Prism or pyramid?

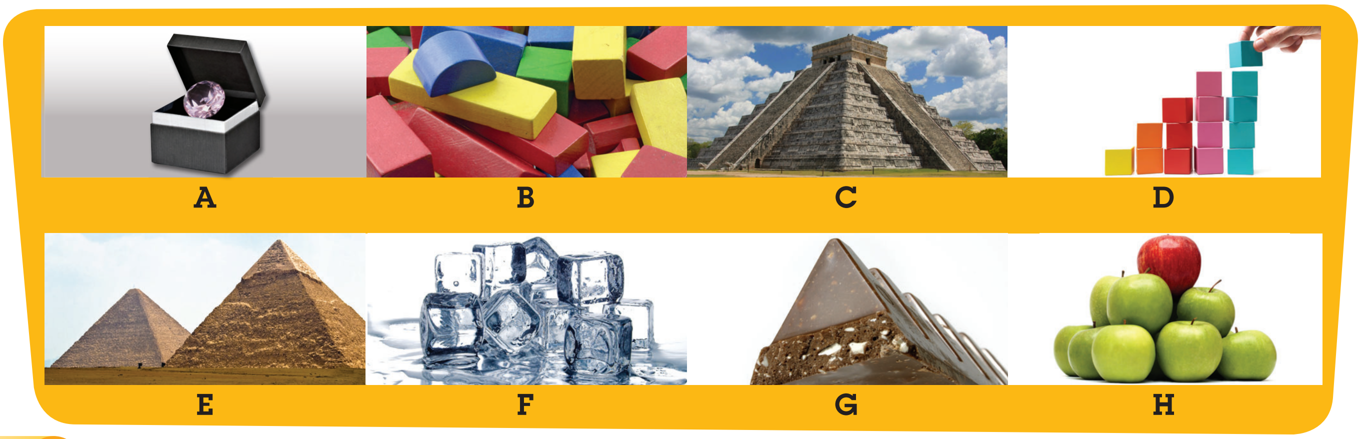
1 Identify the photographs that show objects that resemble:

a a cube A, B, D, F

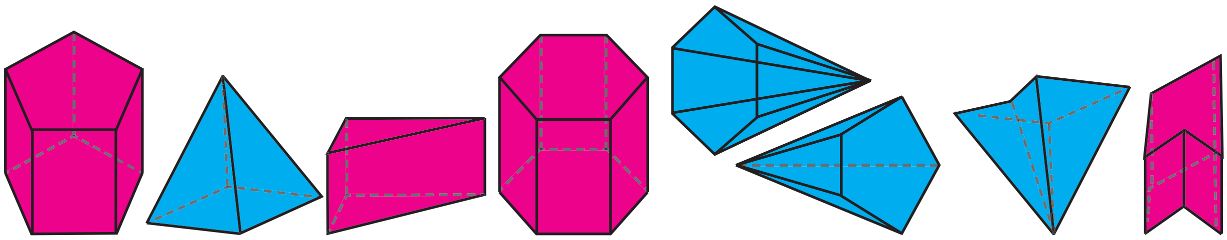
b a square pyramid C, E, H

c a triangular prism G

30



2 Group the shapes below by colouring the prisms red and the pyramids blue.



3 How are the following pairs of solids the same? How are they different?

a rectangular prism and hexagonal prism

They both have the same width for their entire length. They have a different number of sides.

b square pyramid and pentagonal pyramid

Both shapes taper to a peak. They have a different number of sides.

c octagonal prism and octagonal pyramid

Both shapes have a face with eight sides. The pyramid tapers to a peak, whereas the prism keeps the same width along its entire length.

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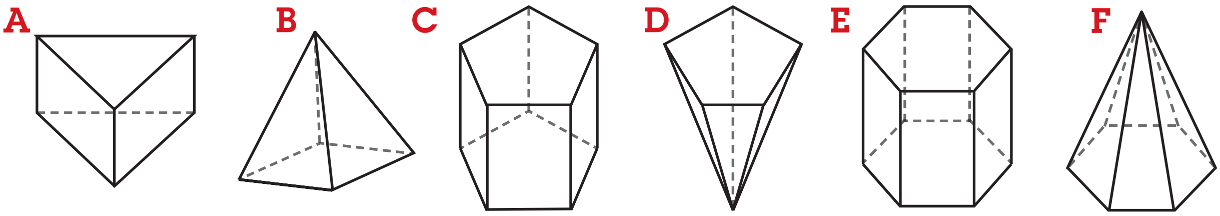
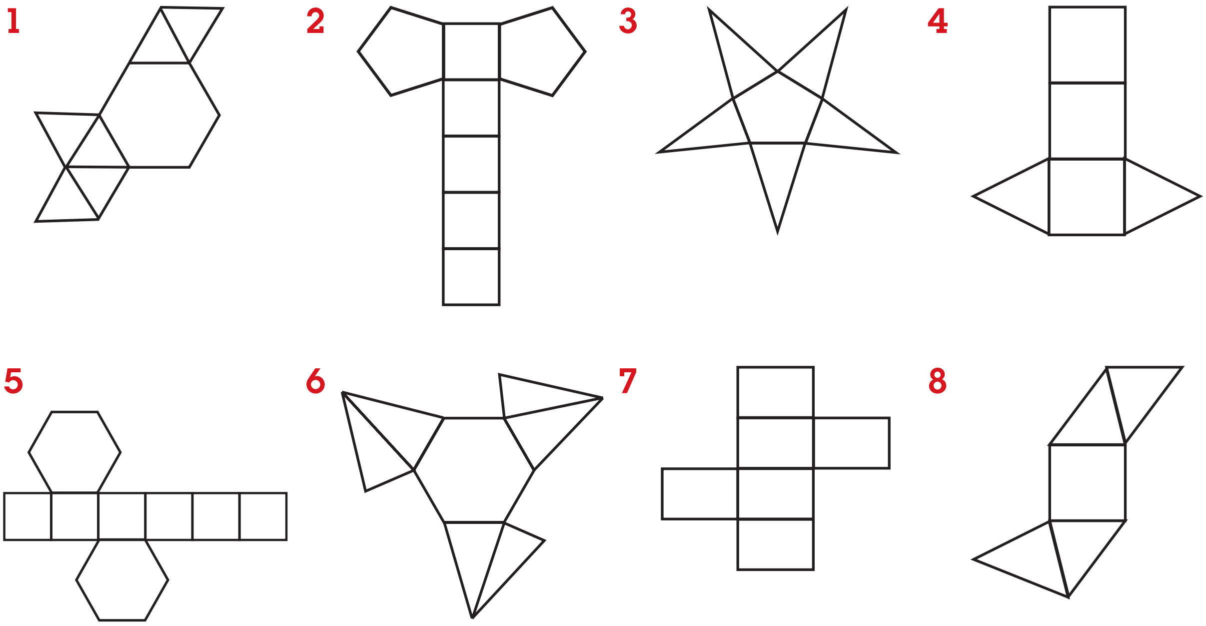
Matching nets

1 Match the correct net from those shown (1–8) to each of the solids (A–F). Write the letter–number pairs in the spaces.





A = 4   B = 8   C = 2   D = 3   E = 5   F = 6

2 Draw different nets for 4 of the solids in Question 1.

Answers will vary

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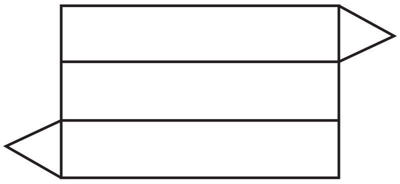
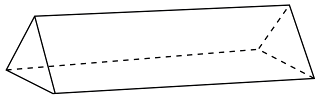
Using nets

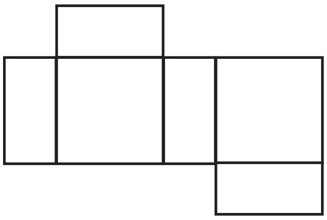
1 Draw the solid, showing depth, which is formed by the following nets.

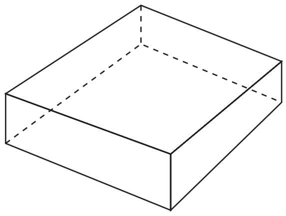
a



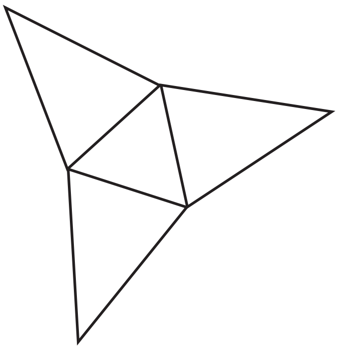


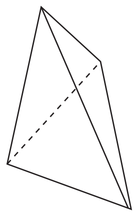
b



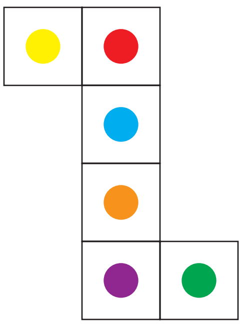


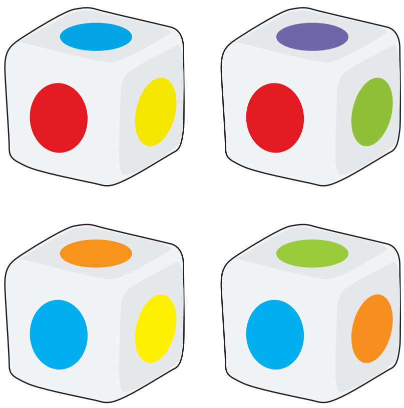
c





2 Use the pictures of the die to draw its net, showing the positions of the coloured dots.





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Cutting solids

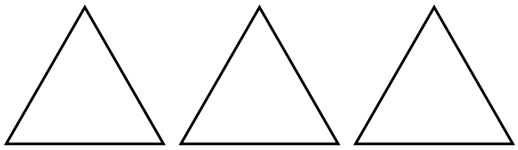
1 Shown below are cross-sections taken at random places from three-dimensional shapes. Use these cross-sections to help you:

i Identify each solid as a prism or a pyramid

ii Name each solid.

iii Draw each solid showing depth.

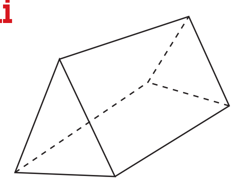
a



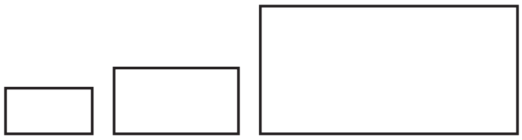
i Prism

ii Triangular prism

iii



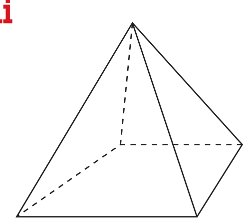
b



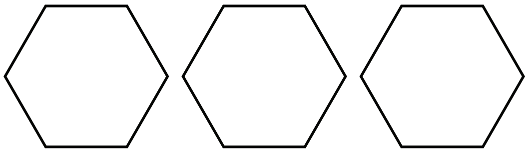
i Pyramid

ii Rectangular pyramid

iii



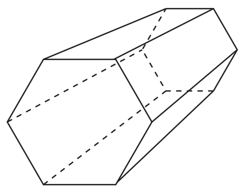
c



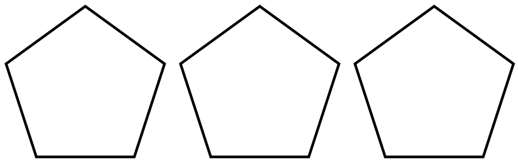
i Prism

ii Hexagonal prism

iii



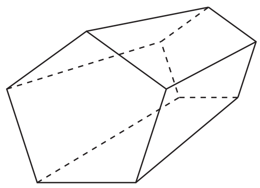
d



i Prism

ii Pentagonal prism

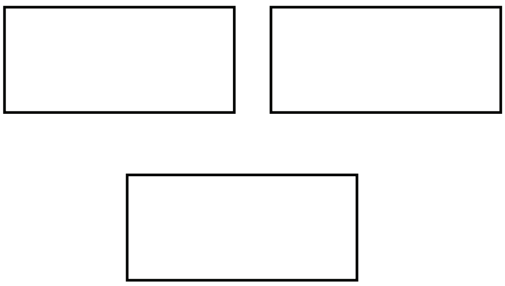
iii

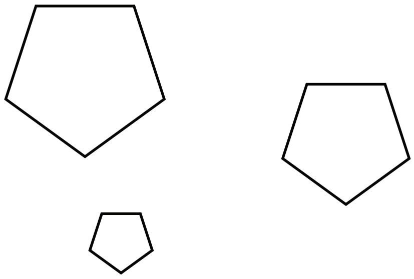


2 Draw three cross sections from:

a a rectangular prism

b a pentagonal pyramid





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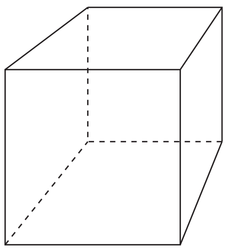
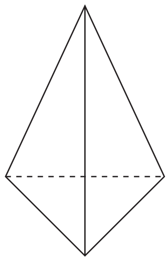
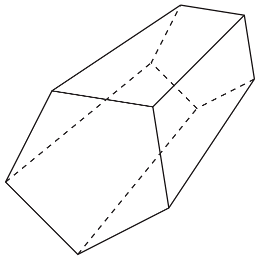
Drawing three-dimensional objects

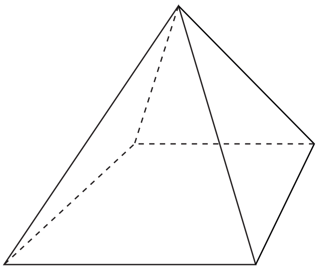
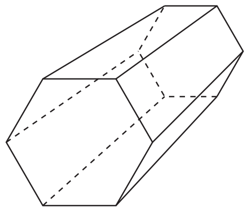
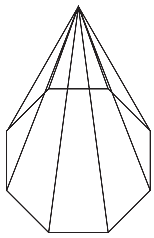
32

1 Draw each of the following solids.

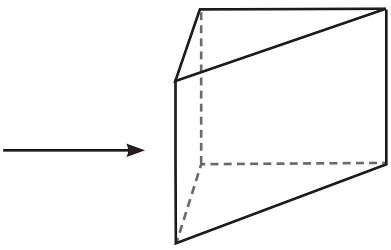
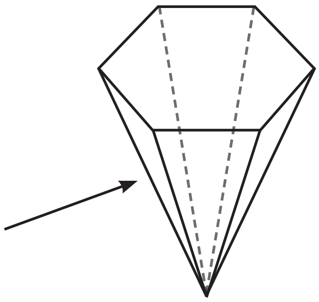
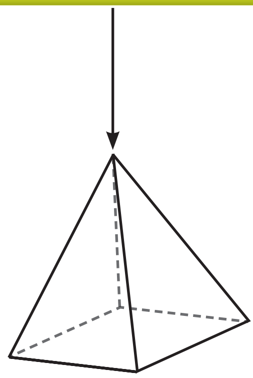
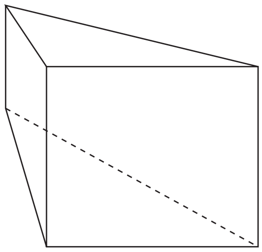
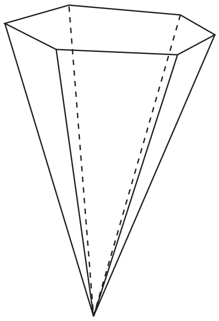
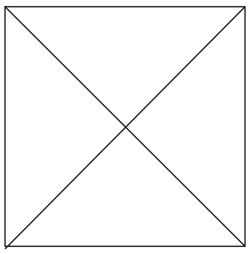
a cube **b** triangular pyramid **c** pentagonal prism

d rectangular pyramid **e** hexagonal prism **f** octagonal pyramid

2 Draw each solid, showing depth, from the perspective indicated by the arrow.

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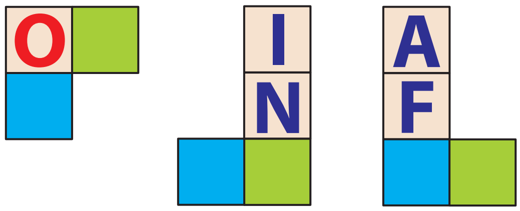
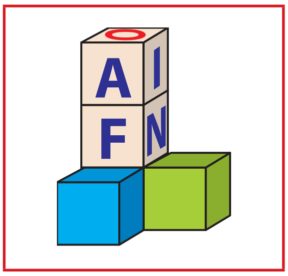
Which object is it?

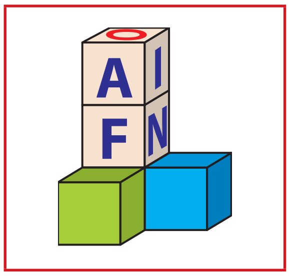
1 Indicate with a tick (✓) which picture is represented by the drawings.

a

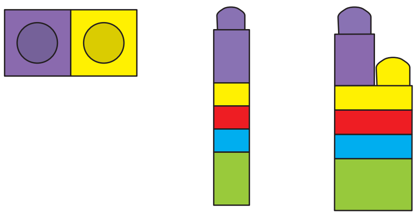


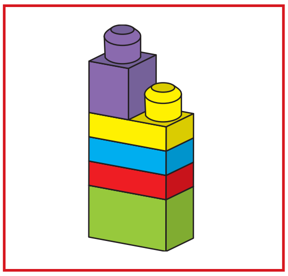


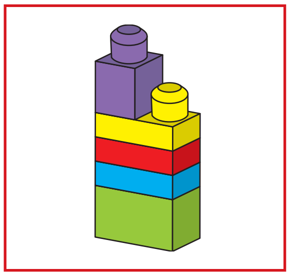
✓



b

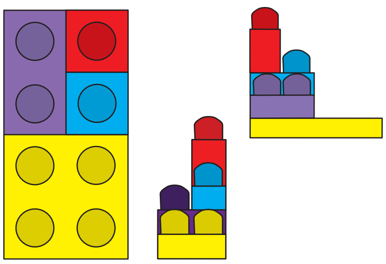


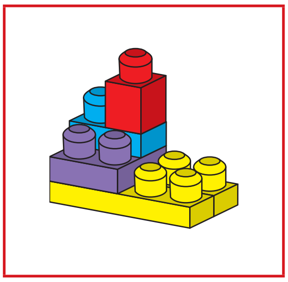


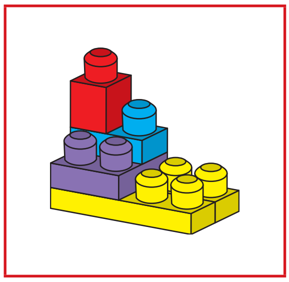


✓

c

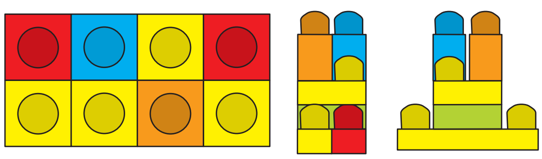


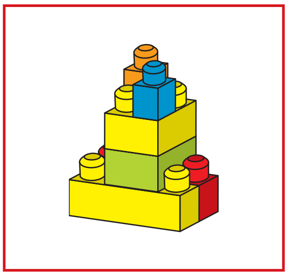


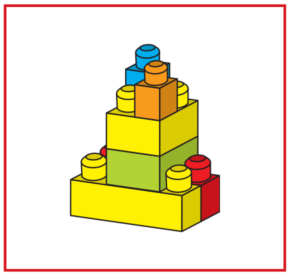


✓

d

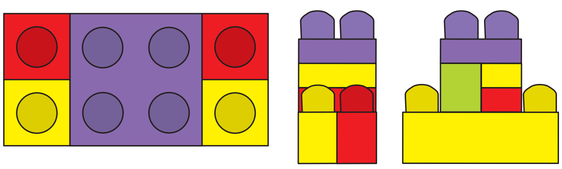


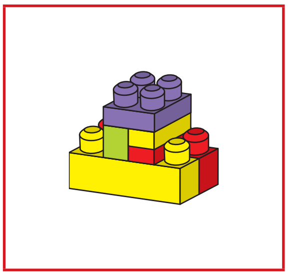




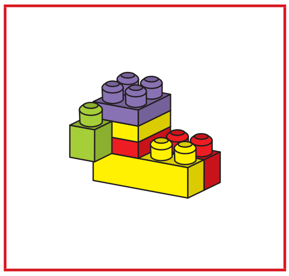
✓

e





✓



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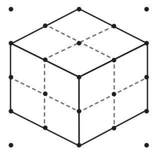
Constructing block towers

1 Use the diagrams to calculate how many cubes are required to construct each block tower. Write the number of cubes in the box.

2 Construct each block tower using Centicubes or Multilink cubes.

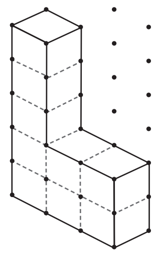
3 Indicate with a tick (✓) whether the number of cubes that you calculated was correct.

a



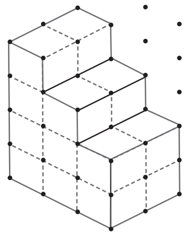
8 cubes

b



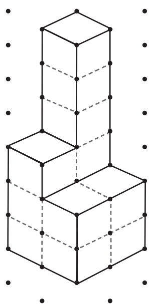
9 cubes

c



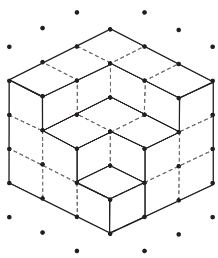
18 cubes

d



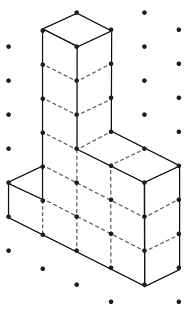
13 cubes

e



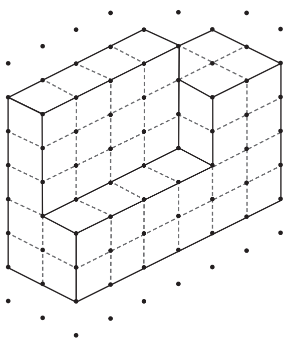
22 cubes

f



13 cubes

g



44 cubes

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Drawing angles

1 Look at each picture and the clues written under them. Using this information, draw in the vertex and both arms of each angle described.

Remember!
An angle is the amount of turn between two arms, rays or lines around a common point that is called a vertex.

a Fuel gauge needle – one arm visible. Draw a new arm pointing to the half-full symbol.

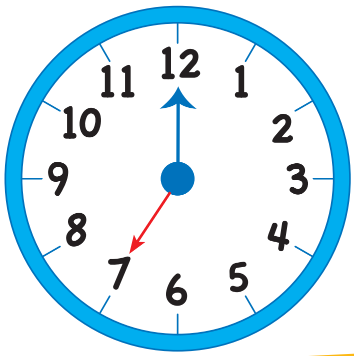
Type of angle: acute

b Open laptop – two arms visible.

Type of angle: obtuse

c Lamppost – one arm visible. Draw in the ground to create a new arm.

Type of angle: right



d Clock – one arm visible. Draw a new arm so that the clock is showing 7 o'clock.

Type of angle: reflex

2 Complete the table of information on angles.

Angle	Description	Size
Acute	Answers will vary	>0, <90°
Right	Answers will vary	90°
Obtuse	Answers will vary	>90, <180°

Angle	Description	Size
Straight	Straight line	180°
Reflex	Answers will vary	>180°, <360°
Revolution	Answers will vary	360°

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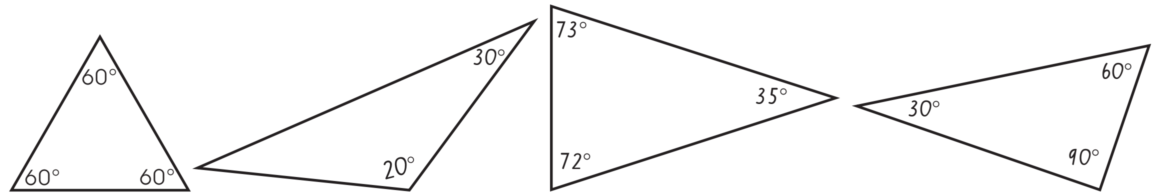
Triangles and quadrilaterals

1 **a** Identify each of the following triangles as equilateral, isosceles, scalene or right in the space below.

b Measure the size of each angle in the triangles using a protractor. Mark its size on the diagram as shown in the first triangle.

c Use the information to complete the table.

33



Type: Equilateral | Isosceles | Scalene | Right

Triangle	Number of angles the same size	Number of sides the same length
Equilateral	3	3
Isosceles	2	2
Scalene	0	0
Right	0	0

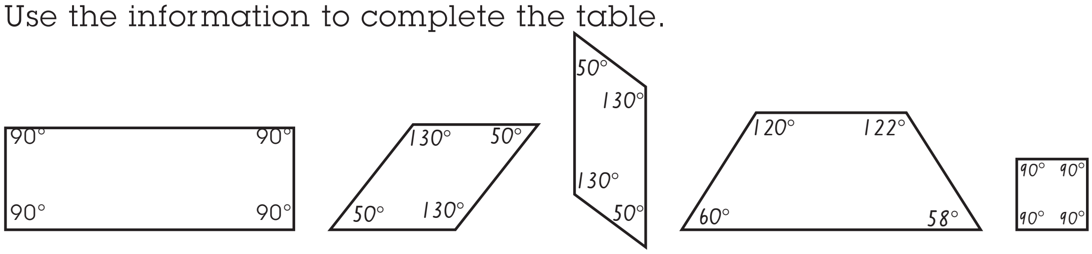
d What features/properties do all right triangles have?

A angle of 90°

2 **a** Identify each of the following quadrilaterals as a square, rectangle, rhombus, parallelogram or trapezium in the space below.

b Measure the size of each angle in the quadrilaterals using a protractor. Mark it on the diagram as shown in the first quadrilateral.

c Use the information to complete the table.



Type: Rectangle | Rhombus | Parallelogram | Trapezium | Square

Quadrilateral	Which angles are the same?	Which sides are the same?
Square	All	All
Rectangle	All	the long sides, the short sides
Rhombus	130° angles, 50° angles	All
Parallelogram	130° angles, 50° angles	the long sides, the short sides
Trapezium	None	None

MiB 3 Cards 136 & 138

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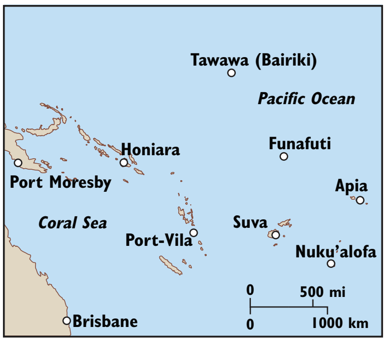
Scales on maps

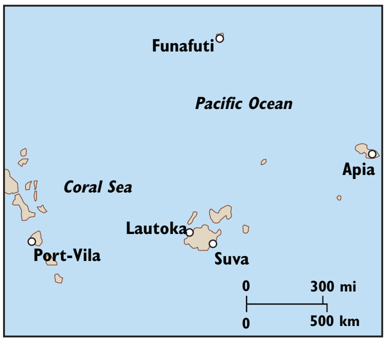
Maps and technical drawings of buildings and equipment are produced **to scale**. This means they have been reproduced on paper by reduction or enlargement using a **scale factor.** This scale is always shown on the map or drawing. The two most common ways that it is shown are by using a ratio or a bar.

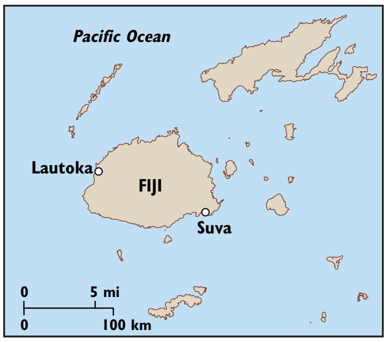
For example: 0 0.5 1 1.5 2 km

1 : 50 000 1 mm on map is 50 000 mm on real item
10 mm on map is 0.5 km on real item

1 Look at the maps shown below. What is the same and what is different about these maps?







Same area, different scale

2 Use the scales given to calculate the length that each line represents and to draw a line that represents the length given.

a 0 1 2 km — length. 5 km

3 km:

b 0 10 20 km — length. 30 km

52 km:

c 0 20 40 60 80 km — length. 118 km

25 km:

d 0 5 10 15 20 m — length. 20 m

50 m:

e 0 10 20 30 40 m — length. 30 m

62 m:

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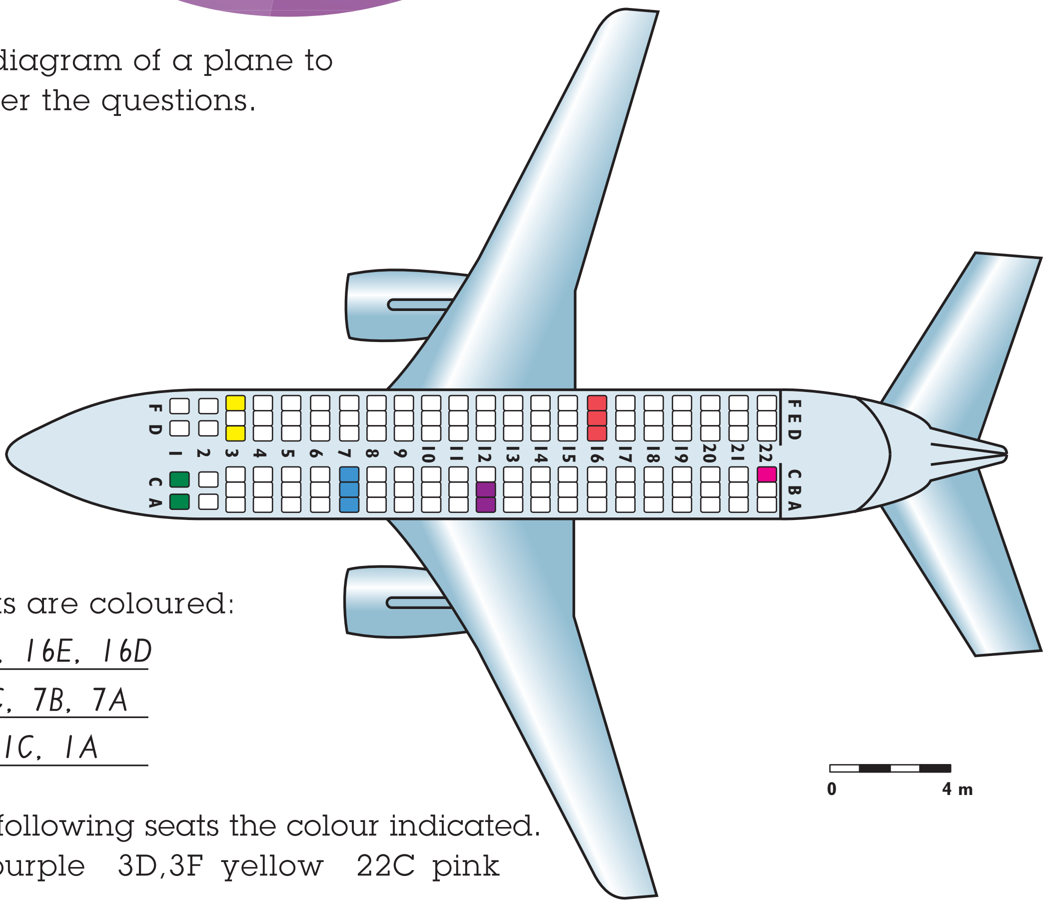
Technical drawings

Use this scale diagram of a plane to help you answer the questions.



1 Which seats are coloured:

red 16F, 16E, 16D

blue 7C, 7B, 7A

green 1C, 1A

2 Colour the following seats the colour indicated.
12A, 12B purple 3D,3F yellow 22C pink

3 **a** What is the scale on this diagram? 1:250

b How many millimetres on this diagram are the same as 1 metre on the real plane?

4 mm

4 Use a ruler to accurately measure, to the nearest millimetre, the length of the following sections of the plane. Use the scale to calculate how long these sections of a real plane would be.

a from wing tip to wing tip

length on scale drawing: 11.7 cm

length on real plane: 29.25 m

b width of the cabin

width on scale drawing: 1.7 cm

width on real plane: 4.25 m

c from nose to tail

length on scale drawing: 13.3 cm

length on real plane: 34.4 m

ISBN: 978-0-521-74540-6

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Using scales on maps

1 Complete the labelling of the grid on this map.

2 What feature can be found in each of the following grid squares?

a K8 Barrabadeen Peak

b L16 Lake Burrendong

c D10 Nangar National Park

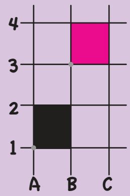
3 In which grid square are the following?

a Parkes G7

b Wellington Caves M14

c Mt Boiga I20

Remember!
The name of the grid square is taken from the lines that intersect at the bottom left hand corner. The black grid square is A1 and the pink grid square is B3.



4 Use a ruler and the scale provided to calculate the distances, in a straight line, between these locations.

From	To	Length on map	Calculation	Distance
Forbes	Orange	6.8 cm	$\frac{6.8}{2.5} \times 40$	108.8 km
Mudgee	Bathurst	5.9 cm	$\frac{5.9}{2.5} \times 40$	94.4 km
Peak Hill	Yeoval	2.6 cm	$\frac{2.6}{2.5} \times 40$	41.6 km

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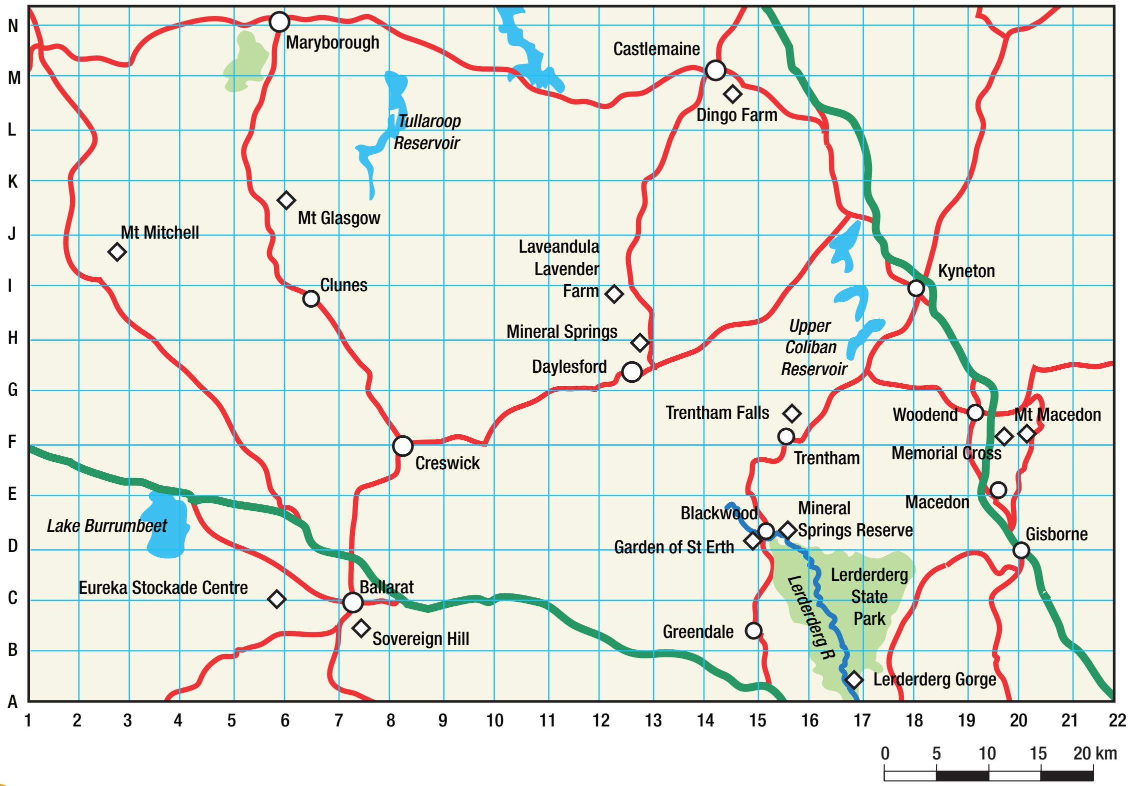
Using maps



1 In which grid squares are the following towns?

a Castlemaine M14 **b** Trentham F15

c Daylesford G12 **d** Clunes 6H

2 Which features are located in the following grid squares?

a I2 Mt Mitchell **b** L14 Dingo Farm **c** F20 Mt Macedon **d** B7 Sovereign Hill

3 Use a ruler and the scale on the map to calculate the straight-line distances between the following towns.

From	To	Length on map	Calculation	Distance
Ballarat	Clunes	4 cm	$\frac{4}{2.8} \times 20$	28.57 km
Greendale	Gisborne	3.7 cm	$\frac{3.7}{2.8} \times 20$	26.43 km
Woodend	Castlemaine	5.6 cm	$\frac{5.6}{2.8} \times 20$	40 km

4 How can you calculate the distance that would be travelled between these places if you followed the roads that are marked?

Cut a piece of string to match the length of the winding road, then measure that length.

5 Use the method you have described in Question 4 to calculate the distances by road between these towns.

From	To	Length on map	Calculation	Distance
Creswick	Maryborough	6.5 cm	$\frac{6.5}{2.8} \times 20$	46.43 km
Gisborne	Kyneton	4.4 cm	$\frac{4.4}{2.8} \times 20$	31.42 km
Daylesford	Ballarat	5.5 cm	$\frac{5.5}{2.8} \times 20$	39.28 km

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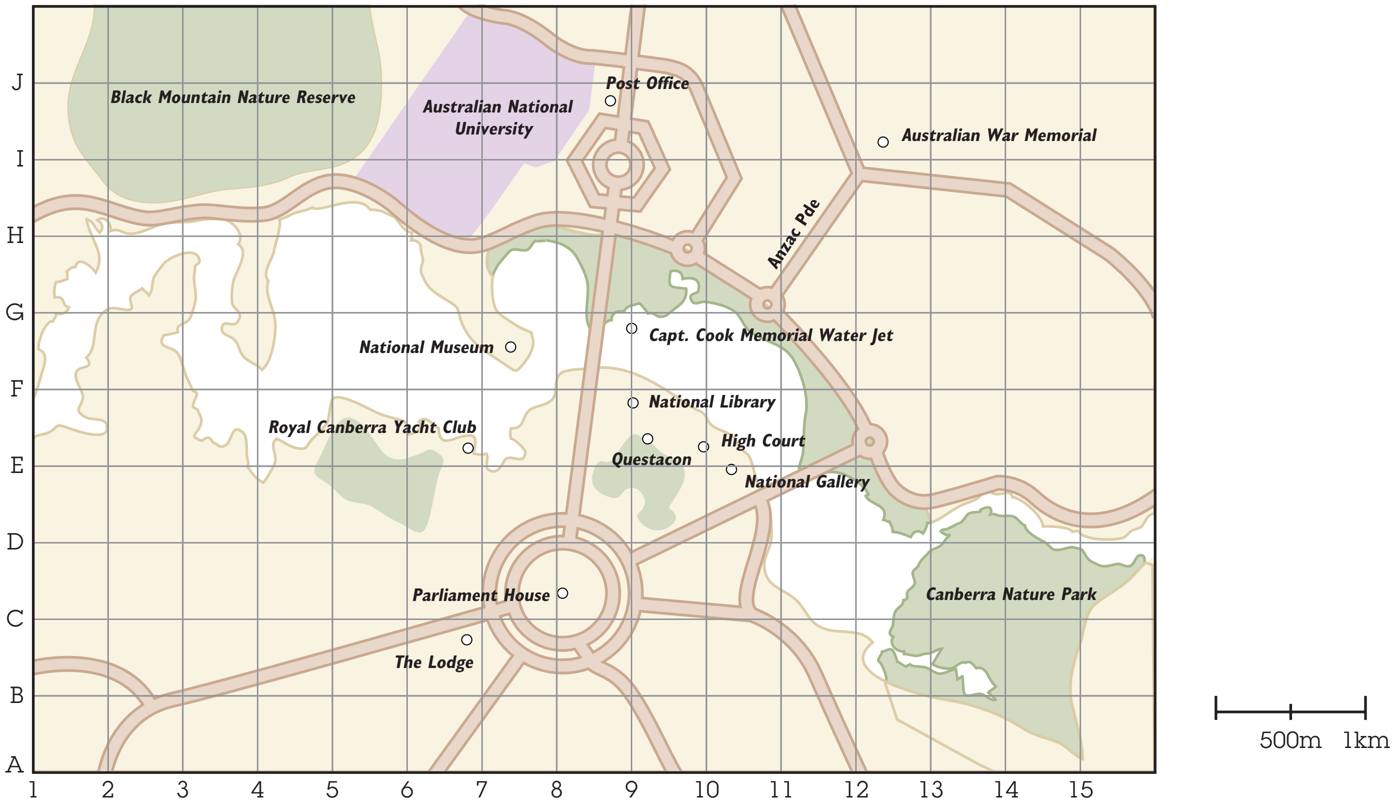

1 Draw and label a 1 cm grid on this map.

2 In which grid squares are the following:

a Post Office I8
b Parliament House C7
c National Museum F7
d Questacon E9

3 The straight-line distance from the Royal Canberra Yacht Club to Questacon is 1250 m.

a Measure the distance between these locations on the map. 25 mm

b Calculate how many metres are represented by 1 mm on this map.

1 mm = 50 mm

c Write or draw a scale on the map.

4 Use your scale to calculate the following distances.

a The length of ANZAC Parade

1 km

b The Lodge to Parliament House

750 m

c The National Gallery from the National Museum

1650 m

d Australian War Memorial to the National Library

2.4 km

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Rotational symmetry

1 Identify with a tick (✓), which of these objects has rotational symmetry.

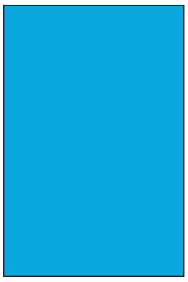

a ☐

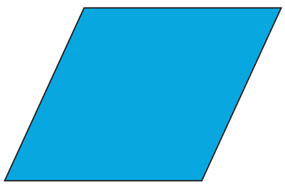

b ☐

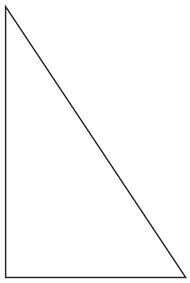

c ✓

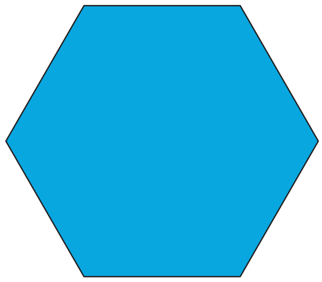

d ✓

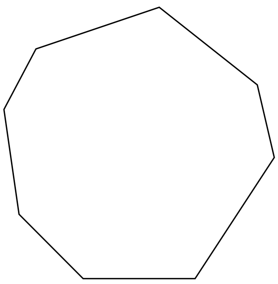
2 Colour in blue the shapes that have rotational symmetry. For these shapes, identify the order of rotational symmetry. You may like to use geoboards, geostrips or shapes cut from paper to help you.

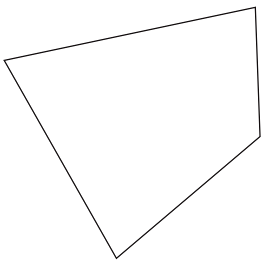

Rectangle 4

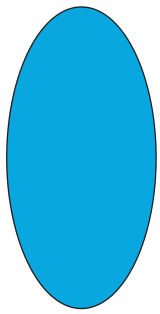

Rhombus 2

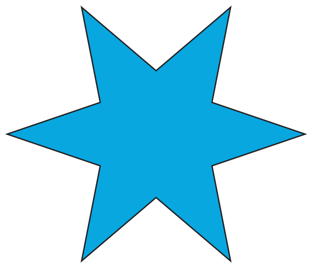

Right-angle triangle ______


Hexagon 6


Irregular octagon ______


Quadrilateral ______

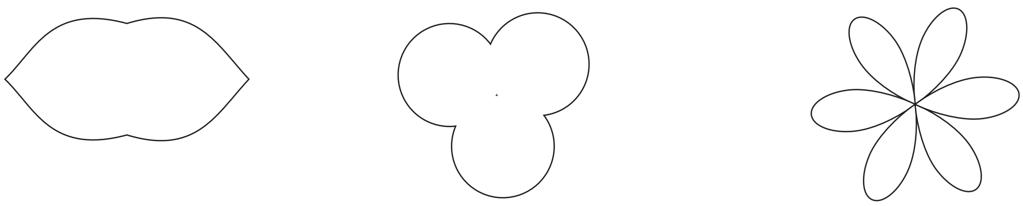

Oval 2


Star 6

3 Construct your own shapes that have a rotational symmetry of:

a order 2 **b** order 3 **c** order 6

34



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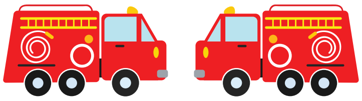
Transformations

1 Indicate the type of transformation performed for each of the original images below. Where the image has been rotated, indicate the rotation in degrees. Where an image has been enlarged or reduced, indicate by what factor. More than one transformation may have taken place.

a Original

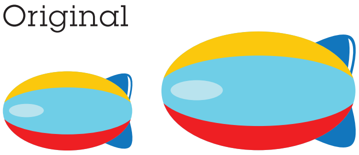


reflection

b Original

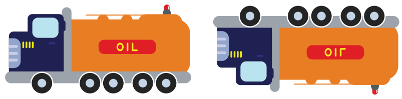
rotated 90°

c Original



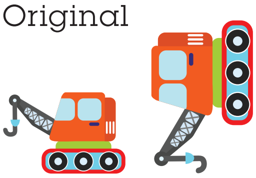
enlarged

d Original



rotated 180°

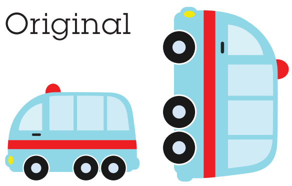
e Original



enlarged

rotated 90°

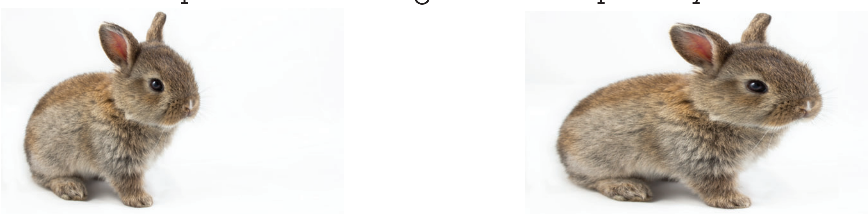
f Original



enlarged

rotated 90°

2 Is this an example of an enlargement? Explain your answer.



No, the picture has not been enlarged the same amount to all directions.

3 Is this an example of a reflection or a 180-degree rotation? Explain your answer.

It is an example of both.

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Enlarging and reducing

1 Look at these three pictures. Complete the table, describing how they are the same and how they are different.

How are the pictures the same?	How are the pictures different?
Images are identical	different sizes

2 Look at these maps. Complete the table, describing how they are the same and how they are different.

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How are the maps the same?	How are the maps different?
Each show a section of NSW	Different parts of NSW are shown
Each shows Sydney	They show different aspects of land
	Different roads

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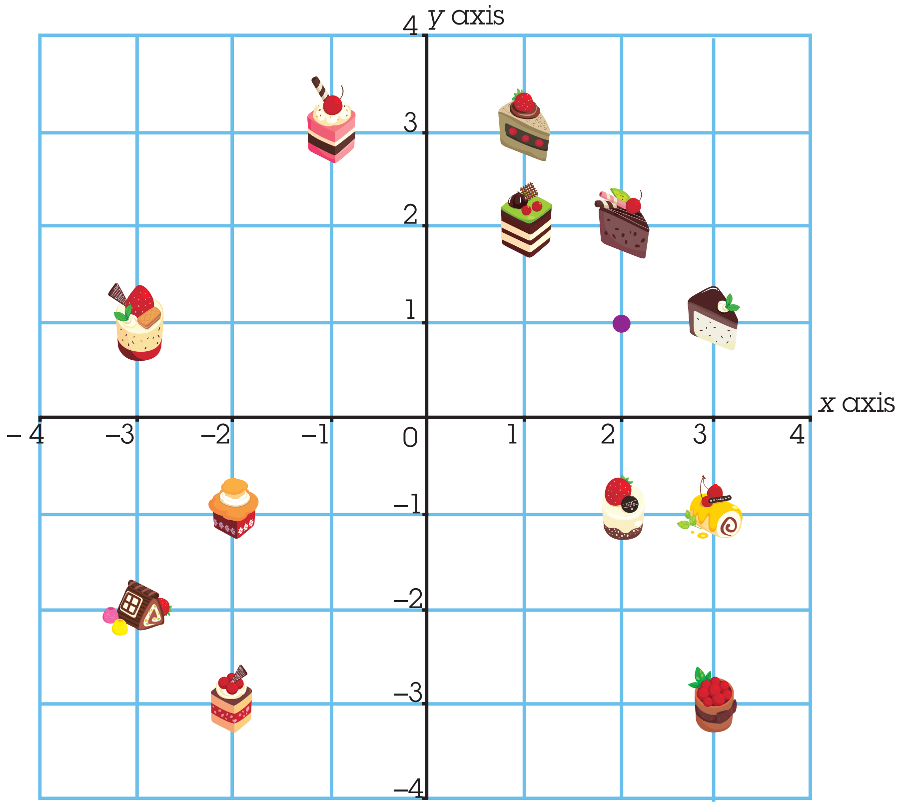
Cartesian cakes

Cartesian coordinates are used to describe the location of points in space. They work in a similar way to the grid coordinates used on maps.
There are a few key differences between the two systems. Instead of indicating a grid square on a map, Cartesian coordinates indicate a point where the coordinates meet on a pair of number lines, called axes.
The axes meet at a point called the origin, which has the coordinates (0,0). Unlike the grid coordinates on a map, each axis is numbered and has both positive and negative values.
The horizontal axis on the grid is called the '*x*-axis', and the vertical axis is called the '*y*-axis'.
The coordinates must always be listed in the right order – the position on the *x*-axis is listed first, followed by the position on the *y*-axis.

For example:
To describe the location of the purple dot on the grid below, start from the origin (0,0):
Move 2 places along the *x*-axis. Then move 1 place up the *y*-axis. The position is written (2,1).

1 Describe the location of each of the cakes in the grid using Cartesian coordinates. The first one is done for you.



a  (–3, 1)

b  (−2 , −1)

c  (1 , 2)

d  (3 , 1)

e  (3 , −3)

f  (−3 , −2)

g  (−2 , −3)

h  (1 , 3)

i  (2 , −1)

j  (3 , −1)

k  (−1 , 3)

l  (2 , 2)

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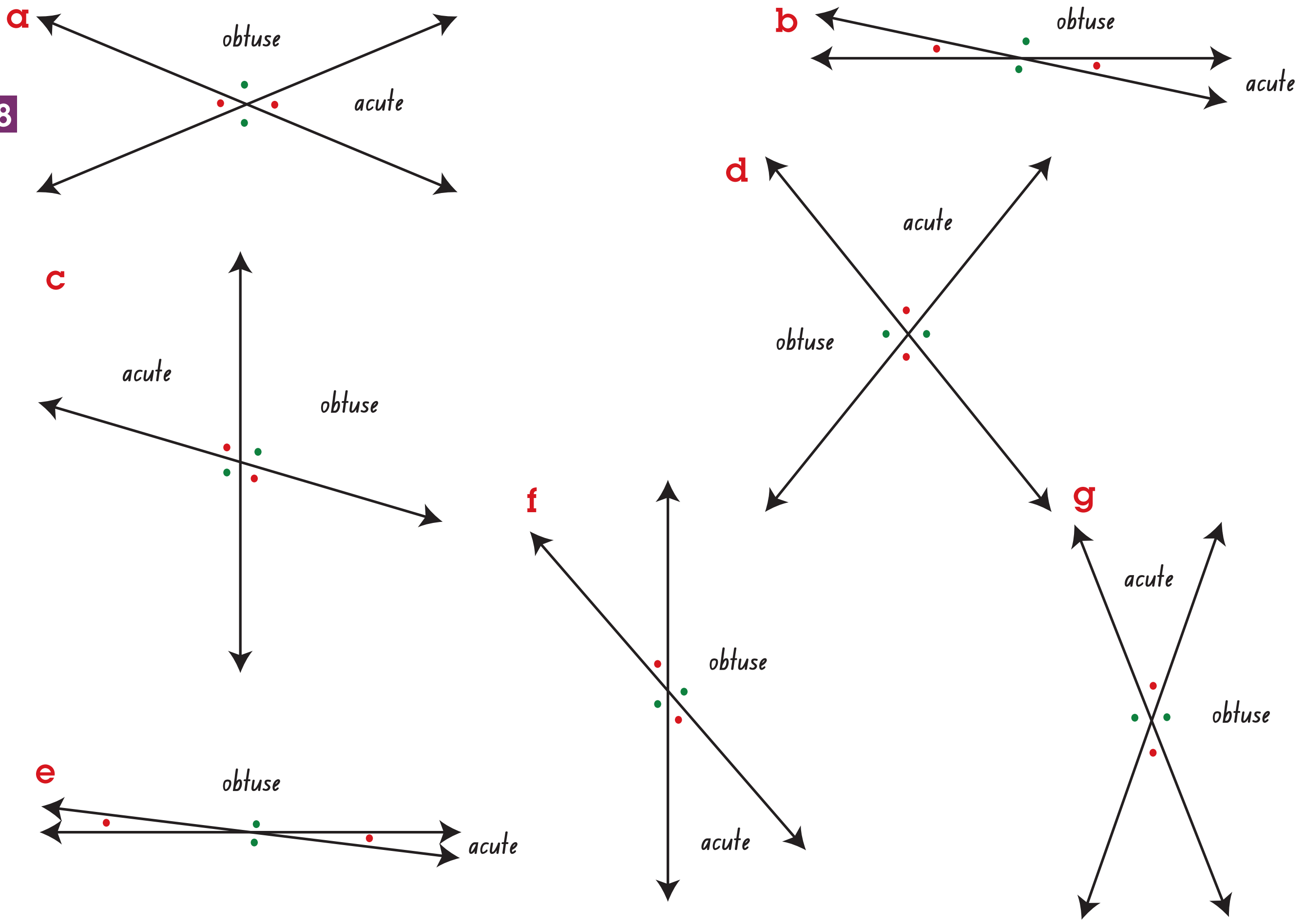
Angles at intersecting lines

38

1 Identify the acute and obtuse angles of the intersecting lines below. Mark the acute angles with a red dot and the obtuse angles with a green dot.



2 Using the information from Question 1, complete the following statements.

In each set of intersecting lines there are ___two___ acute angles and ___two___ obtuse angles. The acute angles are located ___opposite___ each other and the obtuse angles are also located ___opposite___ each other. The obtuse and acute angles never appear ___opposite___ each other.

3 Explain why acute and obtuse angles must always be arranged in this way when lines intersect.

Because the acute and obtuse angles must be adjacent to each other as they add up to 180°.

Share your answer to Question 3 with a classmate. Did they have a different explanation?

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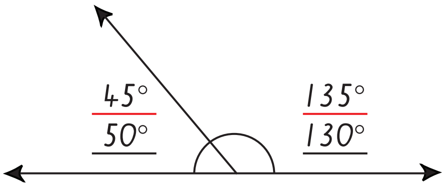
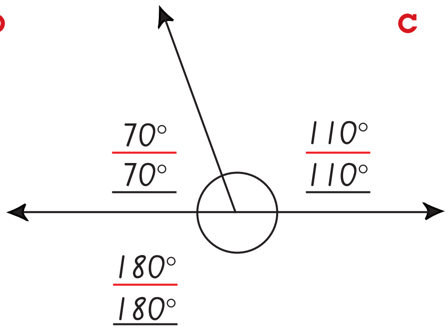
Estimating and finding angles

1 For each of the sets of angles below, estimate each angle, and then write your answer on the red line near that angle. It may help to consider whether the angle you are looking at is acute, obtuse, reflex or straight.

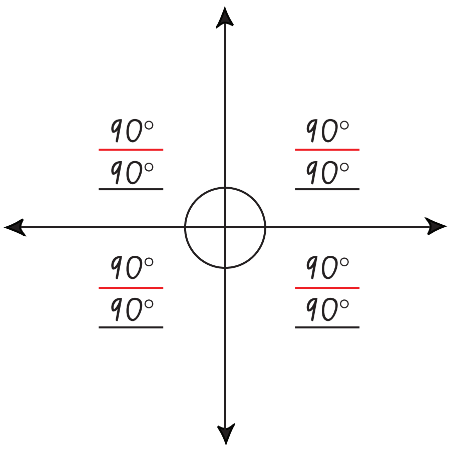
a



b



c

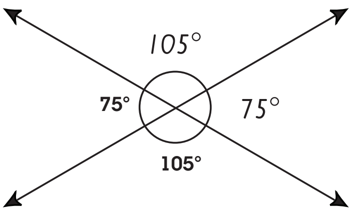


2 Using a protractor, measure each of the angles you estimated in Question 1, and then write your measurements on the black lines near each angle. How close were you? Were there any that you got exactly right?

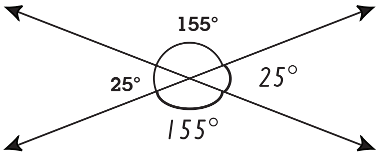
Answers will vary

3 Solve and write in the missing angles for each of these vertically opposite angle pairs. Do not use a protractor.

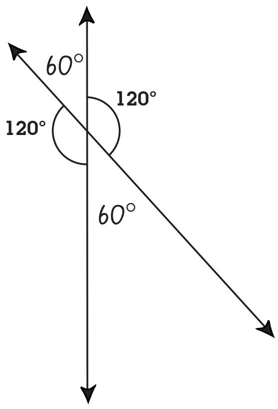
a



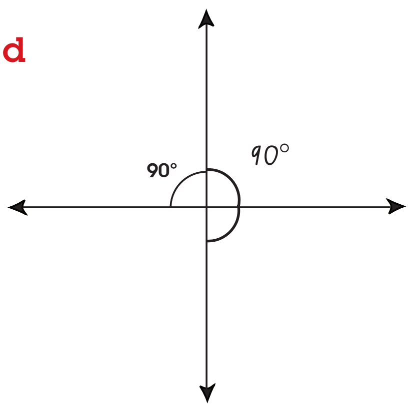
b



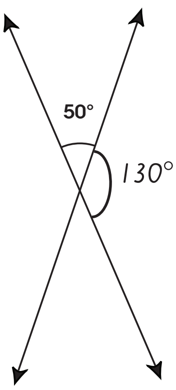
c



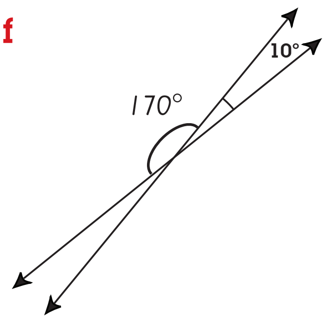
d



e



f



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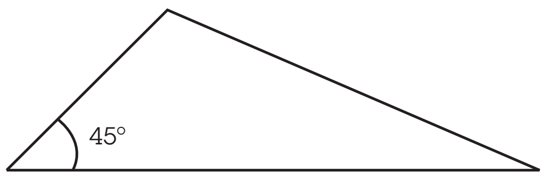
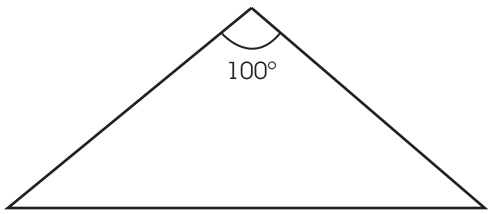
Constructing triangles

1 Construct the triangles that are described.

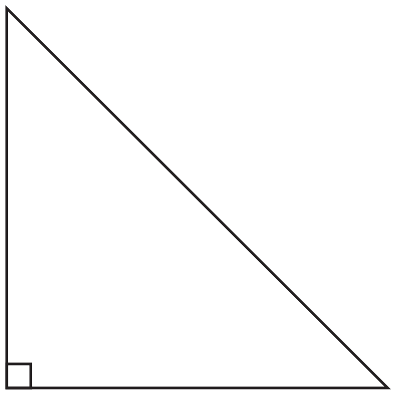
a A scalene triangle with one angle of 45°.



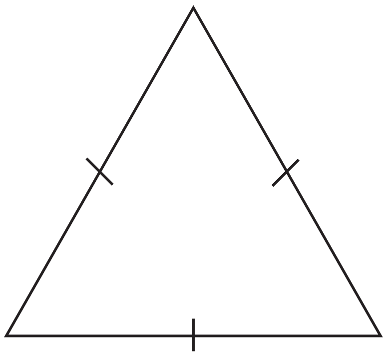
b An isosceles triangle with one angle that measures 100°.



c A right-angled triangle.



d An equilateral triangle.



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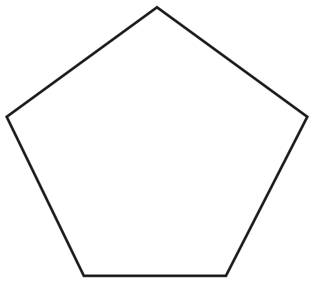
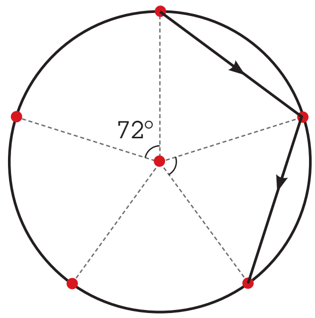
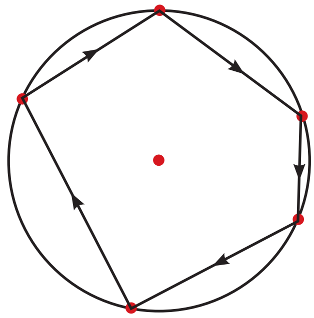
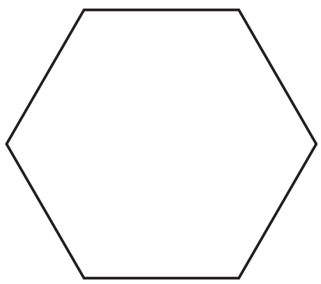
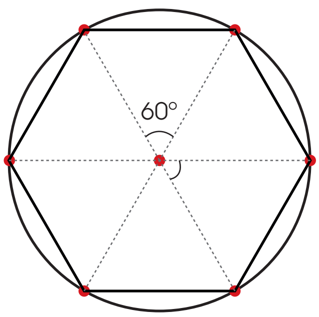
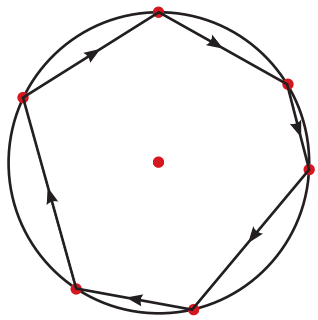
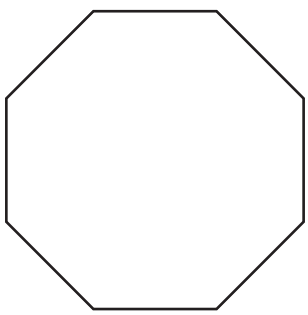
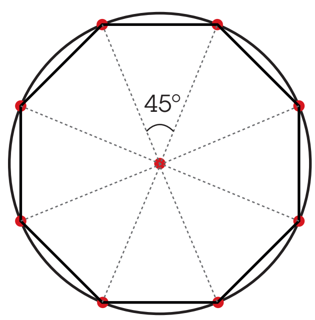
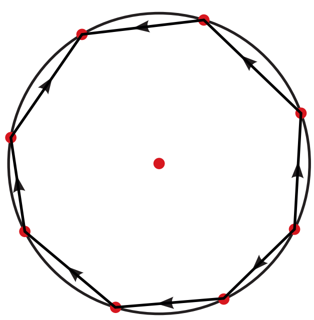
Drawing shapes

1 Trace each shape in the first column of the table below, using a block or template.

2 Construct a regular shape by marking a point on the circle at the angle measurement given. Then connect the points. The first one has been started for you.

3 Construct an irregular shape by marking points on the circle at any location. Then connect the points. The first one has been started for you.

a	Trace a pentagon 	Regular pentagon; mark every 72° 	Irregular pentagon; 5 marks at any place 
b	Trace a hexagon 	Regular hexagon; mark every 60° 	Irregular hexagon; 6 marks at any place 
c	Trace an octagon 	Regular octagon; mark every 45° 	Irregular octagon; 8 marks at any place 

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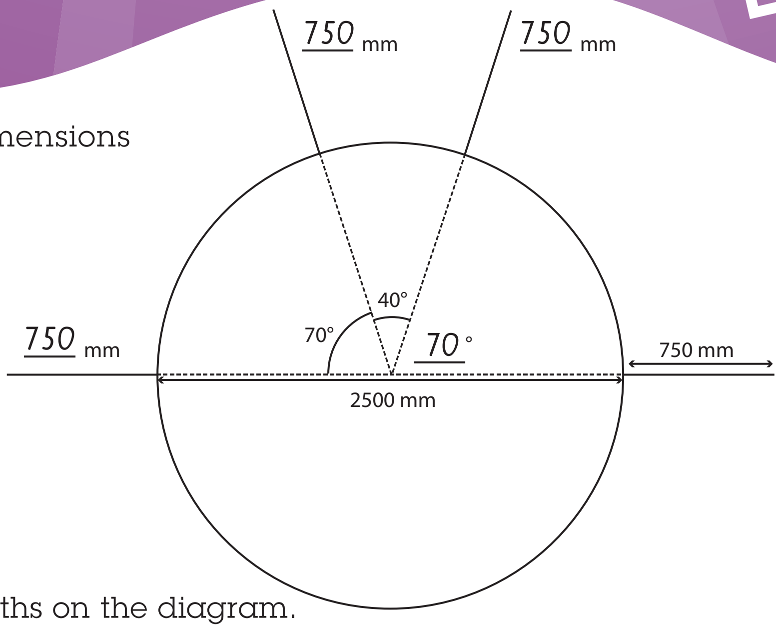
Discus drawing

This sketch details the layout and dimensions of a discus throwing circle.



Remember!
A line has 180°.
A circle has 360°.

1 Fill in the missing angles and lengths on the diagram.

2 Calculate how long each of the following parts of the discus circle would be on a diagram with a scale of 1:5.

a the diameter of the circle 500 mm

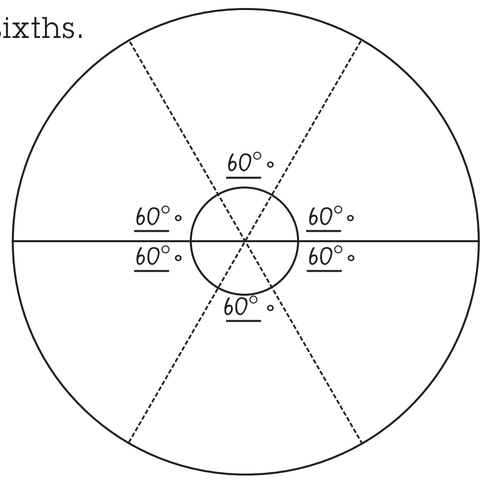
b the lines coming out of the circle 150 mm

c each of the angles 70°, 40°, 70°

d Explain your answer to Question 2c with reference to what you know about enlargement.

Enlargement changes the size but not the shape, so the angles do not change.

3 The circle below is divided into sixths.



a Without measuring the angles with a protractor, calculate the size of each angle. Write down how you worked out your answers.

$360° \div 6 = 60°$

b Now check your answer with a protractor. Write the measurements in the spaces provided.

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