Australian Braille Authority Workshop

Tactual Graphics Production:

... How?

Sydney: 25th May 2013

The graphics examples following were used to stimulate discussion amongst the workshop audience and were shown on a data projector. Also included are some good and some less than ideal braille interpretations of some of the graphics which were used to stimulate discussion of what is best practice.

The braille versions were produced using MS Publisher or PictureBraille, sometimes both versions have been included for comparative discussion.

Line Mode for Simple Drawings

Horizontal line mode

⠐⠒ horizontal line mode indicator

⠒ simple (solid single) horizontal line segment

⠂ variant horizontal line segment (e.g. dotted or dashed)

⠶ double horizontal line segment

⠿ triple horizontal line segment

⠚ corner with upward vertical

⠲ corner with downward vertical

⠺ crossing with vertical line

⠄ horizontal line mode terminator

Vertical lines

⠸ vertical single solid line segment

⠘ first variant vertical line segment (e.g. dotted or dashed)

⠠⠸ second variant vertical line segment (e.g. double line)

Notes on lines: All vertical line segments use the right side of the cell. Horizontal line segments usually use the middle dots in the cell, but the other dots may be used.

Arrows for use with number lines

grade 1 mode is assumed in the following examples.

⠐⠒⠒⠒⠒⠒⠒⠒⠒⠳⠕

⠳⠪ ⠐⠒⠒⠒⠒⠒⠒⠒⠒

(note the line mode is stated after the arrow head)

⠯ ⠐⠒⠒⠒⠒⠒⠒⠒⠒⠒⠳⠕

⠳⠪ ⠐⠒⠒⠒⠒⠒⠒⠒⠒⠒⠿

⠳⠪ ⠐⠒⠒⠒⠒⠒⠒⠒⠒⠒⠽

Whilst there are UEB signs for open and closed circles, these are bulky to use in this context. The use of the ⠨⠿⠿ ⠨⠿⠽ ⠨⠿⠯ make good sense within line mode.

Number line examples:

Simple number line. The vertical marks line up with the numeric indicator.

⠐⠒⠺⠒⠒⠒⠒⠺⠒⠒⠒⠒⠺⠒⠒⠒⠒⠺⠒⠒⠒⠒⠺⠒⠒⠒⠒⠺⠒⠒⠒⠒⠺⠒⠒⠒⠒⠺⠒⠒

⠼⠚ ⠼⠁ ⠼⠃ ⠼⠉ ⠼⠙ ⠼⠑ ⠼⠋ ⠼⠛

The vertical marks still line up with negative numbers. Arrows have been added to each end.

⠳⠪ ⠐⠒⠒⠺⠒⠒⠒⠒⠺⠒⠒⠒⠒⠺⠒⠒⠒⠒⠺⠒⠒⠒⠒⠺⠒⠒⠒⠒⠺⠒⠒⠒⠒⠺⠒⠒⠳⠕

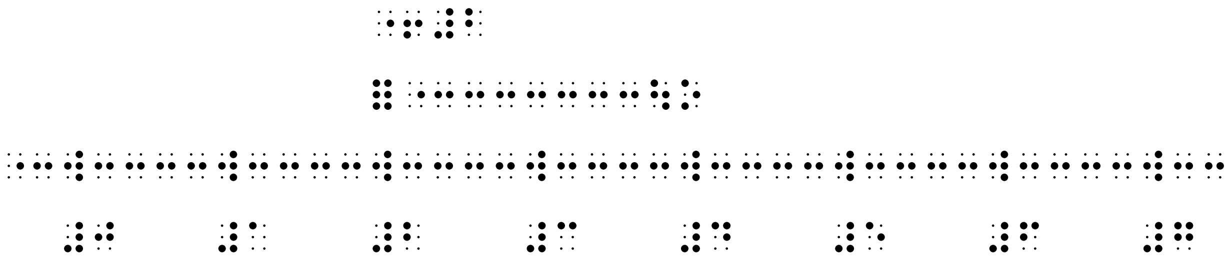
⠐⠤⠼⠉ ⠐⠤⠼⠃ ⠐⠤⠼⠁ ⠼⠚ ⠼⠁ ⠼⠃ ⠼⠉

Using the numeric passage indicator. Aligned to decimal

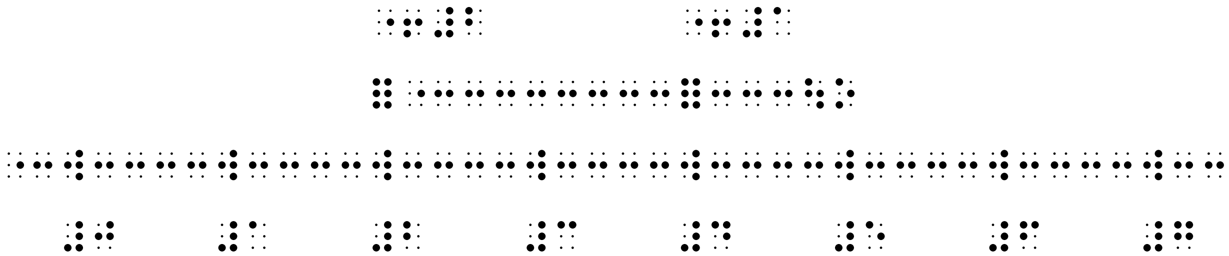
⠳⠪ ⠐⠒⠒⠺⠒⠒⠒⠒⠺⠒⠒⠒⠒⠺⠒⠒⠒⠒⠺⠒⠒⠒⠒⠺⠒⠒⠒⠒⠺⠒⠒⠒⠒⠺⠒⠒⠳⠕

⠼⠼ ⠉⠲⠙ ⠉⠲⠑ ⠉⠲⠋ ⠉⠲⠛ ⠉⠲⠓ ⠉⠲⠊ ⠙⠲⠚ ⠼⠄

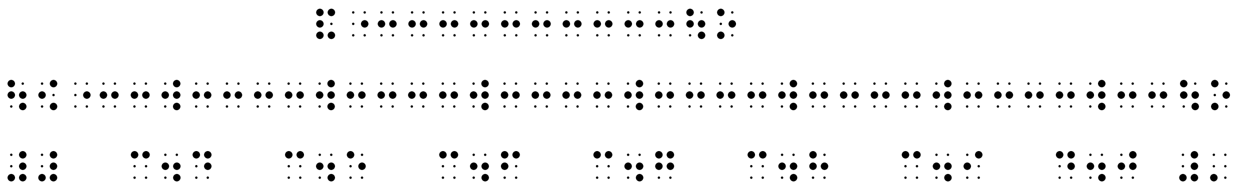
an example showing 2 + 2 = 4



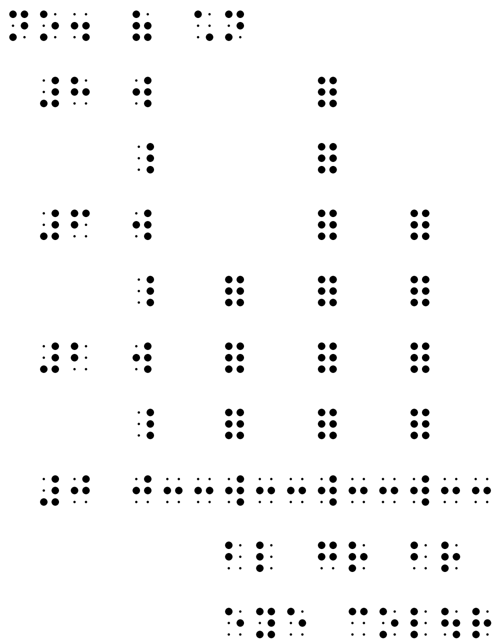
an example showing 2 + 2 + 1 = 6



number line showing numbers > 3.5



A simple column graph: A key may be needed.



Simple picture graphs. By using a 2 full cells you can use:

¼ ⠸ ½ ⠿ ¾ ⠿⠇ whole ⠿⠿

State a key to say what 1 "picture" is e.g.

```
    ⠠⠝⠥⠍⠃⠻ ⠷ ⠉⠜⠎
⠅⠑⠽⠒ ⠿⠿ ⠊⠎ ⠼⠁⠚⠚⠚ ⠉⠜⠎

  ⠠⠎⠽⠙⠝⠑⠽⠒ ⠿⠿ ⠿⠿ ⠿⠿ ⠿⠿ ⠿⠿
⠠⠍⠑⠇⠃⠳⠗⠝⠑⠒ ⠿⠿ ⠿⠿ ⠿⠇
⠠⠁⠙⠑⠇⠁⠊⠙⠑⠒ ⠿⠿ ⠸
     ⠠⠏⠻⠹⠒ ⠿⠿ ⠿⠇
```

or:

```
    ⠠⠝⠥⠍⠃⠻ ⠷ ⠉⠜⠎
⠅⠑⠽⠒ ⠿⠿ ⠊⠎ ⠼⠁⠚⠐⠚⠚⠚ ⠉⠜⠎
⠠⠎⠽⠙⠝⠑⠽⠒   ⠿⠿ ⠿⠿ ⠿⠿ ⠿⠿ ⠿⠿
⠠⠍⠑⠇⠃⠳⠗⠝⠑⠒ ⠿⠿ ⠿⠿ ⠿⠇
⠠⠁⠙⠑⠇⠁⠊⠙⠑⠒ ⠿⠿ ⠸
⠠⠏⠻⠹⠒ ⠐⠐⠐⠐ ⠿⠿ ⠿⠇
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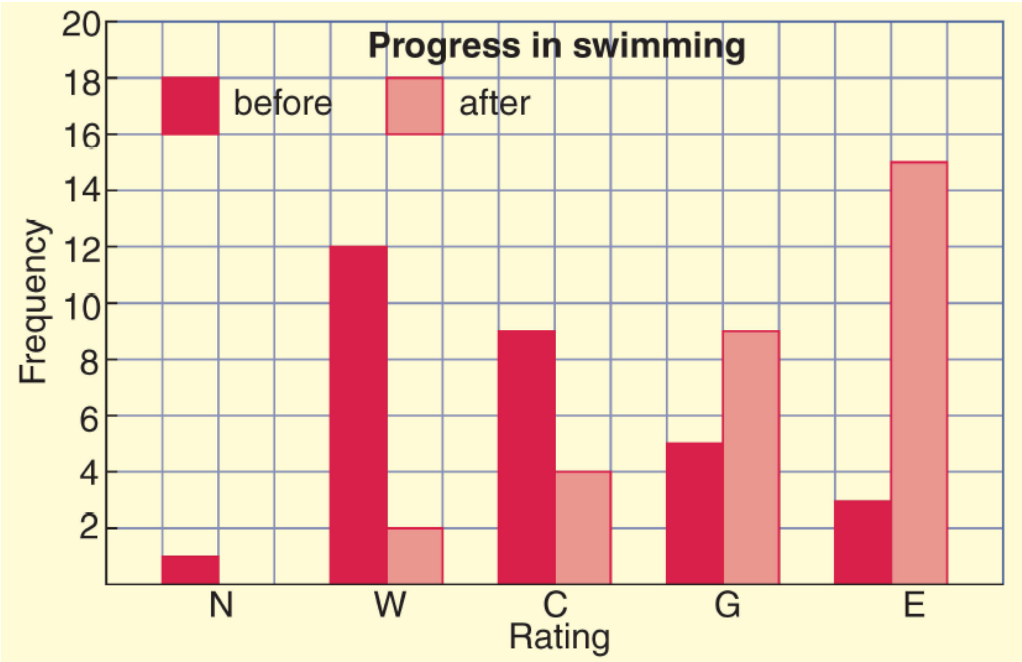
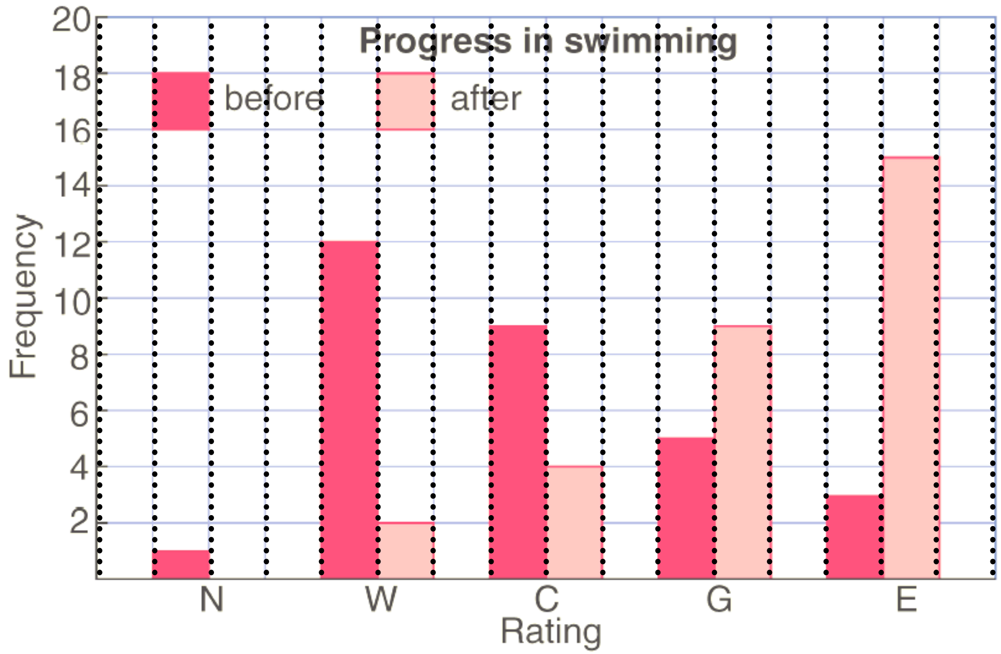
Discussion: Which is best? Left align the cities or right align the cities?

Mathematics

Some suggested solutions


Progress in swimming
before
after
Frequency
20
18
16
14
12
10
8
6
4
2
N
W
C
G
E
Rating


Progress in swimming
before
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Frequency
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18
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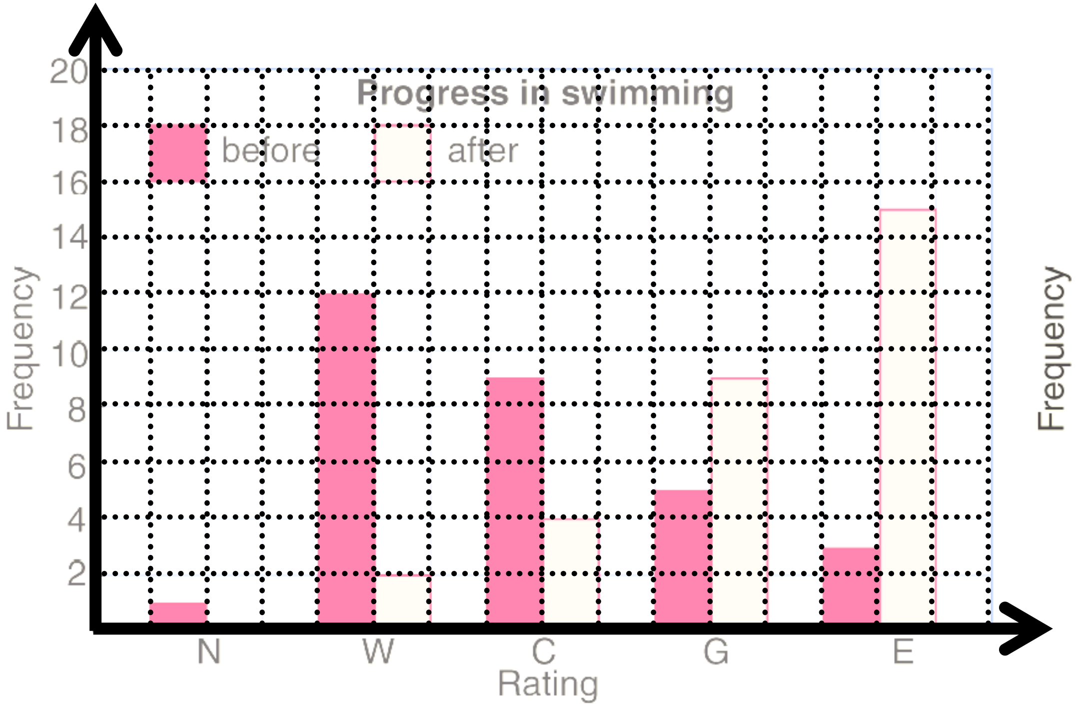
Rating


Progress in swimming
before
after
Frequency
20
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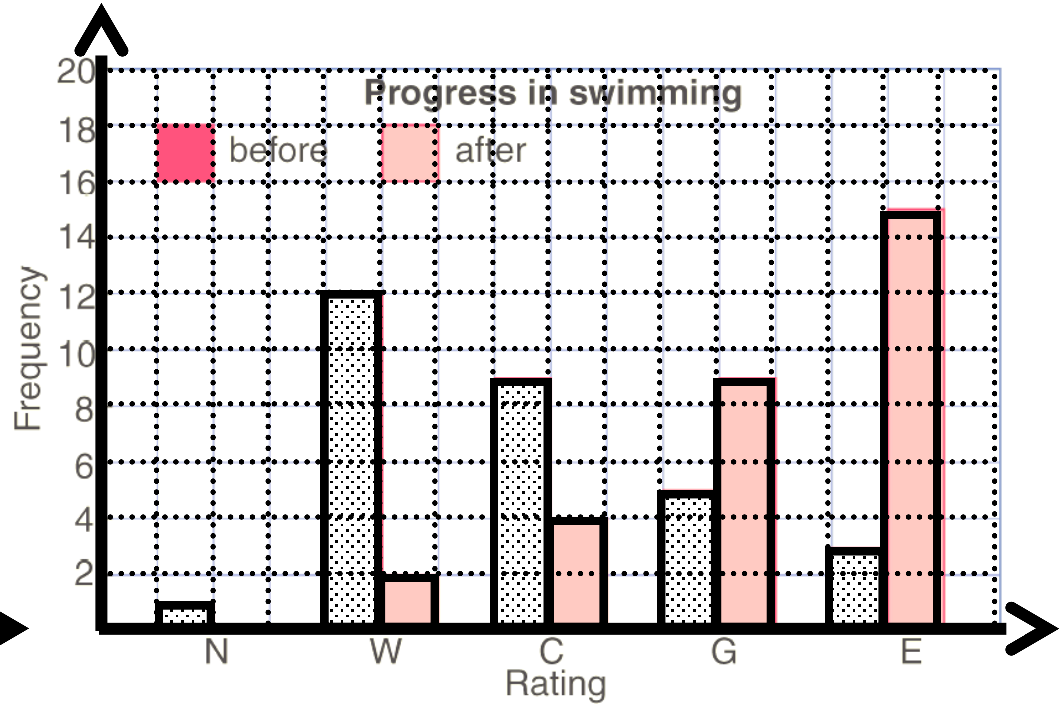
Rating


Progress in swimming
before
after
Frequency
20
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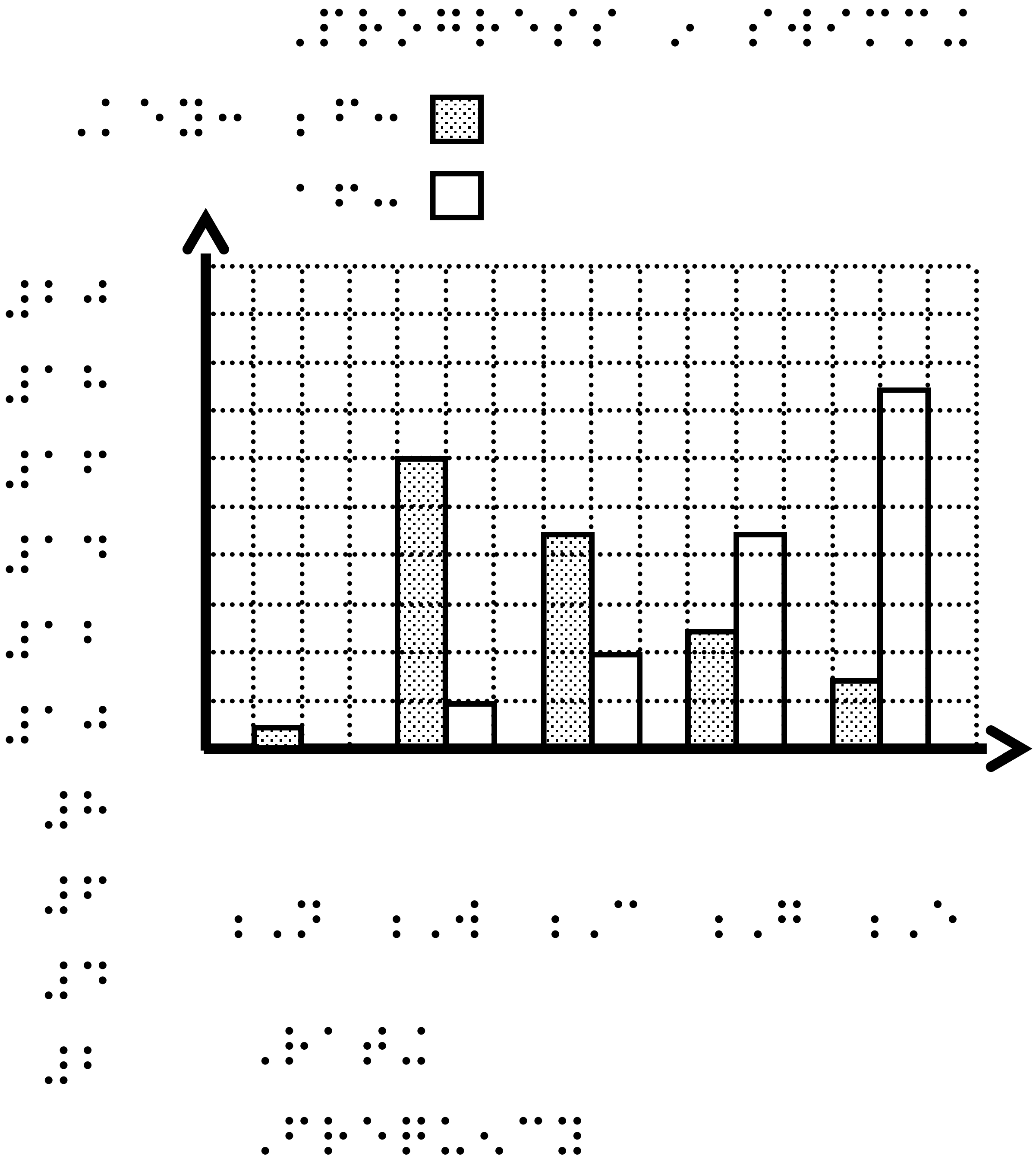
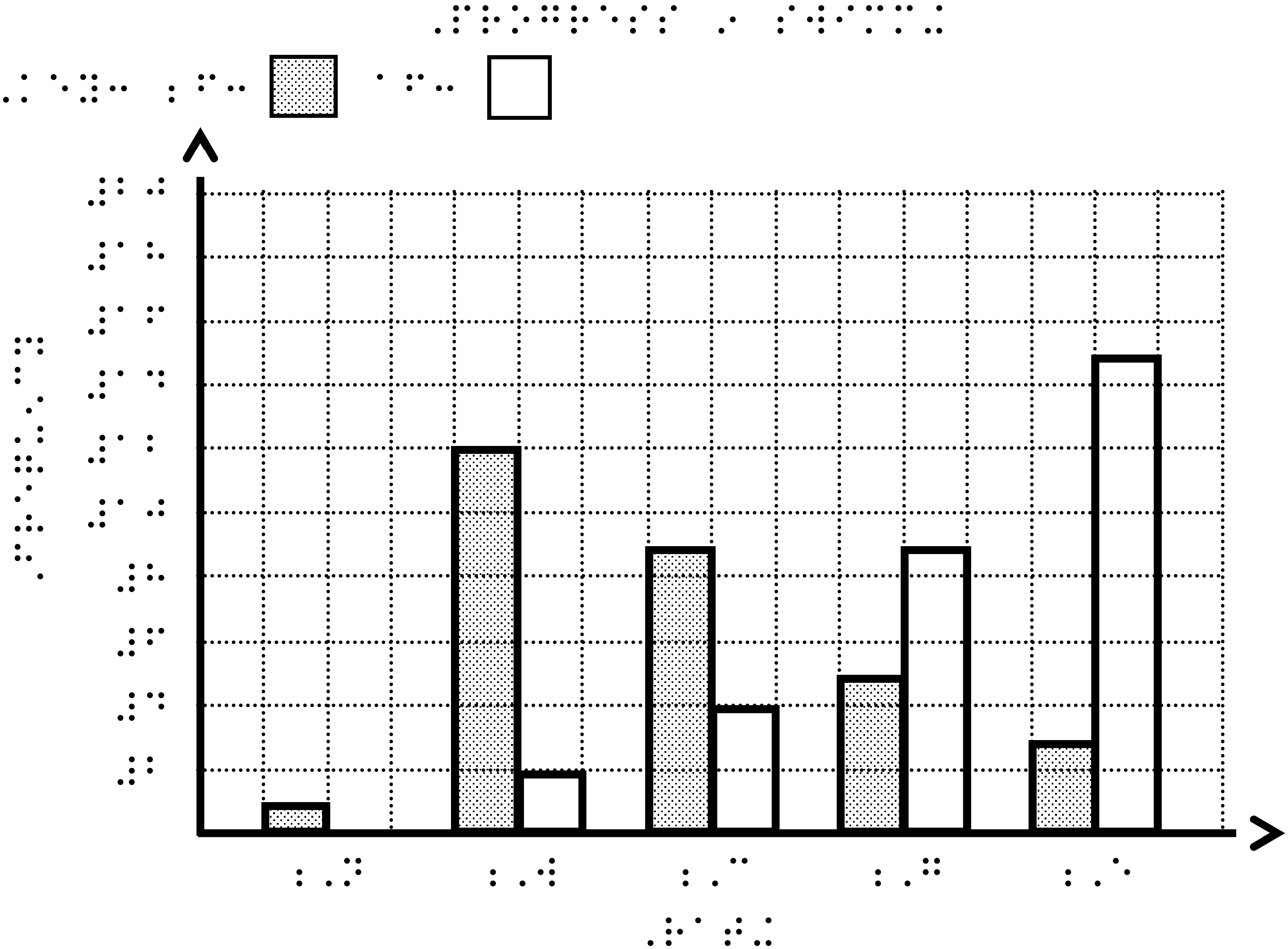
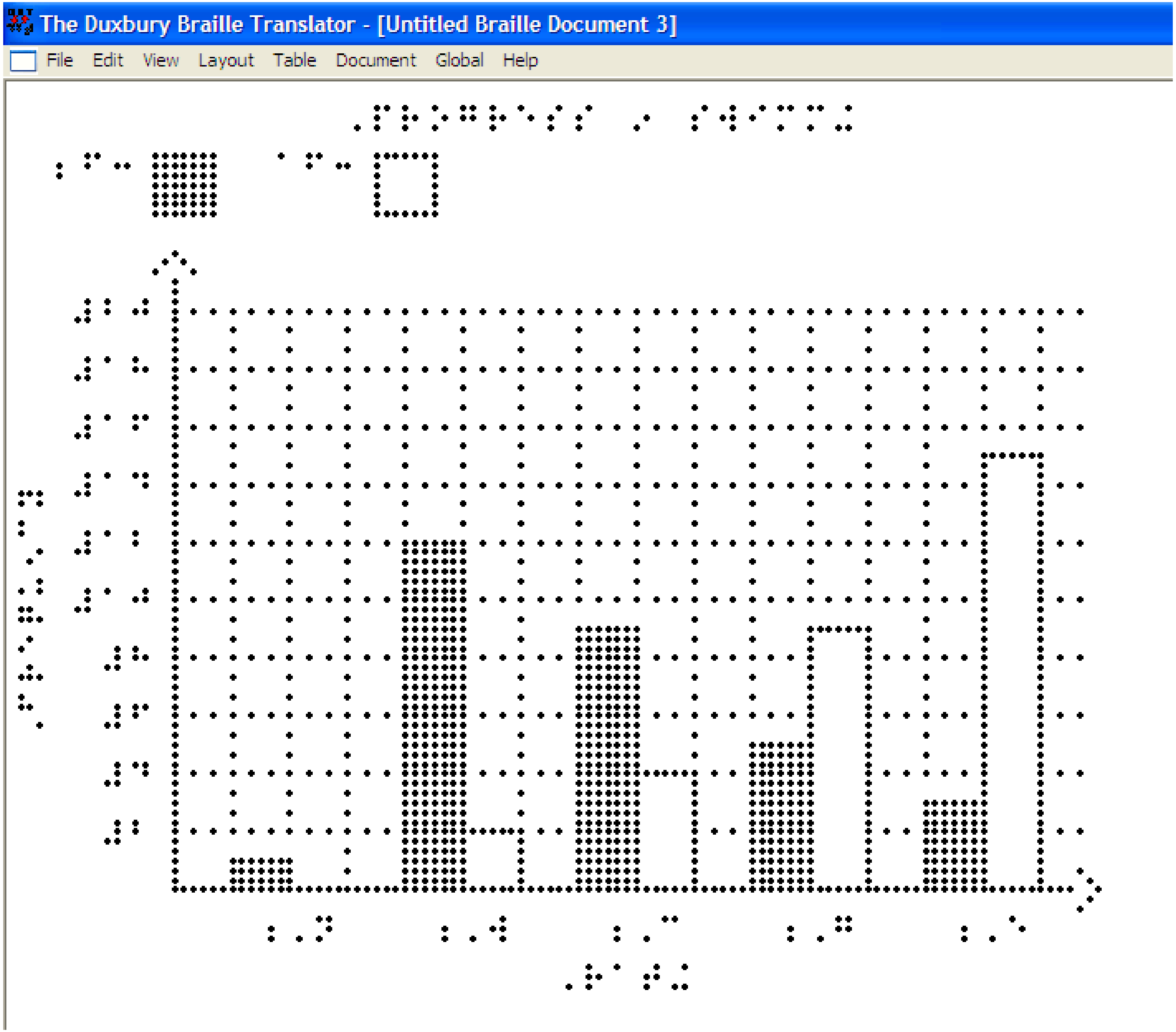
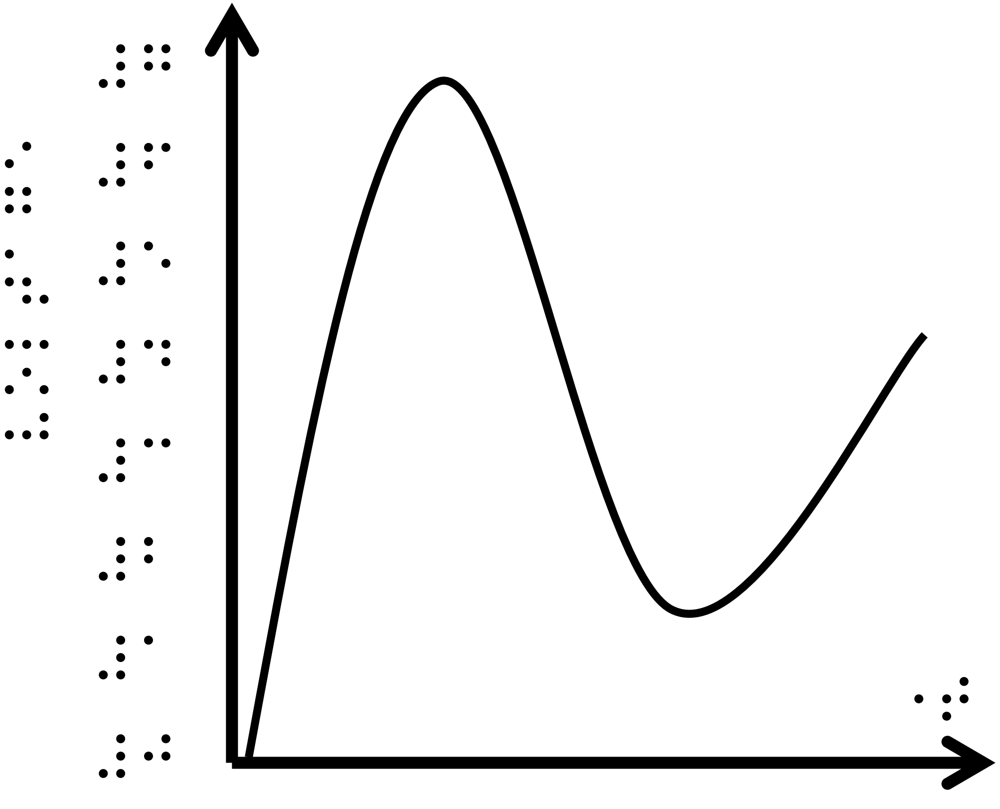
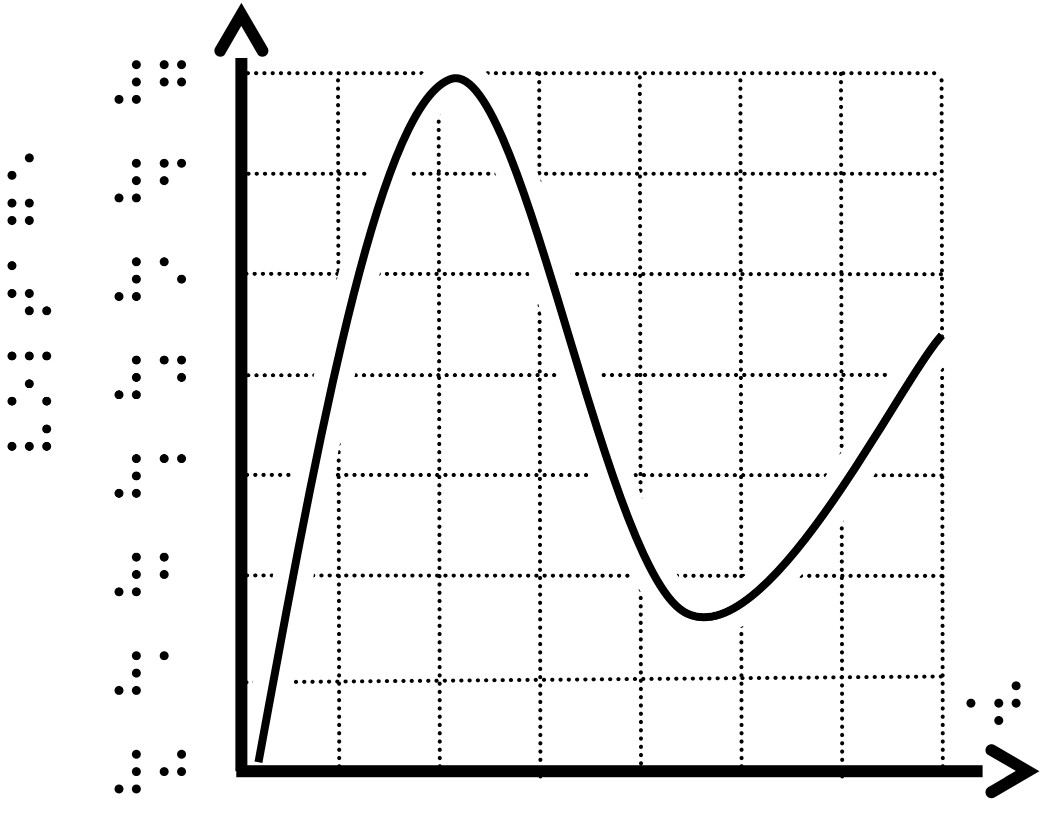
Rating

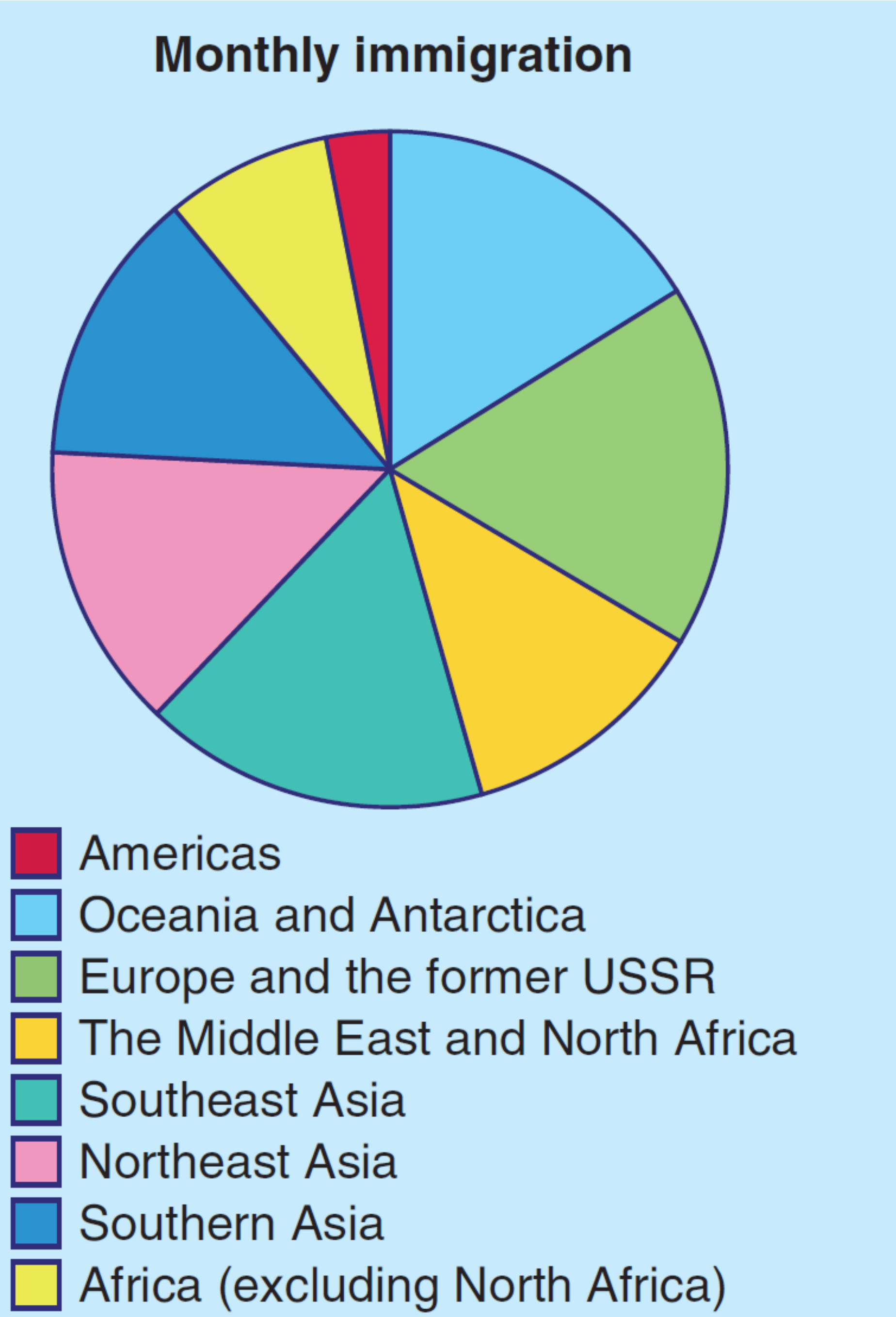


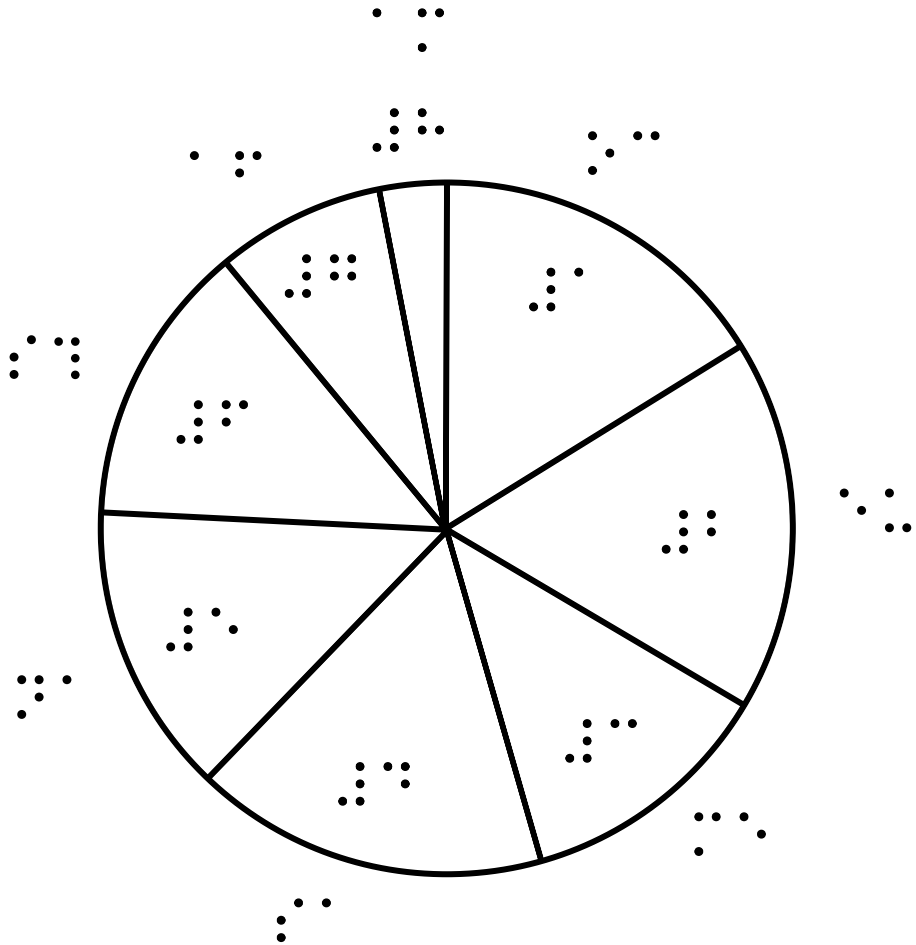



The Duxbury Braille Translator - [Untitled Braille Document 3]
File Edit View Layout Table Document Global Help









- Numbers or letters?
- Placement; inside outside?
- If inside 8 too small, put it outside?
- Af Africa is contraction (after)
- Southeast Asia, Southern Asia; mnemonic key?

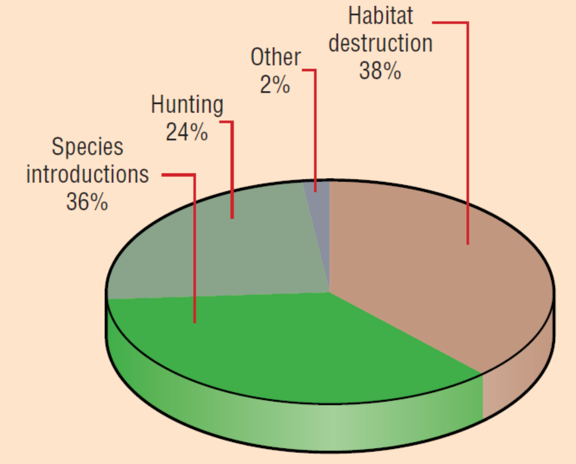


Figure 16.4b Known causes of animal extinctions.

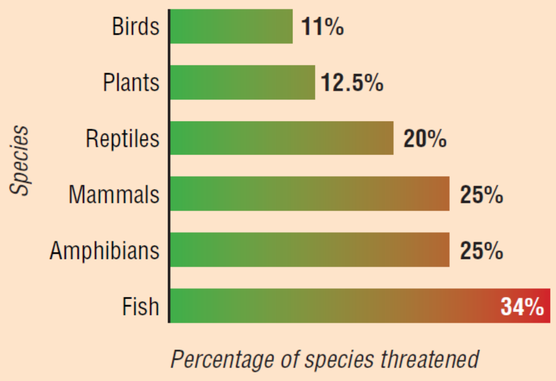


Figure 16.4c Species under pressure. Source: *Time* magazine.

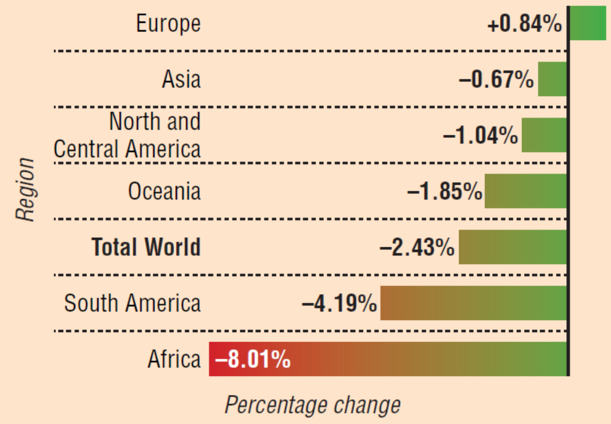
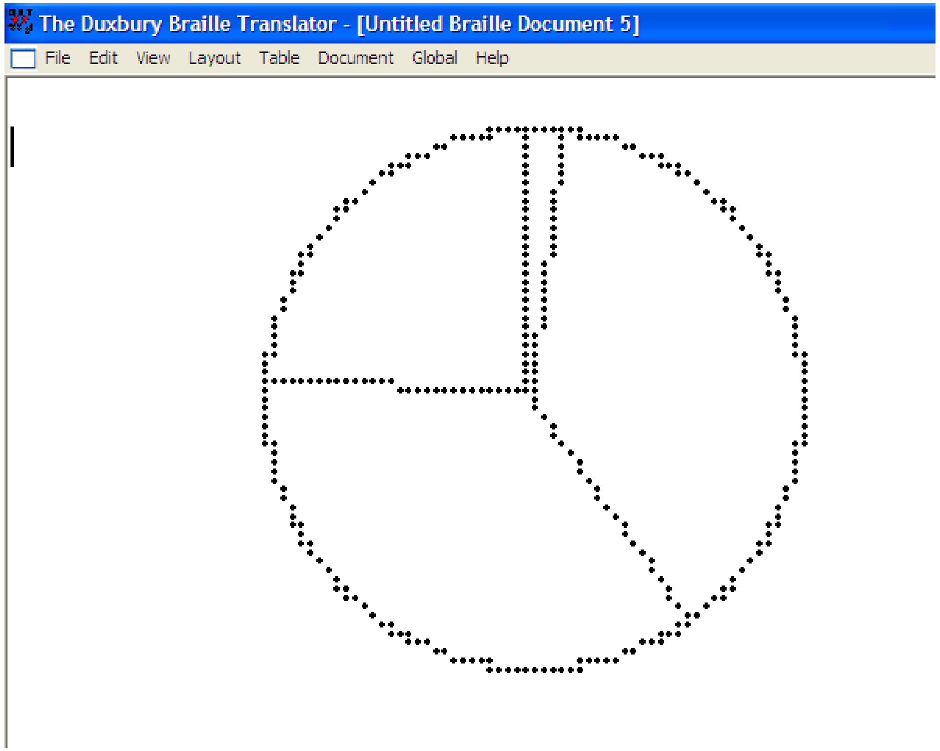
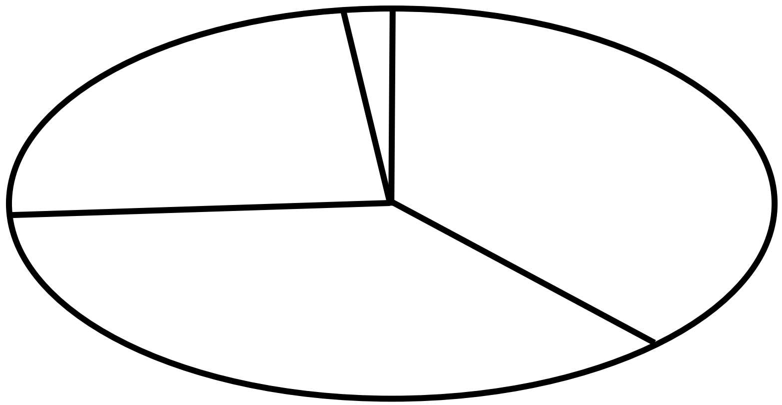


Figure 16.4d Forest loss/gain by region (percentage change), 1990–2000.



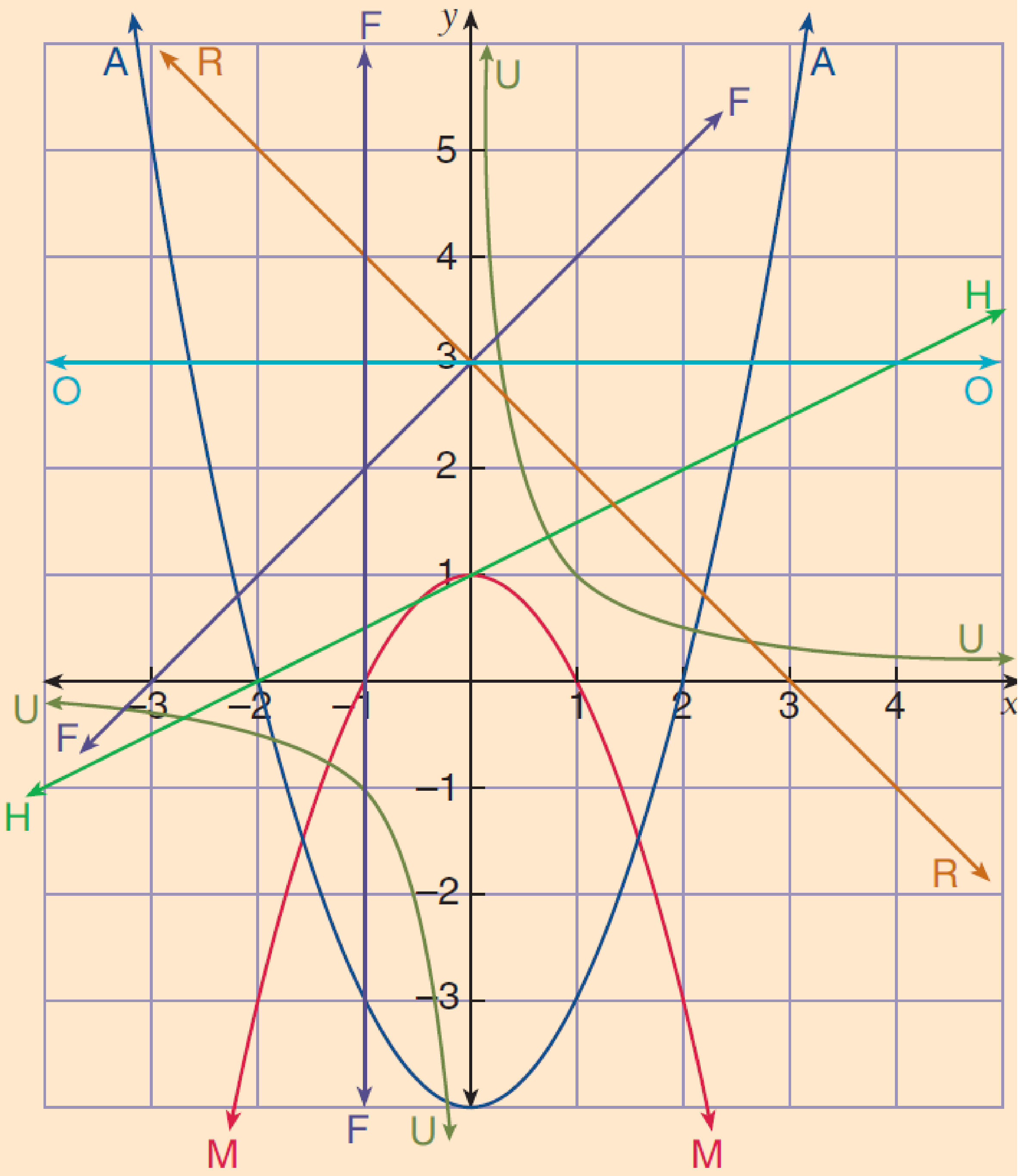


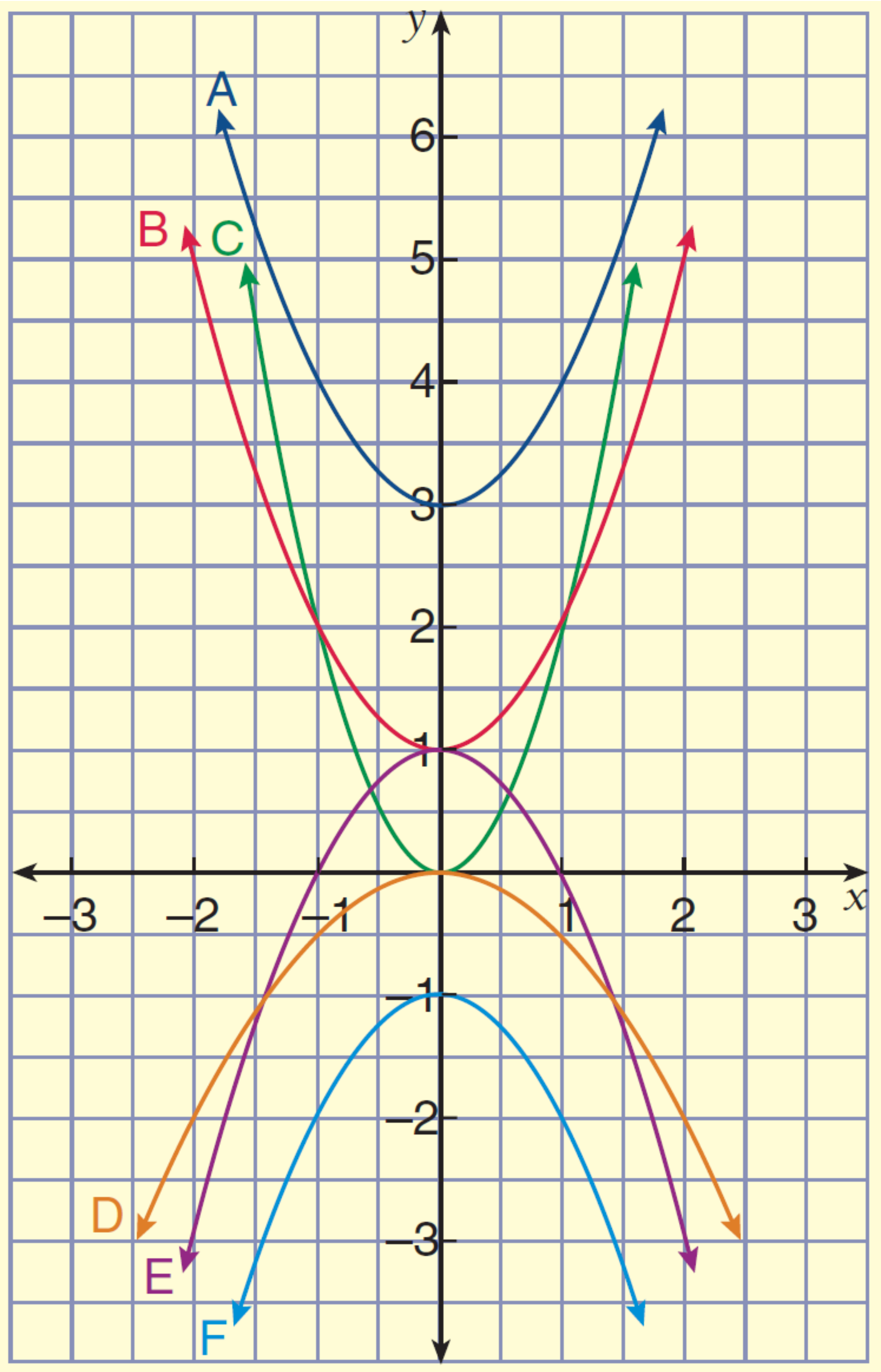
Mathematics

Graphics for discussion

Work out the answer to each question and put the letter for that part in the box that is above the correct answer.

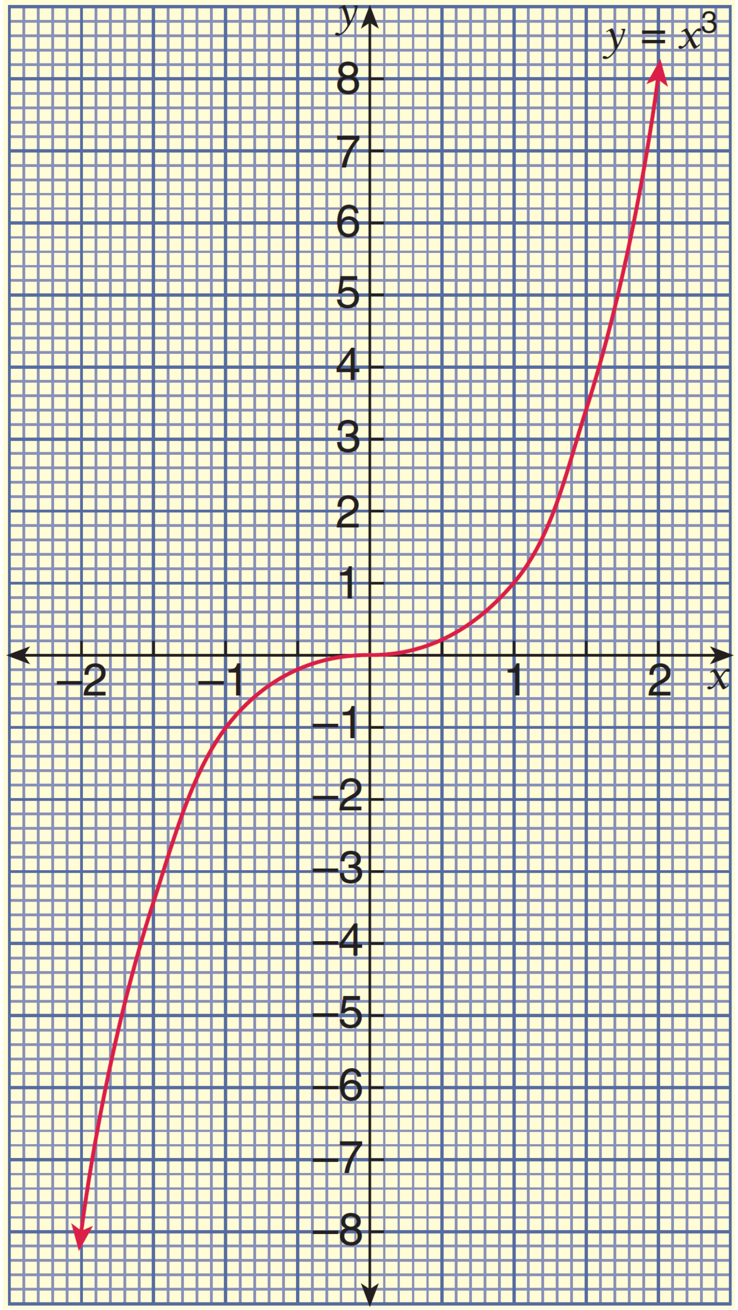
For the number plane shown, match each graph with its correct equation below.

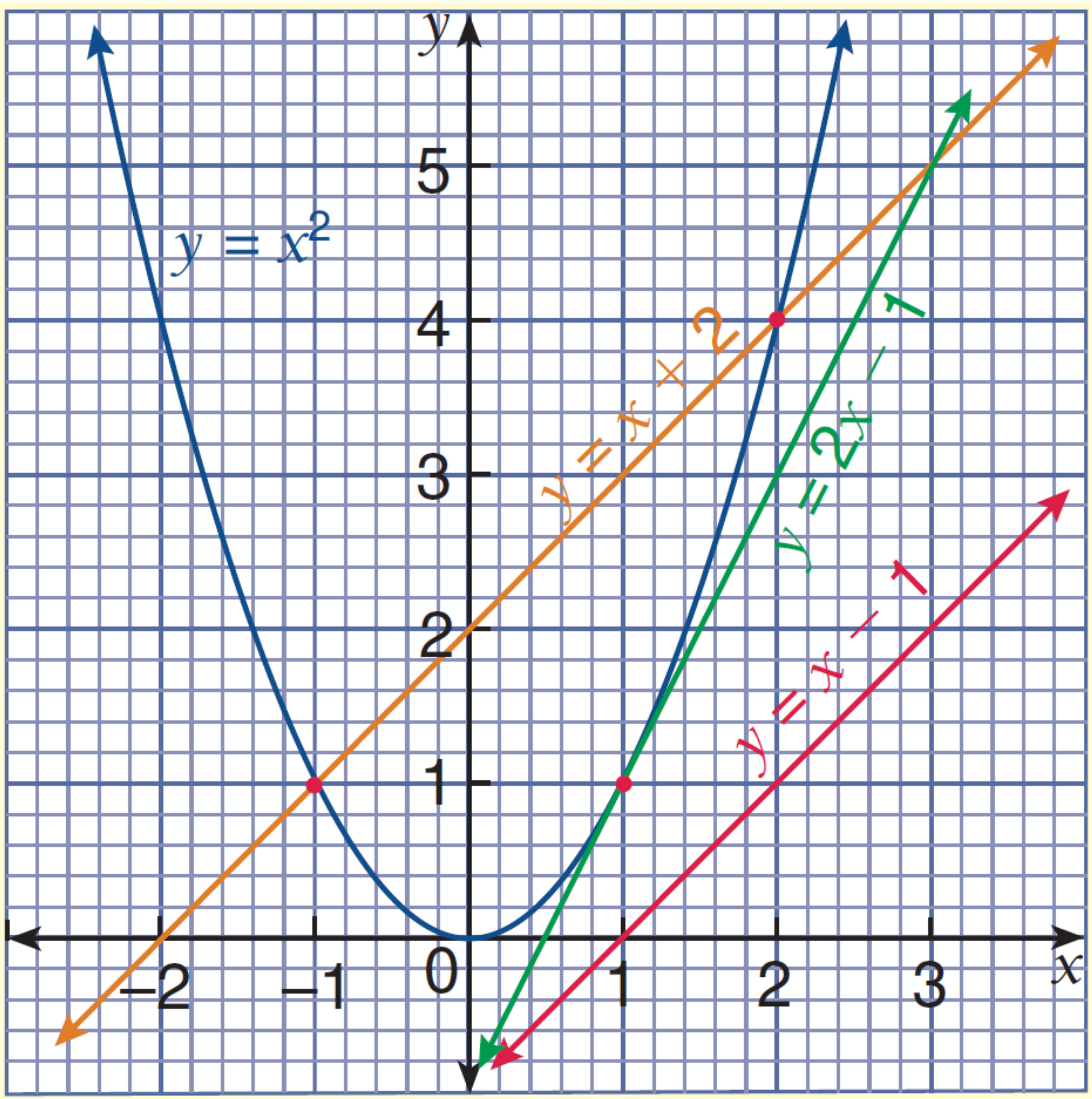




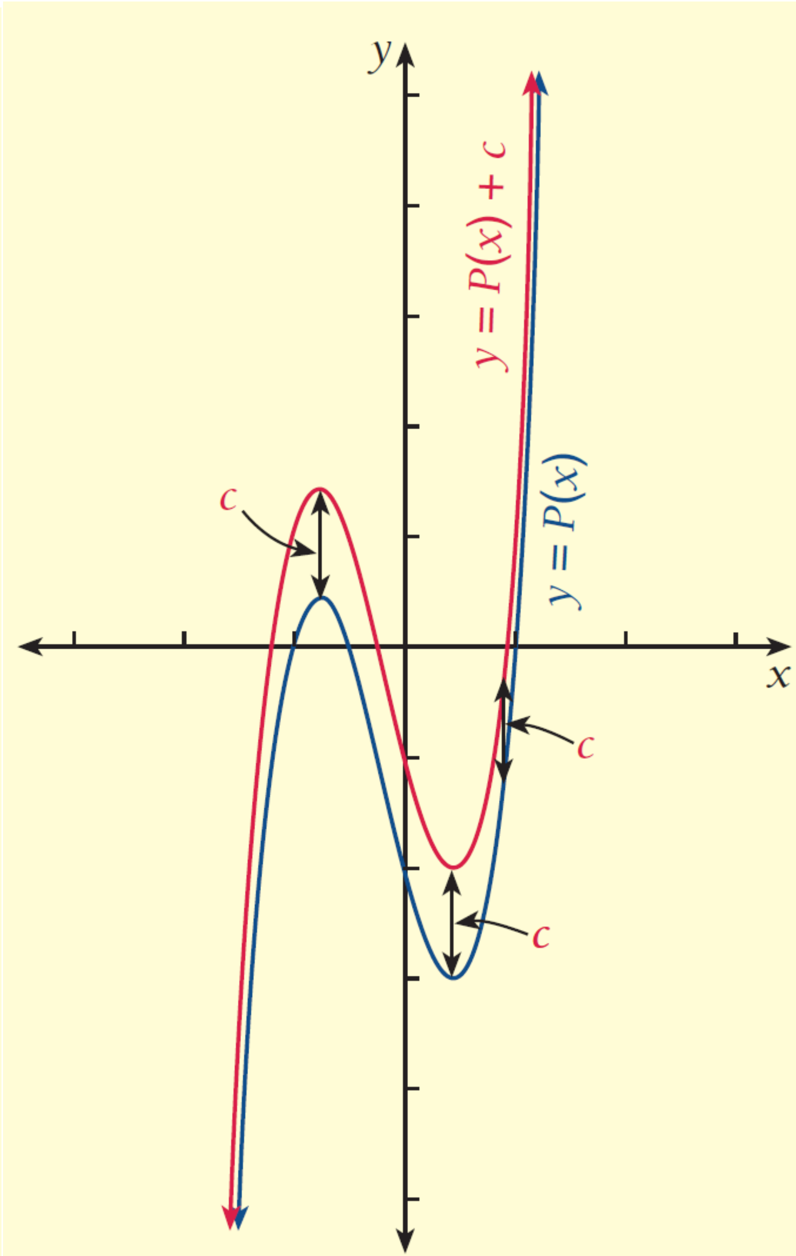
$y = x^3$

x	–2	–1·5	–1	–0·5	0	0·5	1	1·5	2
y	–8	–3·4	–1	–0·1	0	0·1	1	3·4	8





y
x
$y = x^2$
$y = x + 2$
$y = 2x - 1$
$y = x - 1$
1
2
3
4
5
−2
−1
0
1
2
3



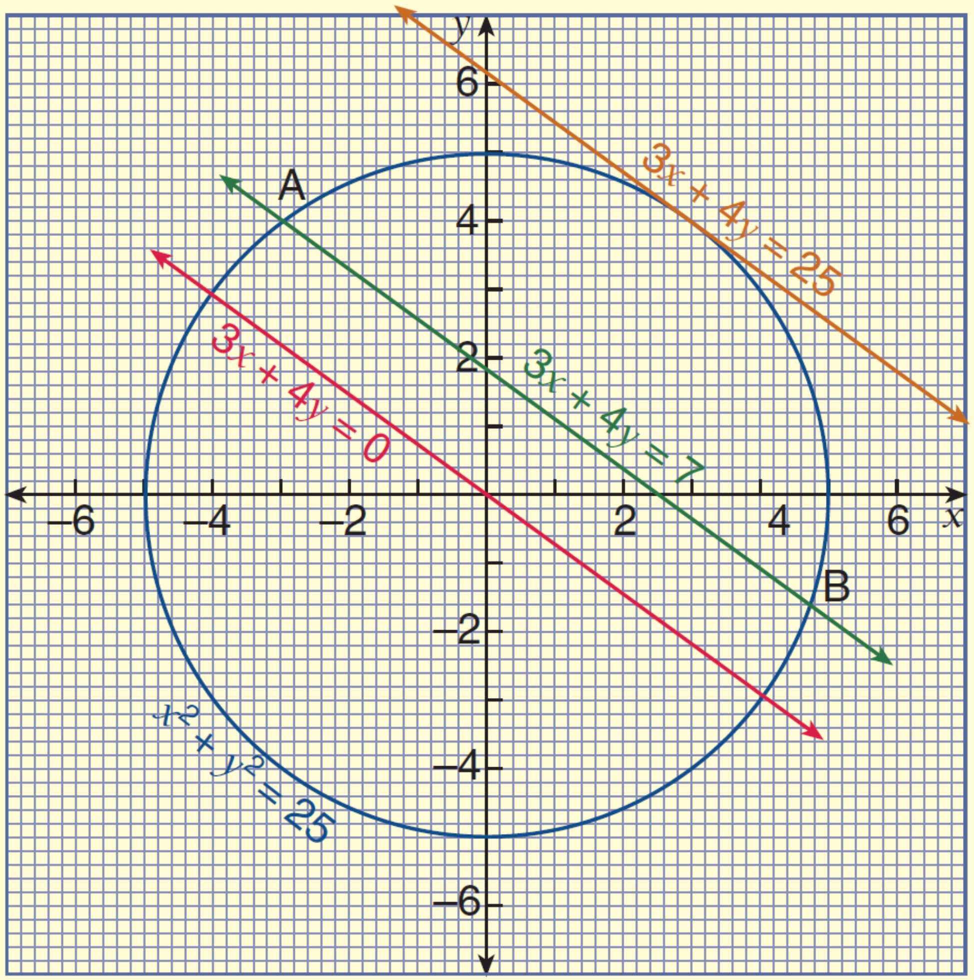
y
x
$y = P(x) + c$
$y = P(x)$
c
c
c

3 Use the diagram to answer the following questions.

a What are the points of intersection of the circle $x^2 + y^2 = 25$ and the line $3x + 4y = 0$?

b The line $3x + 4y = 25$ is a tangent to the circle $x^2 + y^2 = 25$. What is the point of intersection?

c The line $3x + 4y = 7$ meets the circle at A(−3, 4) and at B. Use the graph to estimate the coordinates of B.



Reading maths 4:01 | Financial spreadsheets

Below are two versions of a spreadsheet produced using a computer program.

- The first table shows the income earned by a student over 4 years.
- The numbers down the left and the letters across the top allow us to use **coordinates** to name any **cell** of the spreadsheet.
- The second table shows the **formula** used to obtain the cells in column F and row 10.

	A	B	C	D	E	F
1	**Income**	**2003 (Y7)**	**2004 (Y8)**	**2005 (Y9)**	**2006 (Y10)**	**Total**
2	Odd jobs	212	264	220	160	**$856**
3	Selling newspapers	364	380	0	0	**$744**
4	Mowing lawns	60	260	180	45	**$545**
5	Baby-sitting	0	140	235	380	**$755**
6	Typing	0	0	20	110	**$130**
7	McDonald's cashier	0	0	1654	1840	**$3494**
8	Washing cars	104	260	86	52	**$502**
9						
10	**Total**	**$740**	**$1304**	**$2395**	**$2587**	**$7026**

	A	B	C	D	E	F
1	**Income**	**2003 (Y7)**	**2004 (Y8)**	**2005 (Y9)**	**2006 (Y10)**	**Total**
2	Odd jobs	212	264	220	160	**=SUM(B2..E2)**
3	Selling newspapers	364	380	0	0	**=SUM(B3..E3)**
4	Mowing lawns	60	260	180	45	**=SUM(B4..E4)**
5	Baby-sitting	0	140	235	380	**=SUM(B5..E5)**
6	Typing	0	0	20	110	**=SUM(B6..E6)**
7	McDonald's cashier	0	0	1654	1840	**=SUM(B7..E7)**
8	Washing cars	104	260	86	52	**=SUM(B8..E8)**
9						
10	**Total**	**=SUM(B2..B8)**	**=SUM(C2..C8)**	**=SUM(D2..D8)**	**=SUM(E2..E8)**	**=SUM(F2..F8)**

1 What is referred to in cell:
a D6? **b** B3? **c** A5? **d** F8? **e** C10?

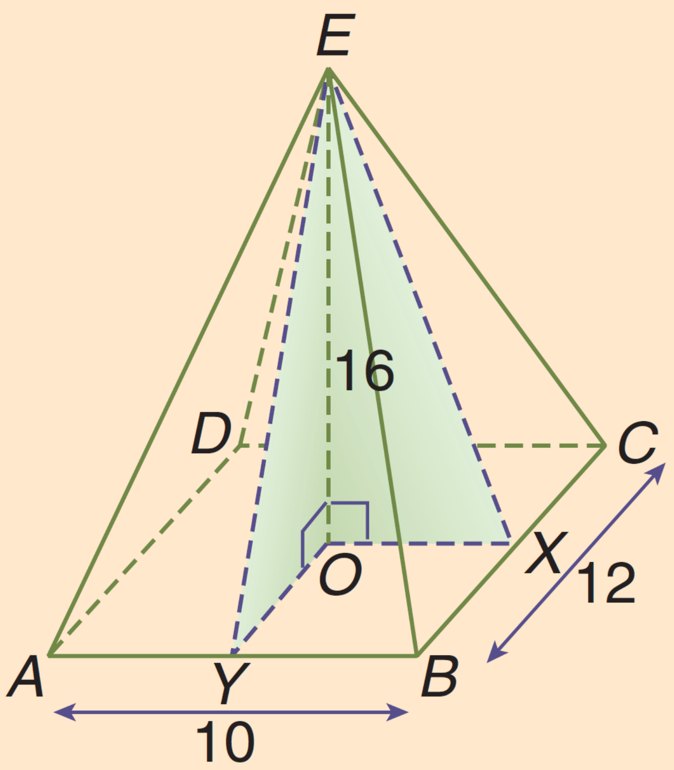
2 What is meant by:
a =SUM(B2..E2)? **b** =SUM(C2..C8)?

3 What would be the answer to '=SUM(B10..E10)'?

4 Why do '=SUM(B10..E10)' and '=SUM(F2..F8)' have the same value?

Make a spreadsheet of your own on a subject of your choice.

ABCDE is a rectangular pyramid.



Find:

5 OX

6 EX

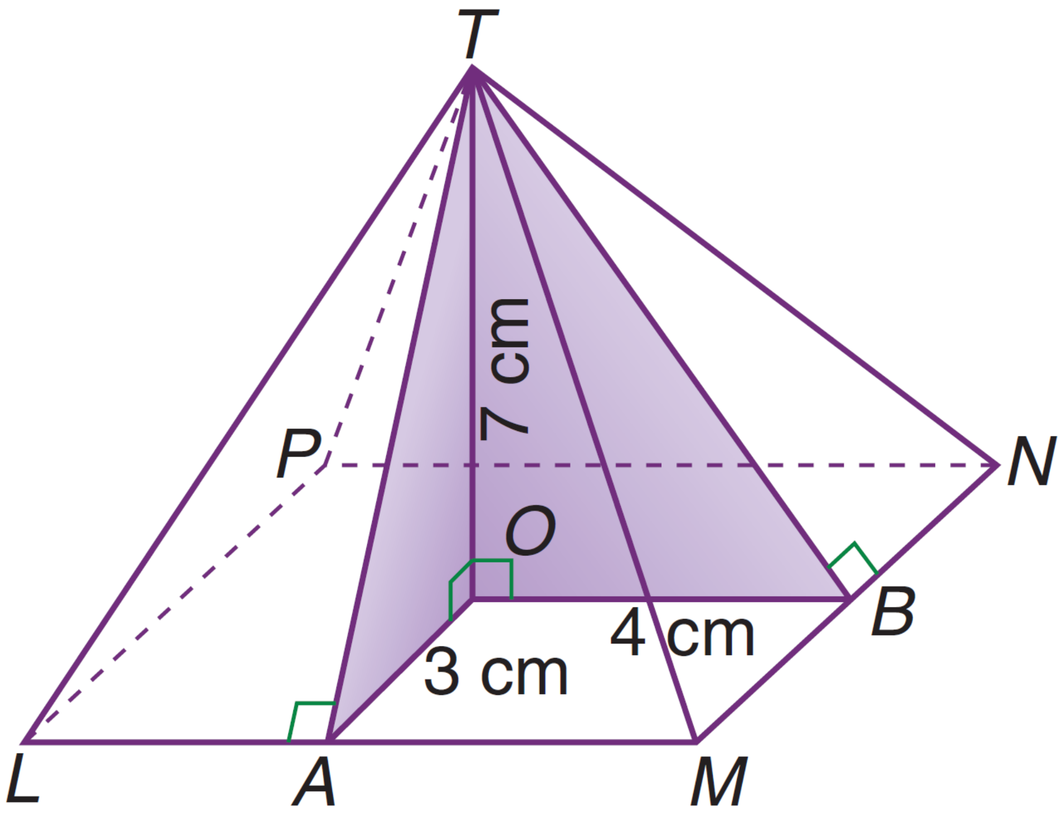
7 OY

8 EY

Find the area o

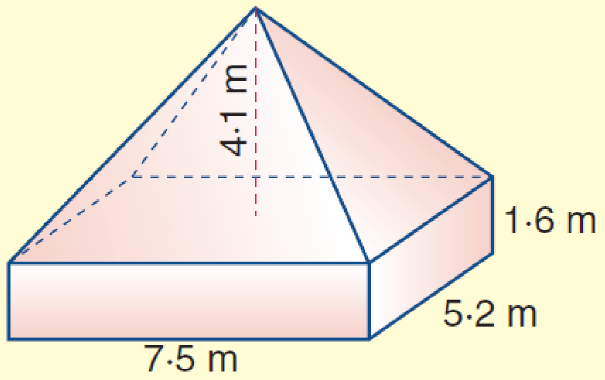
9 ΔEBC

10 ΔABE

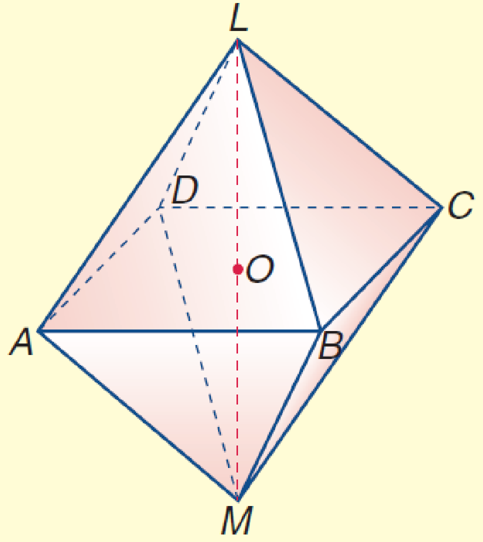


7 Calculate the volume of the following solids.

a

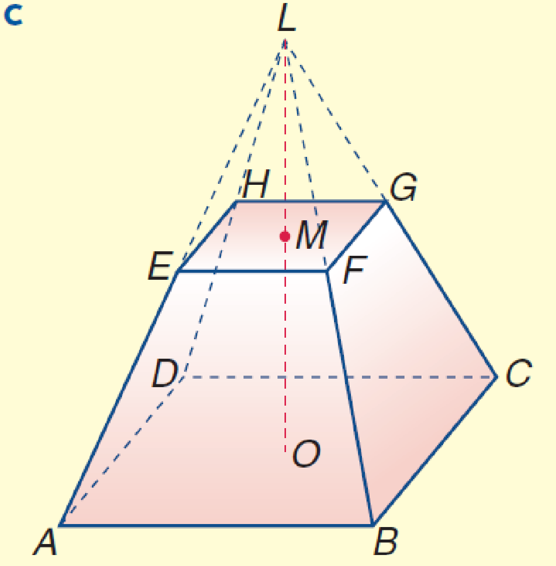


b



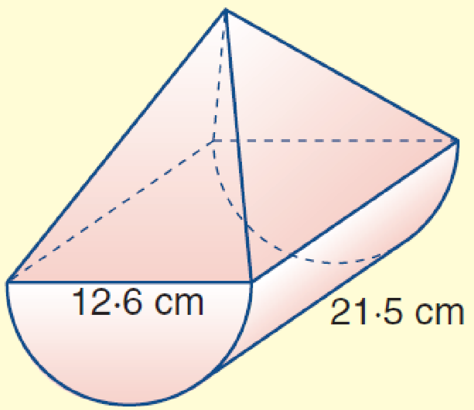
ABCD is a square.
AB = 12 cm
LO = *MO* = 10 cm

c



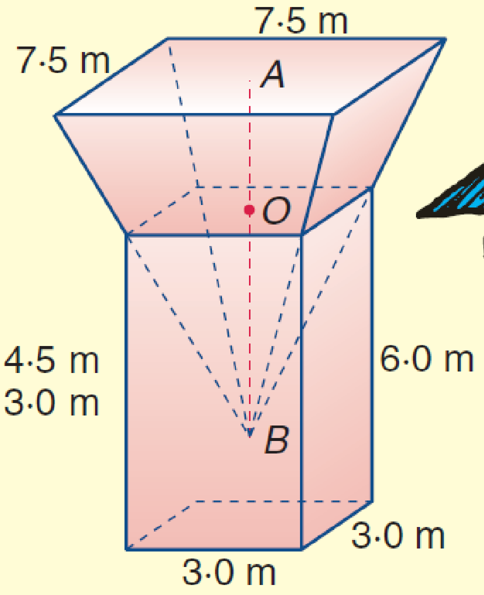
ABCD and *EFGH* are squares.
AB = 20 cm, *EF* = 10 cm
MO = 15 cm, *LM* = 15 cm

d

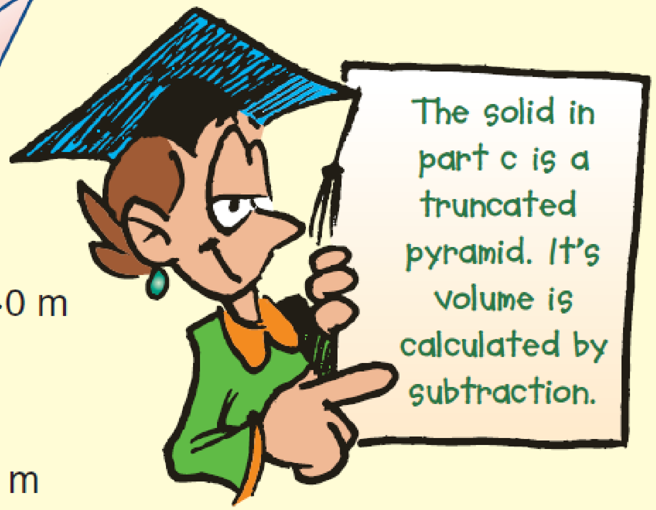


The height of the pyramid is 8·5 cm. (Answer correct to 3 sig. figs.)

e

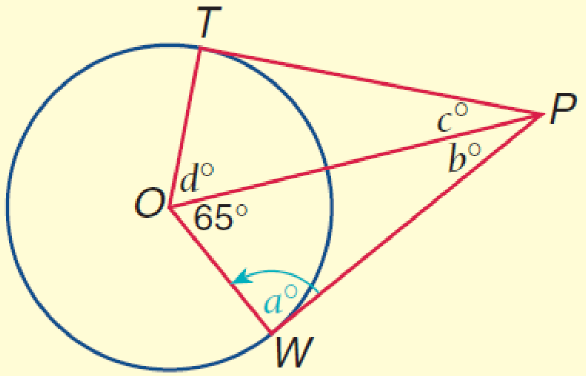


AO = 4·5 m
BO = 3·0 m

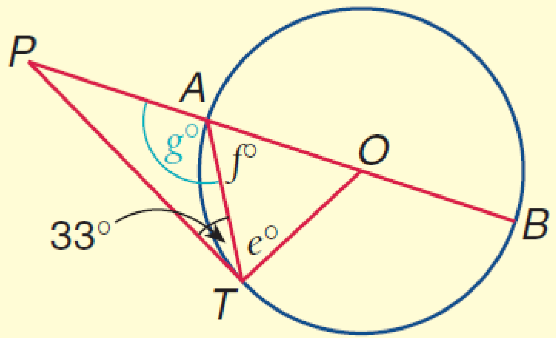


3 Find the value of the pronumerals in each.

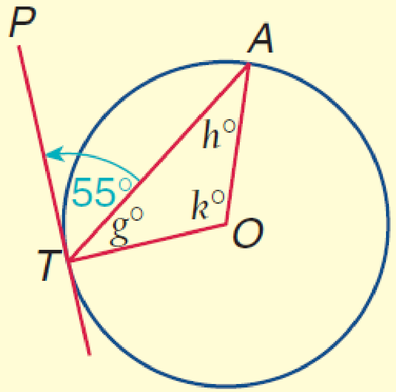
a



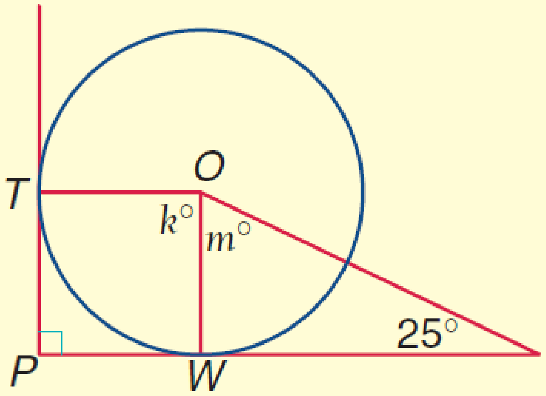
b



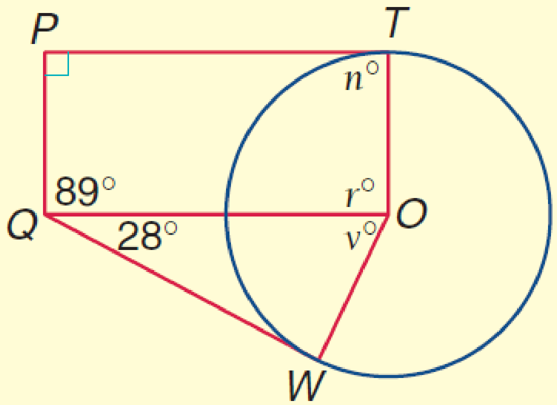
c



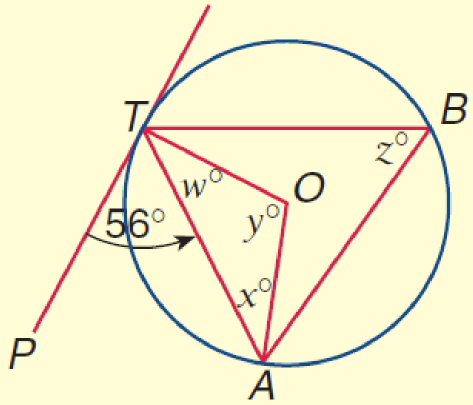
d



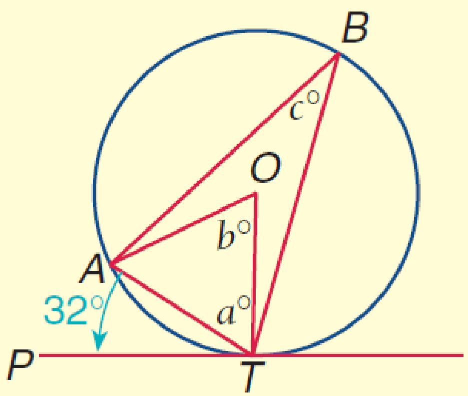
e



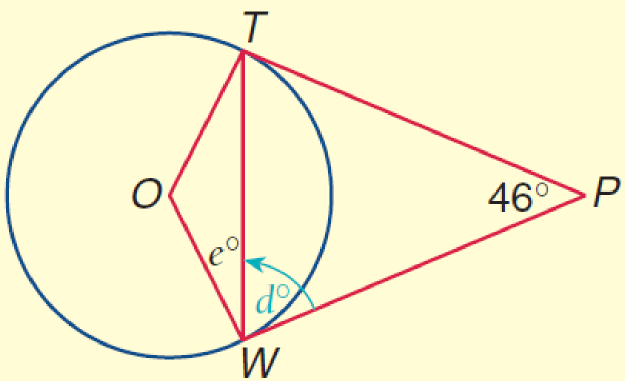
f



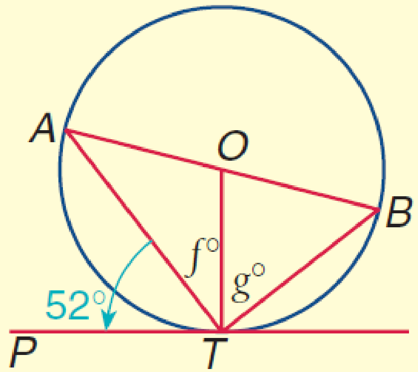
g



h



i



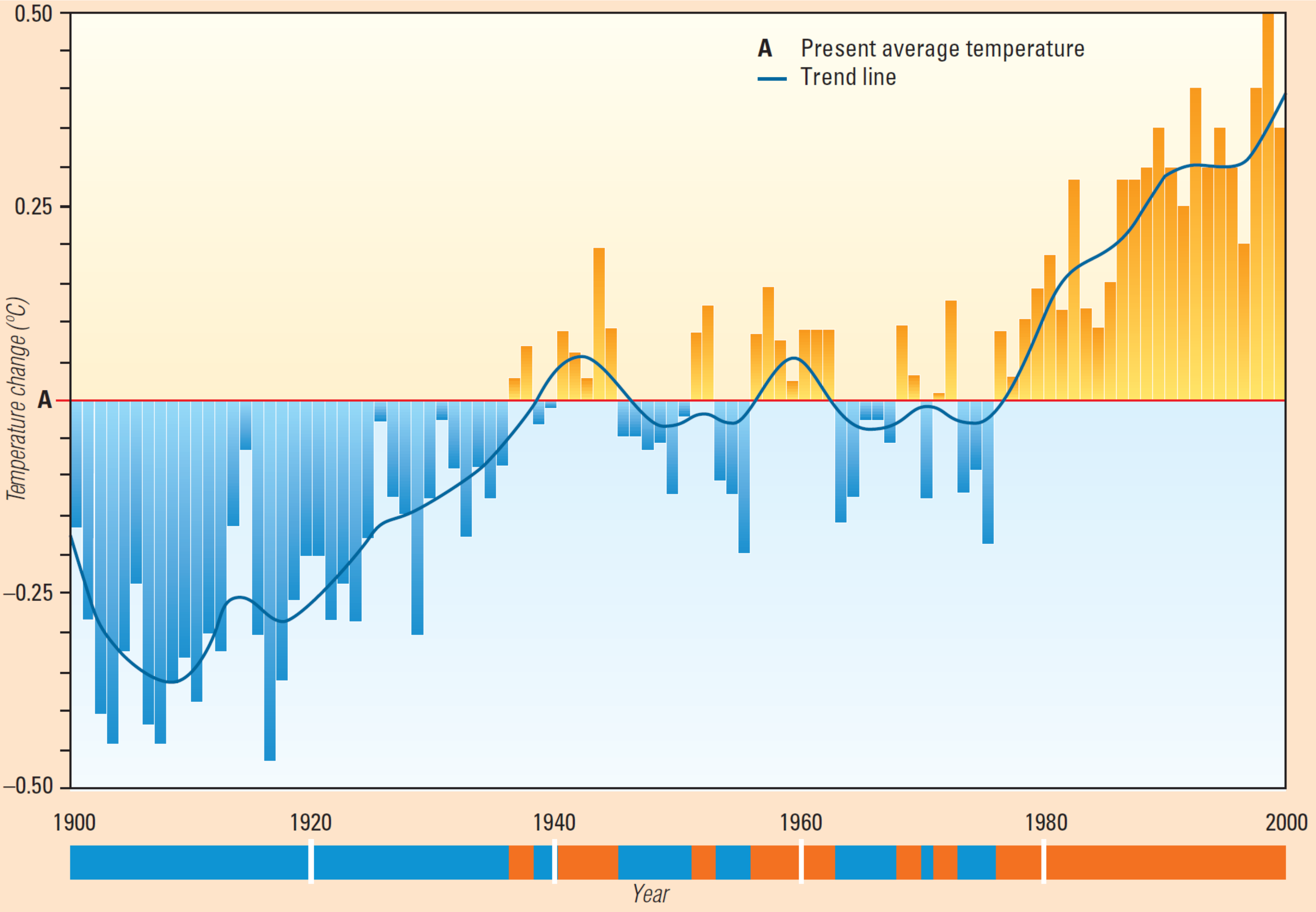
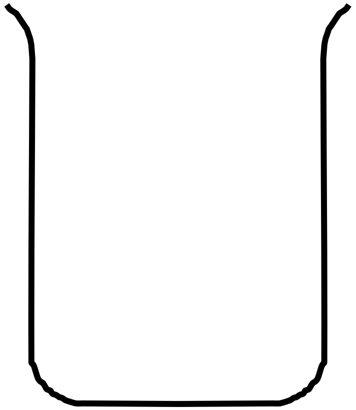
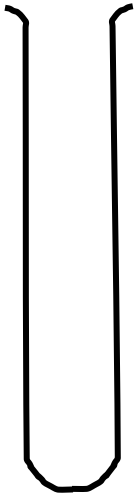


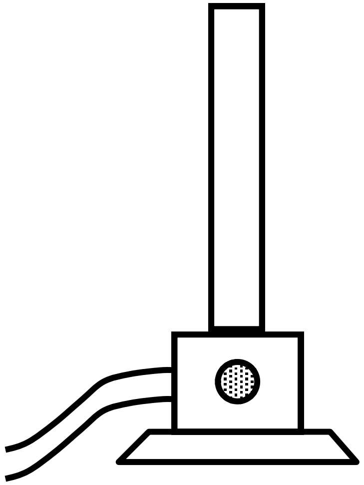
Figure 16.3a Global temperature change since 1900.

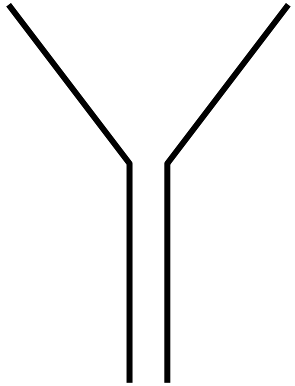
Science

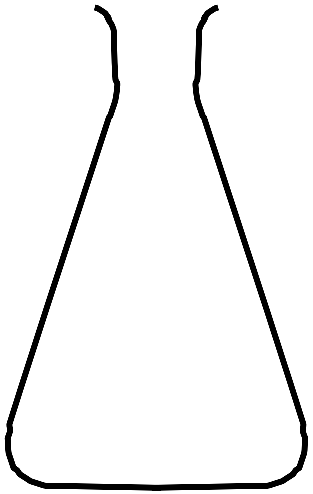
Graphics for discussion

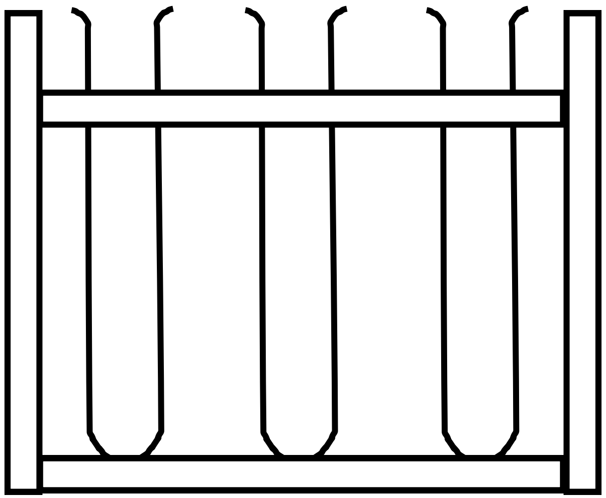


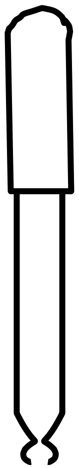












Instruments used to record weather data

1. Rain gauge
Official forecasters have used rain gauges for over 100 years. A rain gauge is shown in drawing 1 in Figure 4.1a. It consists of a large cylinder with a funnel and a smaller measuring tube inside. The funnel collects the rainfall and directs it into a measuring tube, which has exactly one-tenth the cross-sectional area at the top of the funnel. The smaller measuring tube allows more precise measurements to be made because it exaggerates the height of the water in the tube. The graduations used on the side of the measuring tube take into account this exaggeration. This allows **meteorologists** to make very precise measurements.

The rain gauge should be positioned where there will be no runoff of rainwater from trees, roofs or signs, for example. There is a minimum distance that official rain gauges must be from such obstructions. For example, if a nearby tree is 5 metres tall, the rain gauge must be at least twice the distance (10 metres) away.

During periods of heavy rainfall the measuring tube may overflow into the larger cylinder. If this happens the tube needs to be emptied and the additional water needs to be carefully poured into the measuring tube. The total rainfall should be tallied.

When measuring precipitation in the form of hail or snow, the inner tube and the funnel are removed. The ice or snow collected by the outer cylinder is melted and then measured using the inner measuring tube.

2. Wind vane
A wind vane tells the direction of the wind. Remember that winds are named after the direction *from* which they are blowing. A wind blowing from the south, for example, is called a southerly.

3. Anemometer
An anemometer revolves in the wind. The faster the wind speed, the faster it revolves. Wind speed is calculated by counting the number of revolutions per unit of time.

7. Aneroid barometer
An aneroid barometer contains a sealed box with most of its air removed. Any change in pressure will make the box shrink or expand. Levers magnify these changes, causing a pointer to move on a dial. Air pressure at sea level fluctuates around 1013 hectopascals (hPa). It can drop to 970 hPa during severe storms. In a high-pressure system it can reach 1040 hPa. A drop in air pressure, measured over a day or two, will indicate the approach of unsettled weather.

5. Maximum–minimum thermometer
A maximum–minimum thermometer is a special type of thermometer that can record both the maximum and minimum temperature experienced over twenty-four hours. It needs to be reset daily.

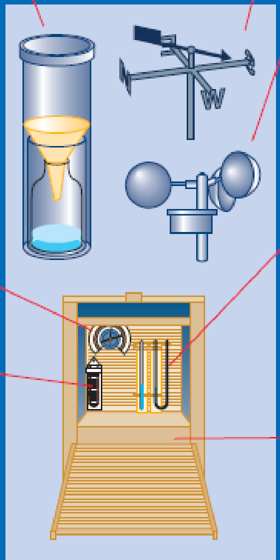


Figure 4.1a Instruments used to record weather.

6. Wet–dry bulb thermometer
A wet–dry bulb thermometer is a standard mercury-in-glass thermometer, with the thermometer bulb wrapped in muslin, which is kept wet. The evaporation of water from the thermometer has a cooling effect, so the temperature indicated by the wet–dry bulb thermometer is less than the temperature indicated by a normal thermometer. The rate of evaporation from the wet–dry bulb thermometer depends on the humidity of the air: evaporation is slower when the air is already full of water vapour. For this reason, the difference in the temperatures indicated by the two thermometers gives a measure of atmospheric humidity.

4. Stevenson screen
A Stevenson screen is used to house various instruments. Air can move freely through the slats, the white colour reflects the worst of the heat, and the roof keeps out the rain. Because the screens are built to a standard design, data collected from anywhere in the world can be compared.

Step 2: collecting information

First, decide which questions shown in Figure 4.2a (p. 90) you are going to investigate. You may like to add additional questions, but they must be relevant to your study. Now decide on how you are going to collect the information. It is important to measure and record your data accurately.

Most of the data you will collect during a river investigation will be **primary data**; that is, data you actually go out and collect through measuring, sketching and observing. The equipment you might use to collect this data is shown in Figure 4.2g.

You could collect **secondary data** about the river you are investigating by contacting the NSW Department of Infrastructure, Planning and Natural Resources. You could then compare this secondary data with your own data.

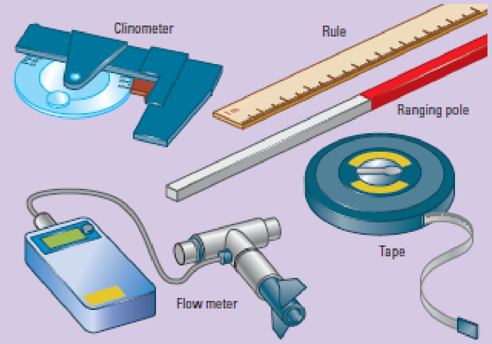


Figure 4.2g Tools used to collect data in the field.

Skills: Calculating cross-sectional area

To find out the cross-sectional area of a river complete the following steps:

1. Use a long tape measure to determine the width of the river.
2. Measure the depth of the water at regular intervals across the width of the river (for example, every 100 centimetres). A 2-metre pole marked with 10-centimetre intervals will assist you in this task. It may be easiest to measure the depth of the river where there is a low bridge for you to stand on.
3. Record your measurements on your data record sheet (see Figure 4.2h, p. 94).
4. Calculate the average depth by adding all the depth readings and divide by the number of readings. Using the data shown in Figure 4.2h, the average would be (20 cm + 25 cm + 35 cm + 45 cm + 30 cm + 20 cm)/6 = 29 cm.
5. Multiply the average depth by the average width of the river to give the area. Using the data shown in Figure 4.2h, the area would be 29 cm (or 0.29 m) × 15 = 435 cm² (or 4.35 m²).

Skills: Calculating water velocity

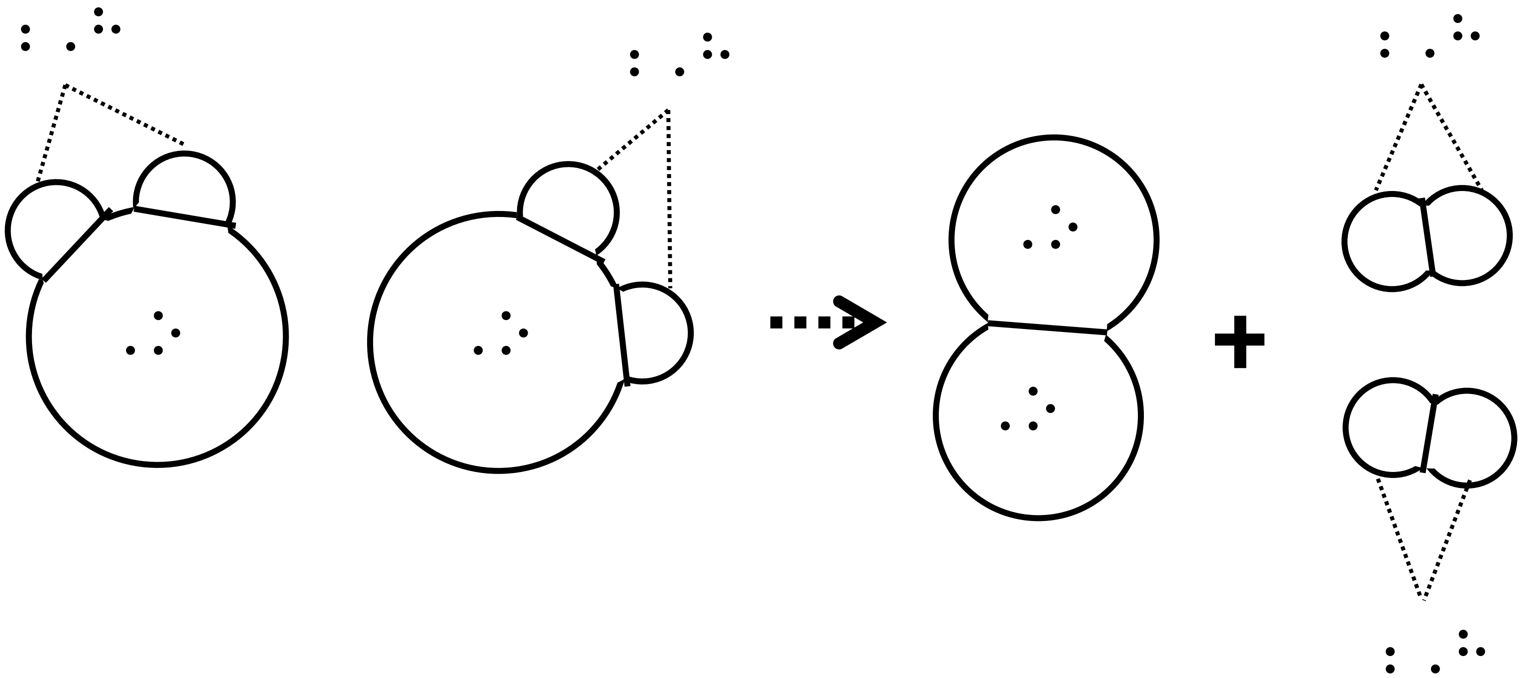
The most accurate way to measure water velocity is to use a flow meter (see Figure 4.2g). If you don't have a flow meter you can use the following procedure:

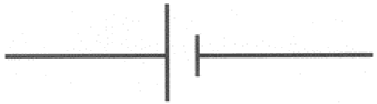
1. Select a straight section of the river that is free of pools and/or shallow, fast-flowing sections.
2. Measure out a distance of 50 metres.
3. Find an object that will float on the surface of the river. The object should be brightly covered and it is best if it is heavy enough to be partly submerged in the water.
4. With the aid of a stopwatch, measure how long it takes for the floating object to cover the 50 metres.
5. Take at least three readings. For greater accuracy take readings on both sides of the river and in the middle. Record your readings on your data record sheet (see Figure 4.2h, p. 94). Average the readings to determine the water velocity.

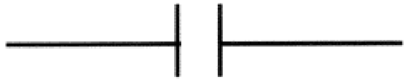
Skills: Calculating discharge

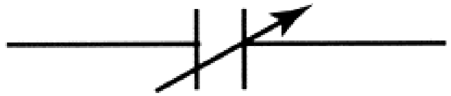
The amount of water flowing down a river is known as **discharge**. The discharge can be calculated by using the formula below.

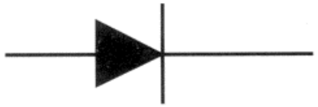
Discharge = velocity × cross-sectional area

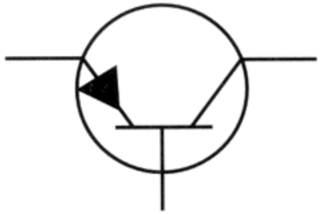


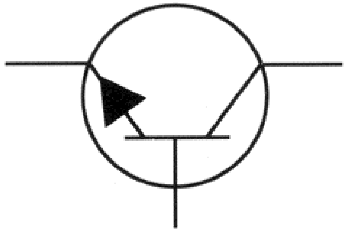


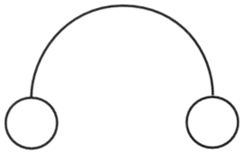


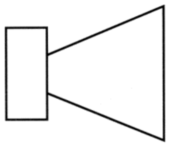


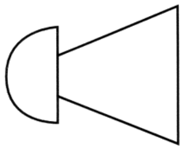












Biology

Graphics for discussion

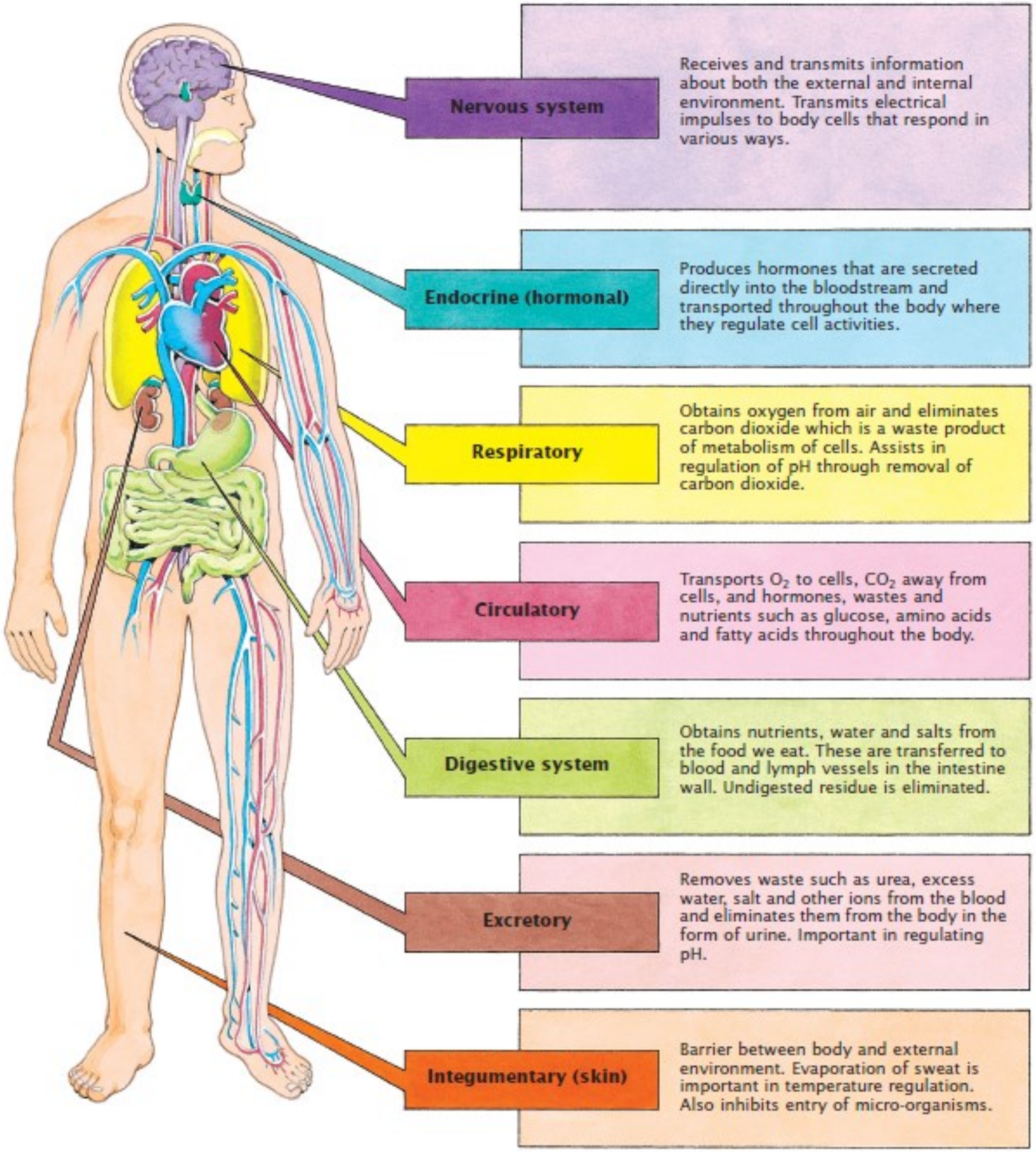


Figure 1.13 Summary of the contribution of some body systems to homeostasis. Can you suggest why kidney failure is a life-threatening condition?

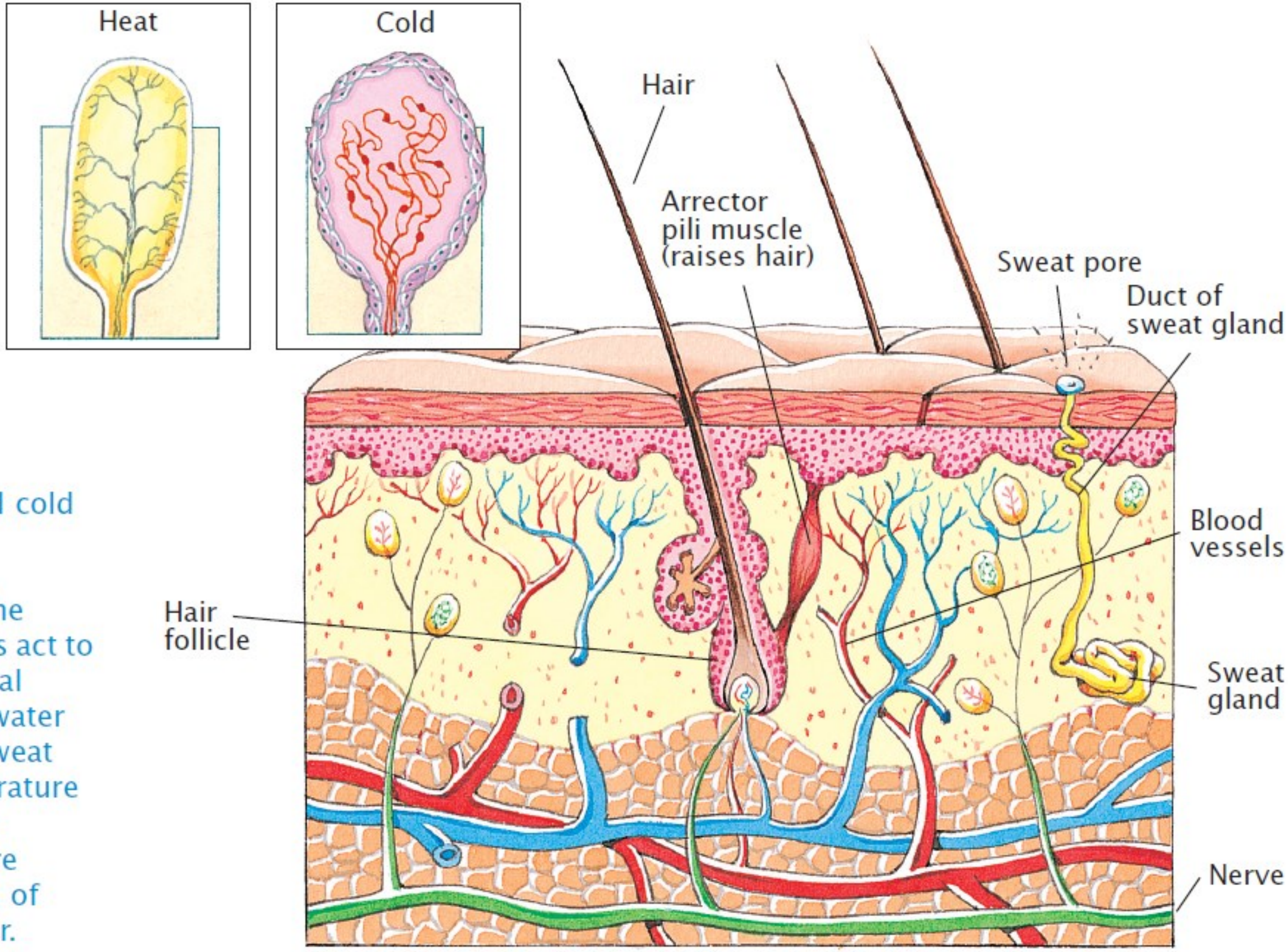


Figure 1.19 Heat and cold sensors in the skin detect changes in temperature, information is relayed to the hypothalamus and effectors act to dilate or constrict peripheral arterioles. Evaporation of water from sweat, secreted by sweat glands, reduces the temperature of the skin by evaporative cooling. Many mammals are insulated against extremes of temperature by fat and hair.

FACT

It has been estimated that the total length of all nephrons in an individual is about 85 kilometres.

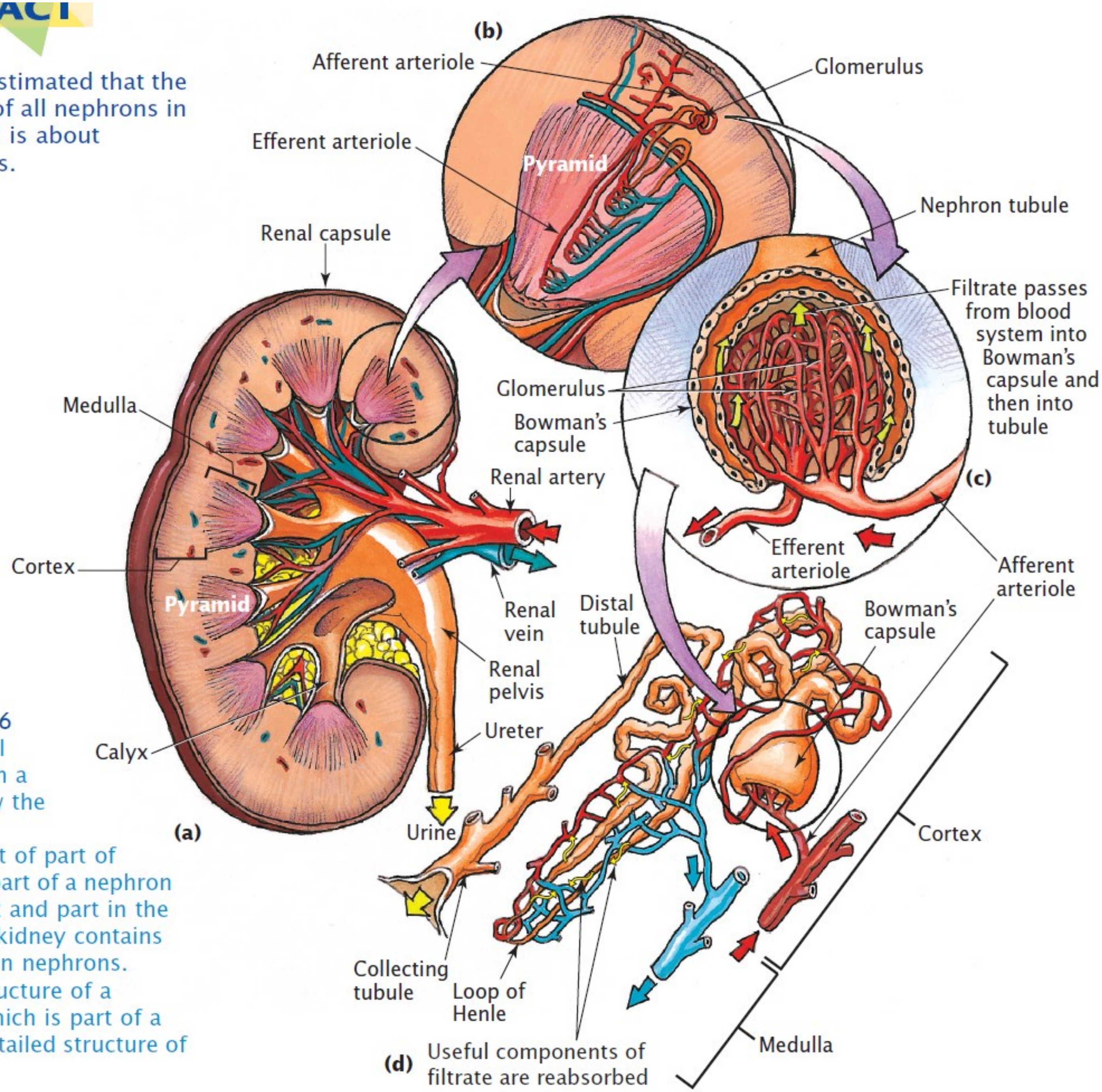
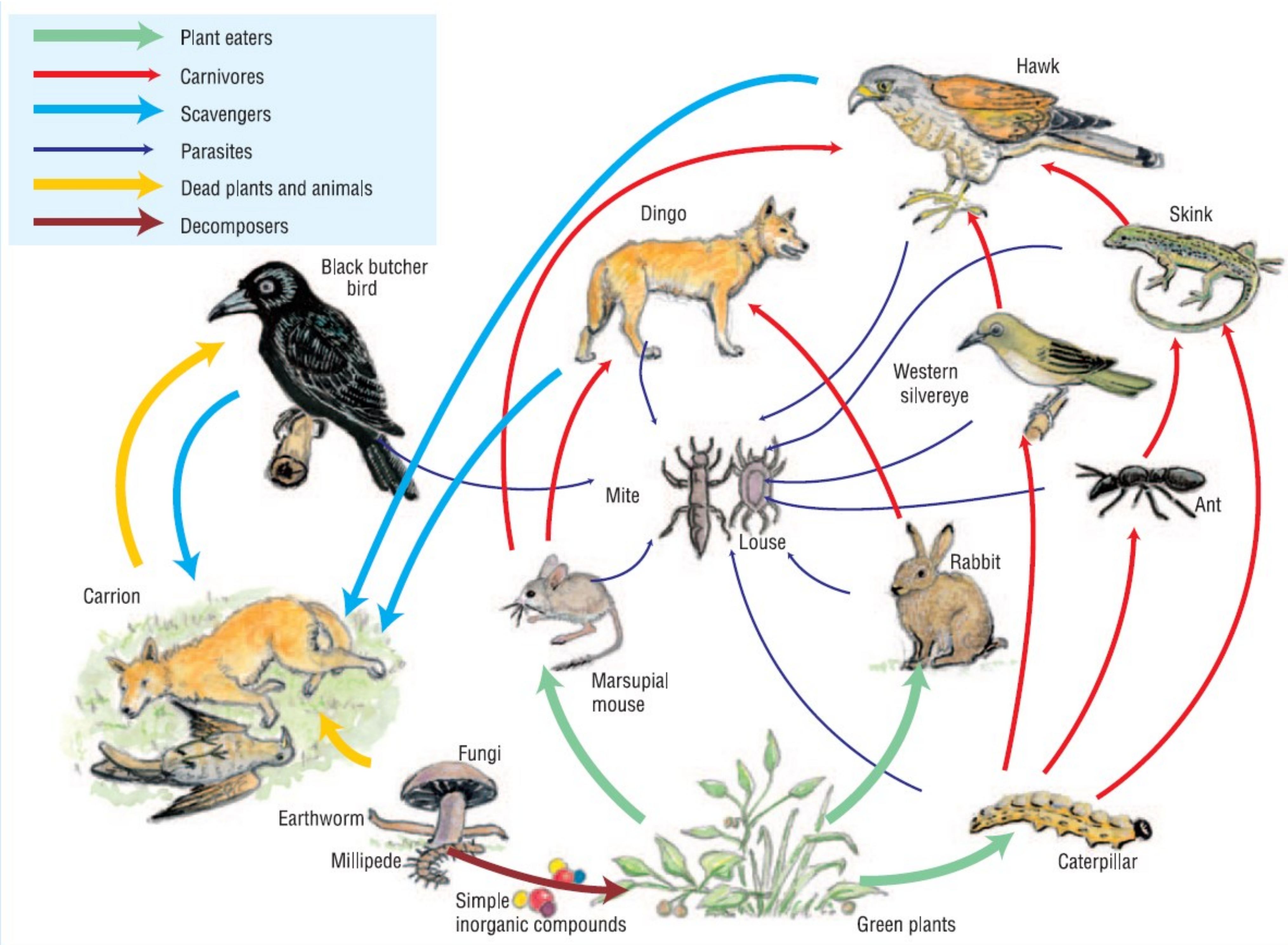


Figure 3.16
(a) Longitudinal section through a kidney to show the internal areas
(b) Enlargement of part of (a). Note how part of a nephron is in the cortex and part in the medulla. Each kidney contains over one million nephrons.
(c) Detailed structure of a glomerulus, which is part of a nephron (d) Detailed structure of a nephron


Plant eaters
Carnivores
Scavengers
Parasites
Dead plants and animals
Decomposers
Hawk
Dingo
Skink
Black butcher bird
Western silvereye
Mite
Louse
Ant
Carrion
Rabbit
Marsupial mouse
Fungi
Earthworm
Millipede
Simple inorganic compounds
Green plants
Caterpillar

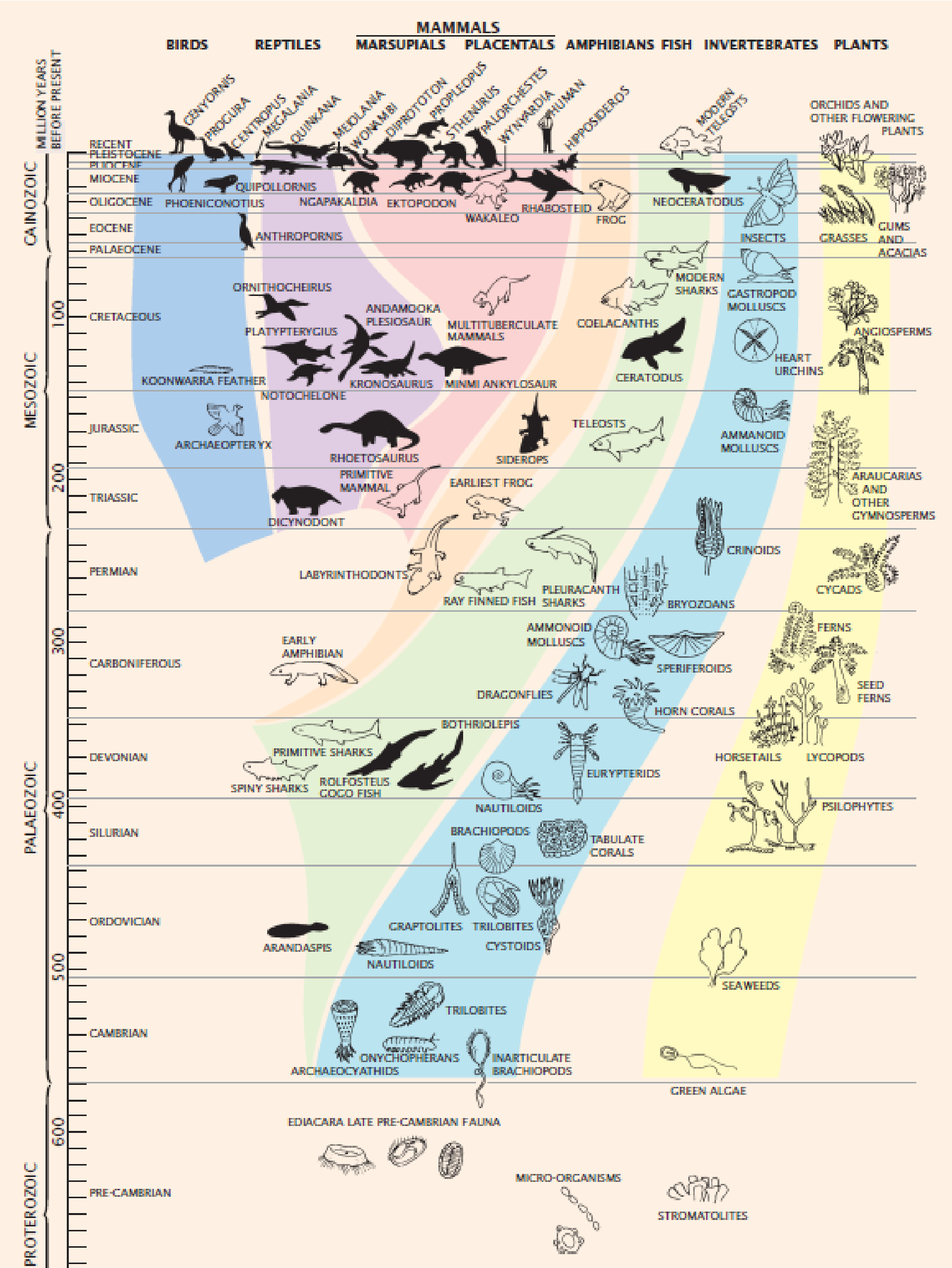
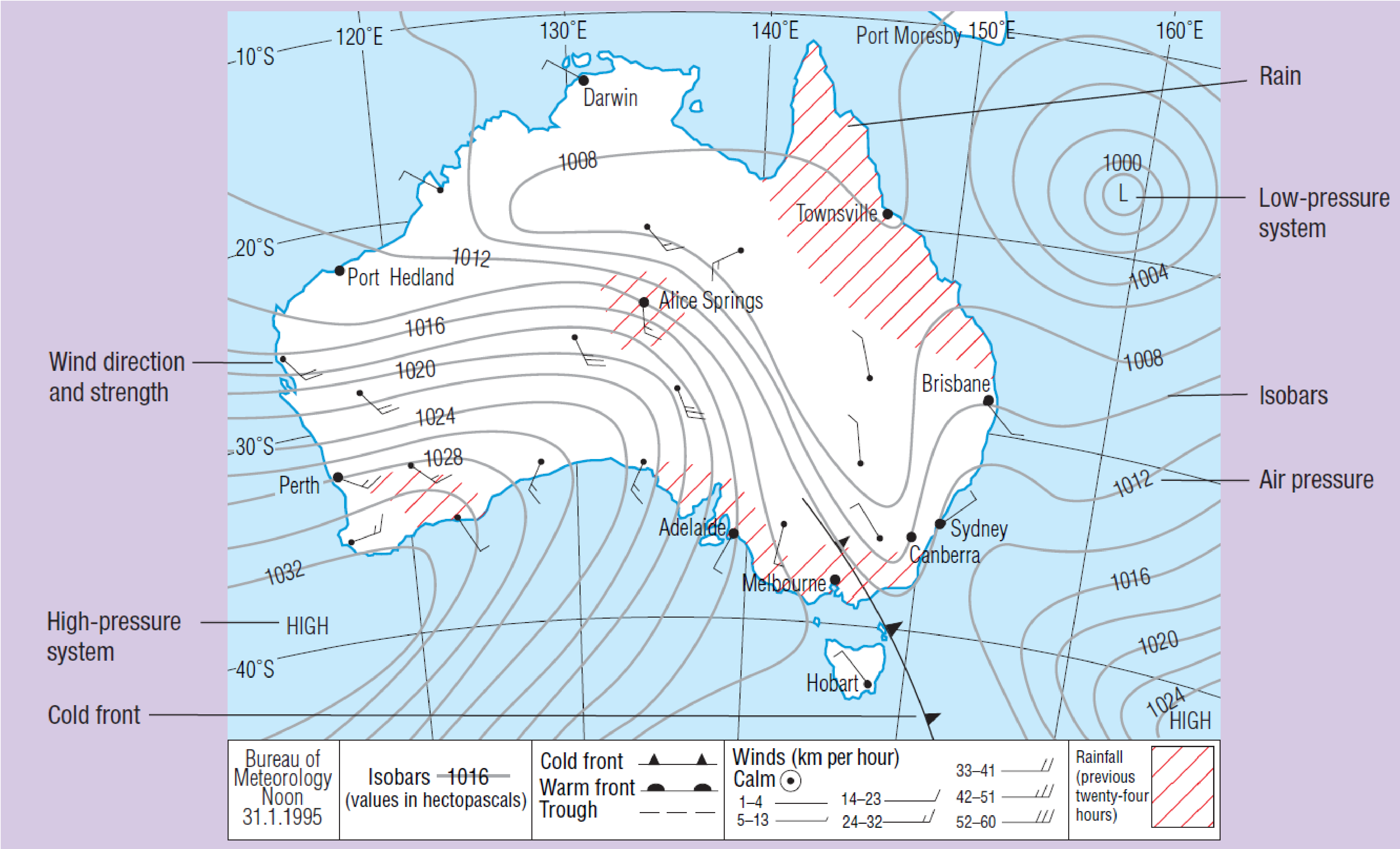


Figure 4.8 Simplified representation of fossil record. More recent dating techniques place the end of the Cambrian period at 544 MYr.

Geography

Graphics for discussion



Rain
Low-pressure system
Isobars
Air pressure
Wind direction and strength
High-pressure system
Cold front
120°E
130°E
140°E
150°E
160°E
10°S
20°S
30°S
40°S
Port Moresby
Darwin
Port Hedland
Alice Springs
Townsville
Brisbane
Perth
Adelaide
Melbourne
Canberra
Sydney
Hobart
1000
L
1004
1008
1012
1016
1020
1024
1028
1032
HIGH
Bureau of Meteorology Noon 31.1.1995
Isobars 1016 (values in hectopascals)
Cold front
Warm front
Trough
Winds (km per hour)
Calm
1–4
5–13
14–23
24–32
33–41
42–51
52–60
Rainfall (previous twenty-four hours)

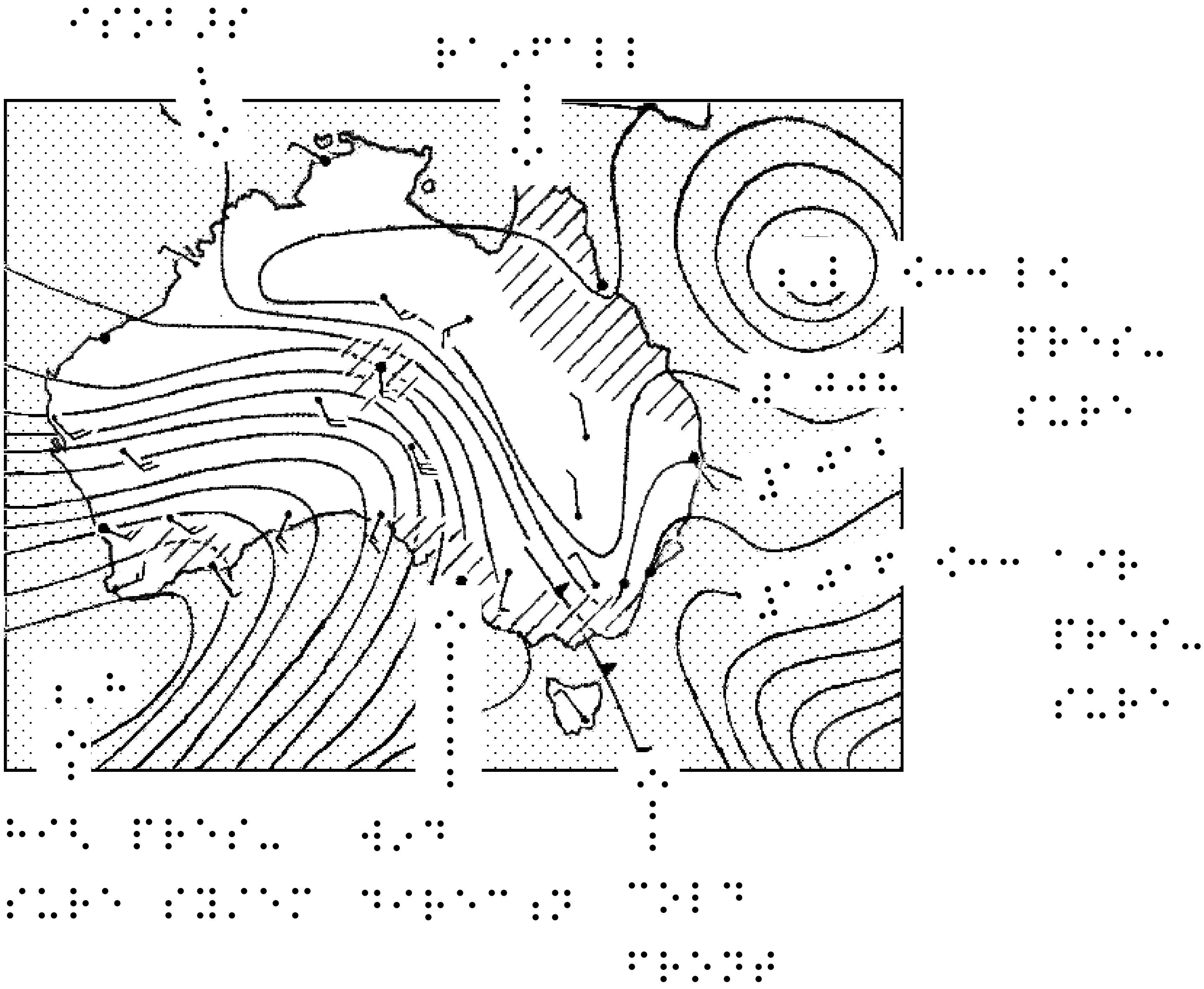


Figure 6.3c Antarctica with and without its ice sheet.

Figure 8.3d The Mt St Helens' eruption, 1980.

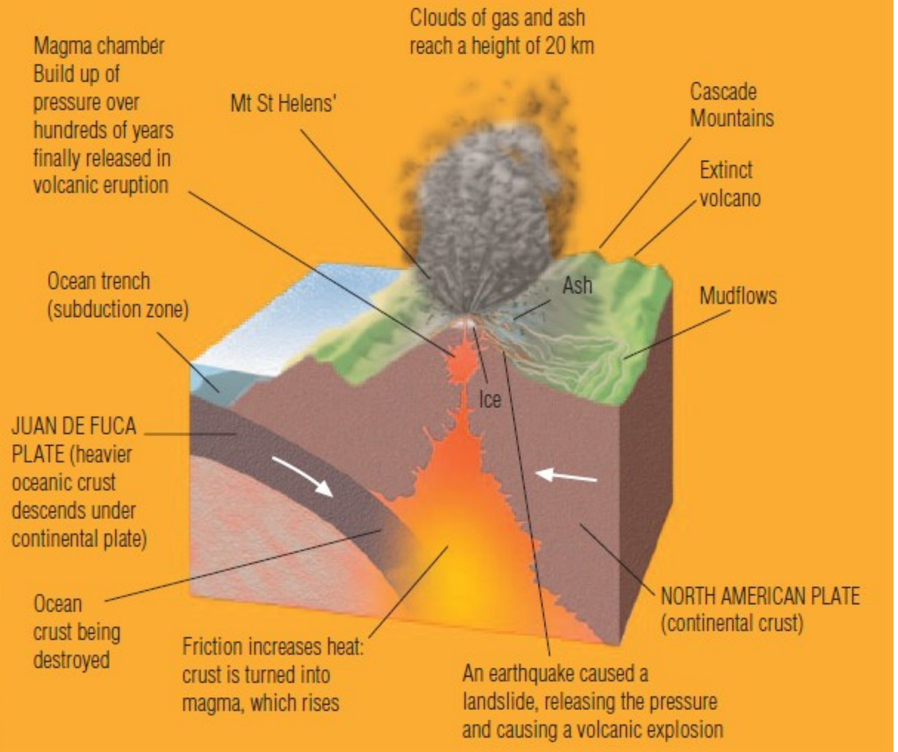


Figure 8.3f Causes of the Mt St Helens' eruption.

Figure 8.3e Location of Mt St Helens'.

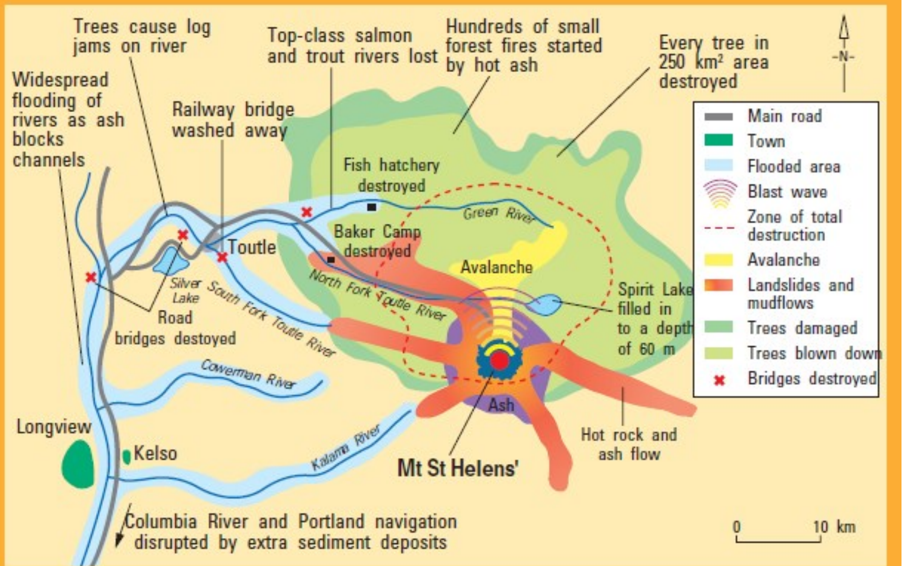


Figure 8.3g Effects of the Mt St Helens' eruption.

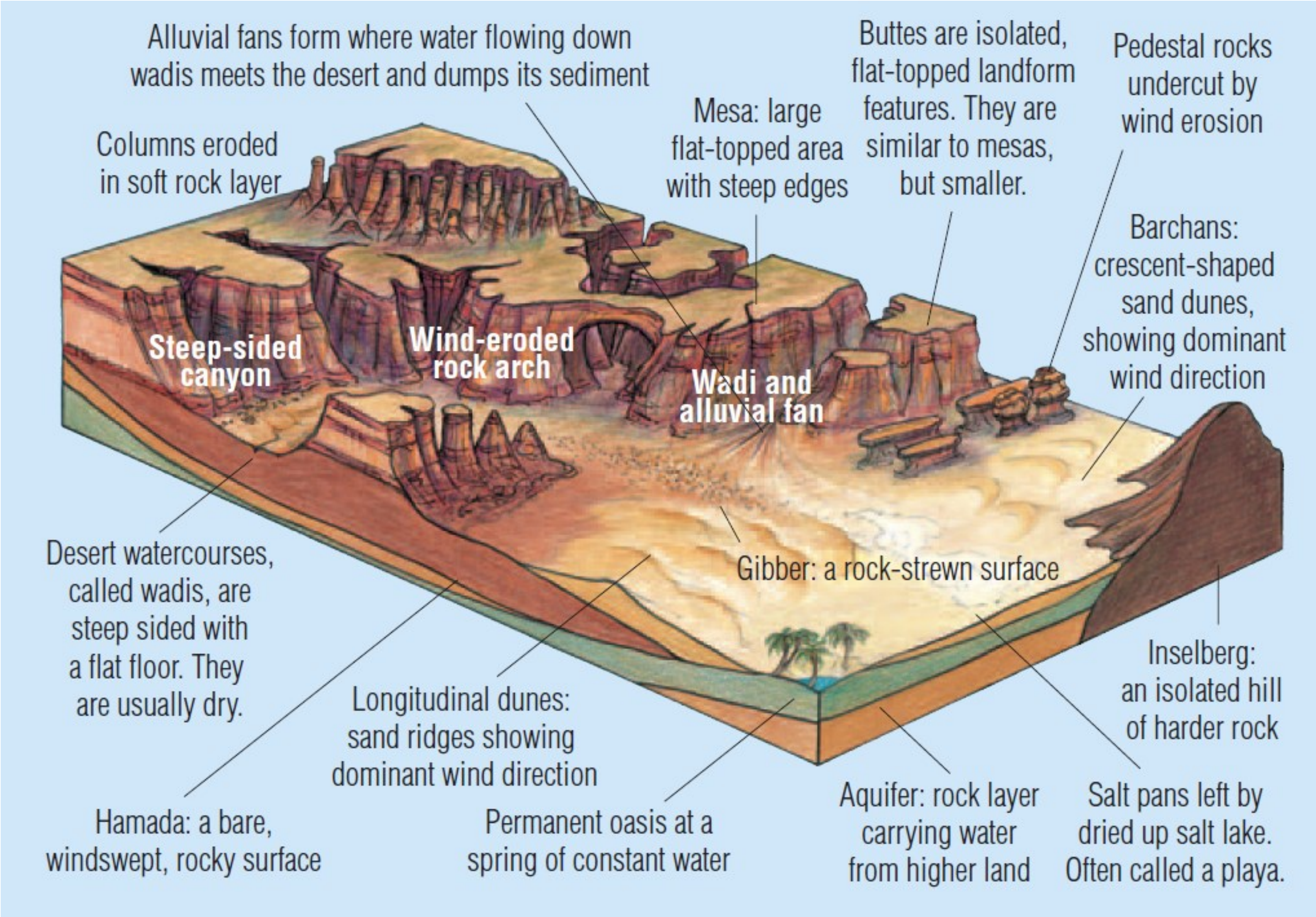


Figure 12.2f Landforms of the desert.

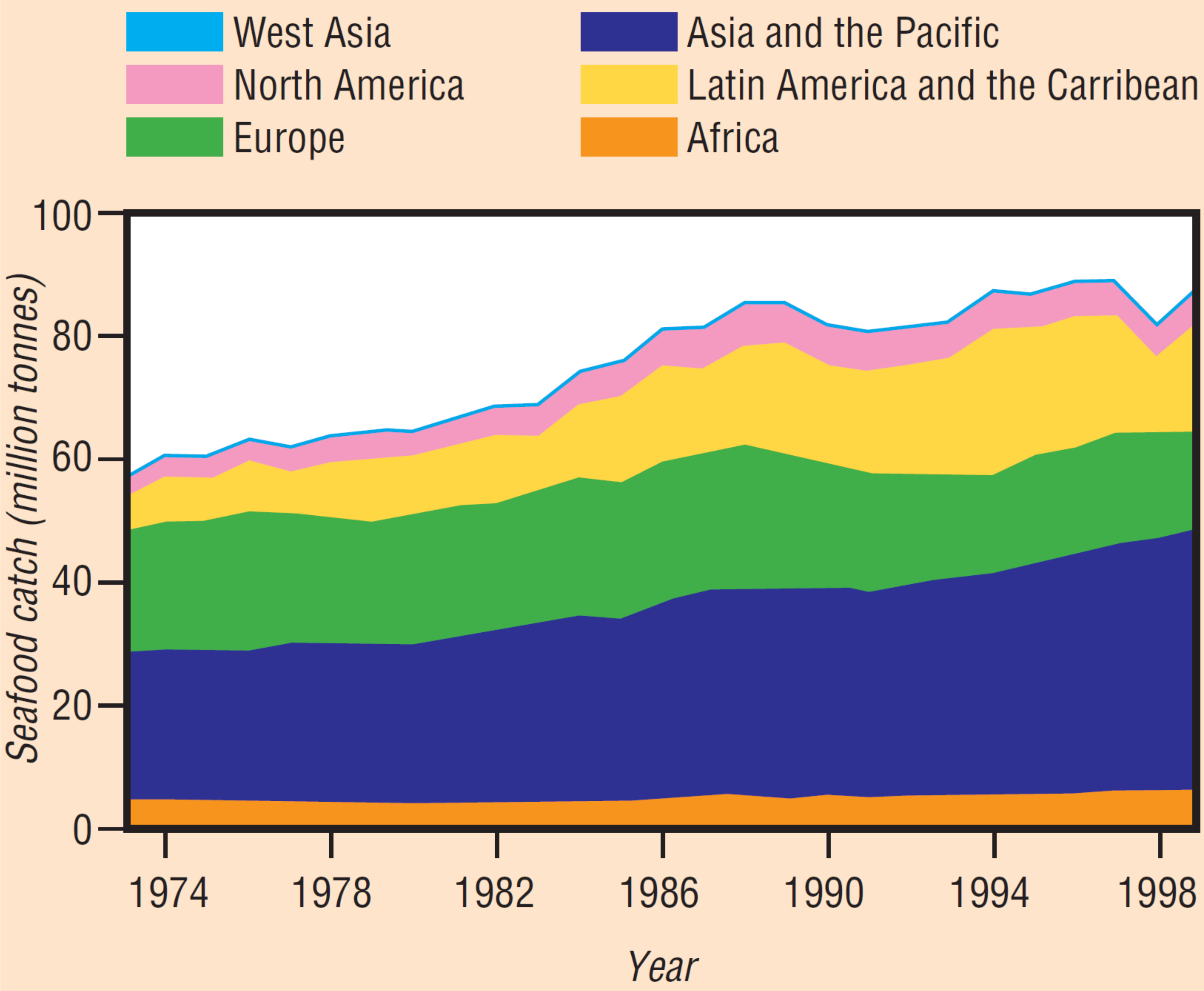


Figure 16.6a Global seafood catch by region,

Topographic mapping skills

Study the topographic map extract of Whistler-Blackcomb opposite, then complete the following tasks:

1 What is the scale of the topographic map extract?

2 What feature of the physical environment is located at each of the following grid references?
 a 678319 b 724275
 c 677248 d 662241

3 What feature of the human environment is located at each of the following grid references?
 a 705295 b 662293
 c 664322 d 673243

4 What recreational activity takes place in each of the following area references?
 a 6530 b 6725
 c 6827 d 6729

5 Name the type of ski lift linking Whistler Village (AR6630) with the Roundhouse Restaurant and Ski Lodge (GR669257).

6 State the length of the Whistler Village Gondola.

7 What is the straight-line distance between the summit of Whistler Mountain (AR6624) and Blackcomb Peak (AR7226)?

8 Identify the main landuse in AR6428.

9 What is the direction of Whistler Village from the summit of Whistler Mountain?

10 In what direction does Harmony Creek flow in AR6825?

11 Name the creek that joins Fitzsimmons Creek at GR705248.

12 What is the aspect of the slope in:
 a AR7025?
 b AR6828?

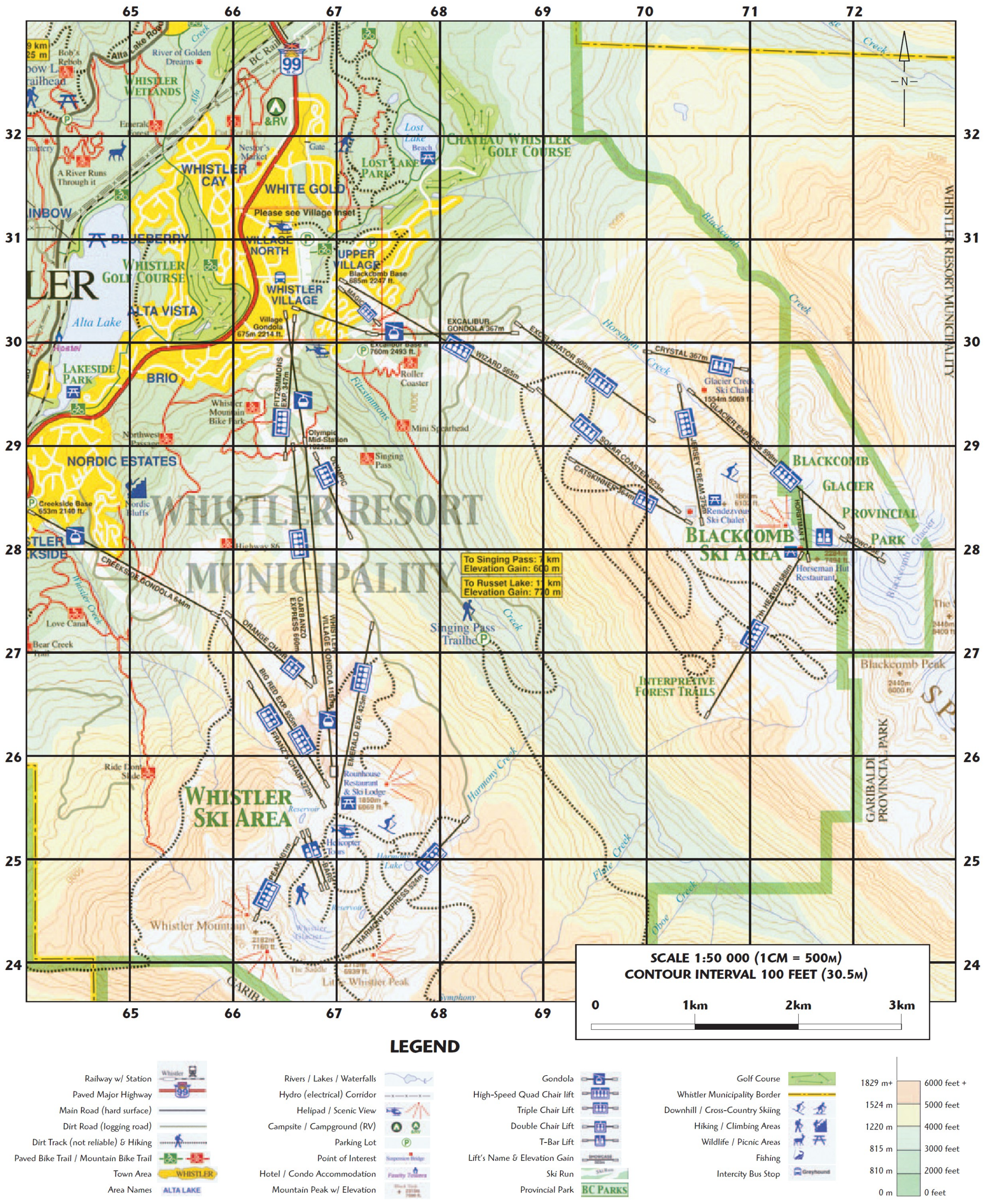
13 What is the difference in elevation of Whistler Mountain and Blackcomb Peak?

14 Describe the topography between Whistler Mountain and Blackcomb Peak.

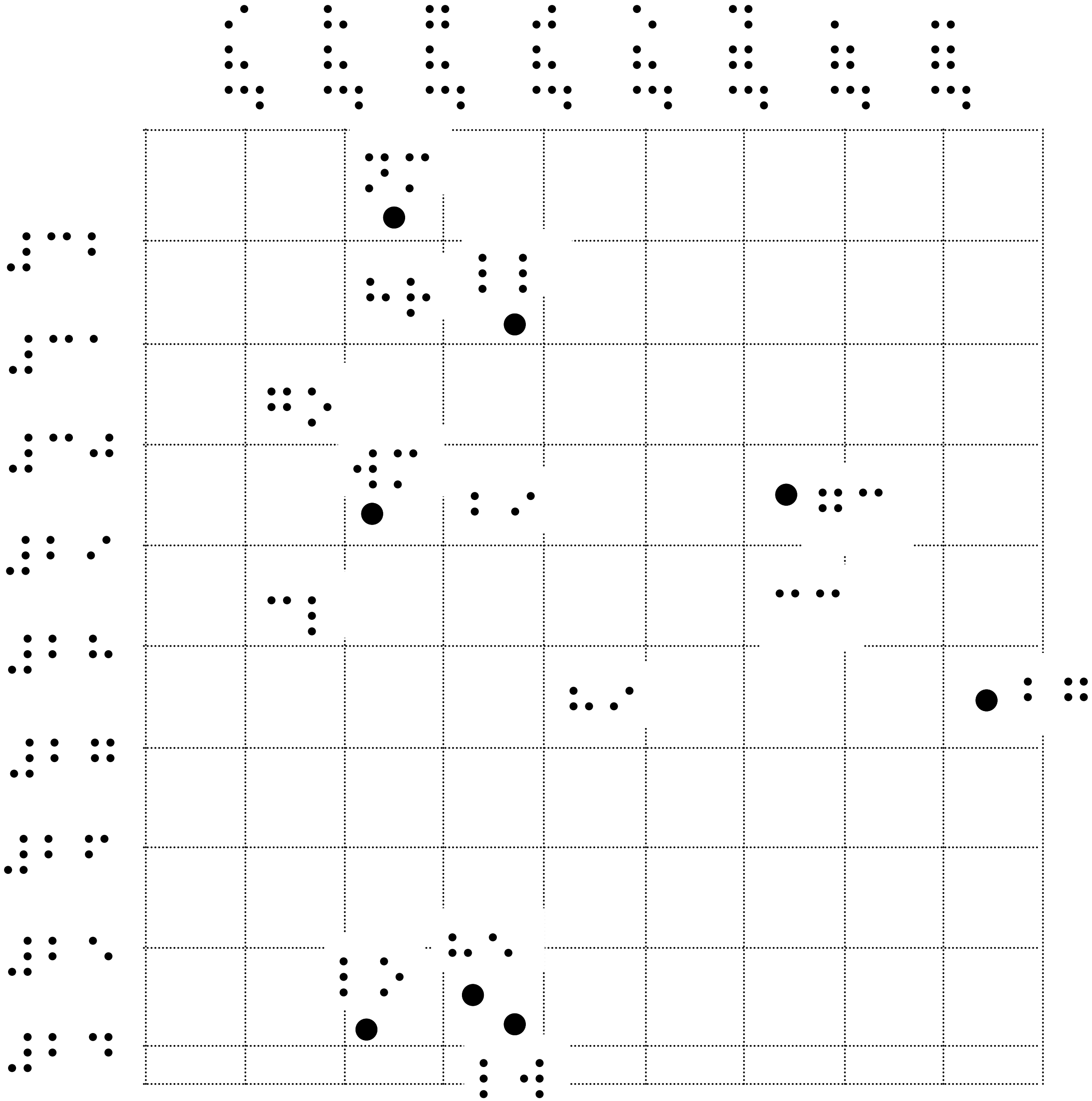
15 Explain how relief is shown on the map extract.

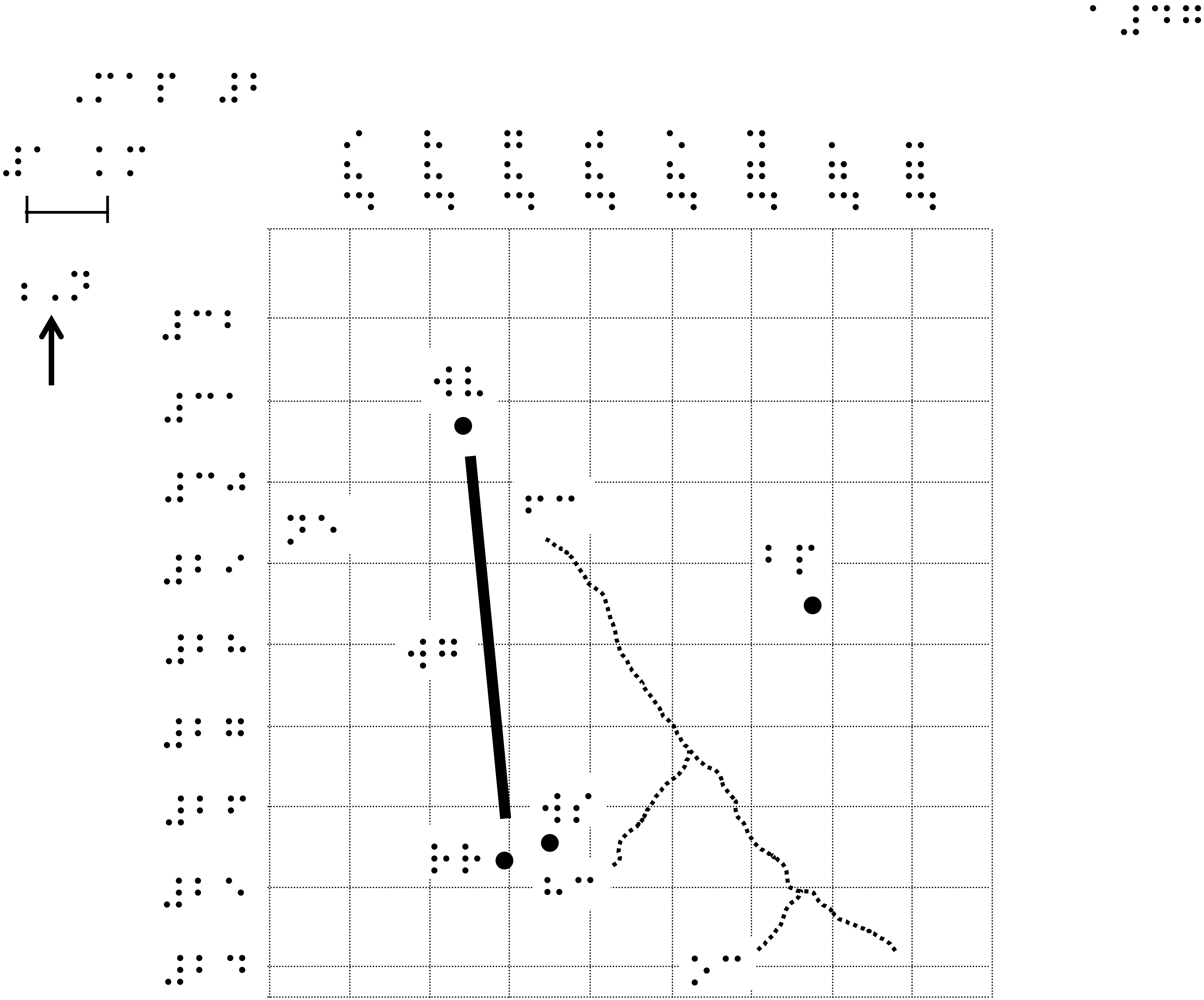
16 Use area references to identify at least three examples of recreational activities tourists could participate in during summer.

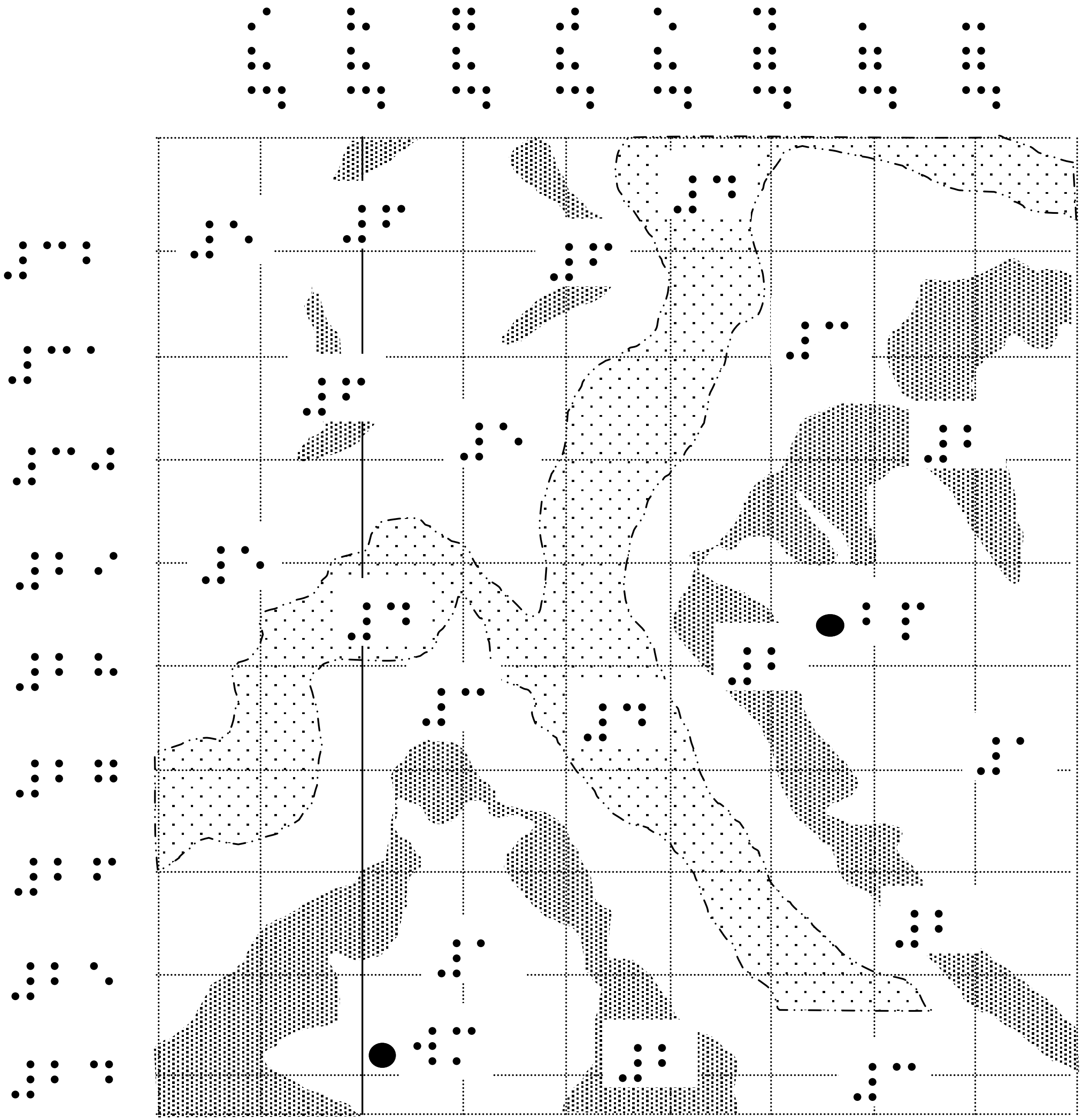
17 Use area references to identify the range of winter recreational activities available to visitors to Whistler.



⠠⠍⠁⠏ ⠼⠁







The Amazon Basin of South America supports about one-third of the world's remaining tropical rainforests. The landscapes, vegetation and animals in this region of the world have many spectacular and unusual features.

The Amazon Basin is a huge area of land that takes its name from the major river that drains water from it: the Amazon. Figures 7.5a and 7.5c (p. 158) show the sources of the Amazon River and its tributaries, the direction of their flow and the point where they empty into the ocean.

Traditional landuses

For perhaps 20 000 years, areas such as the one shown in Figure 7.5d have been able to support people. At one stage, there were more than 2 million people living in the basin. There were more than 200 tribes, often referred to as Indians or Amerindians. These people farmed

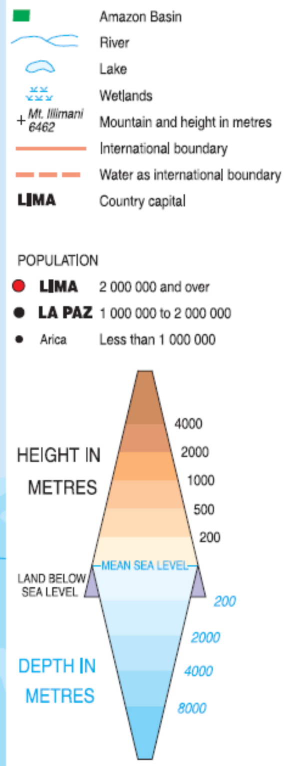


Figure 7.5a The Amazon Basin contains the earth's largest river system.

Working geographically

1 Interpreting maps and illustrations Study Figures 7.5a (p. 157) and 7.5c, then complete the following tasks:

- **a** In which mountains do many of the Amazon's tributaries begin?
- **b** State the general direction in which the Amazon River flows.
- **c** Does the Amazon River flow over mainly flat or steep ground for most of its course?
- **d** Name the ocean into which the Amazon River empties.

2 Integrating knowledge Which of the features described in the text and illustrations best tells you that the Amazon Basin is:

- **a** large
- **b** drained by a huge river
- **c** supporting a large amount of vegetation?

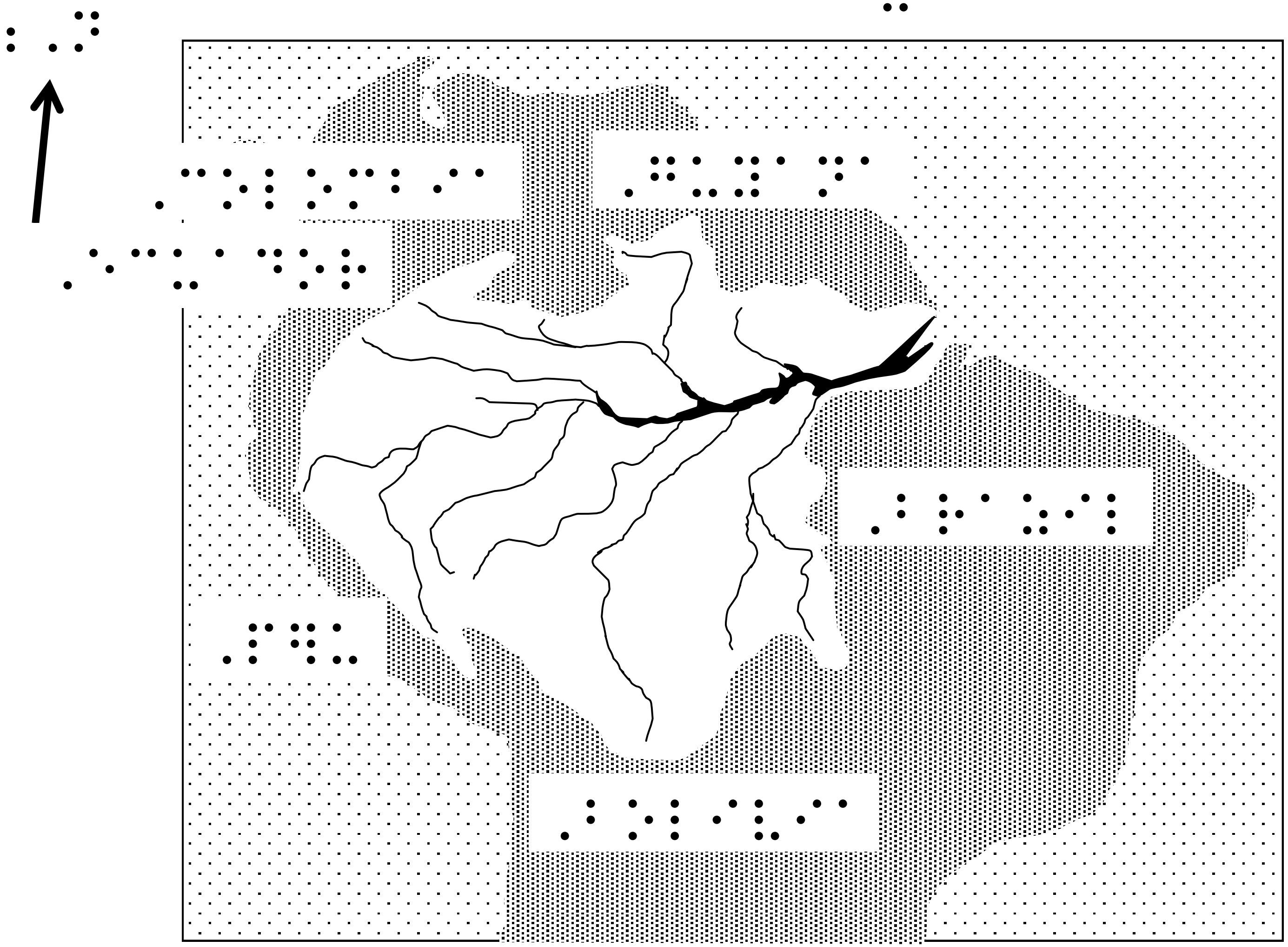
3 Internet research Use the Internet and an atlas to gather information to make a comparison of the Amazon Basin and the Murray–Darling Basin. Summarise this information in your workbook. Be sure to include at least two maps and two annotated photos or sketches in your report.

4 Interpreting photographs Study Figure 7.5b, then complete the following tasks:

- **a** Describe the scene. Be sure to mention the shape of the farming land, how well cleared it is and the type of work that is being done.
- **b** Suggest why this scene will look very different in five years' time and even more different in fifteen years' time.

5 Interpreting photographs Study Figure 7.5d, then answer the following questions:

- **a** How can you tell that the area is likely to be very wet and humid?
- **b** Is the forest dense or thin?
- **c** What may be the best way to travel from one part of the area shown to another part?



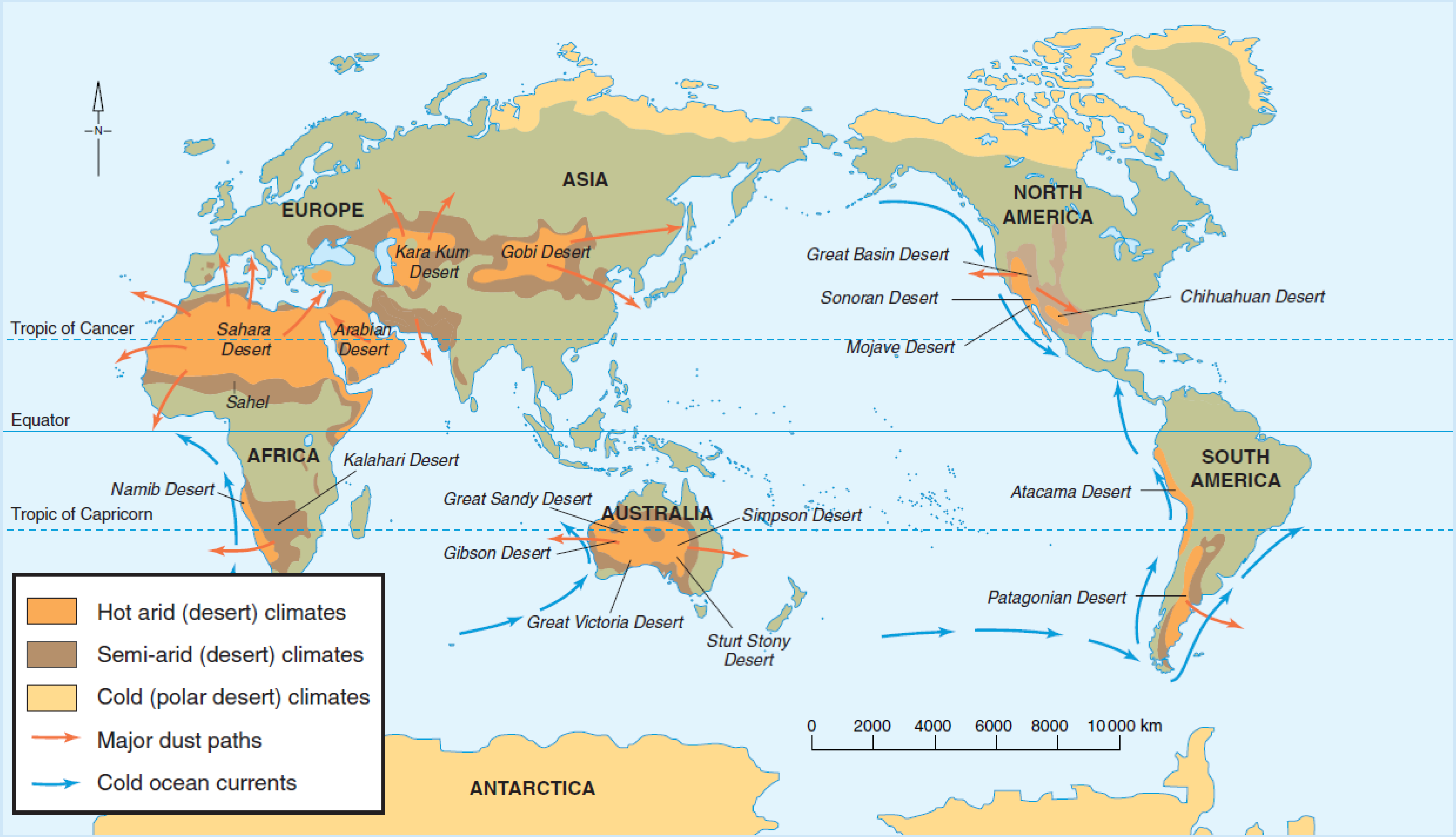
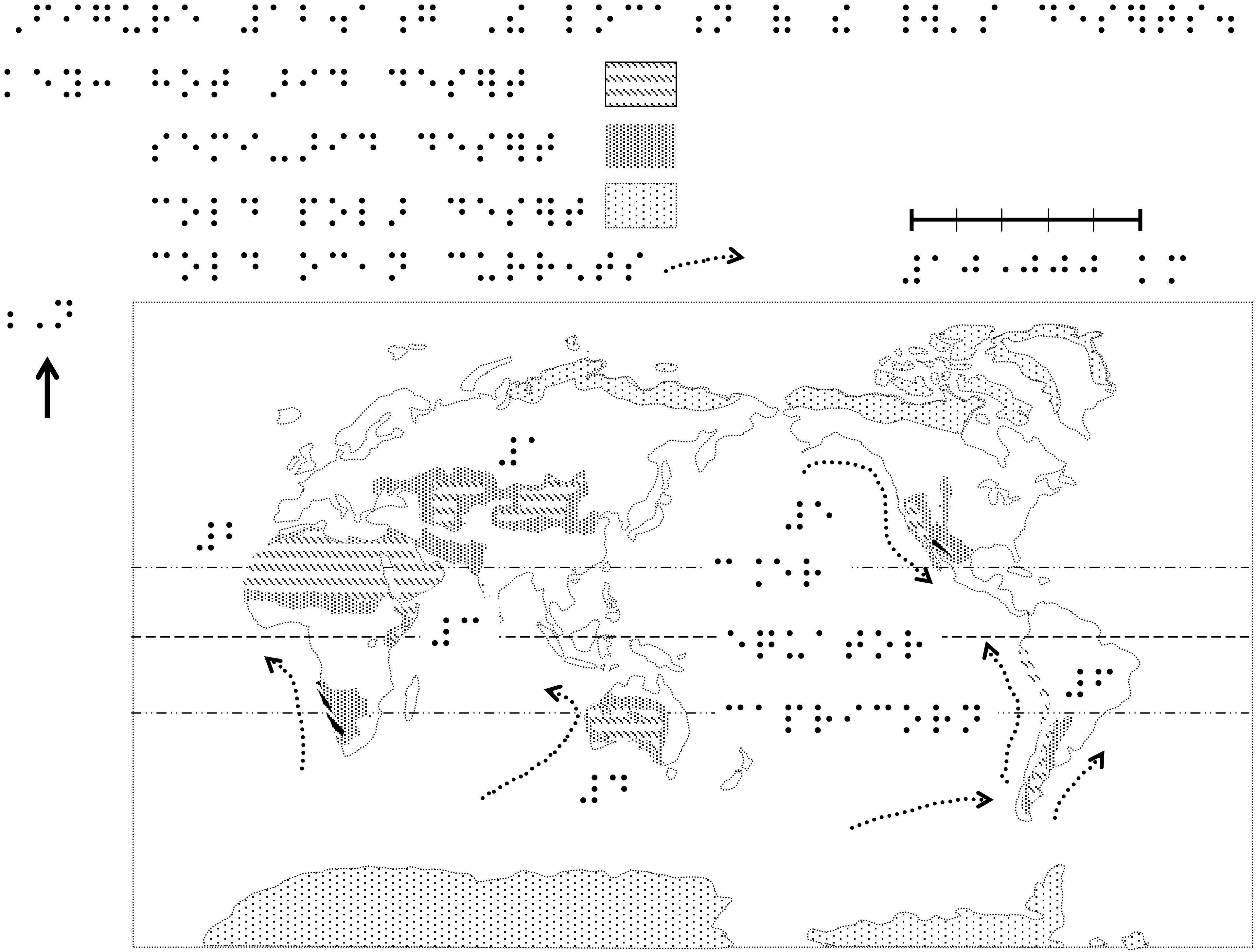
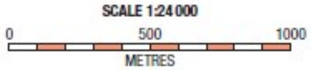
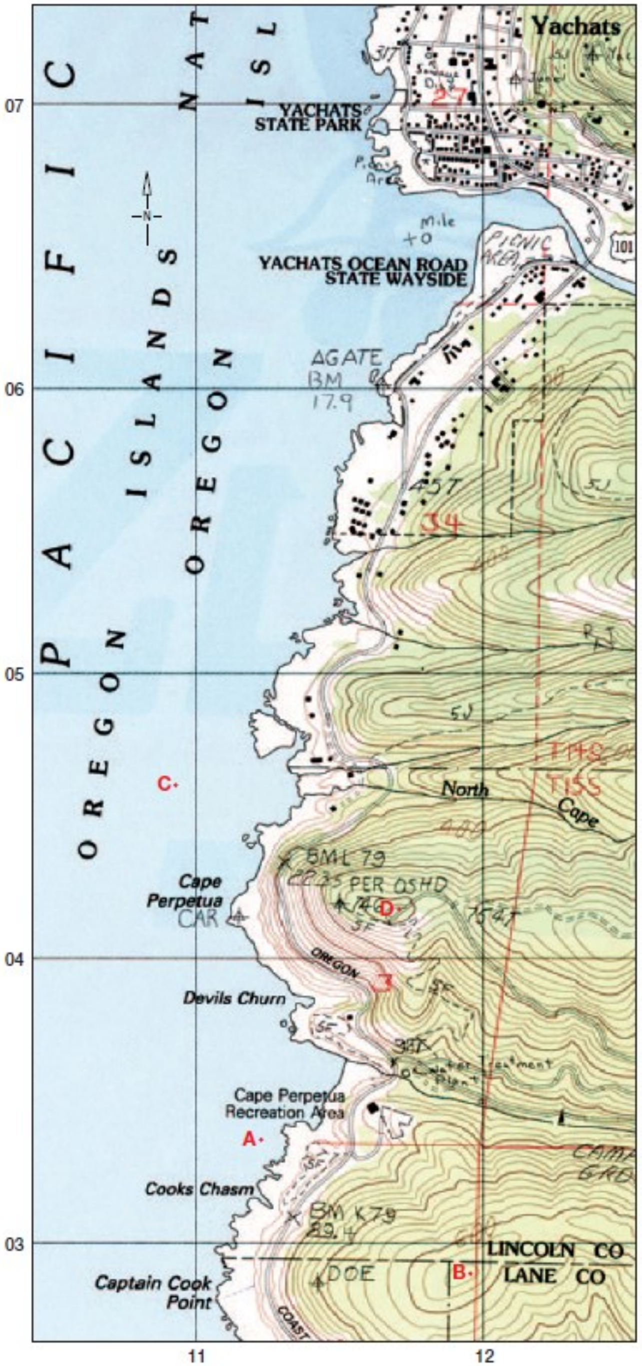


Figure 12.1g The location of the world's deserts.

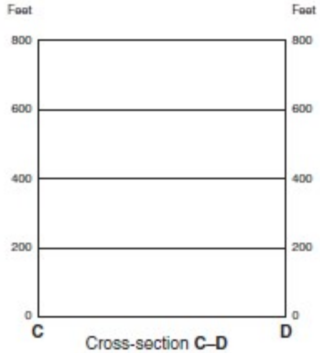




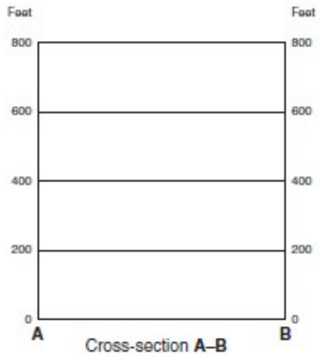


Topographic Map Symbols

Primary highway, hard surface
Other road or street; trail
Built up area; locality; elevation
Cemetery; building
Windmill; water well; spring
Mine shaft; adit or cave; mine, quarry; gravel pit
Campground; picnic area; U. S. location monument
Contours: index; intermediate; supplementary
Land subject to controlled inundation; woodland
Scrub; mangrove

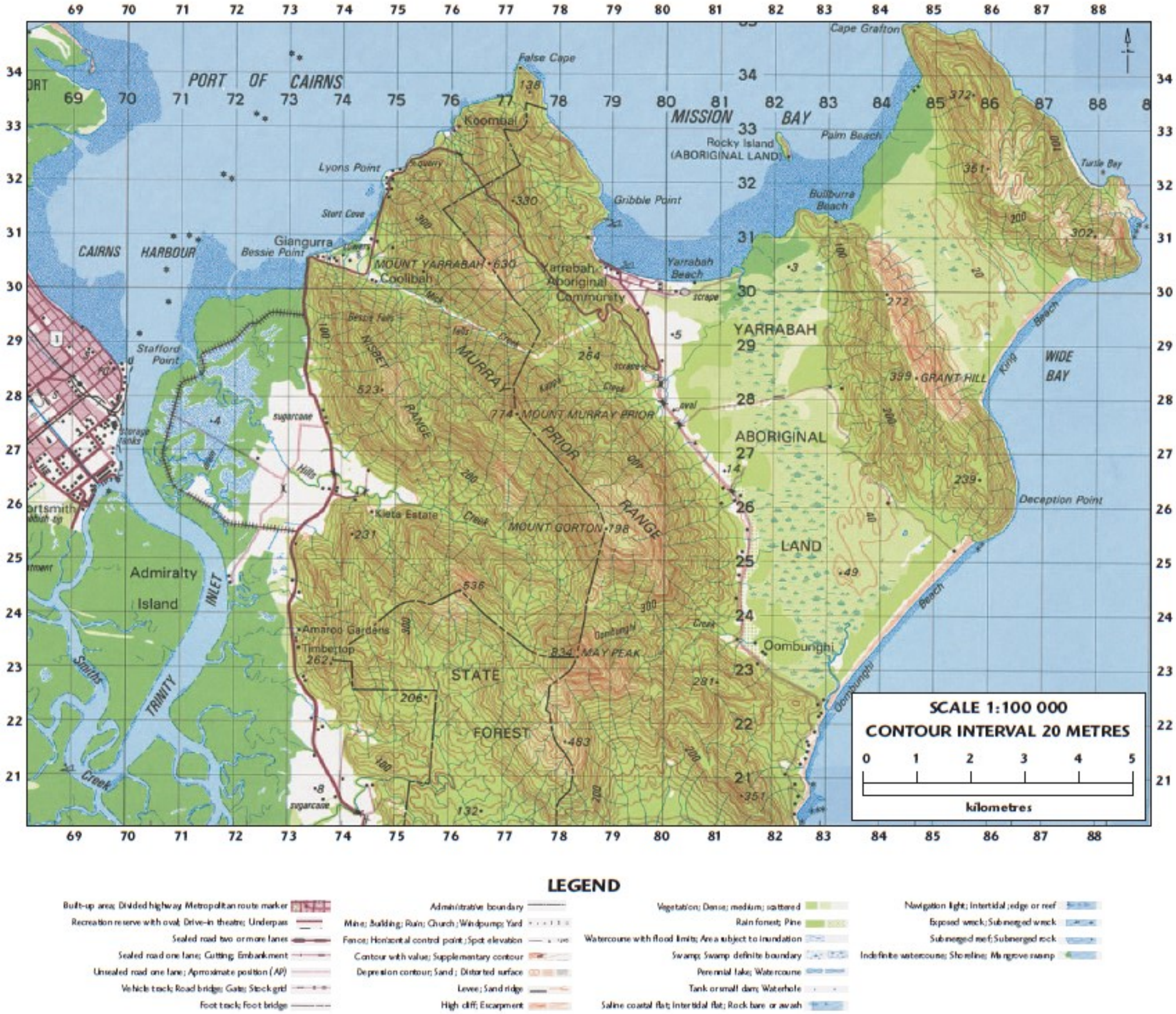


Cross-section **C–D**



Cross-section **A–B**

GeoMatch
GeoWords
GeoQuiz
Chapter test


PORT OF CAIRNS
CAIRNS HARBOUR
MISSION BAY
False Cape
Cape Grafton
Koombal
Lyons Point
Giangurra
Bessie Point
Stafford Point
Gribble Point
Rocky Island (ABORIGINAL LAND)
Palm Beach
Turtle Bay
Bulburra Beach
Yarrabah Beach
MOUNT YARRABAH 630
Coolibah
Yarrabah Aboriginal Community
YARRABAH ABORIGINAL LAND
MURRAY PRIOR RANGE
774 MOUNT MURRAY PRIOR
NISBET RANGE
MOUNT GORTON 798
GRANT HILL
WIDE BAY
King Beach
Deception Point
Kieta Estate
Admiralty Island
TRINITY INLET
Smiths Creek
Amaroo Gardens
Timbertop
834 MAY PEAK
Oombunghi
STATE FOREST
sugarcane
SCALE 1:100 000
CONTOUR INTERVAL 20 METRES
0 1 2 3 4 5
kilometres
LEGEND
Built-up area; Divided highway Metropolitan route marker
Recreation reserve with oval; Drive-in theatre; Underpass
Sealed road two or more lanes
Sealed road one lane; Cutting; Embankment
Unsealed road one lane; Approximate position (AP)
Vehicle track; Road bridge; Gate; Stock grid
Foot track; Foot bridge
Administrative boundary
Mine; Building; Ruin; Church; Windpump; Yard
Fence; Horizontal control point; Spot elevation
Contour with value; Supplementary contour
Depression contour; Sand; Distorted surface
Levee; Sand ridge
High cliff; Escarpment
Vegetation; Dense; medium; scattered
Rain forest; Pine
Watercourse with flood limits; Area subject to inundation
Swamp; Swamp definite boundary
Perennial lake; Watercourse
Tank or small dam; Waterhole
Saline coastal flat; Intertidal flat; Rock bare or awash
Navigation light; Intertidal ledge or reef
Exposed wreck; Submerged wreck
Submerged reef; Submerged rock
Indefinite watercourse; Shoreline; Mangrove swamp

Drawing a river profile

To draw a river profile you will need a topographic map of the area you are studying. Follow the steps below:

1. Use the edge of a piece of paper to measure the length of section of river you are investigating on the map (see Figure 2.5l, p. 34). This will be the length of the river profile for the horizontal axis.
2. Use the map's contour lines to determine the height of the river at the point where you began your river study. Now estimate the height of the point at which you completed your river study. Use this information to determine the vertical scale of your river profile.
3. Place a straight edge of paper along the length of the river and carefully mark each point where the river crosses a contour line. Write the height of the contour line next to each mark. Put your paper along the bottom of the profile. Mark off the changes in height. Join up the points and draw your profile.
4. Label the profile with the information you have collecte at your various study sites, including the measurement and main features.

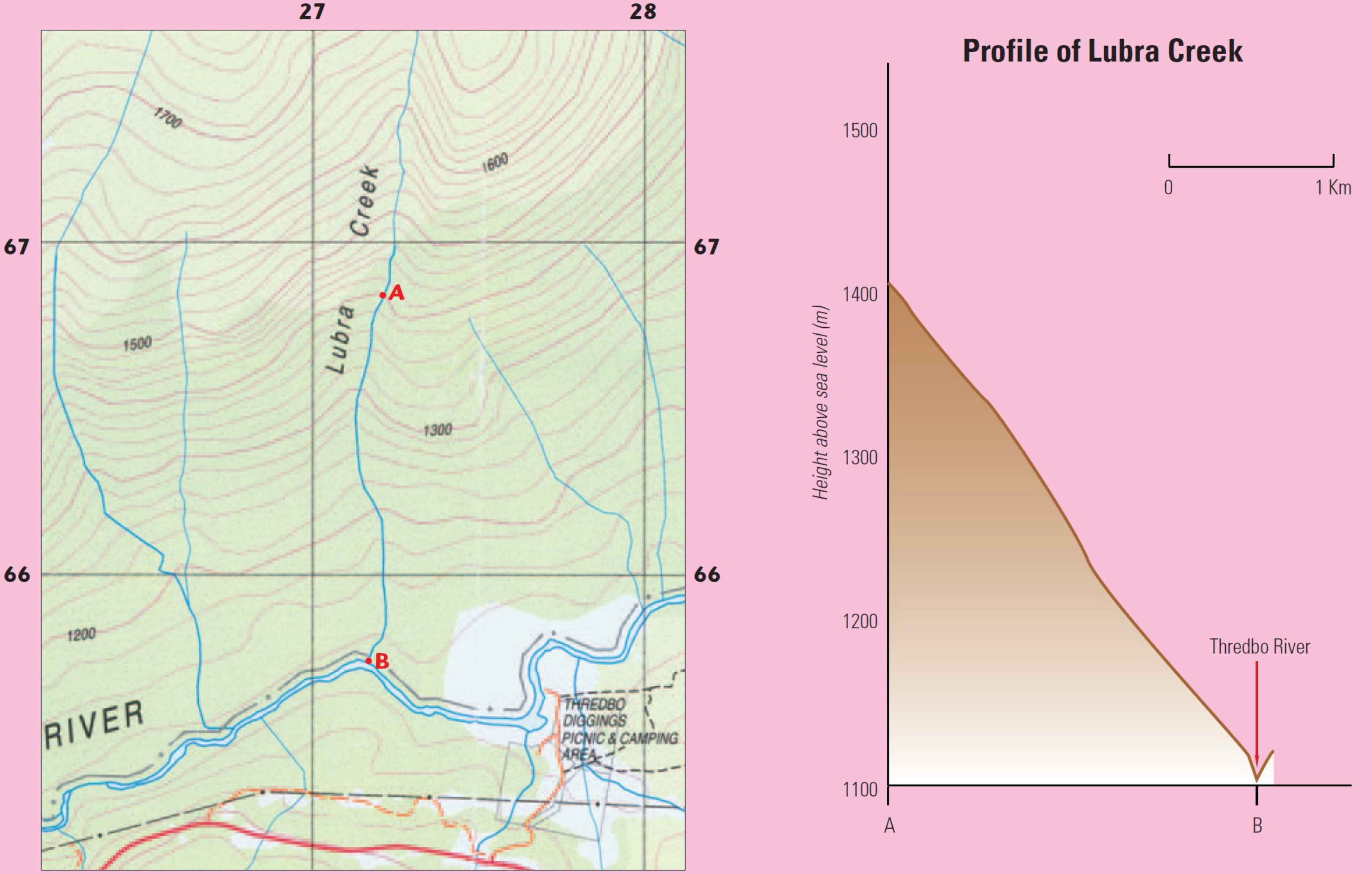


Figure 4.2m A sample river profile drawn using a topographic map.