Activities

1 How many time zones are there around the world? _____

2 What is the time difference from one zone to the next? _____

3 Why does the International Date Line bend along its course? _____

_____

4 **a** How many time zones are there in **Australia?** _____

b List a country with more time zones than Australia. _____

5 When you have breakfast, what time is it in the State and Territory capitals in Australia?

Breakfast **time** _____ Location _____

Times in the State/Territory capital cities _____

_____

_____

Organise your list into a table showing **AEST**, **ACST**, and **AWST**.

Australian Eastern Standard Time	Australian Central Standard Time	Australian Western Standard Time

6 At what time would you be able to watch a live broadcast of the following?

a If you are in Sydney (AEST) and want to watch an AFL match being played in Perth (AWST), starting at 1800 hours?

_____

b If you are in Perth and want to watch a Wimbledon final being played in London, starting at 1500 hours on a Saturday?

_____

c If you are in Adelaide (ACST) and want to watch the Academy Awards held in Los Angeles on Sunday at 1700 hours?

_____

7 If you leave London at 0900 hours on Thursday for an 18-hour flight to Perth (AWST), at what time and on what day should you arrive?

_____

8 Refer to the world tourism map on page 246 of your *Heinemann Atlas 5th Edition*.

a Identify two journeys that would mean you skip forward a day. _____

_____

b Identify one journey that would mean you go back a day. _____

3.6 >> Calculating area

Aim – to use scale and distance to gather information

Sometimes you will need to know the **area** of particular features on a map, or even the total map area.

The following techniques use scale to help you estimate and calculate map areas.

Estimating the area of a feature

To estimate the area of a feature using grid squares:

Step 1 Use the scale of the map to work out the area of one grid square. Area = length × width. The answer will be in units squared (e.g. m^2, km^2).

Step 2 Count the squares that are complete.

Step 3 Count the number of incomplete squares and halve the total to give an approximation.

Step 4 Add the complete and incomplete squares.

Step 5 Multiply the number of complete grid squares by the area of each grid square.

Calculating the area of a map

To calculate the area of a whole map or a map extract:

Step 1 Measure the distance of the map area from east to west in metres (m) or kilometres (km).

Step 2 Measure the distance of the map area from north to south in metres or kilometres.

Step 3 Multiply the east–west distance by the north–south distance.

Step 4 Express the area in square metres (m^2) or square kilometres (km^2).

handy hint

Area will be expressed in m^2 or km^2.

Measuring an irregular area on a map

To measure an irregular area on a map, such as a lake, forest or built-up area , you will need a piece of tracing paper and a piece of graph paper.

Step 1 Use the scale on the map to work out what each cm square on the graph paper represents. Write this value clearly in the corner of the graph paper.

Step 2 Trace the area to be measured and place the tracing over the graph paper. You should be able to see the grids provided by the graph paper.

Step 3 Number each grid square that is completely within the area you are measuring – as in Figure 3.4.

Step 4 Look at the part squares that are covered. Mark off the ones that can be combined to make one more square. Increase your total number of squares by one. Continue to do this until you have used up all the part squares.

Step 5 Multiply the area of one square (from step 1) by your total number of squares. The answer will be in units squared.

Well done.

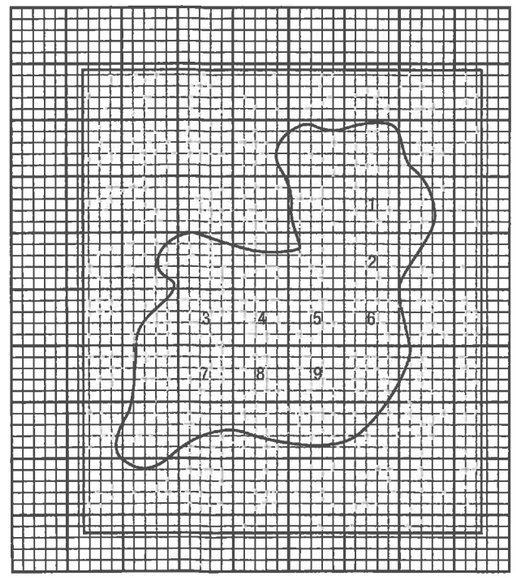


Figure 3.4 Measuring an irregular area

>>

Activities

1 Estimate the area of the Hidden Valley National Park near Kununurra on page 53 of the *Heinemann Atlas 5th Edition*.

2 Calculate the area of Vereker Creek Reference Area on page 100 of the *Heinemann Atlas 5th Edition*.

3 Calculate the area of continuous permafrost in the Arctic on page 184 of the *Heinemann Atlas 5th Edition*.

4 Calculate the area burnt by the Kilmore East–Murrindindi fire complex on page 22 of the *Heinemann Atlas 5th Edition*.

3.7 Cross-sections

Aim – to gain another view of mapped data

A map gives you an **aerial** or **plan view** of a landscape. A **cross-section** complements this by providing a side view or profile of a landscape. Cross-sections drawn from topographic and atlas maps give an immediate visual impression of the shape of the land. This view is valuable for many everyday purposes, including hiking, bike riding and farming.

Look at the cross-section that accompanies your State or Territory gazetteer map in your *Heinemann Atlas 5th Edition*. You will notice the following information:

- the line (in this case latitude) that has been used
- the unit of measure for the vertical scale
- significant features noted
- **vertical exaggeration** (it is common practice to stretch the vertical heights to make them stand out clearly).

The horizontal scale will be same as the map that is being used. To check this, mark the length of your State's or Territory's cross-section on the edge of a piece of paper and place that edge along the stated latitude line. It will be the same length.

The base line of a cross-section can be long (like the ones in your atlas) or it can be short (like ones you would produce in the field).

Drawing a cross-section from a map

Follow these steps and Figures 3.5 and 3.8 to draw a cross-section.

Step 1 Locate the two points on the map between which the cross-section is to be made. Label these points 'A' and 'B'.

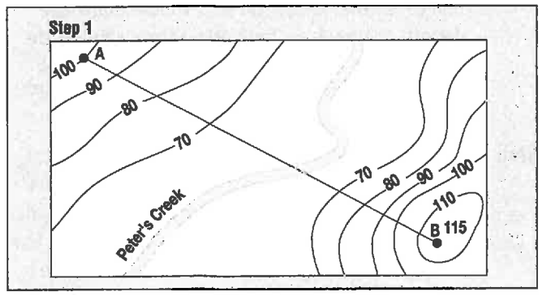


Figure 3.5 Drawing a cross-section – first step

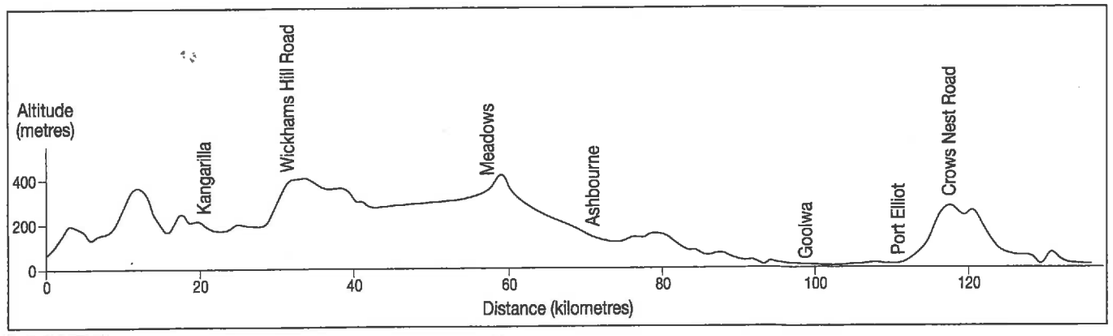


Figure 3.6 A cross-section of the uphill and downhill riding in one section of the 2009 Tour Down Under (a bike race in South Australia)

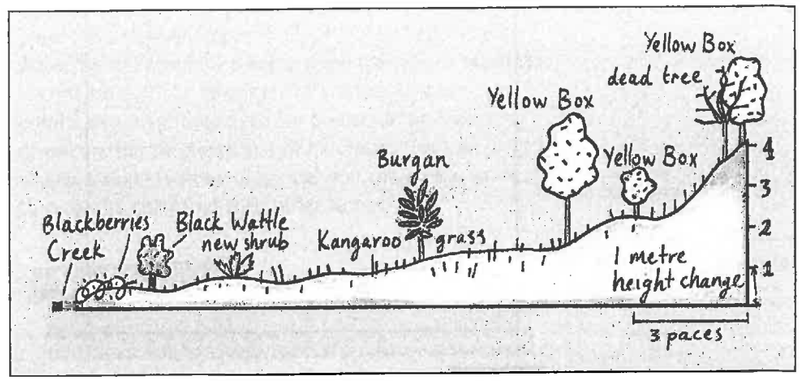


Figure 3.7 A cross-section, or **transect**, produced during fieldwork

handy hint

A cross-section looks like a graph.

>>

Step 2 Place the straight edge of a piece of paper along an imaginary line joining points A and B. Mark points A and B on your paper.

Step 3 Mark the position where your paper crosses each contour line. Write the value of each contour line on your piece of paper. You may have to make an estimate of the height of your starting and finishing points. Also, mark any features you cross (e.g. river, town, road).

Step 4 On graph or squared paper, draw the horizontal and vertical axes for your cross-section. The length of the horizontal axis should equal the length of line A–B. The vertical axis should use a scale that does not exaggerate your vertical scale too much. You don't want a range of low hills looking like the Himalayas!

Step 5 Place your piece of paper along your horizontal axis. Lightly plot, in pencil, the contour points and heights as if you were drawing a line graph. You may wish to slide your piece of paper up the frame to the height of each dot. You have the sides of the cross-section to position point A and point B.

Step 6 Join the dots with a fine, single, smooth curved line.

Step 7 Label any features intersected by your cross-section (e.g. rivers, major roads).

Step 8 Finish off your cross-section by:

- **a** labelling the scale on the **horizontal** and **vertical axes**
- **b** giving your cross-section a title
- **c** providing the source of the data.

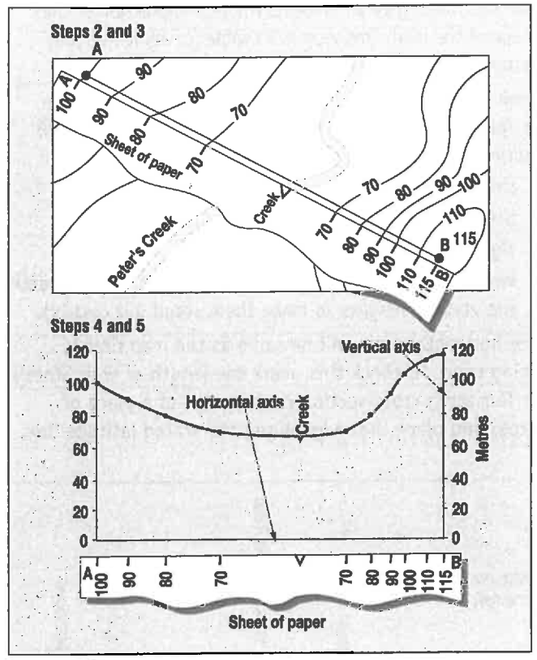


Figure 3.8 Drawing a cross-section (continued)

Activities

1 Refer to the Wilsons Promontory map on page 101 of the *Heinemann Atlas 5th Edition* and construct a cross-section along a line from 415815 to 422783.

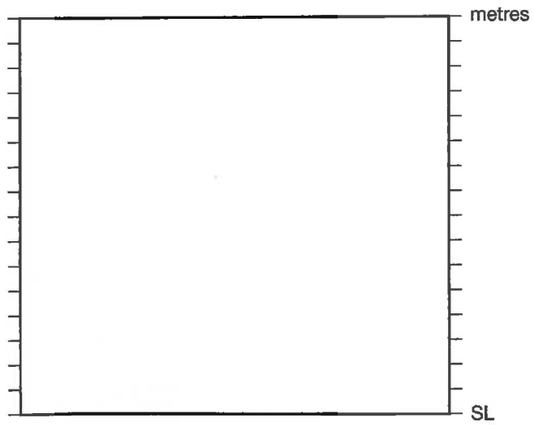


Figure 3.9 Cross-section of Wilsons Promontory

3.8 >> Relief and gradient

Aim – to gain more out of reading contour patterns

Local relief is the variation in height over a small, defined area. It is determined by calculating the difference in height between the highest and lowest points in the area.

Example

Your task is to calculate the local relief between two points: X and Y.

Point X = 119 m; Point Y = 18 m

Local relief = X minus Y

= 119 minus 18

= 101 m

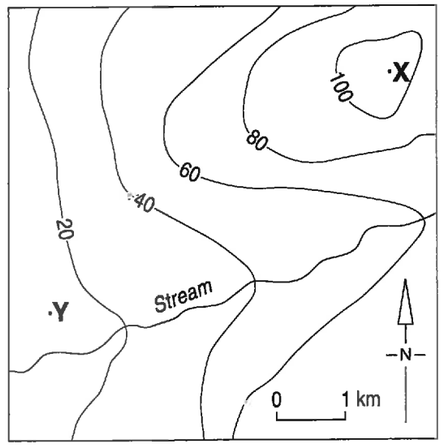


Figure 3.10 Local relief

By looking at contour patterns you can tell whether some areas have steeper slopes than others. Sometimes you will need to know how steep a slope really is. A **gradient** is a measure of the steepness of a slope between two points on a map. Gradients can be useful for measuring or calculating the steepness of landforms. Instead of just saying a slope is steep or gentle, you can give a value that can be compared with other slopes.

handy hint

A plain will have 0 gradient.

Before you calculate a gradient, you need two pieces of information:

1 the difference in height between the two points – the **vertical interval** or 'rise'

2 the horizontal distance between the two points – often referred to as the 'run'.

To calculate the gradient of a slope, use the following formula.

Vertical interval (rise) *divided by* Horizontal distance (run).

The measurement for the rise (numerator) and run (denominator) must be in the same unit of measure (e.g. metres).

Example

Calculate the gradient of the slope between point A and point B in Figure 3.11.

Vertical interval (rise) *divided by* Horizontal distance (run)

= 200 (metres) *divided by* 6000 (metres)

= 1 *divided by* 30

= 1 in 30, or a ratio of 1 : 30

This means that for every 30 metres travelled you go up or down 1 metre in height.

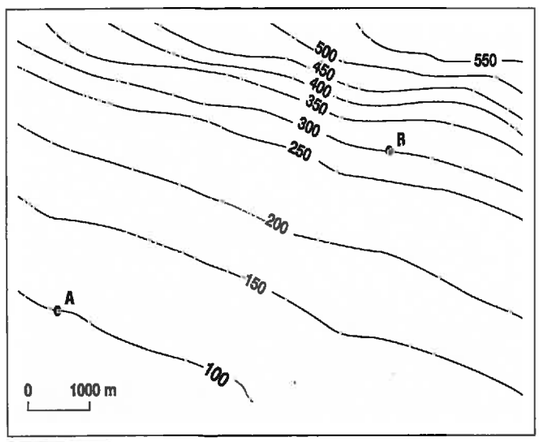


Figure 3.11 Contour lines used to calculate gradient

>>

Activities

1 Refer to the Wilsons Promontory map on page 101 of the *Heinemann Atlas 5th Edition*.

a Look at the path of the road to Mt Oberon (435785). With reference to gradient, explain why it follows this path. You can include a diagram.

* **b** Explain why the Wilsons Promontory Road was placed along its particular route.

c Calculate the gradient of the slope between:

i the Wilsons Promontory Road at 395812 and the summit of Mount Leonard at 408828

ii Monkey Creek at 392860 and the crown land boundary at 408860.

3.9 Topographic map interpretation

Aim – to apply a range of mapping skills

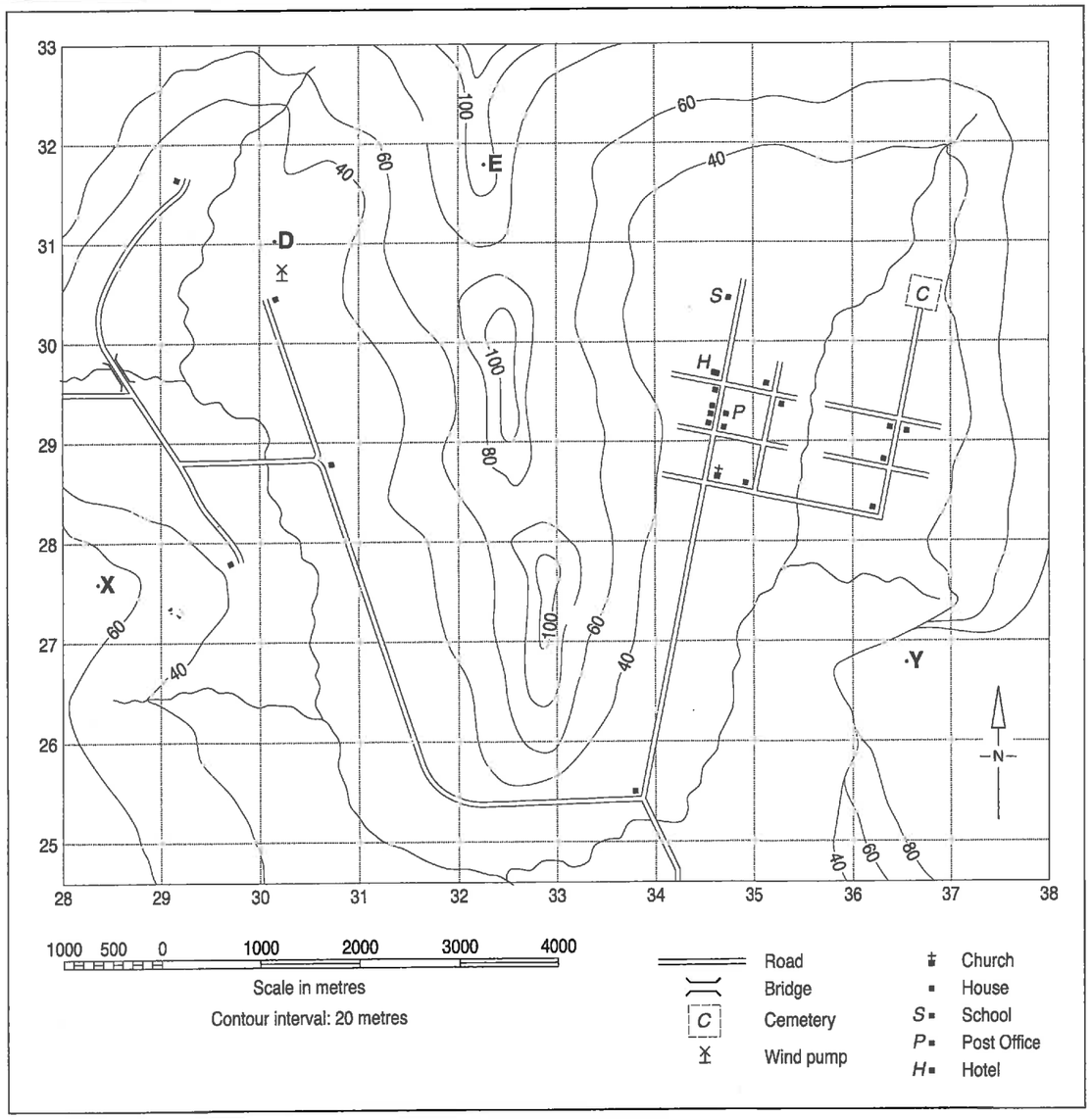


Figure 3.12 Topographic map of a small rural community

handy hint

Remember you have covered many skills in sections 1, 2 and 3.

Use your skills at interpreting maps to complete the following.

1 Colour the rivers blue. Add this to the legend.

2 Colour all land under 40 metres green. Add this to the legend.

3 Use the letter keys below to identify each of the following features once only on the map.

A = hill

B = cliff

C = valley

4 Mark the highest spot on the map with a Δ. Add this to the legend.

5 Mark the lowest spot on the map with a *. Add this to the legend.

6 One contour line has not been numbered. Number it correctly in the space provided.

7 Draw two bridges on the map in appropriate places.

8 Give six-figure grid references for each of the following:

a the school building _____

b the church _____

c the dot at point Y. _____

9 What is found at the following grid references:

367305? _____

293288? _____

10 What is the direction:

a from the cemetery to the most southerly house?

_____

b to the church from the wind pump?

_____

11 Mark in a walking track from the most southerly house to point Y. Update the map legend to show this track.

12 How many kilometres is it from the western edge of the map to the eastern edge?

_____

13 How far is it by road from the cemetery to the school?

_____

14 What is the gradient between point D and point E?

_____

15 Using the frame in Figure 3.13, draw a cross-section from point X to point Y.

Give your cross-section a title and complete these statements.

a The horizontal scale is 1 cm represents

_____

b The vertical scale is 1 cm represents

_____

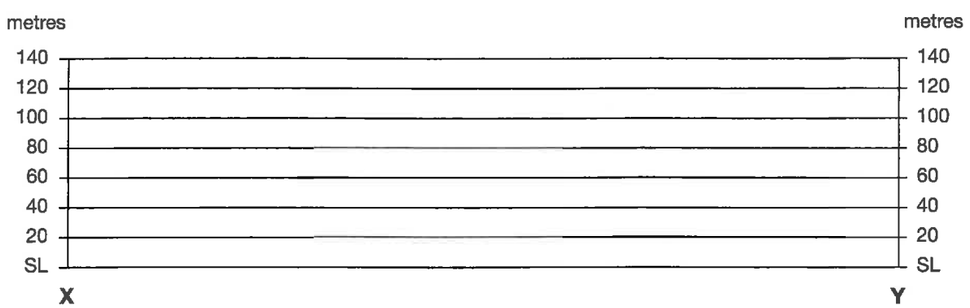
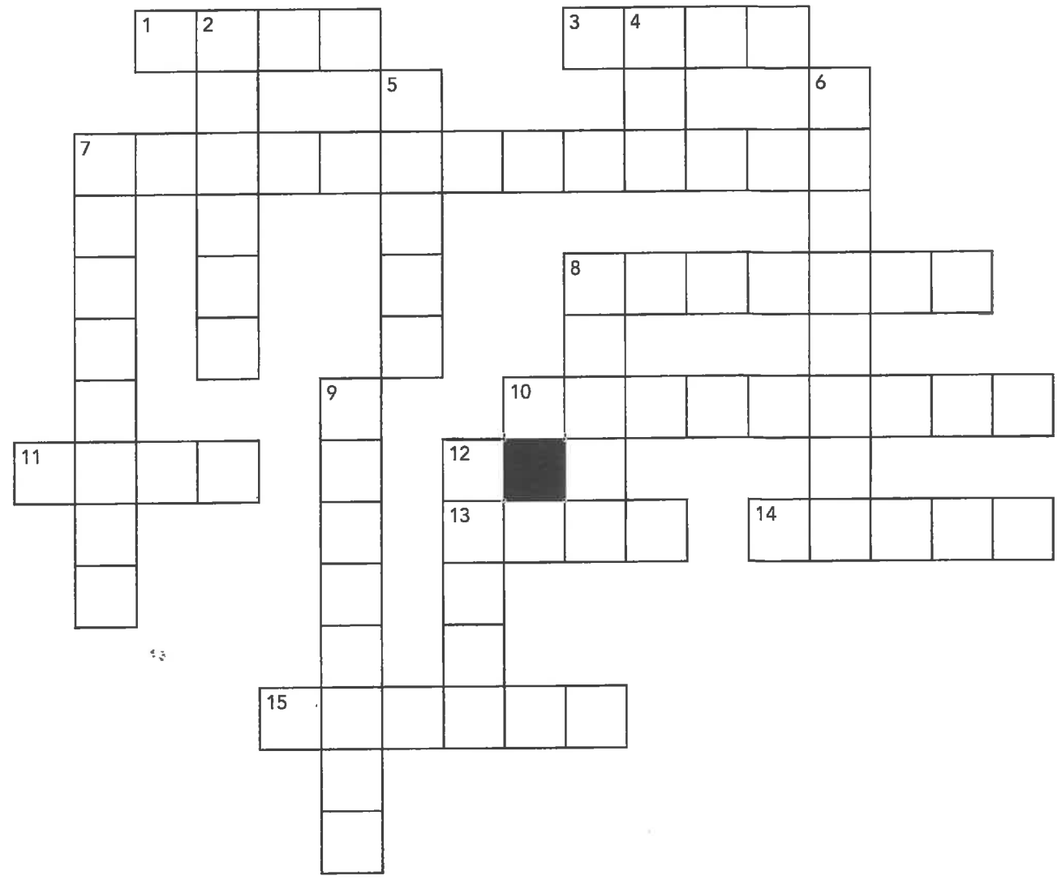


Figure 3.13 Cross-section from X to Y

3.10 Test yourself



Clues across

1 Movement of air from high pressure regions to low pressure regions.

3 The quantity calculated by multiplying length by width.

7 A satellite that stays above the same region on the Earth.

8 Weather system produced when air pressure is very low.

10 Lines used to mark out time zones.

11 Abbreviation (acronym) for Australia Eastern Standard Time.

13 Change in vertical height.

14 Used to make maps fit on a page.

15 A pattern that looks like a line.

Clues down

2 A line joining places of equal air pressure.

4 The horizontal distance in calculating gradient.

5 Name given to colours on satellite images.

6 Weather map.

7 The degree of change in a slope.

8 A side-on view of a region. A _____ section.

9 The line where days change. International _____ _____

12 The starting line for time zones. The _____ meridian.