Prism or pyramid?

1 Identify the photographs that show objects that resemble:

🔥 **30**

a a cube _____ *A, B, D, F* _____

b a square pyramid _____ *C, E, H* _____

c a triangular prism _____ *G* _____

A	**B**	**C**	**D**
E	**F**	**G**	**H**

2 Group the shapes below by colouring the prisms red and the pyramids blue.
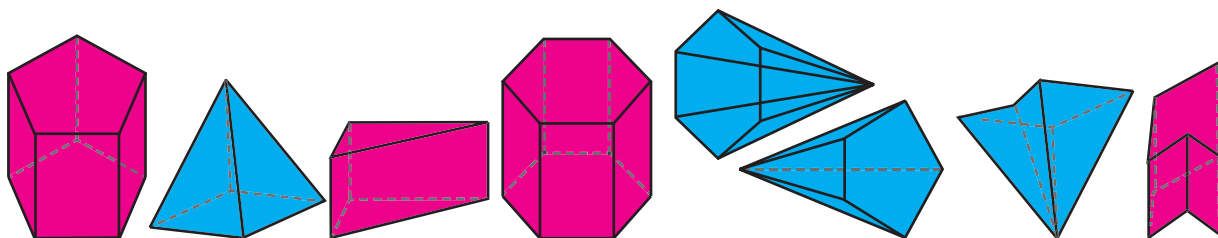
3 How are the following pairs of solids the same? How are they different?

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

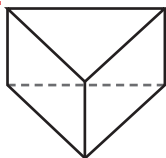_Both shapes taper to a peak. They have a different number of sides._

c octagonal prism and octagonal pyramid

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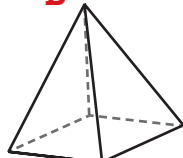
keeps the same width along its entire length.

MiB 3
Card 155

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   B   C   D   E   F
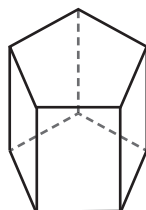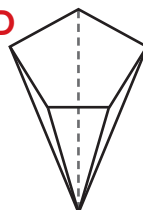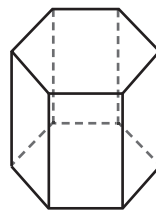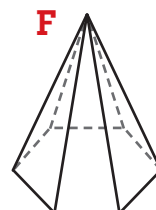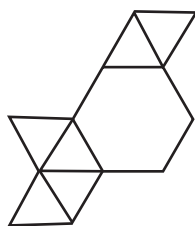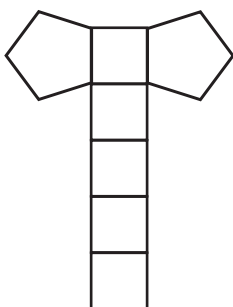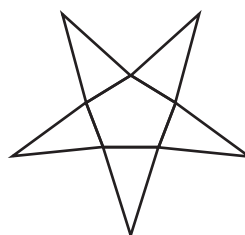
1   2   3   4
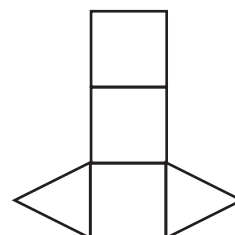
5   6   7   8

<u>A = 4</u>   <u>B = 8</u>   <u>C = 2</u>   <u>D = 3</u>   <u>E = 5</u>   <u>F = 6</u>

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

Answers will vary

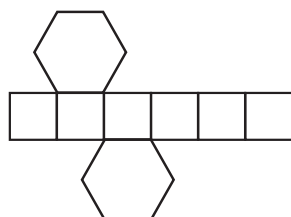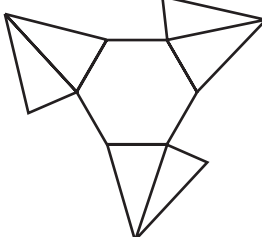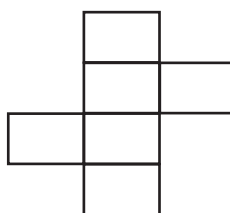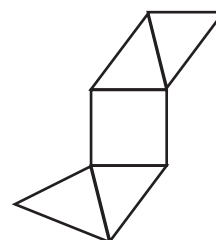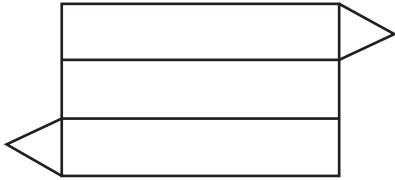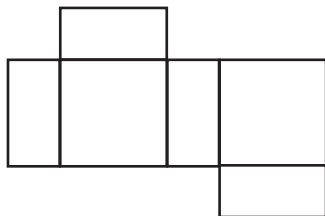**1** Draw the solid, showing depth, which is formed by the following nets.

a
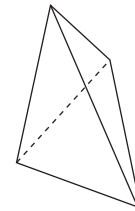
🔥 **31**

b

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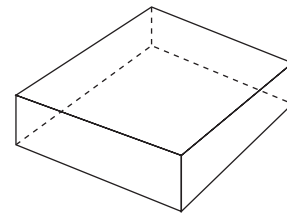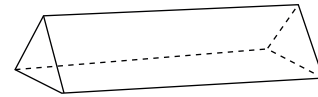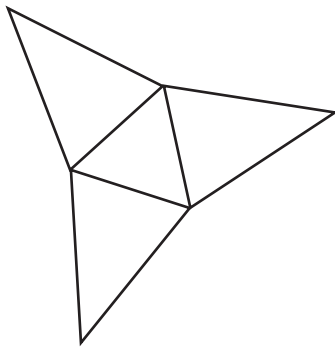
2 Use the pictures of the die to draw its net, showing the positions of the coloured dots.
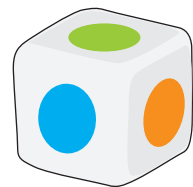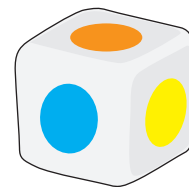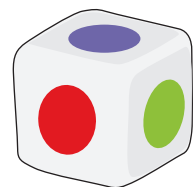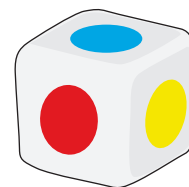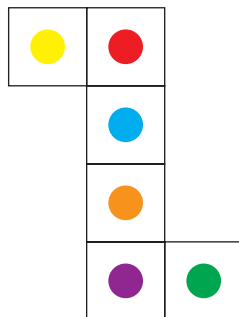
Cutting solids

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
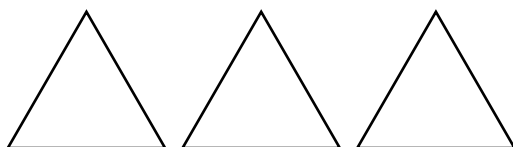
i _Prism_

ii _Triangular prism_

iii

b
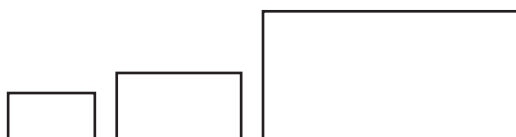
i _Pyramid_

ii _Rectangular pyramid_

iii

c
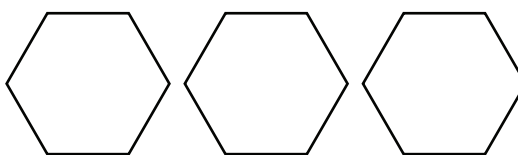
i _Prism_

ii _Hexagonal prism_

iii

d
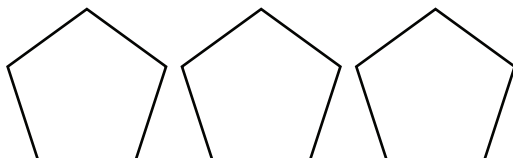
i _Prism_

ii _Pentagonal prism_
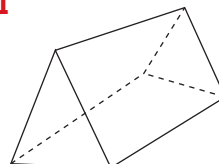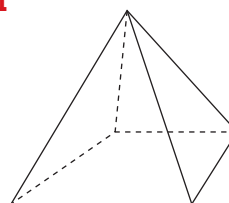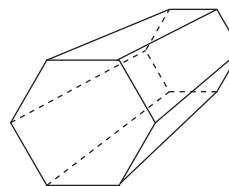
iii
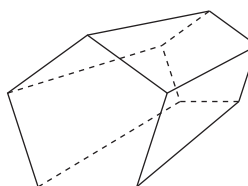
2 Draw three cross sections from:
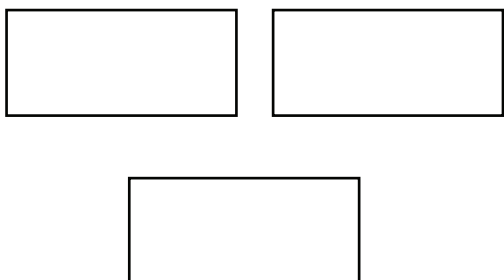
a a rectangular prism   **b** a pentagonal pyramid
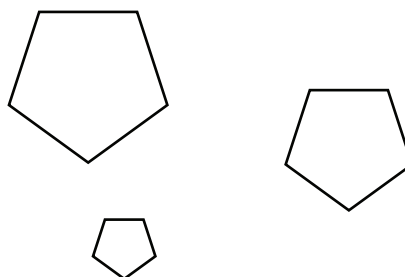
Drawing three-dimensional objects

1 Draw each of the following solids.

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

32
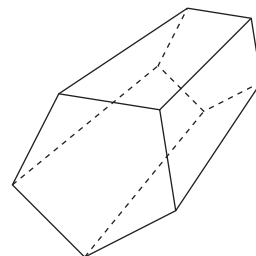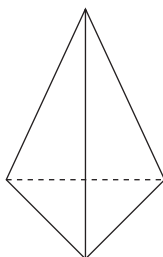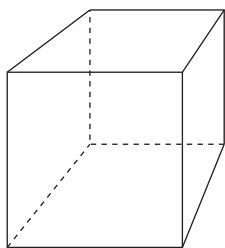
d rectangular pyramid **e** hexagonal prism **f** octagonal pyramid
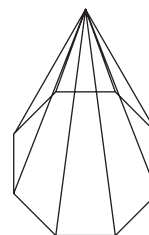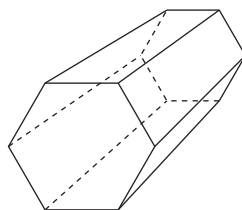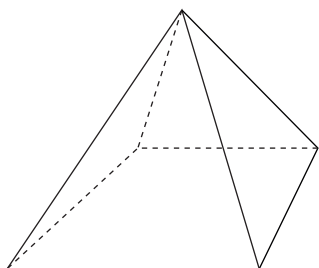
2 Draw each solid, showing depth, from the perspective indicated by the arrow.

102 Shape
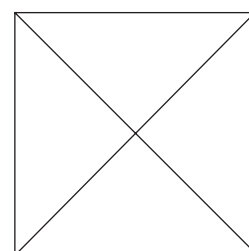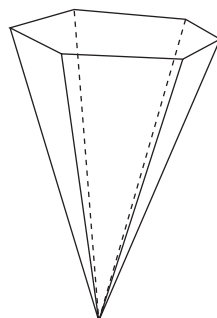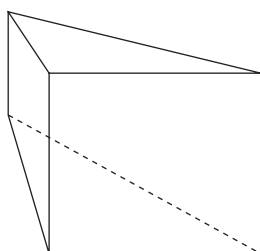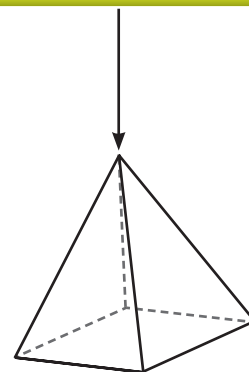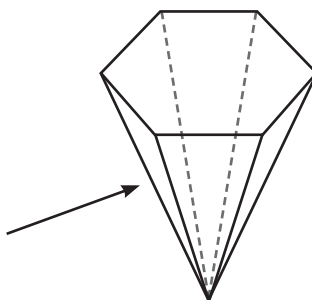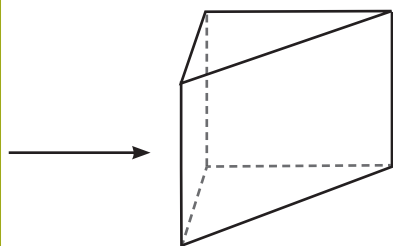
Which object is it?

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

a

✓
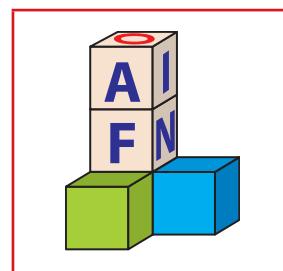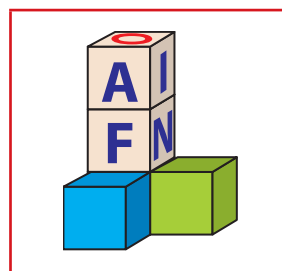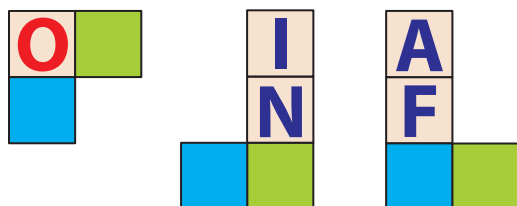
b

✓
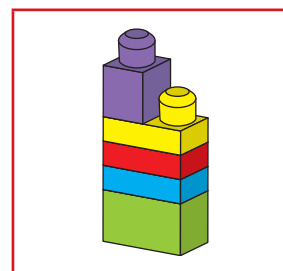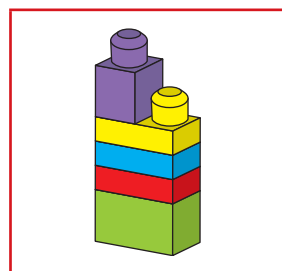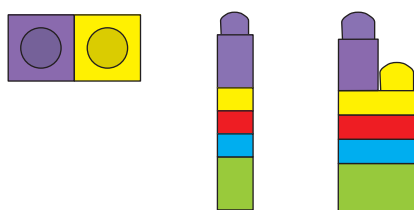
c

✓
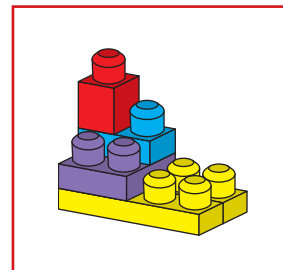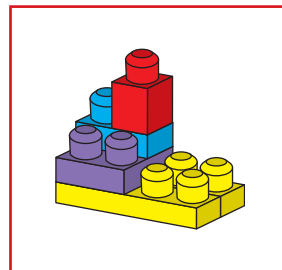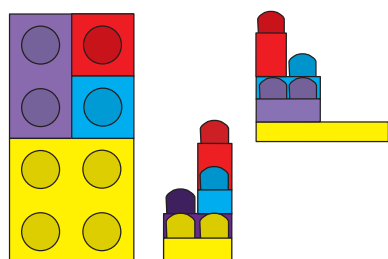
d

✓
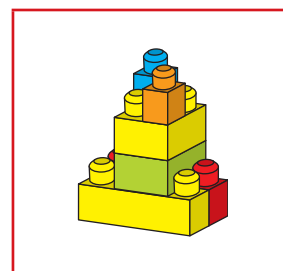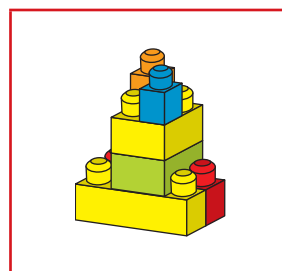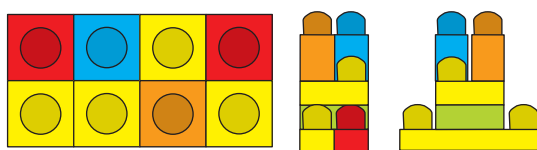
e

✓
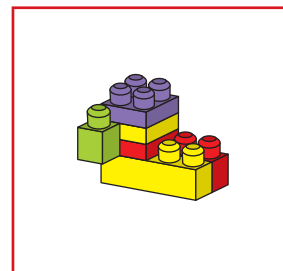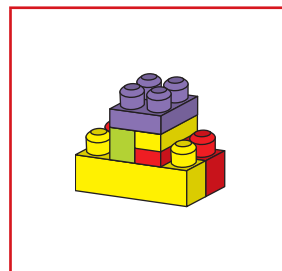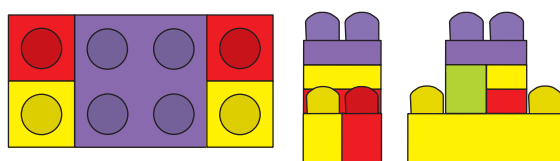
Constructing block towers

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 **b** **c**
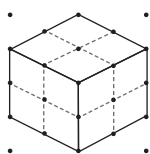
8 cubes   9 cubes   18 cubes

d **e**

13 cubes   22 cubes

f **g**
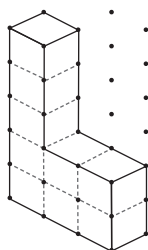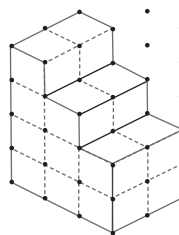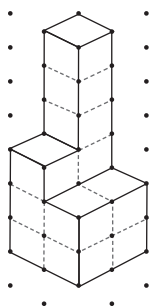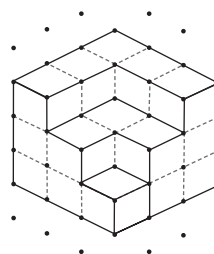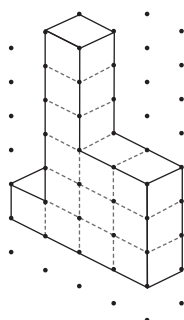
13 cubes   44 cubes
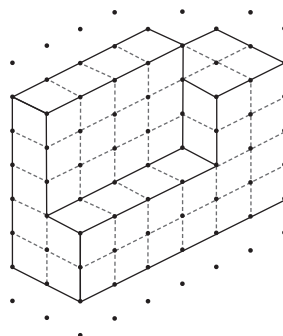
Drawing angles

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.

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*_____
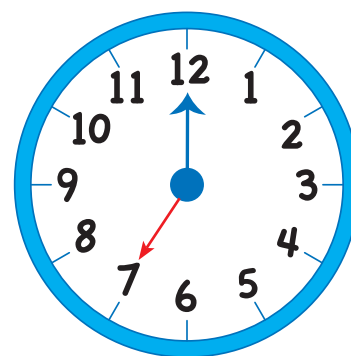
d Clock – one arm visible. Draw a new arm so that the clock is showing 7 o'clock.
Type of angle: _____*reflex*_____

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*	$360°$

Shape **105**

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
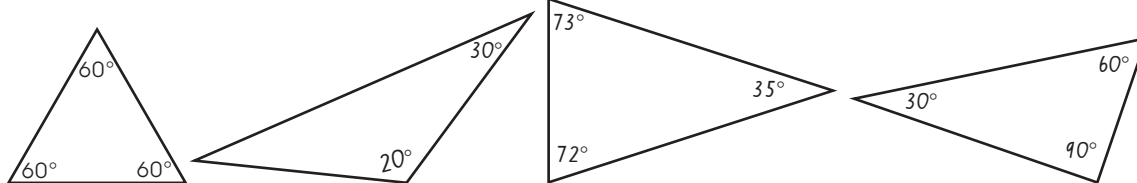
Type: _Equilateral_   _Isosceles_   _Scalene_   _Right_

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.
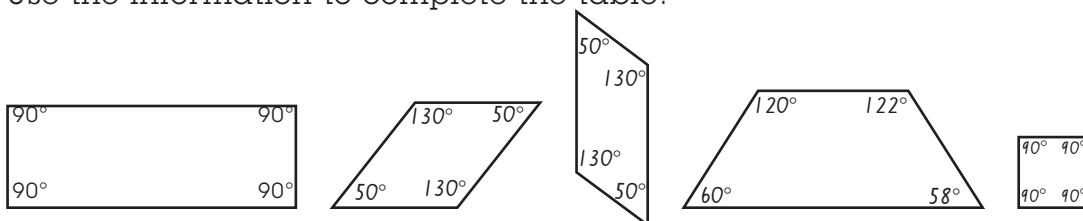
Type: _Rectangle_   _Rhombus_   _Parallelogram_   _Trapezium_   _Square_

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

106   Shape

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?
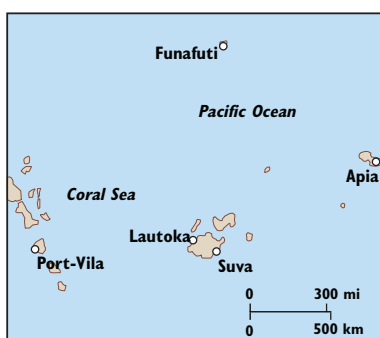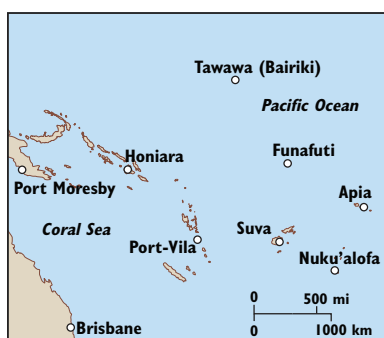
Same area, different scale

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:

MiB 3
Card 173

Location and Transformation   **107**

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

M
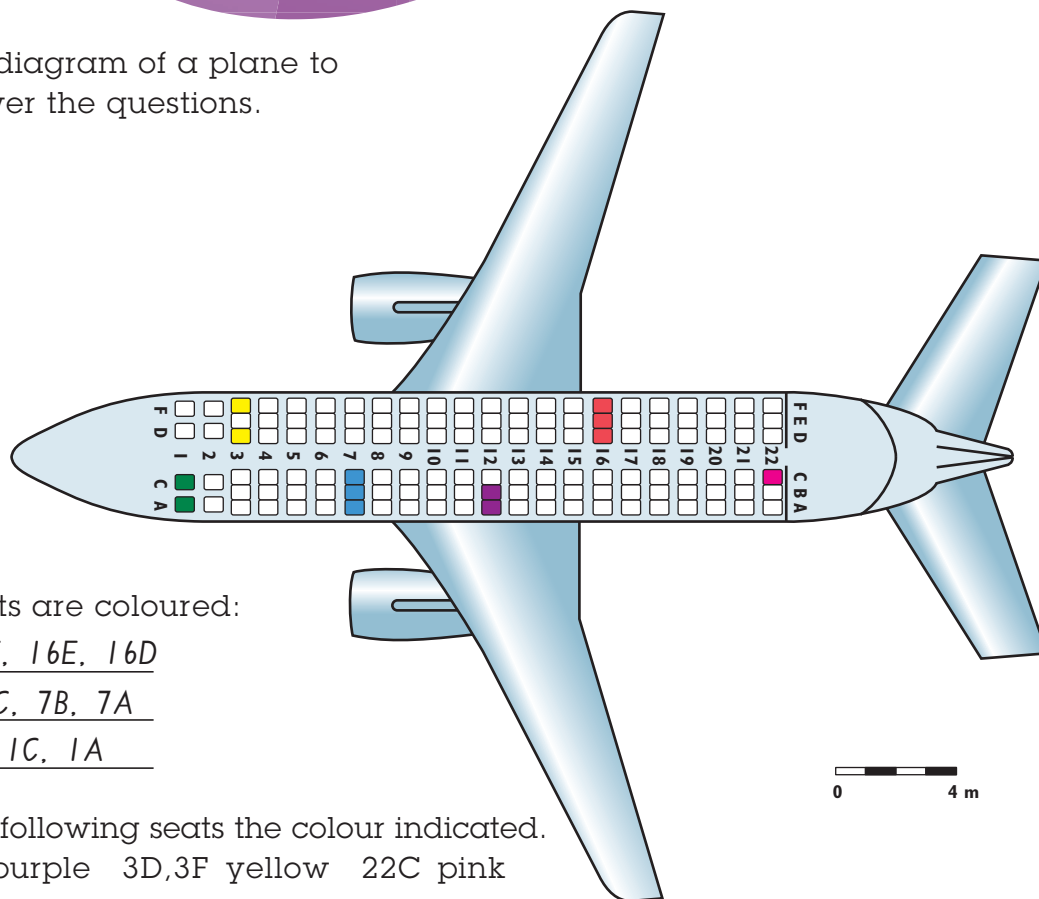
1 Which seats are coloured:

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_

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 H11 _____Barrabadeen Peak_____

b P12 _____Lake Burrendong_____

c J4 _____Nangar National Park_____

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.

3 In which grid square are the following?

a Parkes _____G7_____

b Wellington Caves _____N13_____

c Mt Boiga _____T9_____
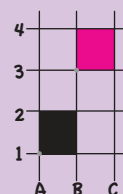
4 Use a ruler and the scale provided to calculate the distances, in a straight line, between these locations.

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

MiB 3
Card 174

Using maps
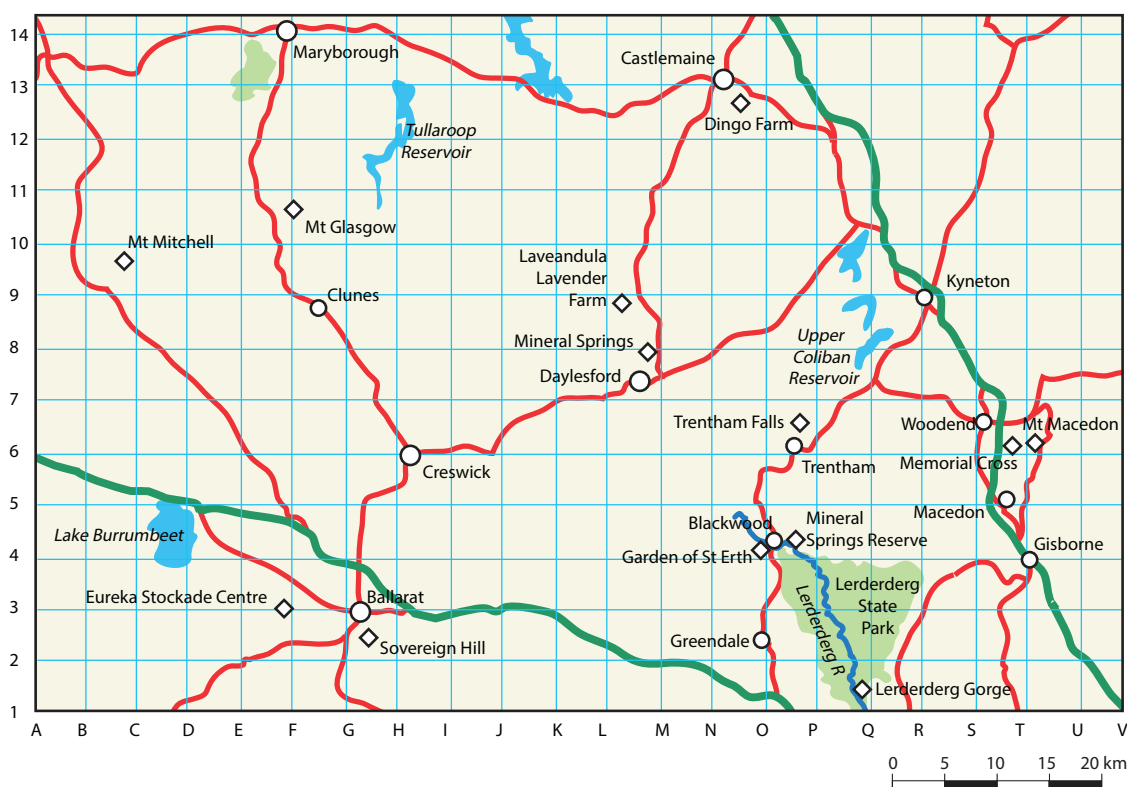
1 In which grid squares are the following towns?

a Castlemaine ___N13___   **b** Trentham ___O6___
c Daylesford ___L7___   **d** Clunes ___F8___

2 Which features are located in the following grid squares?

a B9 _Mt Mitchell_ **b** N12 _Dingo Farm_ **c** T6 _Mt Macedon_ **d** G2 _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

110 Location and Transformation

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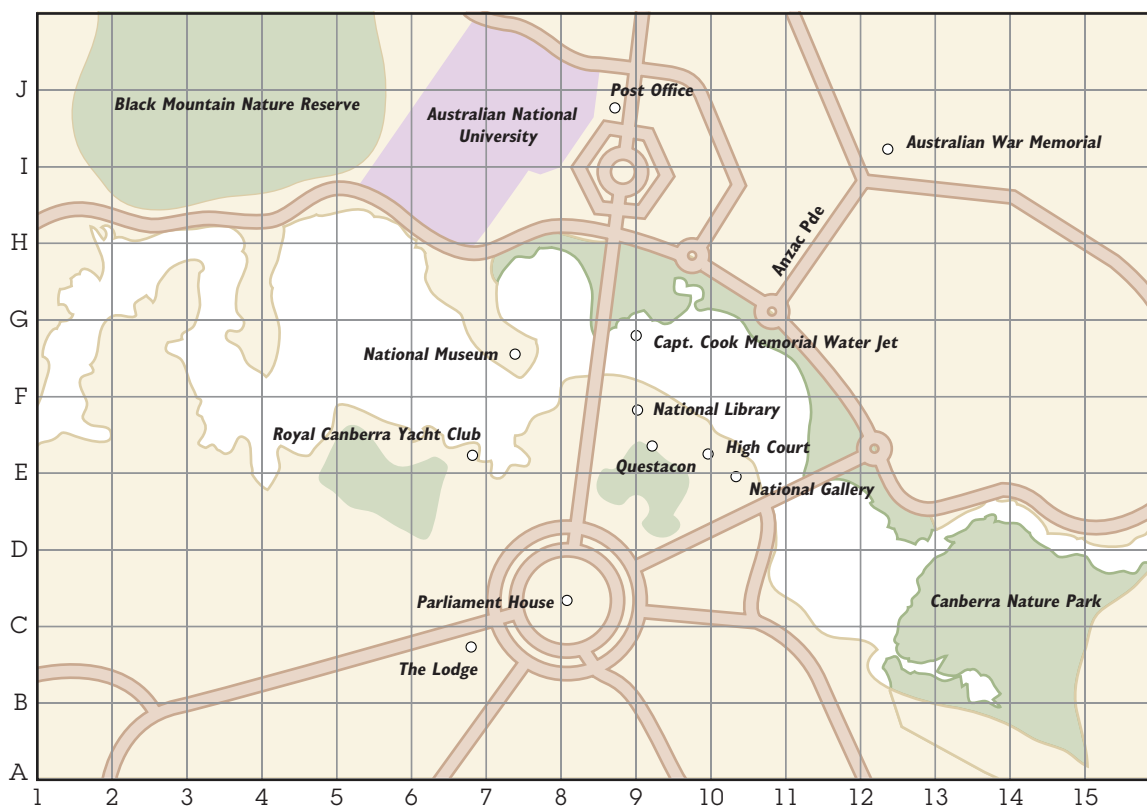
1 Draw and label a 1 cm grid on this map.

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

1 650 m

d Australian War Memorial to the National Library

2.4 km

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Location and Transformation   111

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.
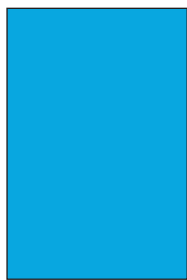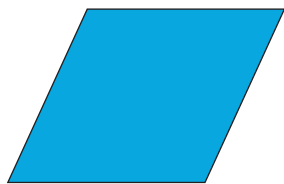
Rectangle __4__ Rhombus __2__ Right-angle triangle _____ Hexagon __6__
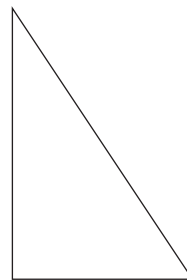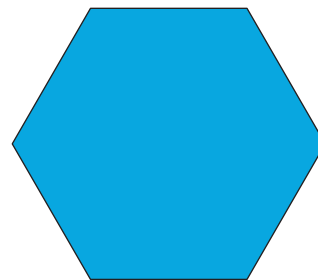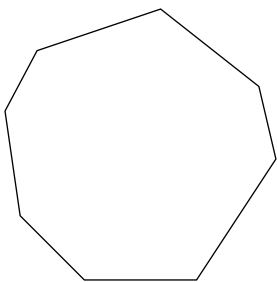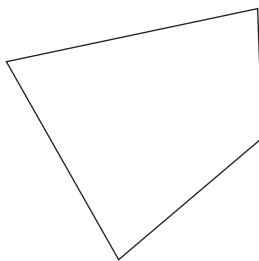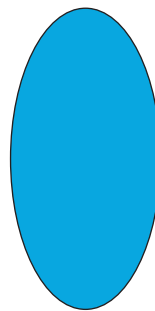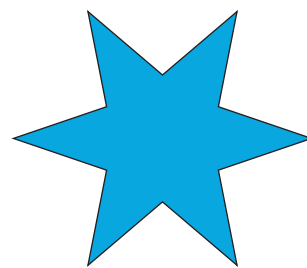
Irregular octagon _____ Quadrilateral _____ Oval __2__ Star __6__

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

a order 2 b order 3 c order 6

34

Location and Transformation
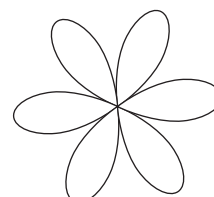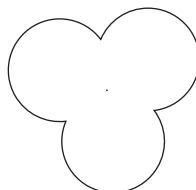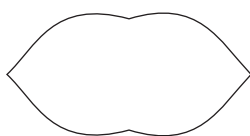
Transformations

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
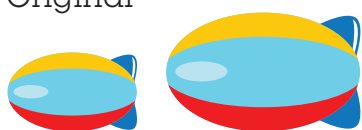
_____
_____enlarged_____

d Original
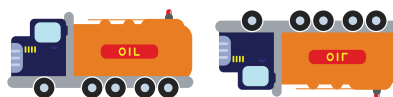
_____
_____rotated 180°_____

e Original

_____
_____enlarged_____
_____rotated 90°_____

f Original
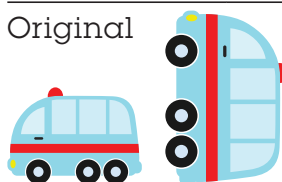
_____
_____enlarged_____
_____rotated 90°_____

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._____

_____

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.

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

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.

37
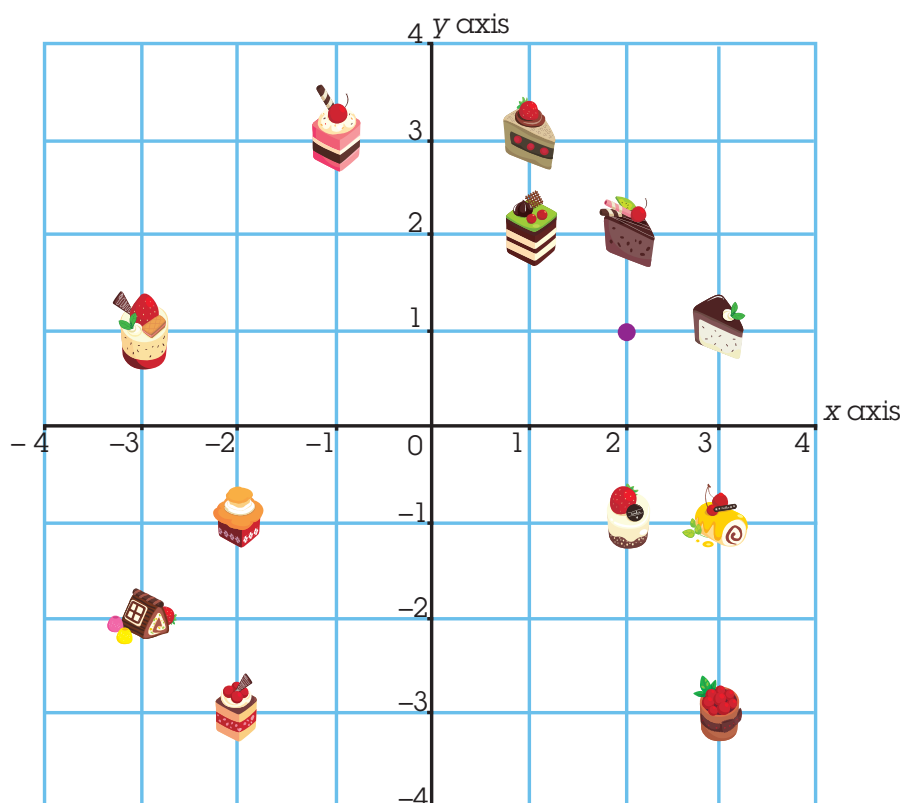
a   (−3, 1)   b   (−2 , −1)   c   (1 , 2)

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)

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.

a obtuse / acute

b obtuse / acute

c acute / obtuse

d acute / obtuse

e obtuse / acute

f obtuse / acute

g acute / obtuse

38
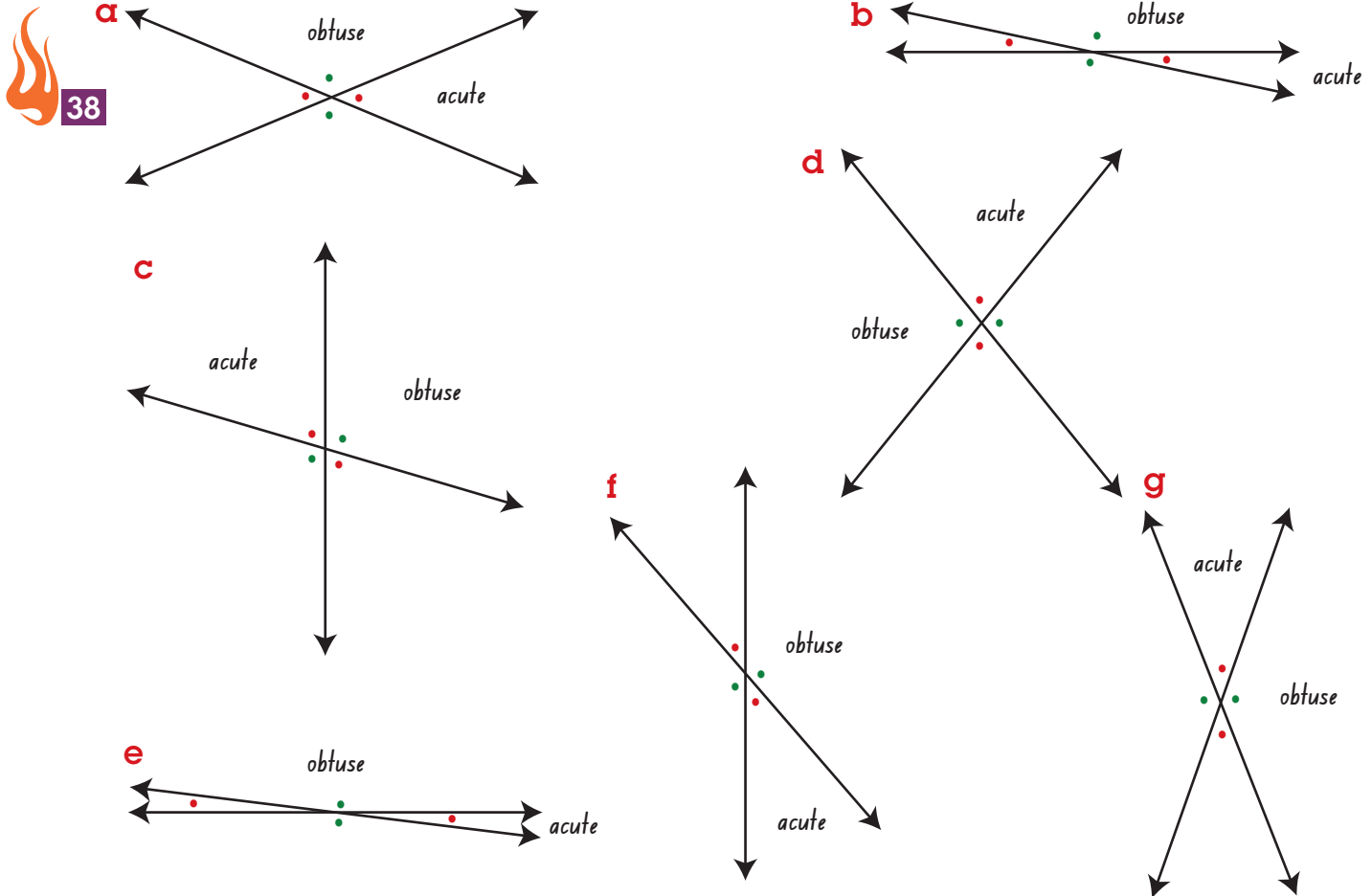
2 Using the information from Question 1, complete the following statements.

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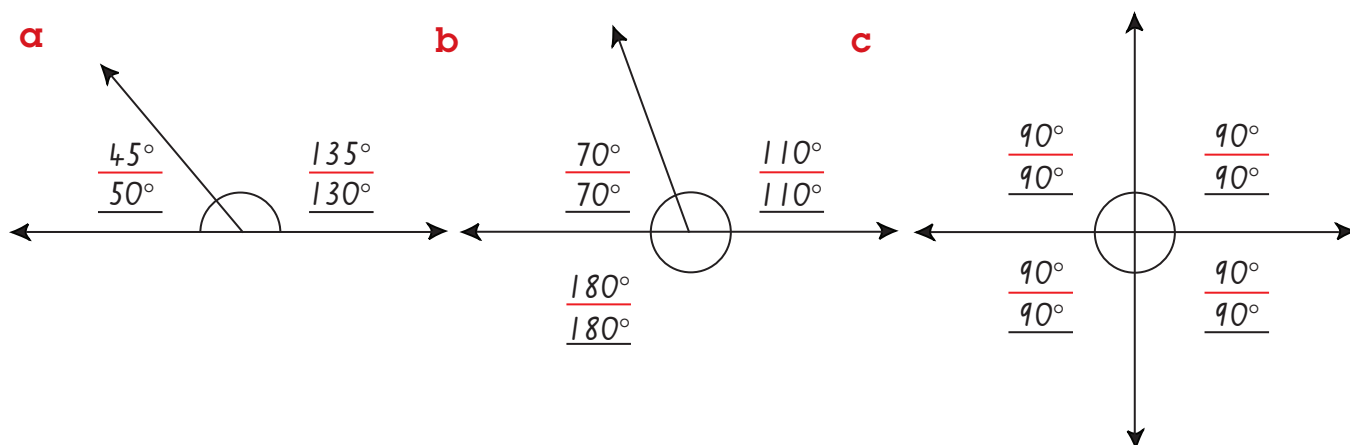
3 Explain why acute and obtuse angles must always be arranged in this way when lines intersect.

_____

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?

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

$\frac{45°}{50°}$ $\frac{135°}{130°}$

b

$\frac{70°}{70°}$ $\frac{110°}{110°}$

$\frac{180°}{180°}$

c

$\frac{90°}{90°}$ $\frac{90°}{90°}$

$\frac{90°}{90°}$ $\frac{90°}{90°}$

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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.
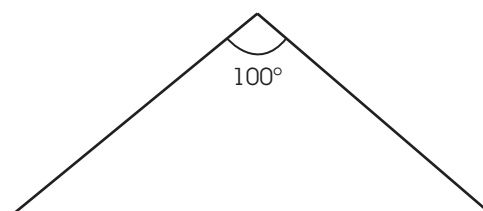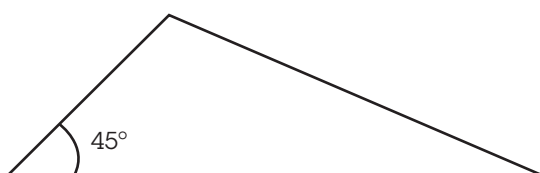
a

105°
75°   75°
105°

b

155°
25°   25°
155°

c

60°
120°   120°
60°

d

90°   90°

e

50°
130°

f

170°
10°
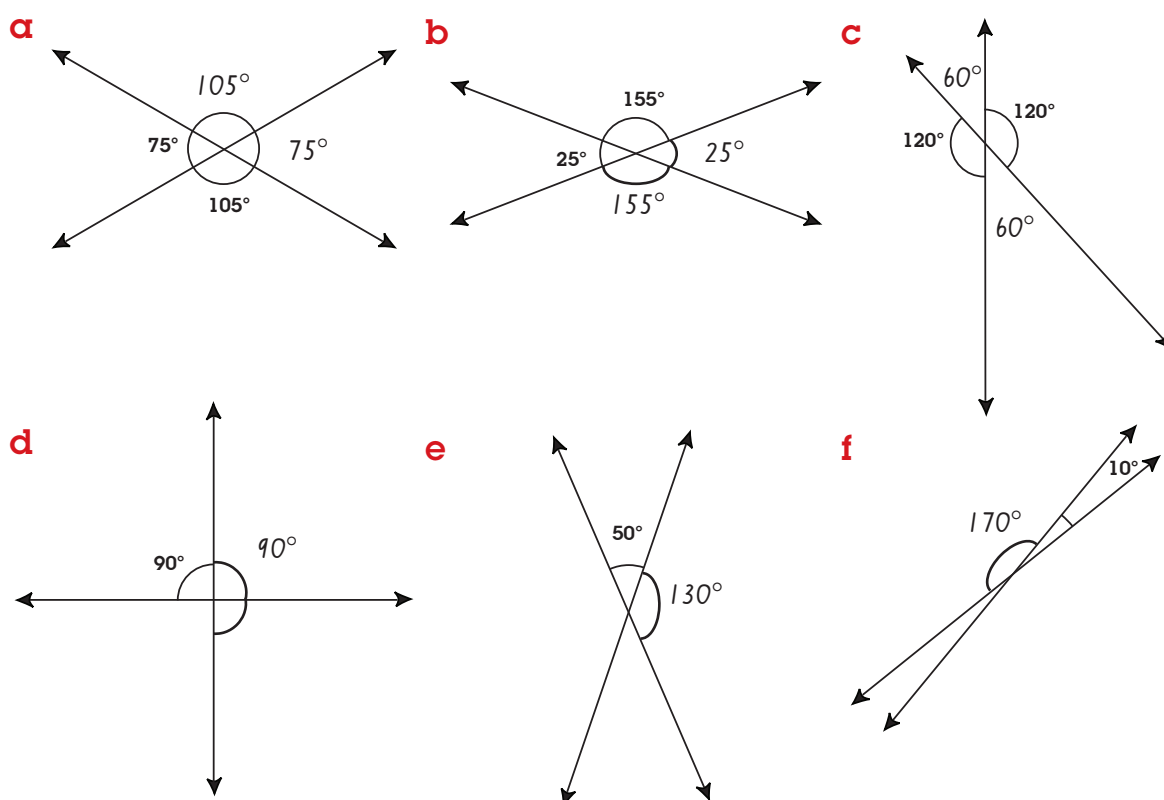
Constructing triangles

1 Construct the triangles that are described.
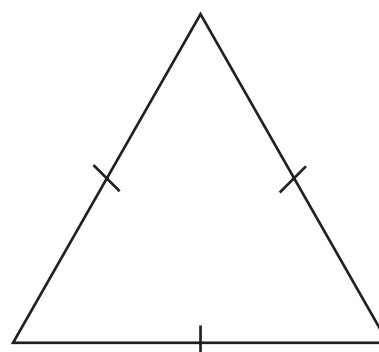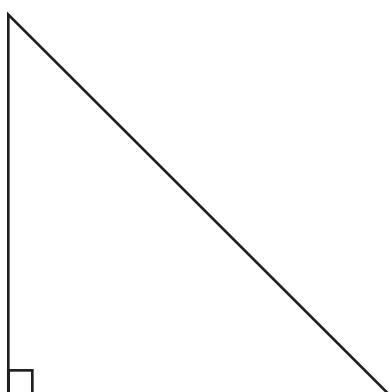
a A scalene triangle with one angle of 45°.

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

45°

100°
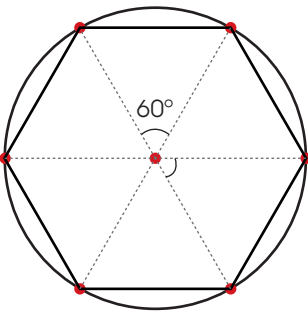
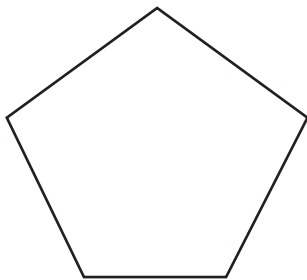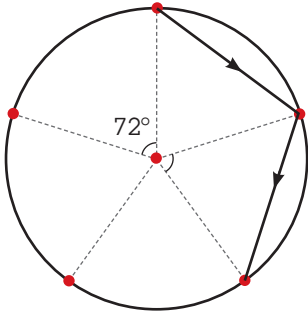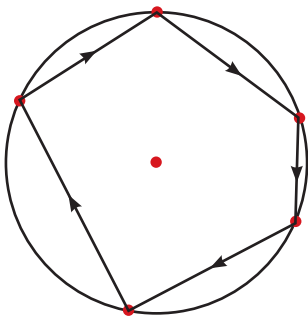**c** A right-angled triangle.
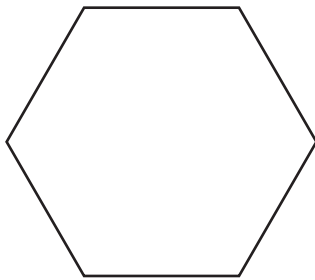
d An equilateral triangle.

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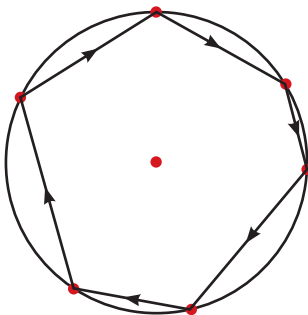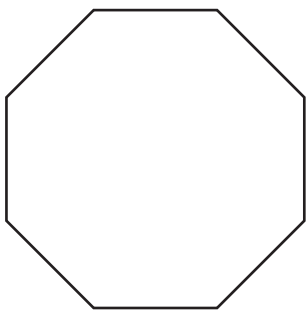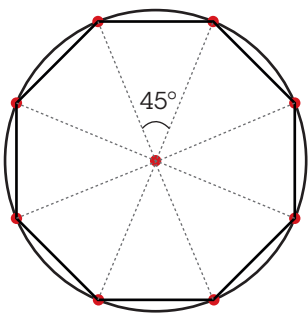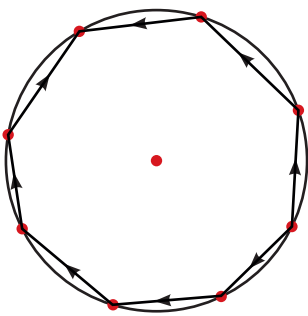
|			
a	Trace a pentagon	Regular pentagon; mark every 72°	Irregular pentagon; 5 marks at any place
b	Trace a hexagon	Regular hexagon; mark every 60°	Irregular hexagon; 6 marks at any place
c	Trace an octagon	Regular octagon; mark every 45°	Irregular octagon; 8 marks at any place

MiB 3 Card 143

Discus drawing

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

$\underline{750}$ mm $\underline{750}$ mm

40°

70° $\underline{70}$ °

$\underline{750}$ mm   750 mm

2500 mm

Remember!
A line has 180°.
A circle has 360°.
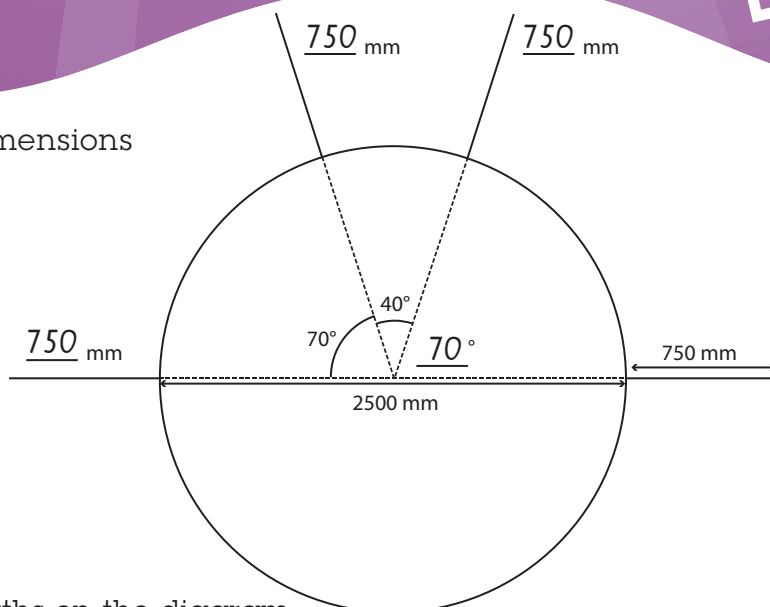
1 Fill in the missing angles and lengths on the diagram.

2 Calculate how long each of the following parts of the discus circle would be on a diagram with a scale of 1:5.
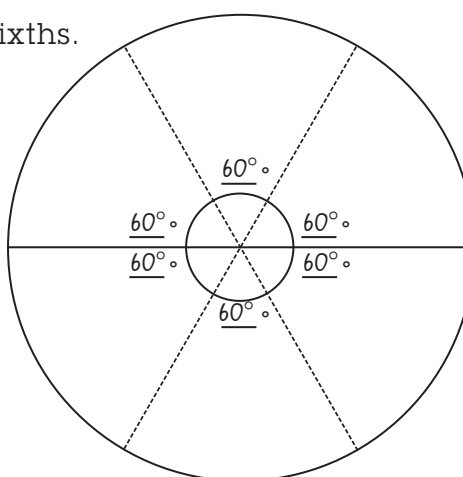
a the diameter of the circle _____ *500 mm* _____

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.

60° °

60° °   *60°* °
60° °   *60°* °

60° °

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

_____ *360° ÷ 6 = 60°* _____

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