Measuring in centimetres and millimetres

1 Circle the length which is longer.

a 50 mm OR 9.5 cm **b** 1200 mm OR 100.5 cm

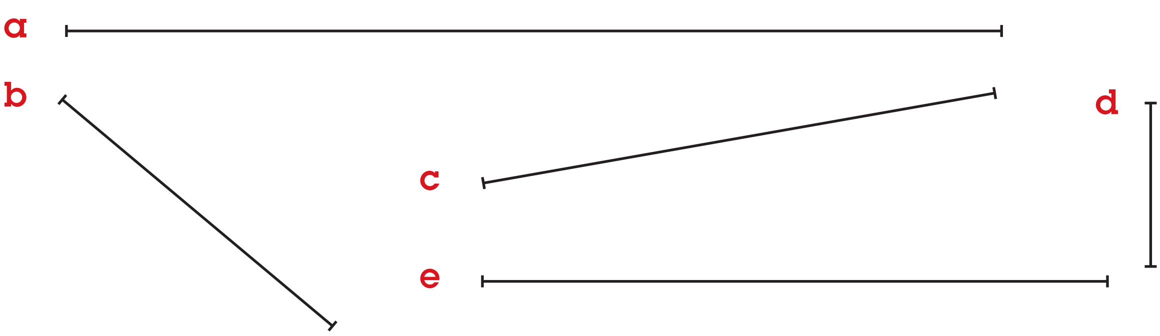
c 425 mm OR 6 cm **d** 950 cm OR 2.45 m

2 Use a ruler to measure each of the lines shown below. Record your answers in the table. The first one has been done for you.

a	12 cm	4 mm	12.4 cm
b	4cm	7mm	4.7cm
c	6cm	9mm	6.9cm
d	2cm	2mm	2.2cm
e	8cm	3mm	8.3cm

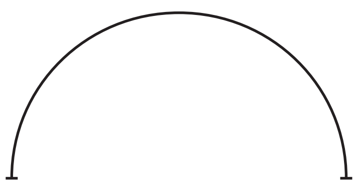
Remember!

One millimetre is $\frac{1}{10}$ of a centimetre.
So 6 mm = 0.6 cm.
A line that measures 3 cm and 2 mm in length is 3 and $\frac{2}{10}$ cm or 3.2 cm.

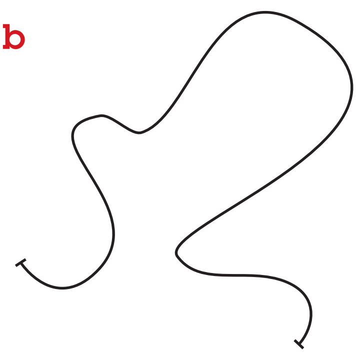


3 Measure each of the following curved lines and record their lengths to 1 decimal place in the space provided.

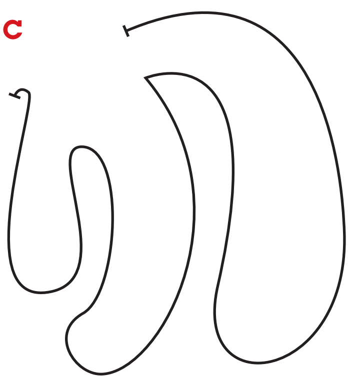
a



b



c



7.2cm 17.1cm 32.1cm

How did you measure the length of these curved lines? Tell a classmate what you did. Did they use the same method? How many different ways can you think of to measure curved lines accurately?

MiB 3 Card 91

ISBN: 978-0-521-74540-6

1 Convert these measurements to the units shown.

a 3 cm, 6 mm = 3.6 cm **b** 9 cm, 3 mm = 9.3 cm

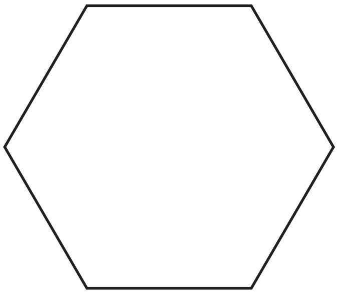
c 10 cm, 8 mm = 10.8 cm **d** 120 cm, 4 mm = 120.4 cm

e 67500 mm = 6750 cm **f** 835 mm = 83.5 cm

g 50 cm = 500 mm **h** 173.5 cm = 1735 mm

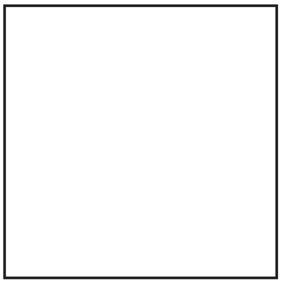
2 Measure the perimeter of each shape in centimetres and record your answer in decimal notation, to the nearest millimetre, in the space provided.

a



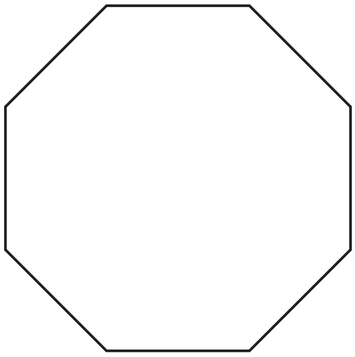
$P = 6 \times 2.2 = 132cm$

b



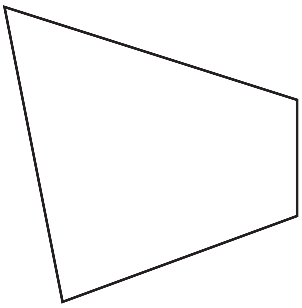
$P = 4 \times 3.6 = 14.4cm$

c



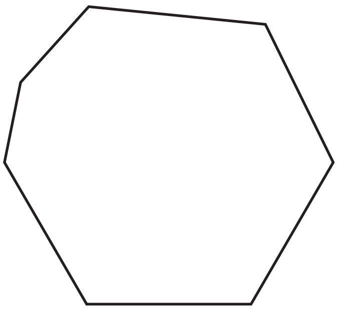
$P = 1.9 \times 8 = 15.2cm$

d



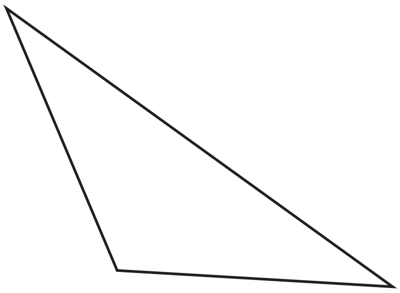
$P = 4 + 33 + 4 + 1.5 = 12.8cm$

e



$P = 11.3cm$

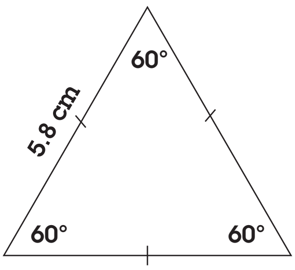
f



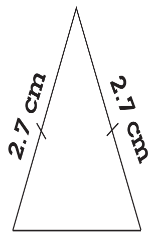
$P = 14cm$

3 Construct the following shapes.

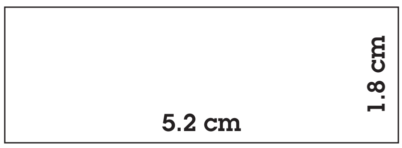
Equilateral triangle with sides of 3.8 cm



Isosceles triangle with 2 sides measuring 2.7 cm



Rectangle with sides of 1.8 cm and 5.2 cm



MiB 3 Cards 15 & 16

ISBN: 978-0-521-74540-6

Measuring length

1 Match the pairs of identical measurements. Rewrite each pair as a mathematical sentence. The first one is done for you.

200 cm	450 cm	423.5 m	700 cm	4.5 m
725 cm	1050 cm	908.25 m	7.25 m	2 m
90 825 cm	7 m	950 cm	42 350 cm	9.5 m
10.5 m				

200 cm = 2 m   423.5m = 42.350cm   450cm = 4.5m   700cm = 7m

725cm = 7.25m   1050cm = 10.5m   908.25 m = 90825cm   950cm = 9.5m

2 Calculate the perimeter of each shape and record your answer in decimal notation, correct to the nearest centimetre.

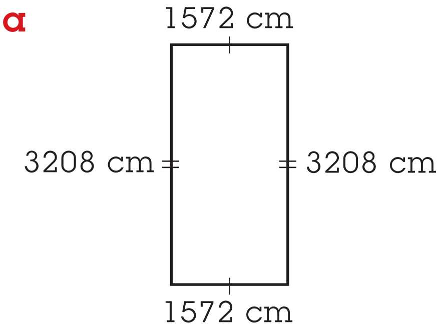
Remember!

1 cm is $\frac{1}{100}$ of a metre or 0.01 m.

So, 3 m and 4 cm is 3 and $\frac{4}{100}$ m or 3.04 m.

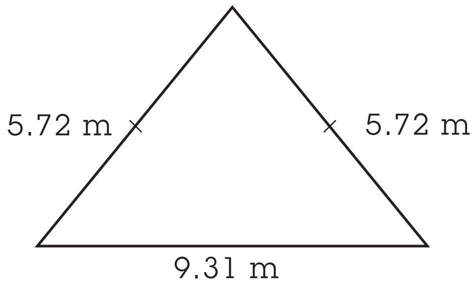
Likewise, 5 m and 38 cm is 5 and $\frac{38}{100}$ m or 5.38 m.

a



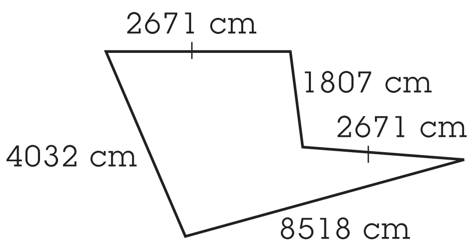
P = 95.6m

b



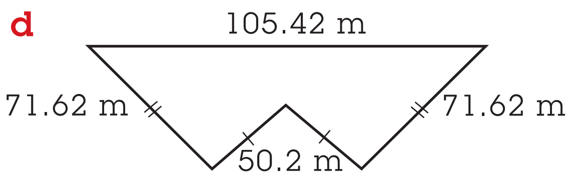
P = 20.75m

c



P = 196.99m

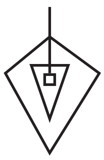
d



P = 298.86

3 How many centimetres of wire would be needed to create matching pairs of these earrings? Record your answer in decimal notation, to the nearest millimetre.

a



Wire per earring: 72mm
Wire per pair: 144mm

b

Wire per earring: 111mm
Wire per pair: 222mm

MiB 3 Card 93

ISBN: 978-0-521-74540-6

Calculating perimeters

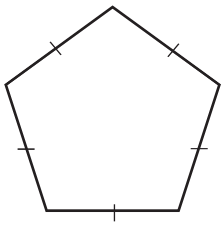
1 Two families went on driving holidays around the towns where they live. The distances they travelled are listed below. Calculate the total distance in kilometres each family travelled.

Rossi family: 7000 m, 13.5 km, 98 250 m 118.75km

Kiel family: 102 500 m, 230.25 km, 2500 m 355.25

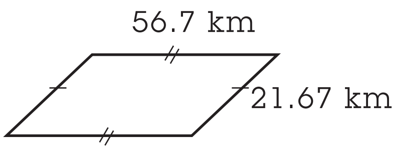
2  Calculate the perimeter of each shape and record your answer in decimal notation, correct to the nearest metre.

a



P=36,250

b



P=156.74km

Remember!

I metre is $\frac{1}{1000}$ of a kilometre or 0.001 km.

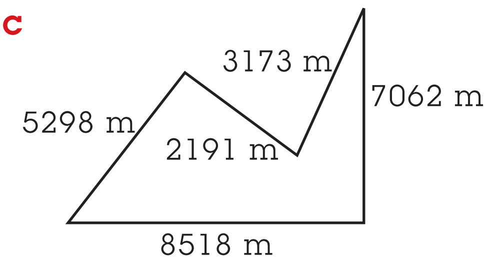
So, 2 km and 67 m is

2 and $\frac{67}{1000}$ km or 2.067 km.

Likewise, 7 km and 402 m is

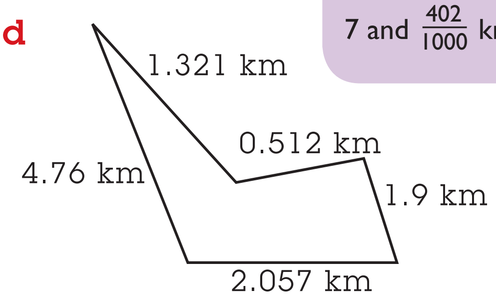
7 and $\frac{402}{1000}$ km or 7.402 km.

c



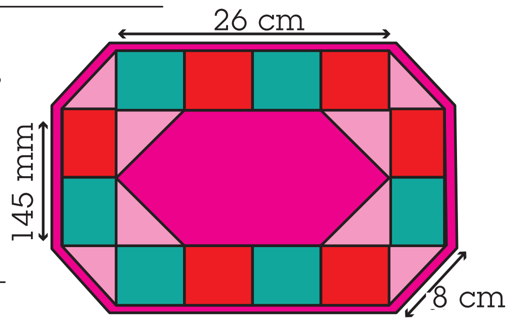
P=19,180m

d



P=10.55km

3 Lyn made a set of 8 placemats, with dimensions as shown in the picture.



a Calculate how much pink edging each placemat required.

(26cm × 2) + (8cm × 4) + (145mm × 2)

= 52cm + 32cm + 29cm

= 113cm of pink edging required.

b How much pink edging was required for 8 placemats?

113 × 8 = 904cm of pink edging required per 8 placemats.

c If Lyn bought an extra 10% in case she made a mistake, what length of pink edging did she buy?

904 + (bl × 904) = 904 + 90.4 = 994.4cm of pink edging.

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Working with different units

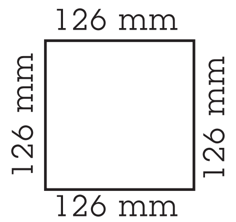
1 Use the appropriate equipment to measure the length of each of the following items to the level of accuracy indicated. Write your answers in decimal notation.

22

a	Length of a pencil	to the nearest mm	______ cm	Answers
b	Width of your desk	to the nearest mm	______ cm	will
c	Height of a classmate	to the nearest cm	______ m	vary
d	Length of classroom	to the nearest cm	______ m	
e	Perimeter of a building	to the nearest cm	______ m	

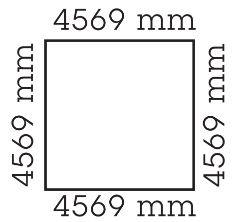
2 Calculate the perimeter of these squares and record your answers in decimal notation, correct to the nearest millimetre.

a



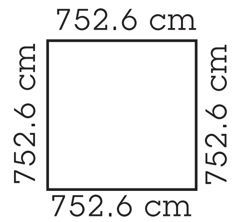
$P = 504$mm

b



$P = 18\,276$mm

c



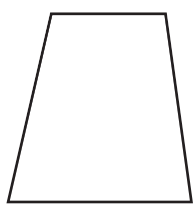
$P = 3010.4$cm

3 Work with a classmate to describe a quick method that can be used when measuring or calculating the perimeter of squares. Record your answer below.

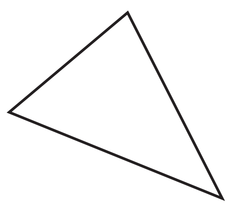
Multiply one side length by four.

4 Look at the shapes shown below:

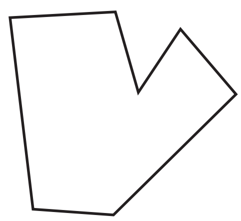
A



B



C



a Write an estimate for the perimeter of each shape.

A 11cm **B** 8cm **C** 16cm

b Measure the perimeter of each shape accurately to the nearest millimetre and record your answer in decimal notation.

A 8.6cm **B** 8cm **C** 10.6cm

c List the shapes in order from shortest to longest perimeter.

B, A, C

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Perimeter

1 Convert these measurements to the units shown.

a 3350 mm = 335 cm **b** 625 mm = 62.5 cm

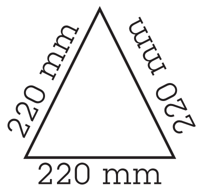
c 7725 cm = 77.25 m **d** 18 500 m = 18.5 km

e 123.5 cm = 1235 mm **f** 87.3 cm = 873 mm

g 17.25 m = 1725 cm **h** 931 km = 931 000 m

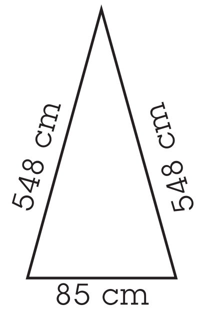
2 Calculate the perimeter of each shape shown below and record your answers accurately to three decimal places.

a



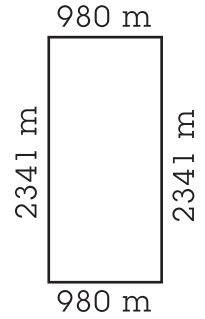
P = 66 cm

b



P = 11.81 m

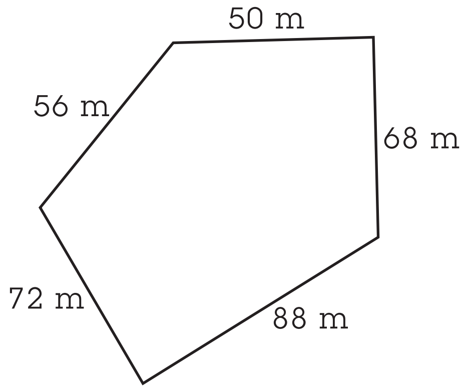
c



P = 6.642 km

How can you easily calculate the perimeter of shapes that have some or all of their sides the same length? Talk about what shapes this applies to.

3 A farmer wants to re-fence one of her paddocks. A diagram of the paddock is shown on the right. The fence she wants to construct is made of 5 wires with fence posts every 2 m and on every corner.



a How many kilometres of wire does the farmer need to fence the paddock?

0.334 km

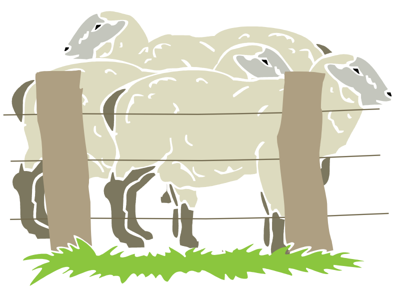
b If the farmer orders an extra 25%, what length of wire does she order?

334m + (0.25 × 334m) = 334 + 83.5 = 417.5m

c How many fence posts should the farmer order?

$\frac{334}{2} + 5 = 167 + 5$

= 172 posts need to be ordered.



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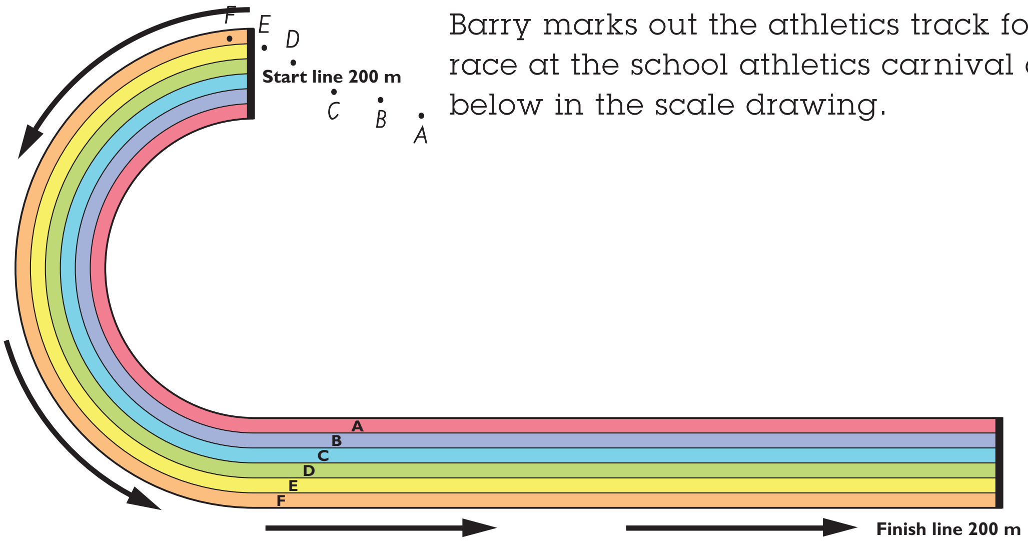
Length in athletics

1 Complete each statement using <, > or =.

a	1000 m	<	1.5 km	**b**	500 m	=	0.5 km
c	94 250 m	>	90 km	**d**	65 mm	<	650 cm
e	925 cm	<	10 m	**f**	19 km	<	190 000 m
g	56.5 km	=	56 500 m	**h**	30.25 km	<	300 250 m

2 Barry marks out the athletics track for the 200 m race at the school athletics carnival as shown below in the scale drawing.



Scale 1:1000

a Measure the length of the inside (A) and outside (F) running lanes as accurately as you can and record your answer in part b below.

b Use the scale on the diagram to calculate how far athletes will run in two running lanes during the race.

inside (A) lane: diagram length (mm) 176mm actual length (m) 176m

outside (F) lane: diagram length (mm) 204mm actual length (m) 204m

c Has Barry marked out the track correctly? Will the race be a 'fair' race? Give a reason for your answer.

No. The race will not be fair, as runners have to run different lengths.

d How should the track be marked out so the 200 m race is 'fair'?

They should start from different positions.

e Indicate on the diagram the approximate starting positions for each athlete in a 'fair' 200 m race.

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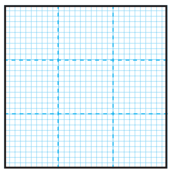
Squares and triangles

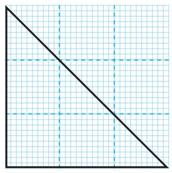
1 Count the grid squares, or use a mental strategy, to determine the area of each triangle and rectangle.

23

a

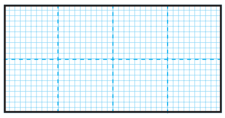


9 squares

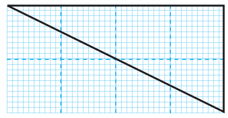


$4\frac{1}{2}$ squares

b

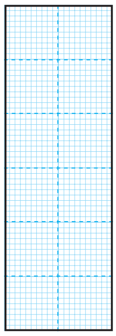


8 squares

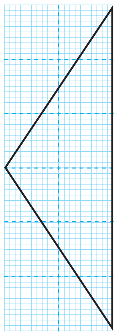


4 squares

c

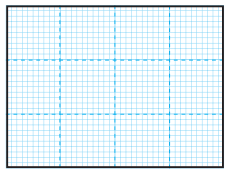


12 squares

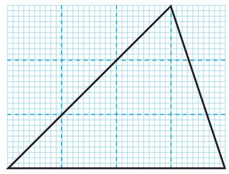


6 squares

d



12 squares



6 squares

2 Is there a relationship between the area of each triangle and the area of each rectangle? What is this relationship?

Yes. Area of the triangle is equal to half the area of the rectangle.

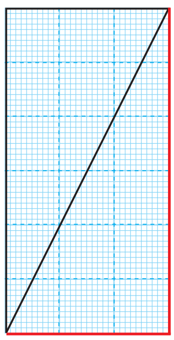
3 Describe how you could calculate the area of a triangle without having to count grid squares.

Multiply the base by height by $\frac{1}{2}$

4 **a** Complete the rectangles around each triangle in red.

b Calculate, using mental strategies, the area of each rectangle and thus the area of each triangle.

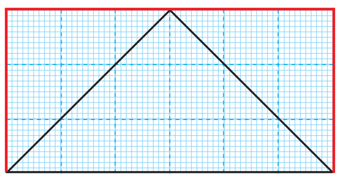
i



area rectangle = 18 squares

area triangle = 9 squares

ii



area rectangle = 18 squares

area triangle = 9 squares

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Cambridge University Press

Australian area

This picture of Australia is drawn approximately to scale. Use the picture to help you answer the following questions.

1 Which state/territory has the largest area?

Western Australia.

2 Which state/territory has the smallest area?

ACT.

3 List the states/territories in order from largest area to smallest area.

Western Australia, Queensland,

Northern Territory, South Australia, New South Wales,

Victoria, Tasmania, ACT

4 Complete the table by matching each area listed below to the most appropriate state or territory.

237 629 km²	1 852 642 km²
2 358 km²	2 645 615 km²
1 420 970 km²	90 758 km²
809 444 km²	1 043 514 km²

State/territory	Area in km²
Australian Capital Territory	2 358
New South Wales	809 444
Northern Territory	1 420 970
Queensland	1 852 642
South Australia	1043 514
Tasmania	90 758
Victoria	237 629
Western Australia	2645 615

5  What is the total area of Australia?

8 102 930

6 Which states/territories are larger in area than:

a Texas, USA 678 051 km² — All except ACT, Tasmania and Victoria

b Switzerland 41 290 km² — All except ACT

c Sahara Desert 4 619 260 km² — None

7 Use the internet or another information source to find out the area, in square kilometres, of: Answers may vary.

a the Simpson Desert — 176 500 km²

b Kakadu National Park, NT — 19 804 km²

c the Great Barrier Reef — 344 400 km²

d Norfolk Island — 34.6 km²

What area of Australia is populated? What percentage of the total area of Australia is this? How does this compare to other countries in Europe or Asia?

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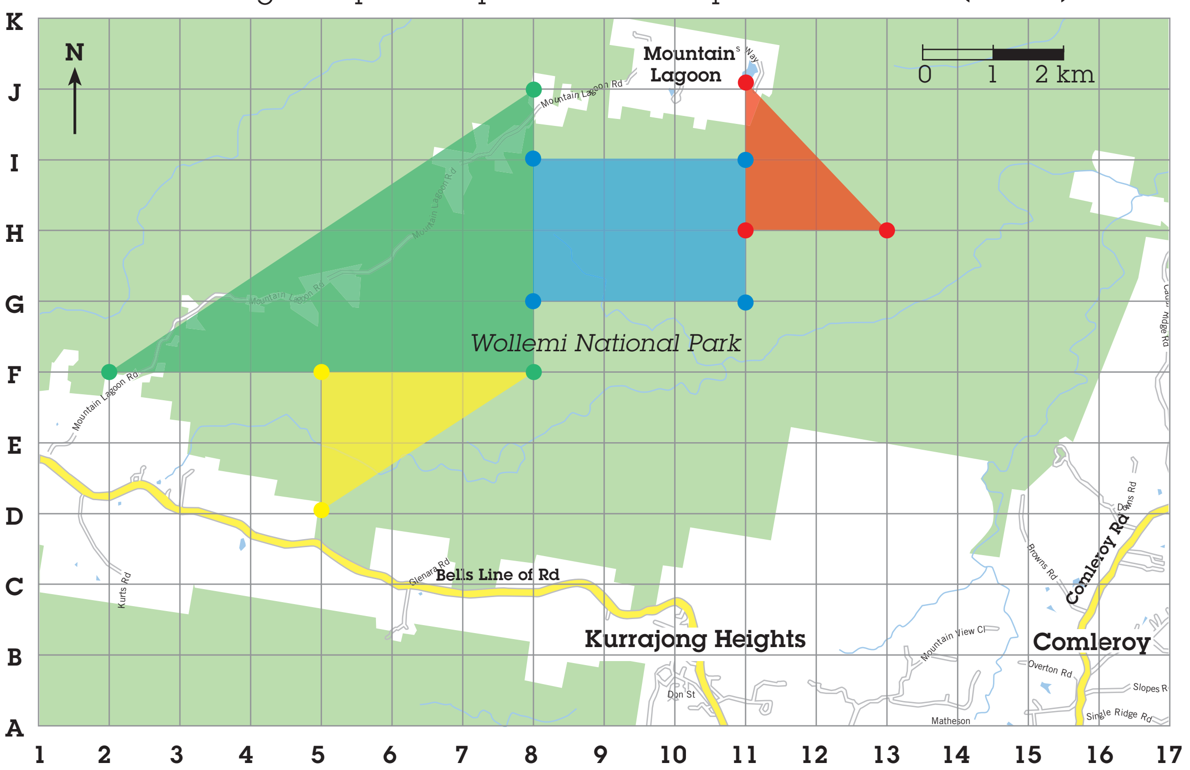
Search and rescue

On a one-day bushwalk in Wollemi National Park, three students have become separated from the main group. They have not returned by nightfall. A search of the area is to be made at first light. The map below shows the area to be searched. Each grid square represents one square kilometre (1 km^2).



1 Place a dot at the following co-ordinates.

red team:	J11, H11, H13	blue team:	I8, G8, I11, G11
green team:	J8, F2, F8	yellow team:	F5, D5, F8

Join the dots to find the search areas for each team. Colour each area the colour of its team.

2 **a** Find the area, in square kilometres, that each team must cover.

red team: 2 km^2 blue team: 6 km^2

green team: 12 km^2 yellow team: 3 km^2

b Mark on the map a fifth search area that covers 8 square kilometres.

c Estimate how many square kilometres of Wollemi National Park, south of the road leading to Mountain Lagoon, will remain unsearched.

37 km^2

3 You are the search coordinator. You have a team from the police search and rescue unit with a helicopter, another team of SES volunteers and a third team of members of the local community. Which search area do you give to each of these groups? Give reasons for your choices.

Members of the local community: area marked by F3, D5, F5 as small area, close to road.

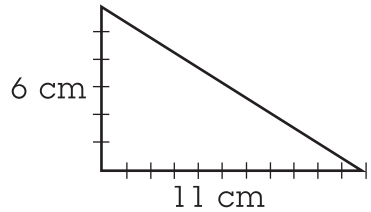
Helicopter team: big area south of blue team. SES team: east of red team to cover remaining area.

ISBN: 978-0-521-74540-6 Cambridge University Press

Area

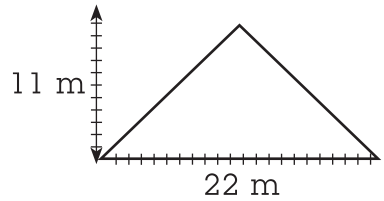
1 Calculate the area of each triangle by first calculating the area of a rectangle.

A



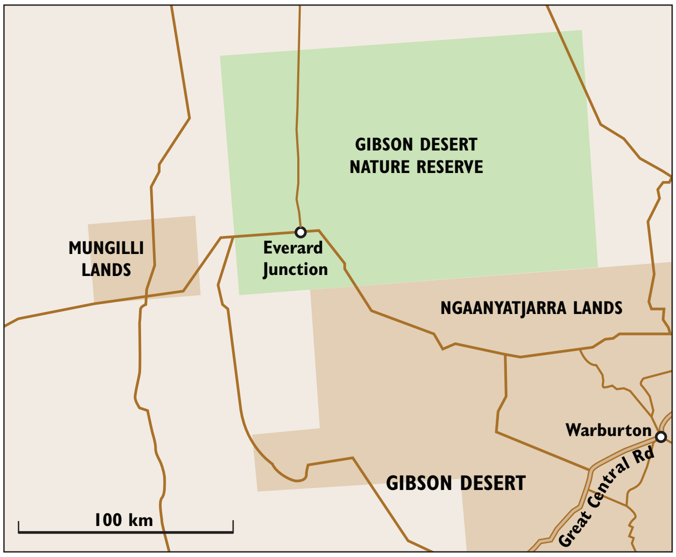
Area $= \frac{1}{2}(6 \times 11) = \frac{1}{2}(66) = 33 cm^2$

B



Area $= \frac{1}{2}(11 \times 22) = \frac{1}{2}(242) = 121 m^2$

2 This map shows the Gibson Desert Nature Reserve in Western Australia near the Northern Territory border. A new ranger needs to plan several trips and wants to know the total area of the Nature Reserve.



a What is the scale on this map?

7: 25 000 000

b How many kilometres in the Gibson Desert Nature Reserve is 1 mm on this map?

3.57 km

c Use a ruler to measure the size of the Nature Reserve in millimetres.

length: 31 mm width: 48 mm

d Calculate the dimensions of the Gibson Desert Nature Reserve in kilometres.

length: 110.67 km width: 171.36 km

e Calculate the area of the Gibson Desert Nature Reserve in square kilometres.

Area = 18 964.4 km2

f Use the method above to help you calculate the area of the Mungilli Aboriginal lands, marked by a small brown rectangle.

Map area $= 1.4 cm \times 1.1 cm = 1.54 cm^2$

Area $= (14 \times 3.57) \times (11 \times 3.57) = 49.98 \times 39.27 = 1962.72 km^2$

MiB 3 Card 109

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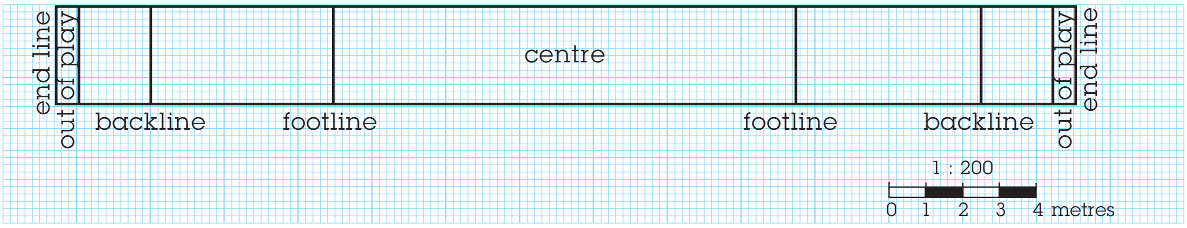
Area in sport

Boules pitch



1 Use a ruler and the given scale to calculate the dimensions of these sections of the boules (also called *bocce* or *petanque*) pitch. Calculate the following areas.

a The total pitch area.

drawing: length 135mm width 13mm

playing pitch: length 27m width 2.6m

total pitch area = 70.2m²

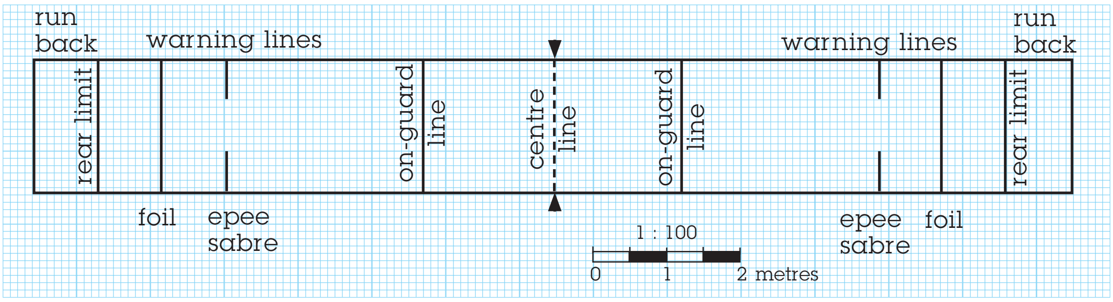
b The centre area.

drawing: length 61mm width 13mm

playing pitch: length 12.2m width 2.6mm

centre area = 31.72m²

Fencing piste



2 Use a ruler and the given scale to calculate the dimensions of these sections of the fencing piste. Calculate the following areas.

a The total piste area.

drawing: length 137mm width 17.5mm

fencing piste: length 13.7m width 1.75m

total piste area = 23.98m²

b The centre area (between the two on-guard lines).

drawing: length 34mm width 17.5mm

fencing piste: length 3.4m width 1.75m

centre area = 5.95m²

3 Which has the larger area, a fencing piste or a boules pitch?

A boules pitch.

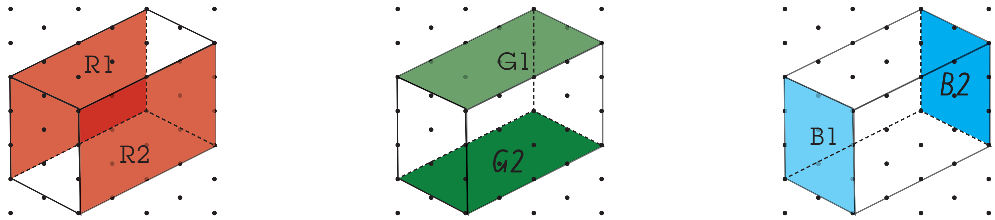
ISBN: 978-0-521-74540-6

Area of surfaces

1 **a** Build the block tower below using small cubic centimetre blocks.

b Use your tower to identify the opposite surfaces. Use red, green and blue pencils to mark these opposite surfaces on the diagrams. The first one has been done for you.

c Place a piece of 1 cm grid paper over each surface of the rectangular prism you have built. Count the squares and record the area, in square centimetres (cm²), in the table below.



Red surface 1	Area = $12cm^2$	Red surface 2	Area = $12cm^2$
Green surface 1	Area = $8cm^2$	Green surface 2	Area = $8cm^2$
Blue surface 1	Area = $6cm^2$	Blue surface 2	Area = $6cm^2$

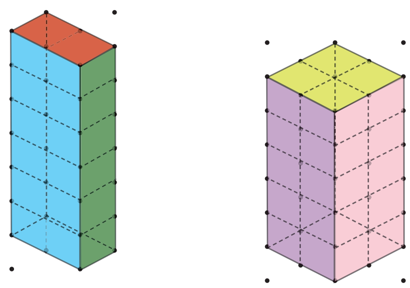
d What do you notice about the area of the opposite surfaces?

They are the same.

e Calculate the total surface area of this rectangular prism by adding the areas of each of the 6 surfaces together.

Area = $52cm^2$

2 **a** Build each of the block towers shown on the right. Identify the opposite surfaces. Use 1 cm grid paper to find the area of each coloured surface. Record these areas in the space provided.



Red surface	$4cm^2$	Yellow surface	$8cm^2$
Green surface	$24cm^2$	Purple surface	$20cm^2$
Blue surface	$12cm^2$	Pink surface	$20cm^2$

b Calculate the total surface area of each rectangular prism.

Surface area = □ + □ + □ + □ + □ + □
= 4 + 24 + 12
= $40cm^2$

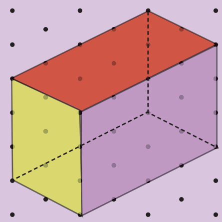
Surface area = □ + □ + □ + □ + □ + □
= 20 + 20 + 8
= $48cm^2$

ISBN: 978-0-521-74540-6 Cambridge University Press

Surface area of rectangular prisms

1 Complete the statements.

The surface area of a three-dimensional object is the total area of the object's faces.



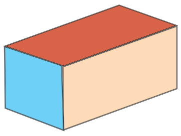
Surface area = □ + □ + □ + □ + □ + □
= (2 x □) + (2 x □) + (2 x □)

a

Surface area = □ + □ + □ + □ + □ + □

= (2 x □) + (2 x □) + (2 x □)

b

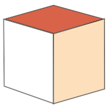


Surface area = □ + □ + □ + □ + □ + □

= (2 x □) + (2 x □) + (2 x □)

24

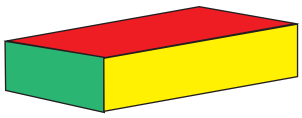
c



Surface area = □ + □ + □ + □ + □ + □

= (2 x □) + (2 x □) + (2 x □)

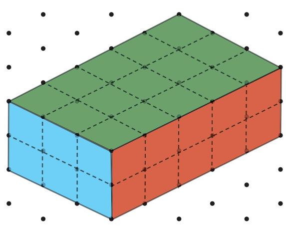
d

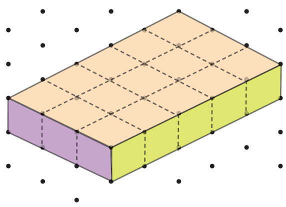


Surface area = □ + □ + □ + □ + □ + □

= (2 x □) + (2 x □) + (2 x □)

2 **a** Build each of the following rectangular prisms using cubic centimetre blocks. Identify the opposite sides. Find the area of each side using a piece of 1cm grid paper and record this value in the space provided. Then find the total surface area of each rectangular prism.





Red surface	$10cm^2$	Yellow surface	$5cm^2$
Green surface	$15cm^2$	Purple surface	$3cm^2$
Blue surface	$6cm^2$	Pink surface	$15cm^2$

b Calculate the total surface area of each rectangular prism.

Surface area = □ + □ + □ + □ + □ + □
= 15+15+10+10+6+6
= $62cm^2$

Surface area = □ + □ + □ + □ + □ + □
= 3+3+15+15+5+5
= $46cm^2$

MiB 3 Card 106

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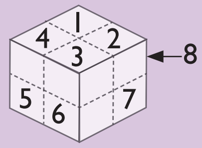
Volume of block towers

1 Use the pictures to help you determine the volume of each rectangular prism. Write an estimate for each in the space.

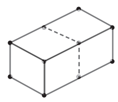
2 Construct each rectangular prism and count how many cubic centimetre blocks were used. Record the volume of each in the space.

The volume of an object is the amount of space that it takes up. Volume is usually measured in cubic units such as cubic centimetres (cm^3) or cubic metres (m^3).
The volume of a rectangular prism can be found by counting the number of cubes that have been used to construct it.



Volume = 4 + 4 = 8 cubes

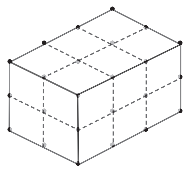
a



estimate: 2cm^3

volume: 2cm^3

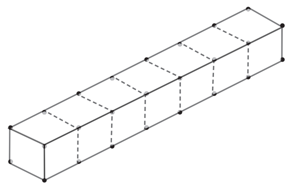
b



estimate: 12cm^3

volume: 12cm^3

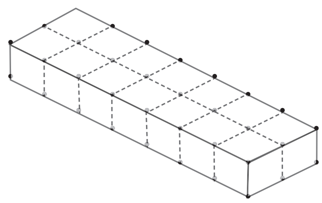
c



estimate: 7cm^3

volume: 7cm^3

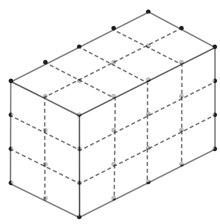
d



estimate: 14cm^3

volume: 14cm^3

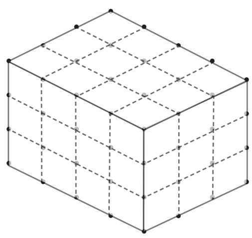
e



estimate: 24cm^3

volume: 24cm^3

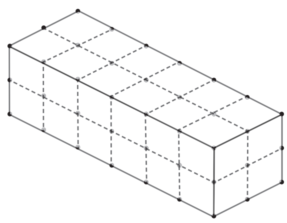
f



estimate: 36cm^3

volume: 36cm^3

g



estimate: 24cm^3

volume: 24cm^3

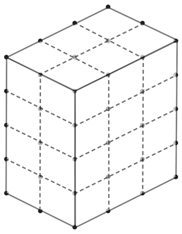
MiB 3 Card 110

ISBN: 978-0-521-74540-6

Counting cubes

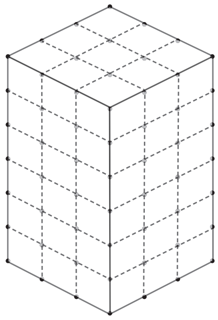
1 Calculate the volume of each rectangular prism by using repeated addition to help you count the cubes.

a



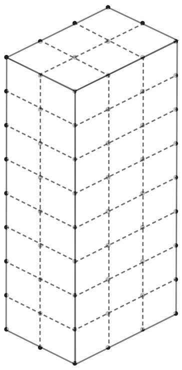
volume = 12 + 12
= 12 × 2
= 24 cm^3

b



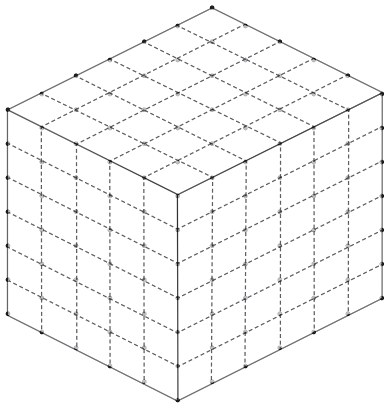
volume = 18 + 36
= 18 × 3
= 54 cm^3

c



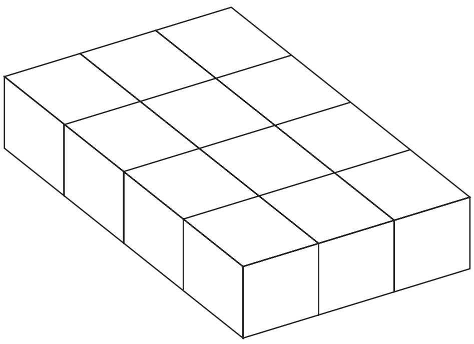
volume = 24 + 24
= 24 × 2
= 48 cm^3

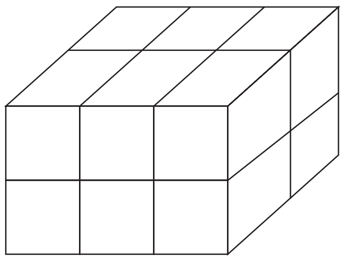
d



volume = 36 + 144
= 36 × 5
= 180 cm^3

2 Use cubic centimetre blocks to build and draw 2 rectangular prisms with a volume of 12 cubic centimetres (12 cm^3). Draw the prisms below.





MiB 3 Card 112

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Volume or capacity?

1 **a** Construct a frame which measures one cubic metre (1 m^3).

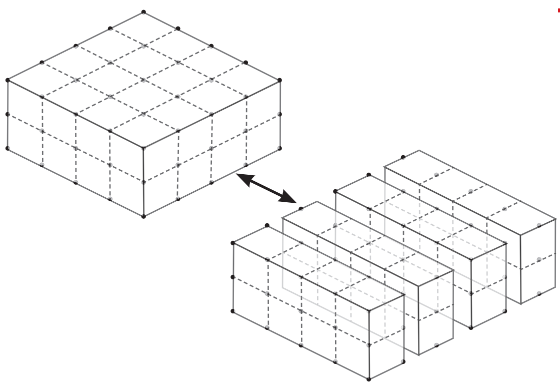
b Work with a partner to measure the volume of a room in cubic metres. Explain in the space below how you did this. Include a diagram to help in your explanation.

Answers will vary.
Possible answer: measure the length, width & height of room, multiply, then subtract any part that makes the room non-rectangular.

The volume inside a container, or how much it holds, is called its capacity. Capacity is usually measured in millilitres (mL) or litres (L), but can also be measured using cubic units such as cubic centimetres (cm^3) or cubic metres (m^3).

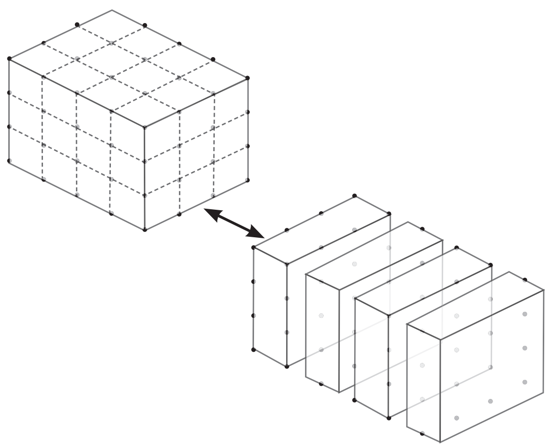
2 Katrina stacked cubic centimetre blocks into two kitchen containers. Use the pictures to help you calculate their capacity: how many cubic centimetre blocks fitted into each container?

a



volume = 8 + 8 + 8 + 8
= 8 × 4
= 32 cm^3

b



volume = 9 + 9 + 9 + 9
= 9 × 4
= 36 cm^3

ISBN: 978-0-521-74540-6 Cambridge University Press

How does it stack up?

1 Obtain the containers listed in the table below and choose 3 others. How many cubic centimetre blocks do you think it will take to fill each container? Record your estimates in the table.

2 Work with a partner to fill each container with cubic centimetre blocks and count how many it takes to fill each one. Record your results in the table.

Answers will vary.

Container	Estimate	Number of blocks	Volume
Lunch box			
Pencil case			
Drinking glass			
Empty can or jar			

3 Was it easier to estimate the capacity of some containers than others? Why?

It will be easier to estimate the capacity of rectangular objects, as students know the rule, and also rigid objects as they won't change shape.

4 How did you fill your containers with blocks? Were some easier to fill than others?

Answers will vary.

5 Did you count each individual block or did you find a quicker way to count them? What was the quicker way?

A quicker way would be to stack the cubes in a block and then use multiplication.

Compare your answers to Question 5 with a classmate from another group.
Are their answers similar to yours?

MiB 3 Card 111

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Cubic centimetres and millilitres

1 **a** Fill each of the containers below with cubic centimetre blocks and record its capacity, in cubic units, in the table.

b Use a measuring cup and water to determine the capacity of each container in millilitres and record this in the table. *Answers will vary*

Container	Number of blocks (cm^3)	Volume in millilitres (mL)
Lunch box		
Plastic box		
Small container		

c How do the values for the capacity in cubic centimetres and the capacity in millilitres compare? What do you notice about your answers?

They are the same magnitude. One millilitre is equal to one cubic centimetre.

d Complete the following statement:

The volume of one cubic centimetre block (1 cm^3) is *the same* as the volume of one millilitre (1 mL) at room temperature.

2 Peter bought this fish tank. It measures 175 cm across, 80 cm deep and 50 cm wide.

a What volume, in cubic centimetres, does this fish tank occupy?

700 000 cm^3

b If Peter fills his fish tank to the rim, how many millilitres of water has he used? How many litres is this?

700 000ml = 700L has been used

MiB 3 Card 117

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Volume of irregular solids

The volume of water that is displaced (moved) when an object is submerged is equivalent to the volume of the object. Use the relationship between cubic units and millilitres to help you.

1 **a** Obtain a measuring cup that holds 500 mL of liquid. Add 300 mL of water to it.

26

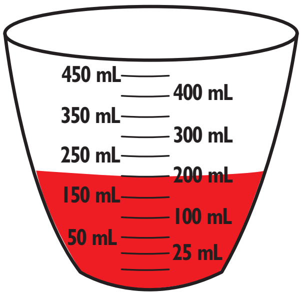
b Place each of these objects, and three of your own choice, into the measuring cup, one at a time. Record the volume of the water when the object is submerged. When you remove the object, check that the water level returns to 300 mL. If it doesn't, add water before inserting the next object. *Answers will vary.*

Object	Volume before	Volume after	Volume of water displaced	Volume of object (cm^3)
Matchbox car	300 mL			
Lump of plasticine	300 mL			
Plastic figure	300 mL			
	300 mL			
	300 mL			
	300 mL			

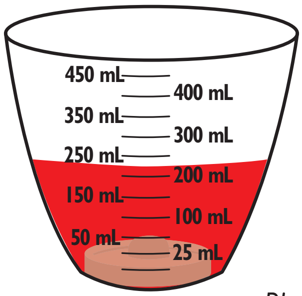
c Calculate the volume of water that was displaced by each object and use this to find the volume, in cubic centimetres, of the objects. Complete the table.

2 Use the volume of water displaced to help you calculate the volume, in cubic centimetres, of the following objects.

a A plug



before



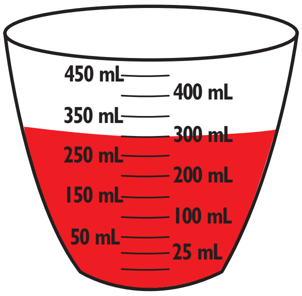
after

Before = 200ml

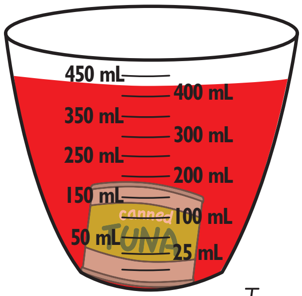
After = 225ml

Plug = 225-200 = 25cm³

b A can of tuna



before



after

Before = 300ml

After = 225ml

Tuna can = 425-300 = 125cm³

MiB 3 Card 116

ISBN: 978-0-521-74540-6

Small volumes

1 **a** Obtain a medicine cup that holds 40 mL of liquid. Add 30 mL of water to it.

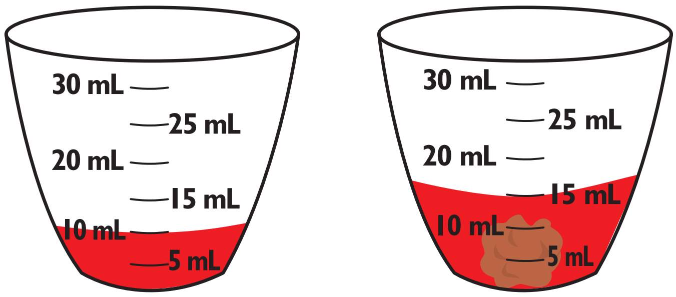
b Place each of the objects in the table below, and three of your own choice, into the measuring cup, one at a time. Record the volume of the water when the object is submerged. When you remove the object, check that the water level returns to 30 mL. If it doesn't, add water before inserting the next object. *Answers will vary.*

Object	Volume before	Volume after	Volume of water displaced	Volume of object (cm^3)
20c coin	30 mL			
Marble	30 mL			
Keyring	30 mL			
	30 mL			
	30 mL			
	30 mL			

c Calculate the volume of water displaced by each object and use this to find the volume, in cubic centimetres, of the objects. Complete the table.

2 Use the volume of water that was displaced to help you calculate the volume of the following objects in cubic centimetres.

a lump of plasticine



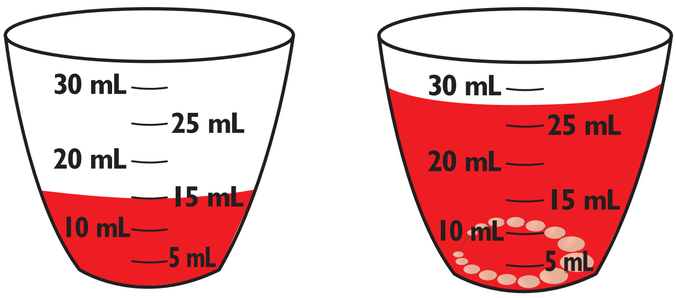
before after

Before = 10ml

After = 15ml

Plasticine = 15-10 = 5cm³

b necklace



before after

Before = 15ml

After = 27.5ml

Necklace = 12.5cm³

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Cambridge University Press

Other volumes

1 The monthly water usage of the O'Brien family is shown in the table.

Month	Water usage (kilolitres)
January	14.9
February	26.25
March	27.655
April	27.009
May	28.56
June	27.8
July	28.045
August	27.84
September	20.95
October	21.8
November	20.65
December	21.068

a What is a kilolitre?

1000 litres.

b  Calculate the total volume, in kilolitres, of water used by the O'Brien family during this year.

292.527 kL.

c How many litres is this?

292 527 L.

d Suggest a possible reason that the value for January is so low.

Perhaps the family were away or on holidays for part of January.

Answers will vary.

e There was a large drop in the family's usage of water after August. Suggest a possible reason their water usage reduced at this time.

They stopped watering their garden because of increased rain in spring.

What other explanations can be given for these water usage results?
What can you do to save water at home and at school?

2 The engines of motorcycles and cars are often referred to by their capacity, expressed in cc. A motorcycle like that in the picture is said to have an 800 cc engine.

a What does 'cc' stand for?

Cubic centimetre.

b Use the internet or another source to find out which volume this measurement refers to. Write an answer in the space below.

This measurement refers to engine displacement, or the volume of the cylinders of an internal combustion engine.

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Measuring the mass of objects

1 Convert these measurements to the units shown.

a 16 500 g = 16.5 kg

b 11.5 kg = 11 500 g

c 67 500 kg = 67.5 t

d 63.5 t = 63 500 kg

e 172 250 g = 172.25 kg

f 186 kg = 186 000 g

Remember!
1 kilogram = 1000 grams
AND
1 tonne = 1000 kilograms

27

2 Use a balance or an electronic scale to measure and record the mass of these objects, and 3 of your own choice, in decimal notation. *Answers will vary*

Object	Mass (kg)
Large block	
Pencil case and contents	
Ball	
Book	
Piece of fruit	
Calculator	

3 Pictured below are some different types of scales or balances. Each can only measure a specific mass range. Use the internet or other information sources to find out what range of masses these types of scales/balances can measure.

a

kitchen scales

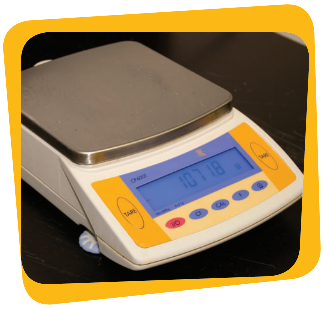
Approx 0 - 5kg

b

bathroom scales

Approx 0 - 180kg

c



digital balance

Approx 0 - 500g

d

weighbridge

Approx 0 - 10 000kg

MiB 3 Card 121

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Finding the mass of small objects

1 **a** Use a set of kitchen scales to measure the mass of the following items. Record their mass as accurately as you can. *Answers will vary.*

a rubber band	tea bag	pencil	cube

b Was it possible to get an accurate reading of the mass of these objects? Why or why not?

Possible difficulties include reading errors, wind, faulty equipment and scale capacity.

c Use the kitchen scales to measure the mass of 25 of each item.

a rubber band	tea bag	pencil	cube

d Was it easier to accurately measure the mass of 25 of each object than only one of each object? Explain why.

Yes. Because it is heavier, hence less affected by small errors.

When measuring the mass of small objects it is often easier to measure many of them and use division to find the average mass of a single small object.

2 Calculate the average mass of each item. Round your answers as appropriate.

a

box of chocolates = 750 g
25 chocolates
mass of 1 chocolate

$\frac{750}{25} = 30g$

b

loaf of bread = 650 g
20 slices of bread
mass of 1 slice

$\frac{650}{20} = 32.5g$

c

box of teabags = 200 g
100 teabags
mass of 1 teabag

$\frac{200}{100} = 2g$

d

carton of eggs = 750 g
12 eggs
mass of 1 egg

$\frac{750}{12} = 62.5g$

e

packet of soap = 375 g
6 bars of soap
mass of 1 bar

$\frac{375}{6} = 62.5g$

f

set of pencils = 420 g
16 pencils
mass of 1 pencil

$\frac{420}{16} = 26.25g$

3 Look at your answers to Question 2. Does every object have the exact mass that has been calculated? Give a reason for your answer.

No (this is extremely unlikely). There is almost certainly some variation between each item.

MiB 3 Card 122

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Is it too heavy?

1 Calculate or estimate the mass of each load. Which of these loads would fit in a trailer that can carry 250 kg? a, c

a load 1: 95 000 g, 36 kg, 45 500 g mass = 95 + 36 + 45.5 = 176.5

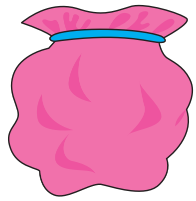
b load 2: 24 500 g, 186 kg, 53 000 g mass = 24.5 + 186 + 53 = 263.5 kg

c load 3: 72 kg, 27 000 g, 126 000 g mass = 72 + 27 + 126 = 225 kg

d load 4: 115 000 g, 165 kg, 35 500 g mass = 115 + 165 + 35.5 = 315.5 kg

2 Find the total mass of the objects in each container. Write your answer in decimal notation.

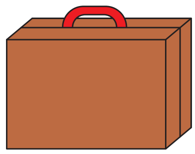
a toiletry bag



Deodorant 200 g
Shampoo 0.5 kg
Conditioner 500 g
Medicine 0.25 kg

1.45 kg

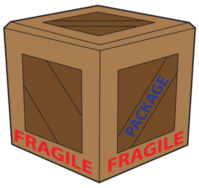
b briefcase



Laptop 5 kg
Papers 2500 g
Personal items 1250 g

8.75 kg

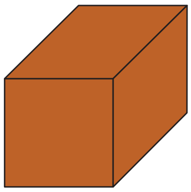
c packing box



Books 10.5 kg
Posters 500 g
Pillows 750 g
Stationery 125 kg

136.75 kg

d shipping container

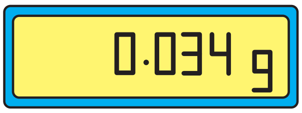


Generator 5 t
Machine parts 750 kg
Jeep 3.5 t

9.25 t

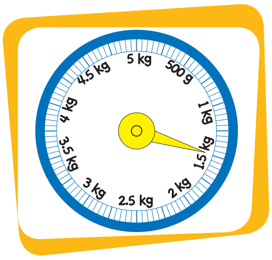
3 Read each scale and calculate the difference between the masses.

a



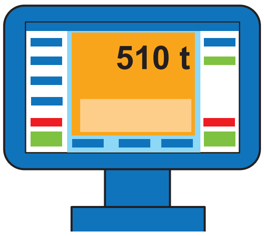
233 g

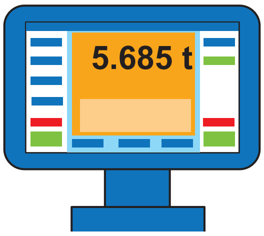
b



0.6 kg

c





504.315 t

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Mass of water

1 What is the mass of 1L of water? Write your prediction in the space

I predict the mass of 1L of water will be ___1 kg___ .

2 Obtain a 250 mL measuring cup, a container that holds more than 2L and a set of kitchen scales. Measure the mass of the empty container and record it in the space below.

Mass of empty container = ___Answers will vary___

3 Measure the mass of each volume of water listed in the table below. Record the results in the table.

Volume of water	Mass of water and container	Mass of water		Mass of 1L of water
250 mL or 1 cup	Answers will vary	250g	Multiply by 4	1 kg
500 mL or 2 cups	Answers will vary	500g	Multiply by 2	1 kg
1L or 4 cups	Answers will vary	1 kg		1 kg
2L or 8 cups	Answers will vary	2kg	Divide by 2	1 kg

4 Subtract the mass of the empty container from the mass that you recorded. This will give you the mass of the water inside the container. Record these masses in the table.

5 Multiply or divide the mass of water you have measured by the value in the table. This is the mass of 1L of water. Record the answer in the final column of the table.

6 What do your results show?

That one millilitre of water is equal to one gram, and one litre is equal to one kilogram.

7 Use the internet or another information source to find out the accepted mass of 1L of water.

1 kg.

Accepted mass of 1L water = ___1 kg.___

Record the details about your information source in the space below:

Answers will vary

8 How do your results compare to the accepted mass of 1L of water?

Answers may vary, though should be close depending on accuracy of measurement.

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MiB 3 Card 125

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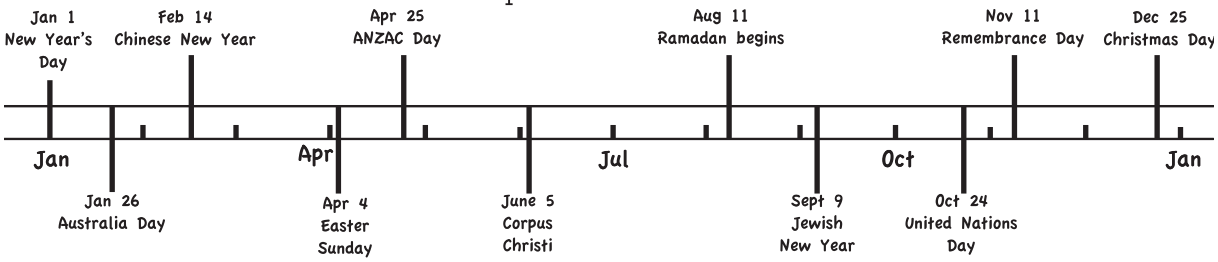
Using timelines

1 Use this timeline to answer the questions.



a On which dates are the following:

i Easter Sunday April 4

ii Jewish New Year September 9

iii beginning of Ramadan August 11

iv Chinese New Year February 14

b In which months are no events listed?

March, May, July.

c Circle the event in each pair which occurs earliest in the year.

i Remembrance Day OR ANZAC Day

ii Easter Sunday OR Ramadan

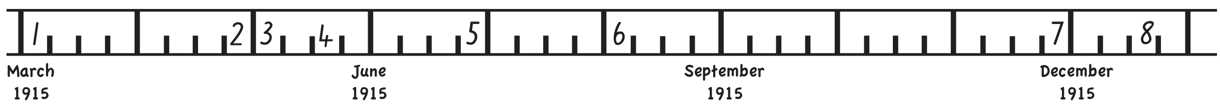
iii New Year's Day OR Jewish New Year

iv Australia Day OR United Nations Day

2 Write the number of each of the events listed in the table onto the timeline.

The ANZAC Gallipoli campaign 1915

Date	Event	Date	Event
Mar 4	**1** Arrival at Lemnos Is.	Apr 25	**2** ANZAC landing
May 4	**3** Attack on Gaba Tepe	May 20	**4** Brief truce to bury the fallen
Jun 29–30	**5** Last Turkish attack	Aug 6–7	**6** Attack on Lone Pine & the Nek
Nov 27–28	**7** The Great Blizzard	Dec 20	**8** Evacuation completed



Where are timelines used? Look in newspapers and magazines: are there any timelines?

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Timelines

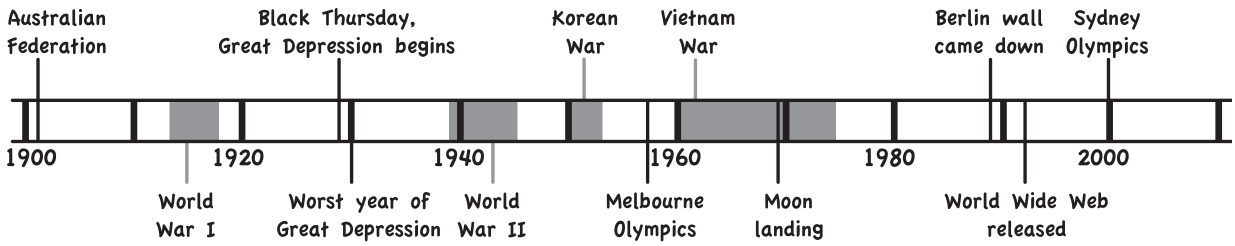
1 **a** List 10 events from your life in the table and place these onto a timeline. You may like to include things such as starting school, moving house, births of sisters and brothers and holidays. *Answers will vary*

My life

Date	Event	Date	Event

b Write a question that can be answered using your timeline. Ask a classmate to answer it. *Answers will vary*

2 Use this timeline to answer the questions.



a What were the dates of these conflicts and how long did each last?

i World War I *1914 - 1918. 5 years.*

ii World War II *1939 - 1945. 7 years.*

iii Korean War *1950 - 1953. 4 years.*

iv Vietnam War *1960 - 1975. 16 years.*

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b In which year was the World Wide Web released? How many years has it been going?

1991; 20 years.

3 Make up your own question about the above timeline. Ask a classmate to answer it.

Answers will vary.

MiB 3 Card 135

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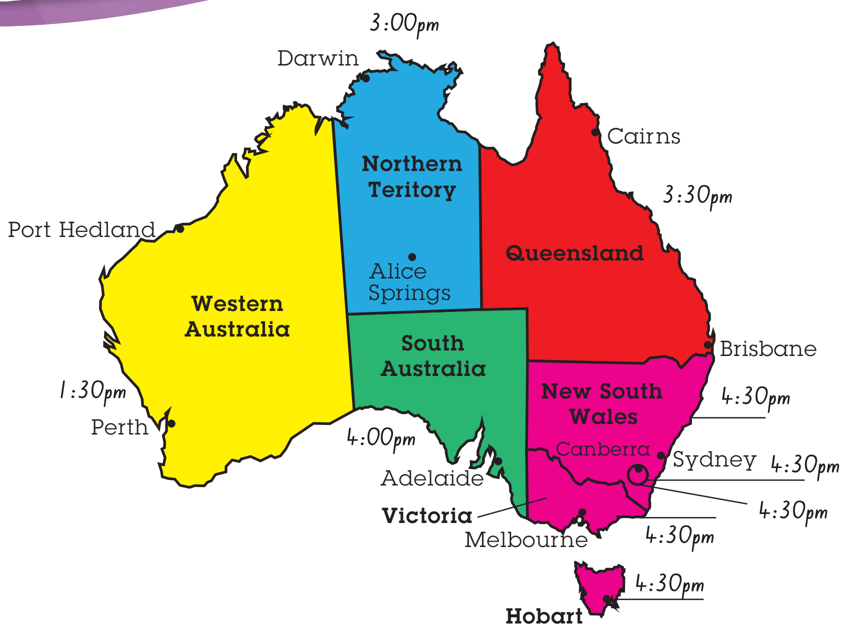
Australian daylight saving time



1 Write in the state and territory names on the map. Colour the states and territories that follow:

Eastern Daylight Saving Time	pink
Eastern Standard Time	red
Central Daylight Saving Time	green
Central Standard Time	blue
Western Daylight Saving Time	orange
Western Standard Time	yellow

2 If it is 3 p.m. in Darwin, NT, complete the map with the times in the other states and territories.

3 It is daylight saving. Complete these times.

a 0940 hrs in Sydney is 0910 hrs in Adelaide and 0640 hrs in Perth.

b 5:15 p.m. in Hobart is 3:45 pm in Darwin and 4:15 pm in Brisbane.

c 2030 hrs in Port Hedland is 2230 hrs in Cairns and 2330 hrs in Canberra.

d 2:05 a.m. in Cairns is 3:05 am in Melbourne and 1:05 am in Darwin.

e 0015 hrs in Canberra is 2315 hrs in Brisbane and 2115 hrs in Perth.

f 11:50 a.m. in Adelaide is 9:20 am in Port Hedland and 12:20 pm in Hobart.

4 Give some reasons that people like or dislike daylight saving.

Some people dislike it because it disturbs sleep, and it may increase energy use.

Some people like it because it gives more opportunities to spend time outside.

Which other countries have daylight saving? When does daylight saving start and end in those countries? When do countries in the northern hemisphere have daylight saving? Why?

MiB 3 Cards 132 & 133

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Working with daylight saving

1 Complete these statements:

Daylight Saving Time begins in NSW, ACT, SA, VIC and TAS on the first Sunday in October at 2:00am in the morning. On this day the clocks are put forward and we lose one hour.

Daylight Saving Time ends in NSW, ACT, SA, VIC and TAS on the first Sunday in April at 2:00am in the morning. On this day the clocks are put back and we gain one hour.

2 Use the internet or another information source to find out what is happening in Western Australia and Queensland about Daylight Saving. Write what you find in the space provided. In Western Australia, a vote was held on Daylight Saving in 2009. The result was a "no" vote. In Queensland, a bill in Parliament to introduce Daylight Saving for the south-east of the state was not passed.

3 Suri is visiting her grandmother in Adelaide for the summer holidays. Her flight departs Brisbane at 0830 hrs and arrives in Adelaide at 1110 hrs Adelaide Daylight Saving Time.

a What time is it in Adelaide when Suri departs from Brisbane?

0900 hrs

b What time is it in Brisbane when Suri arrives in Adelaide?

1040 hrs

c What is the time difference between Brisbane and Adelaide during daylight saving?

Adelaide is 30 min ahead.

4 Keith lives in Queensland and wants to phone his sister Lorraine who lives in Victoria. What time is it in Queensland if Keith calls Lorraine at 10.30 a.m. in Victoria?

9:30am

5 Malik watches each event listed below on pay TV where they are screened live. If Malik lives in Perth, what time is it when each of these events begins?

a Melbourne Cup, November in Melbourne at 3:00 pm — 12:00pm

b Day-night cricket match, January in Brisbane at 1300 hrs — 1100hrs

c Indy car race finish, October in Queensland at 5:00 pm — 3:00pm

d AFL Grand Final, Melbourne in September at 1430 hrs — 1230hrs

e Test match cricket, November in Hobart at 9:00 am — 6:00am

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Train times and travel

Read the train timetable and answer the questions.

Station			
East Hills	11:30	11:51	12:00
Panania	11:32	----	12:02
Revesby	11:34	----	12:04
Padstow	11:37	11:56	12:07
Riverwood	11:39	11:59	12:09
Narwee	11:42	----	12:12
Beverly Hills	11:44	----	12:14
Kingsgrove	11:47	12:05	12:17
Bexley North	11:49	----	12:19
Bardwell Park	11:51	----	12:21
Turrella	11:53	----	12:23
Wolli Creek	11:56	12:11	12:26
International Airport	11:58	12:13	12:28
Domestic Airport	12:01	12:16	12:31
Mascot	12:03	12:18	12:33
Green Square	12:06	12:21	12:36
Sydenham	----	----	----
Redfern	----	----	----
Central	12:11	12:26	12:41
Museum	12:13	12:28	12:43
St James	12:15	12:30	12:45
Circular Quay	12:19	12:34	12:49
Wynyard	12:21	12:36	12:51
Town Hall	12:23	12:38	12:53

1 What is the earliest time that you can catch a train from Narwee?

1142 hrs or 11:42am

2 I missed the 1159 hrs train from Riverwood.

a What time does the next one arrive? 1209 hrs or 12:09pm

b How long would I have to wait? 10 minutes

3 I missed the 11:51 a.m. train from Bardwell Park.

a What time does the next train arrive? 1221 hrs or 12:21

b How long is the wait between these two trains? 30 minutes

4 Marcie catches the 12:36 p.m. train from Green Square.

a What time does she arrive at Town Hall? 1253 hrs or 12:53pm

b How long was her journey? 17 minutes

5 Edgar catches the 11:30 a.m. train from East Hills and gets off at Circular Quay.

a What time does he get to Circular Quay? 12:34 hrs or 12:34pm

b How long was his trip? 49 minutes

6 Jennifer catches the 11:51 a.m. train from East Hills and also gets off at Circular Quay.

a What time does Jennifer arrive at Circular Quay? 12:34 hrs or 12:34pm

b How long did her trip take? 43 minutes

c Was her trip longer or shorter than Edgar's? By how much?

Shorter, by six minutes.

d Give a reason why the trip may have been longer or shorter.

Because there were fewer stops, the trip was shorter.

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