

Using a blank sheet of paper trace Map 1.
1. Study the spot heights on Map 1 carefully. Draw in the contours. Use a contour interval of 50 m. *This means that you will draw the* 50, 100, 150, *and* 200 m *contour lines.*

Map 1



MAP 2



Using your blank sheet of paper trace Map 2. This map shows a landscape illustrated by contour lines.

2. (a) Where is the greatest drop in elevation over the shortest distance on the map? Label this drop on your map with the letter S. You have now found the steepest slope on the map.

(b) Where is the smallest drop over the longest distance on the map? Label this area with the letter G. You have now found the gentlest slope on the map.

(c) Look at your answer to (a) and (b). Write an explanation of the relationship between the spacing of contours and the slopes that they show.

(d) Use an arrow on your map to show in which direction the Snake River is flowing.

(e) Draw a road running from northeast to southwest across your map. Explain your choice of location for the road.

3. Imagine that you are standing at position A on Map 2. Describe the view looking in the direction of the arrow from A.

4. Write a description of the view from position B.

Geolab 10

CONTOURS

Review the guidelines for drawing contour lines in the previous exercise.

Geolab 10 - Exercise

Using a blank sheet of paper trace Maps 1, 2, and 3.

1. Draw in the contour lines using a contour interval of 50 m *on Maps 1, 2, and 3. The* 50 m *contour on Map 1 has been completed.*

2. Describe the landforms you have drawn on Maps 1 and 2.

3. Label on Map 3 the following features.

(a) Steep slope

(b) Gentle slope

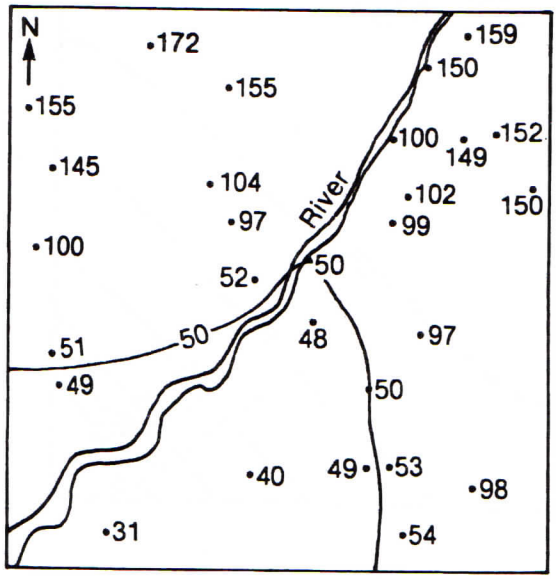
(c) Cone-shaped hill

(d) River valley

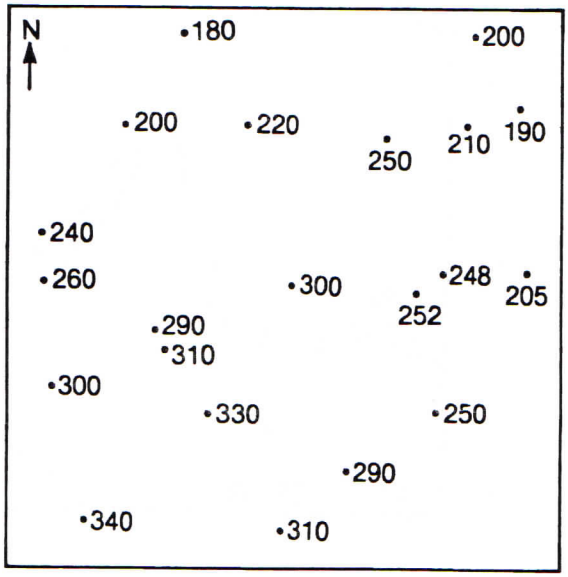
(e) Confluence (the meeting point of two rivers)

(f) River mouth (where a river reaches the ocean)

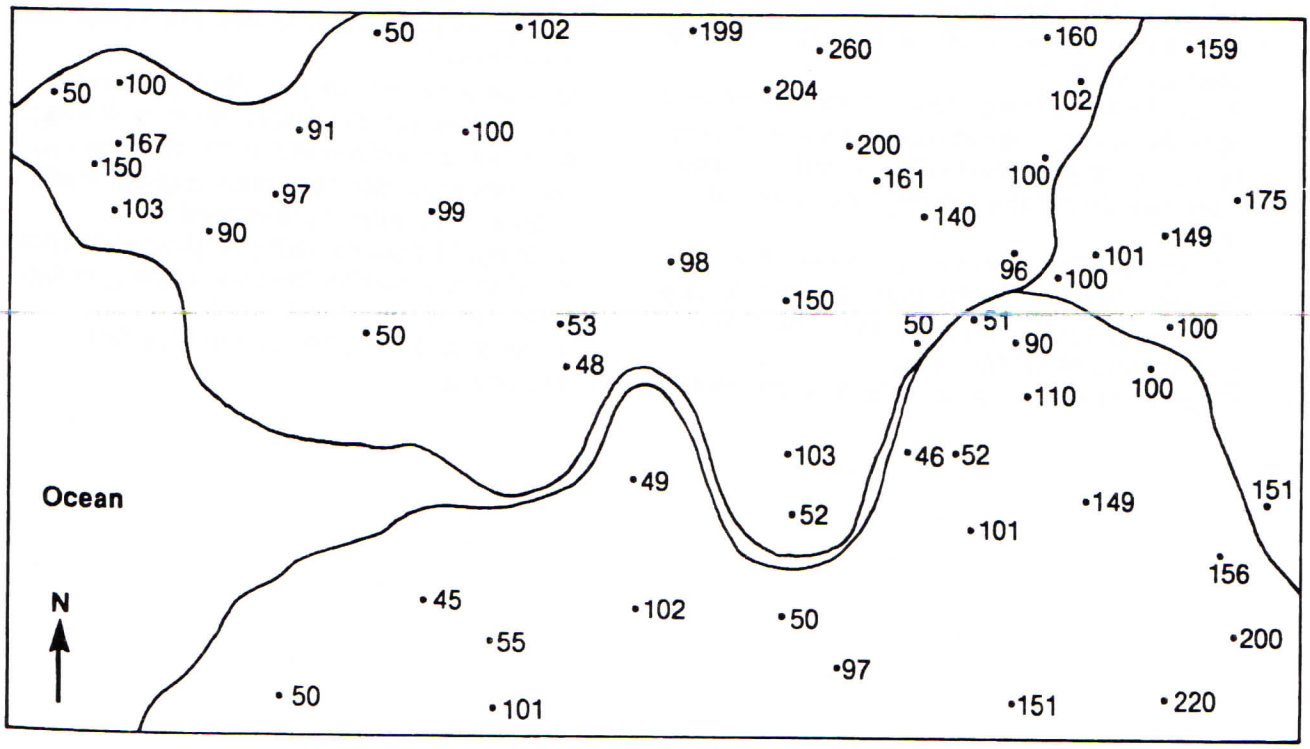
MAP 1



MAP 2



MAP 3

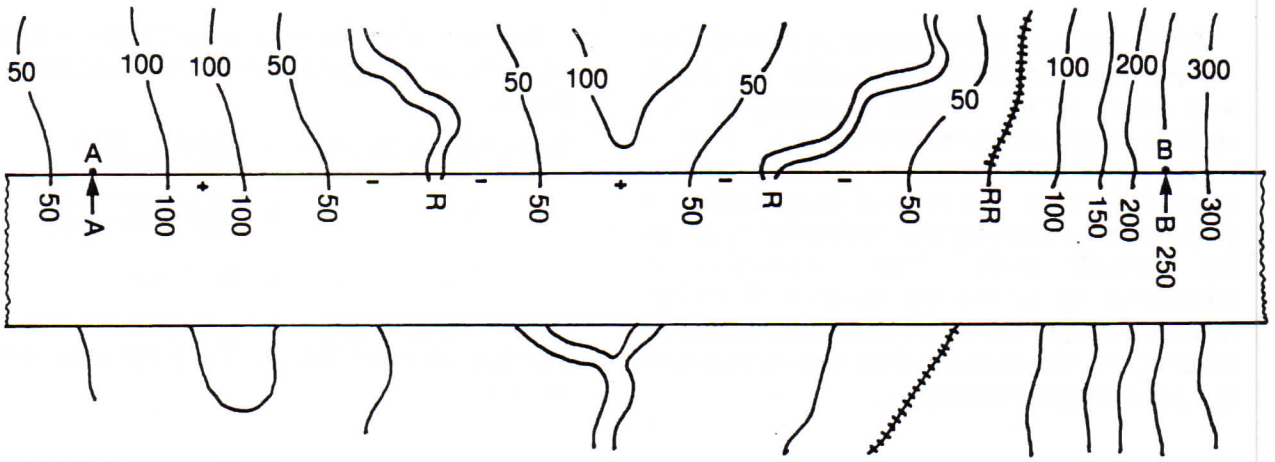


Geolab 11

CONTOUR CROSS-SECTIONS

One of the best ways to understand the link between contour lines and landforms is by drawing a cross-section.

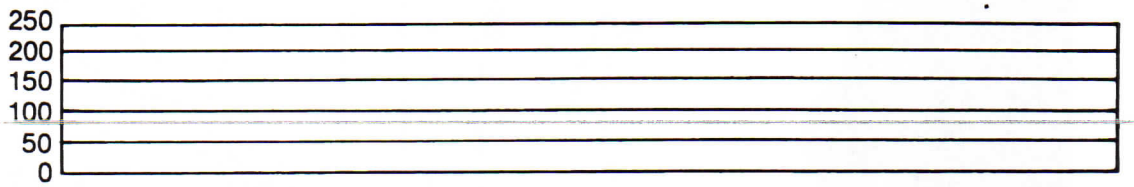
A cross-section of the landscape between A and B on the map is required. The first step in drawing the cross-section is to place the straight edge of a clean strip of paper between A and B. Mark on the strip of paper each contour line that passes under the paper. Use a dash to show its position and write the elevation below the dash. Where two consecutive contours are the same elevation show with a plus (+) or minus (-) sign whether the land rises or falls between the two contour lines. Also mark any important features such as roads or rivers.



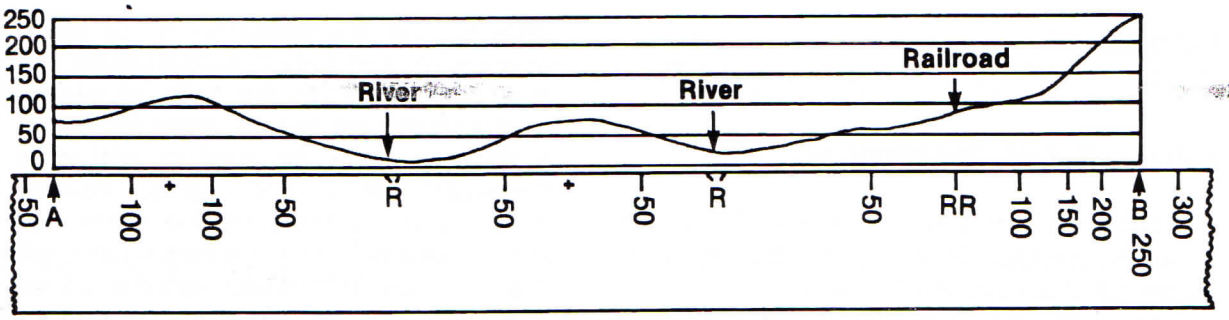
SCALE: 1 cm to 500 m

CONTOUR INTERVAL: 50 m

The next step is to transfer the information from your strip of paper to a framework. This framework is shown below. Its length is the same as the length A to B on your strip of paper. The height of the framework depends on the vertical scale you have been given. The vertical scale on this framework is 4 mm to represent 50 m. The vertical scale is drawn so that the lowest and highest points on your cross-section can be shown.



Finally, the strip of paper is placed along the base of your framework as shown on the following diagram. The heights of A and B are calculated and placed on the framework in their correct positions. The elevations between A and B are plotted by raising imaginary vertical lines from each dash mark on your strip of paper. These elevations are shown on the framework with a dot at the correct height. The dots are then joined with a smooth curve. The plus and minus signs help in drawing the high and low elevations. Important features that you have noted on the strip of paper are transferred and labelled on your cross-section as shown on the following diagram.



VERTICAL SCALE 4 mm:50 m HORIZONTAL SCALE 1 cm:500 m
VERTICAL EXAGGERATION = 4x (Times)

Below the cross-section you will notice that the vertical and horizontal scales are given. Also given is the vertical exaggeration. The vertical exaggeration is the number of times by which the vertical scale is greater than the horizontal scale. The vertical exaggeration is calculated by dividing the horizontal scale by the vertical scale. This calculation is completed by taking the number of metres represented by 1 cm on the horizontal scale and dividing it by the number of metres represented by 1 cm on the vertical scale.

The following formula is used to calculate the vertical exaggeration for the cross-section above.

$$\text{Vertical Exaggeration} = \frac{\text{Horizontal Scale}}{\text{Vertical Scale}}$$

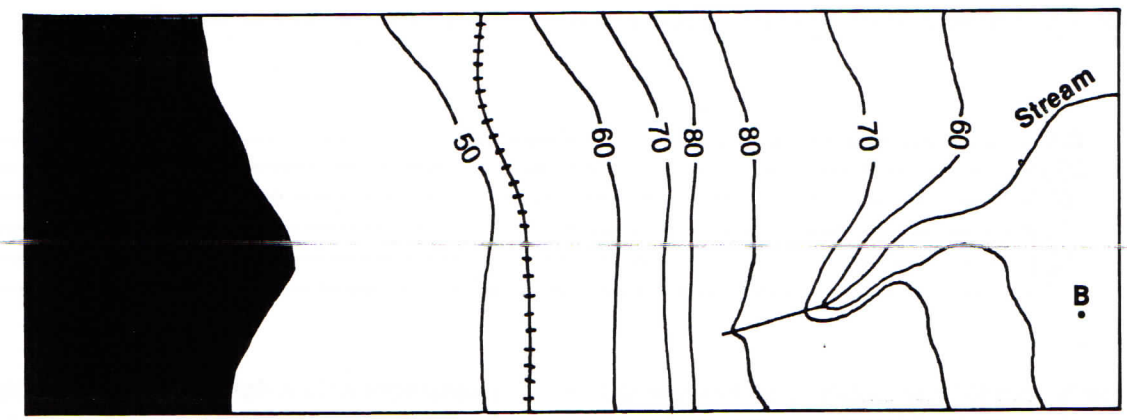
$$\text{V.E.} = \frac{500 \text{ m (1 cm: 500 m)}}{125 \text{ m (4 mm: 50 m)}}$$

V.E. = 4X (Times)

The vertical scale is exaggerated to show the changes in elevation of the landscape more clearly.

Geolab 11 - Exercise

Draw a cross-section from A to B on the following map. Use a vertical scale of 1 cm *to* 10 m *to draw your own framework. Calculate and state the vertical exaggeration of the cross-section.*



1:100 000 CONTOUR INTERVAL: 10 m

Geolab 13

CONTOUR MAPPING

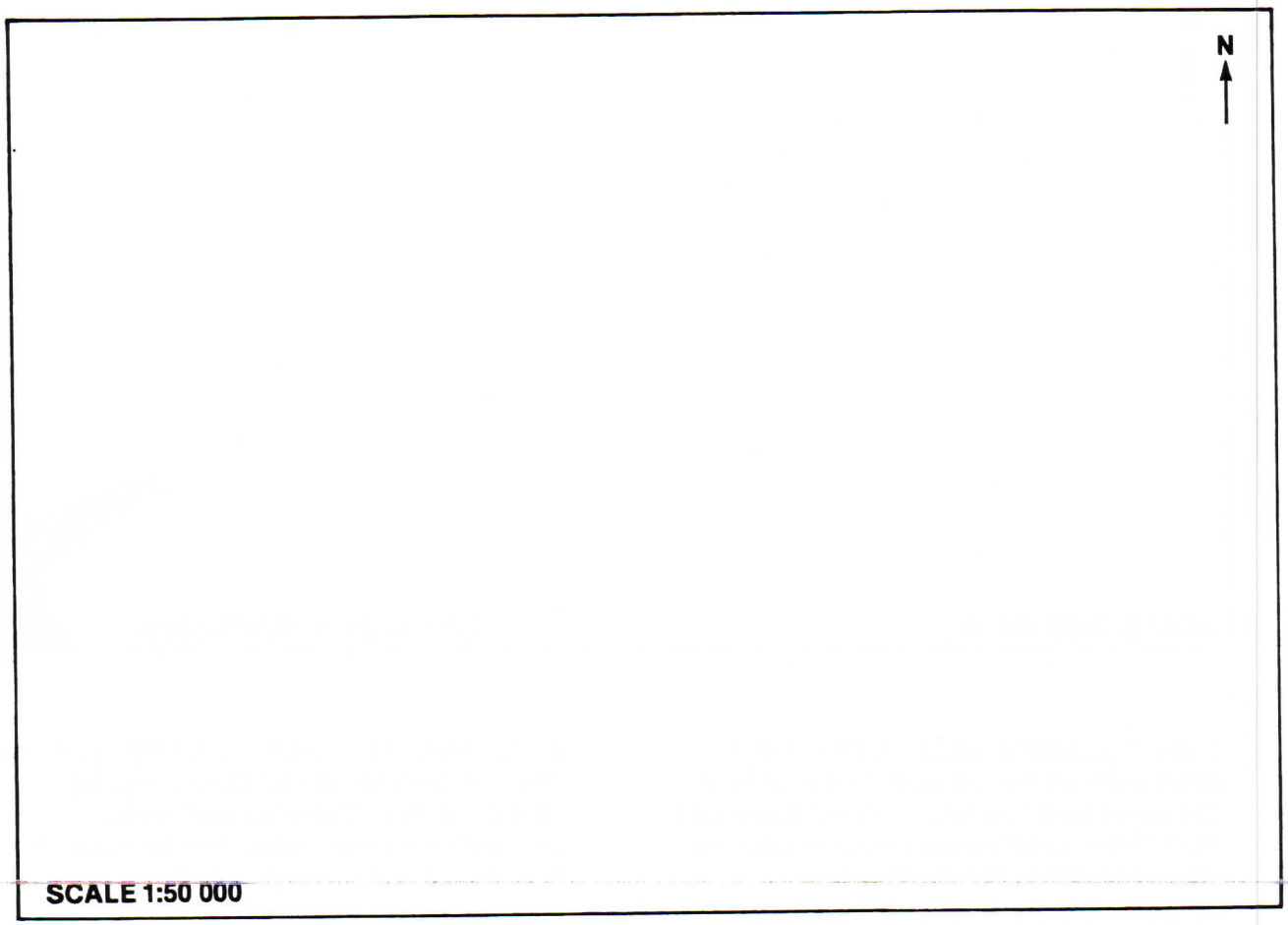
On a blank sheet of paper copy the two map frames in this Geolab.

Geolab 13 - Exercise

1. In Map Frame 1 draw a contour map to show the following landscape. A peanut-shaped island runs east-west about 7 km. *The average width of the island is between* 3 *and* 4 km. *The highest point on the island is a cone-shaped mountain rising* 160 m *above sea level. It is located at the east end of the island. A narrow ridge of elevated land, about* 110 m *above sea level, runs from the mountain through the centre of the island ending in a steep drop to the sea in the west. The coastal plain along the north shore is wider than that along the south coast.*

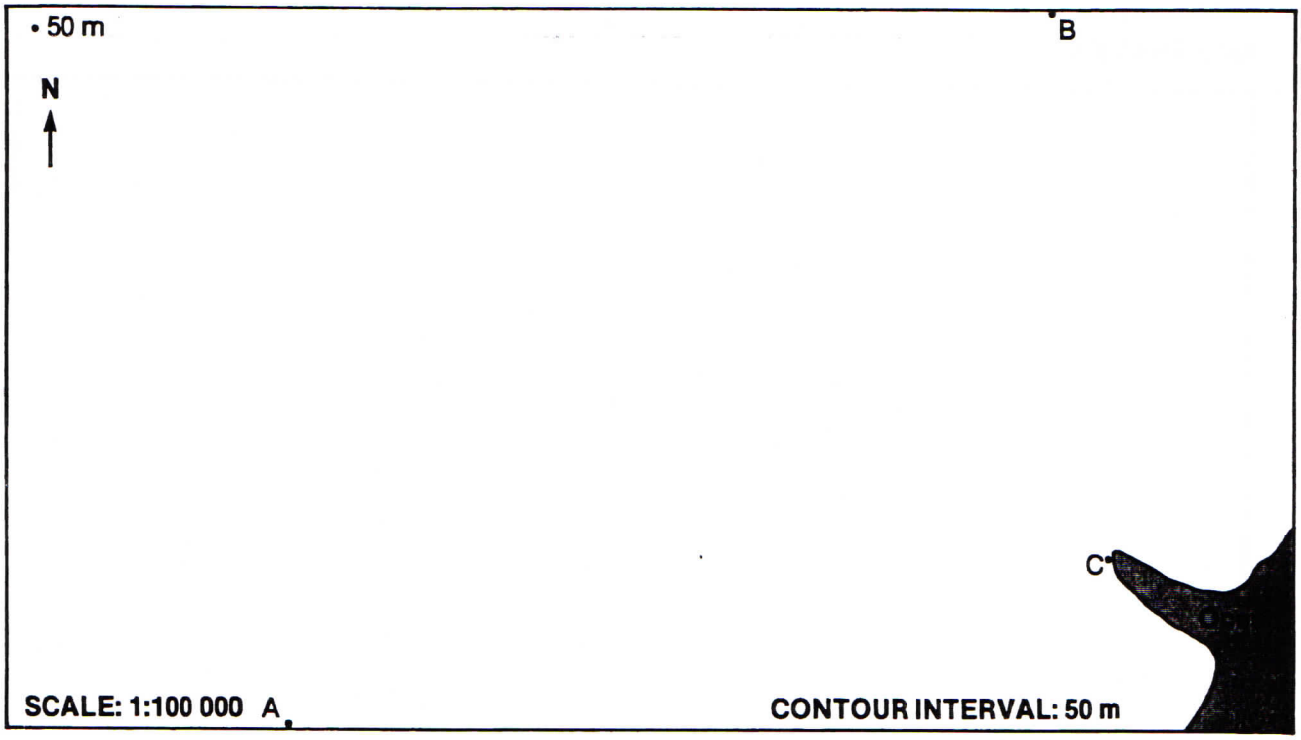
On your map use a contour interval of 50 m *and a scale of* 1 cm:0.5 km. *Complete your map with the basic map requirements.*

MAP FRAME 1



2. In Map Frame 2 draw a contour map to show the following landscape. A river valley extends from the northwest corner of the map to the estuary in the southeast corner of the map. In its lower course the valley is 3 km wide and the river meanders. In its upper course the valley is narrow and the river is quite straight. A ridge of hills, gently rising to maximum heights of 163 and 174 m, runs in a northwest/southeast direction to the south of the river valley. A second elevated area can be found north of the river valley. Here the land rises in a concave slope to a plateau about 320 m above sea level. A circular lake with a diameter of 1 km, sits in a shallow hollow on this plateau, at a height of 310 m above sea level. From the lake a tributary stream runs down into the valley and joins the meandering section of the main river.

MAP FRAME 2



3. (a) Construct a cross-section of the landscape between A and B on your Map 2. Use a vertical scale on your cross-section of 1 cm:100 m. Label on your cross-section the main features of the landscape.

(b) Calculate the vertical exaggeration of your cross-section.

4. The floor of the river valley in the northwest corner of the map has an elevation of 50 m above sea level. Calculate and state the gradient of the river valley floor from the 50 m spot height to the estuary at C.