Mathletics

Series G Teacher

Geometry

Series G – Geometry

Contents

Series Authors:

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Series G – Geometry

Page 1

1 A flower.

Page 2

1 90; less; more, 180; 180; 360; 360

b right

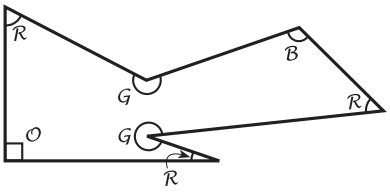
c obtuse

d reflex

e obtuse

f reflex

2



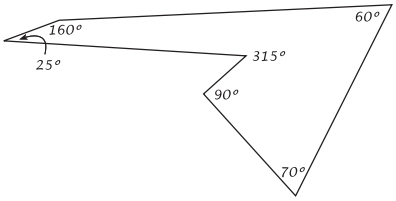
Page 3

1a 55

b 150

c 90

2



3 Answers will vary and may include:

a football player

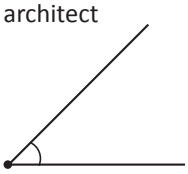
b diver

c cricket player

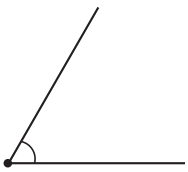
d builder

e architect

4a

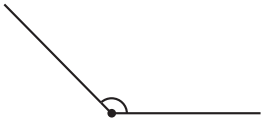


b



c

4d



5a 30°

b 6°

6 Answers will vary.

Page 5

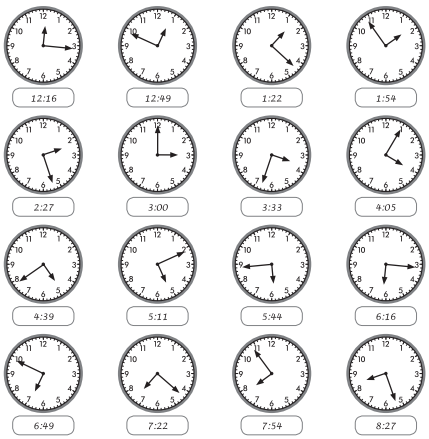
What to do

Answers will vary.

Page 6

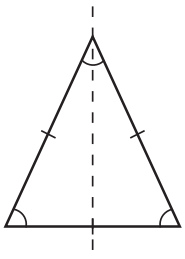
What to do

There are 22 times. Answers will vary and may include:



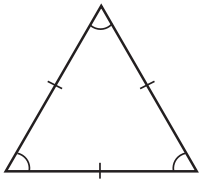
Pages 7–9

1 square; isosceles triangle; 540°; 720°; trapezium; dodecagon; parallelogram or rhombus;

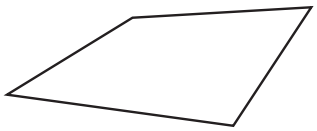


isosceles triangle;

Total of angles added together;

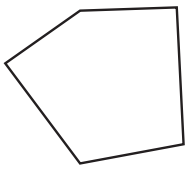


2 360°



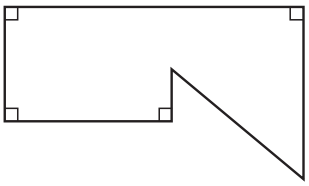
They also add to 360°.

3



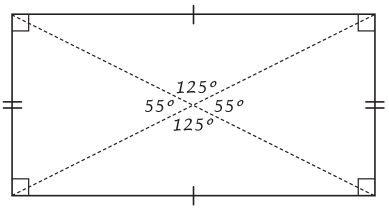
They also add to 540°.

4 Answers will vary.



5a 4

b, c, d, f, g

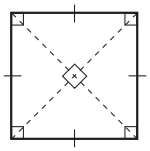


e 2

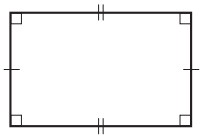
6 Answers will vary.

Pages 10–11

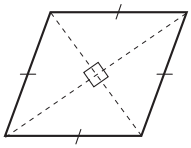
1



square



rectangle

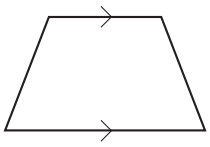


rhombus

Series G – Geometry

Pages 10–11

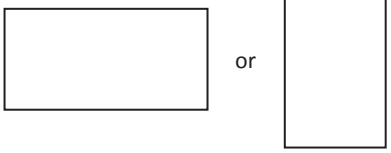
1



trapezium

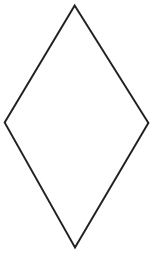
2 Yes because it has 2 pairs of parallel sides, all sides are equal, and the opposite angles are equal.

3a



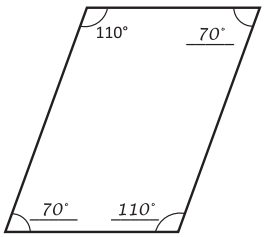
or

b

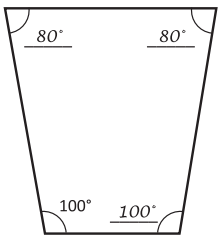


c Answers will vary.

4a

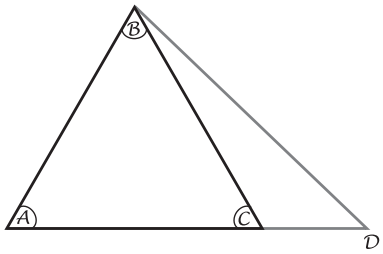


b



Pages 12–13

1, c



a 180°

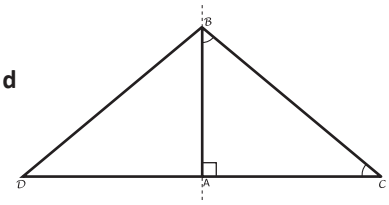
b equilateral

1d no

e 180°

f scalene

2a, d



b 180°

c right angle

e D and C

f DB and BC

g 180°

h isosceles

3 Answers will vary and may include:

– equal side = equal angle

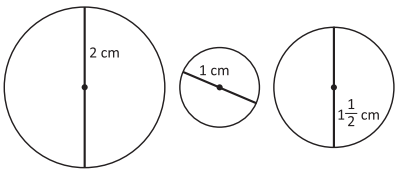
– equilateral triangles have 3 equal sides and 3 equal angles

– scalene triangles have no equal angles or sides

– isosceles triangles have 2 equal angles and 2 equal sides

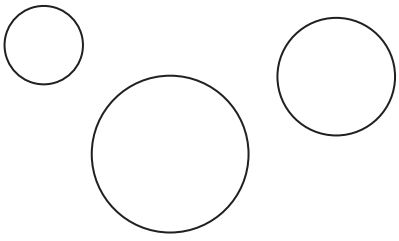
Pages 14–15

1a



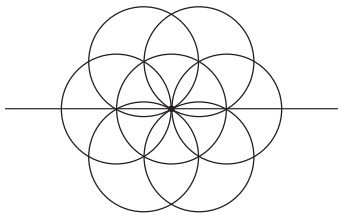
b 4 cm 2 cm 3 cm

2a Answers will vary.
Sample answer:



b Diameter is twice radius.

3a–d



Page 16

What to do

circumference;
arc;
radius;
diameter;
centre;
sector;
ball

No;
Yes;
A ball wouldn't roll.;
No. A polygon has straight sides.;
Yes;
No;
5 cm;
No;
30 cm

What to do

Observe students.

Page 17

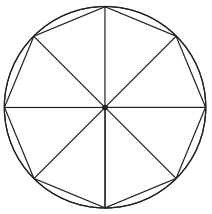
Getting ready

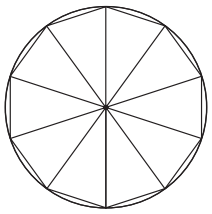
360°

What to do

360°

What to do next





octagon
lines 8
angle 45°

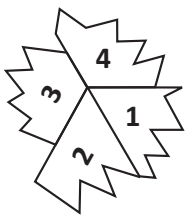
decagon
lines 10
angle 36°

Page 18

Getting ready

Teacher check.

What to do



The angles form 360°

Series G – Geometry

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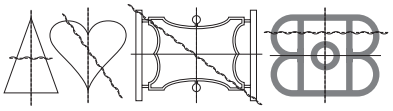
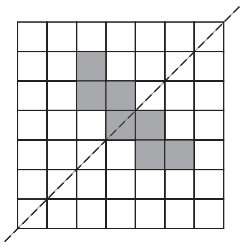
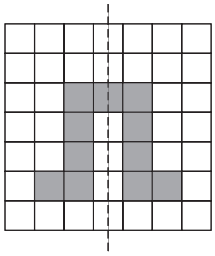
What to do next

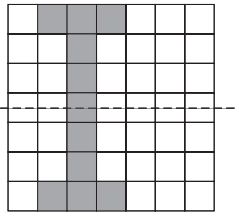
Answers will vary.

Page 19

1 

2a 

b 

c 

Page 20

1a 4

b 8

c 0

d 3

2a–e Observe students.

Pages 21–22

1a reflected

b translated

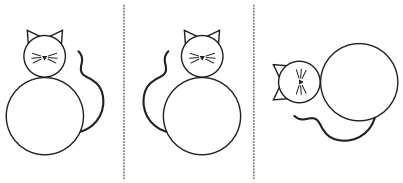
c rotated

2 **d → p** **b → q**

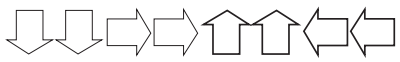
n → u **u → n**

M → W **W → M**

3 SOS It is always the same.

4 

5a 

b 

6 Answers will vary.

Pages 23–24

1
- right angled triangles, squares
- large hexagons, small equilateral triangles
- equilateral triangles
- large hexagons, small squares, small triangles
- large dodecahedrons, small hexagons, small squares
- large dodecahedrons, small triangles

2 

3a 180 **a** 720

b 60 **b** 120

c 6 **c** 3

d 360 **d** 360

e 3, 3, 3, 3 **e** 6, 6, 6

4 3 angles meet

$2 \times 135° = 270°$

$1 \times 90° = 90°$

$360°$

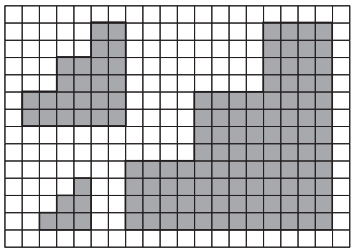
5 hexagon angle = 120°

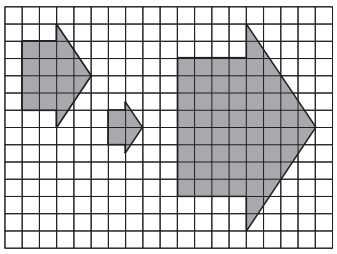
$4 \times 60° = 240°$

(triangles) $360°$

6 Observe students.

Page 25

1a 

b 

2a 2 times as long.

b No

c No

d Yes

Page 26

Getting ready

Observe students.

What to do

Observe students.

What to do next

Answers will vary.

Page 27

What to do

Answers will vary.

Pages 28–30

1 Answers will vary and may include:
- 2D shapes have length and width.
- 3D shapes have length, width and height.
- A 2D shape can be cut out on a piece of paper. It is flat.

2a 6; 12; 8

b 6; 12; 8

c 5; 8; 5

d 6; 10; 6

3a–c Answers will vary.

Series G – Geometry

Pages 28–30

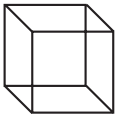
4a cylinder

b octahedron

c square-based pyramid

d sphere

e



f icosahedron

g tetrahedron

h cone

i pentagonal pyramid

j pentagonal prism

k torus

Teacher check.

5

Polyhedron	Triangular prism	Square based pyramid
Number of faces (F)	5	5
Number of vertices (V)	6	5
Number of edges (E)	9	8
Formula	F + V – E = 5 + 6 – 9 = 2	F + V – E = 5 + 5 – 8 = 2

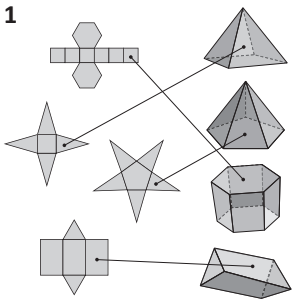
Polyhedron	Cube	Rectangular prism
Number of faces (F)	6	6
Number of vertices (V)	8	8
Number of edges (E)	12	12
Formula	F + V – E = 6 + 8 – 12 = 2	F + V – E = 6 + 8 – 12 = 2

F + V – E = 2

6 Answers will vary.

Page 31

1



square pyramid

pentagonal pyramid

hexagonal prism

triangular prism

2 Answers will vary.

Page 32

pentagonal pyramid e

triangular pyramid b

hexagonal prism g

triangular prism c

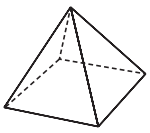
pentagonal prism d

hexagonal pyramid f

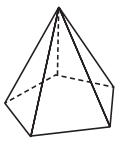
cube a

Pages 33–34

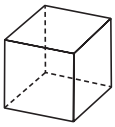
1a



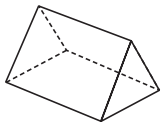
b



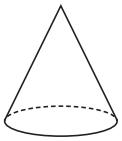
c



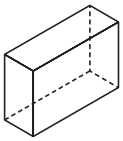
d



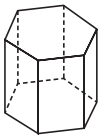
e



f



g



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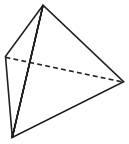


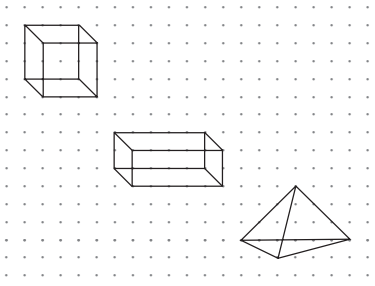
2 Answers will vary.

3 tetrahedron or triangular based pyramid

4 Answers will vary.

5 Answers will vary.

Possible answers:



Page 35

Getting ready

Observe students.

What to do

Answers will vary.

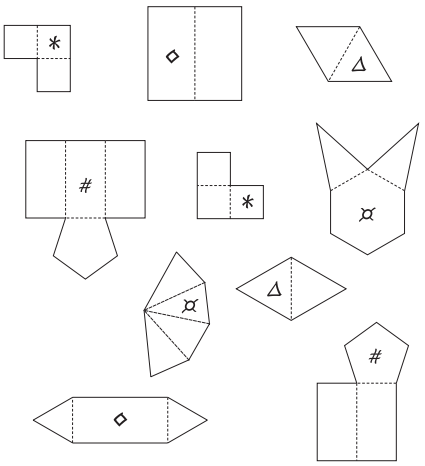
Page 36

Getting ready

Observe students.

What to do

List of shapes:
pentagonal prism,
cube,
hexagonal pyramid,
triangular pyramid,
triangular prism



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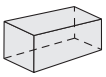
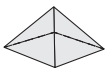
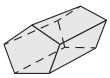
What to do



rectangular prism
- square
- rectangle

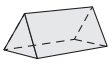


square pyramid
- square
- triangle



pentagonal prism
- pentagon
- rectangle

pentagonal pyramid
- pentagon
- triangle



triangular prism
- triangle
- rectangle

hexagonal pyramid
- hexagon
- triangle

cube
- square

Series G – Geometry

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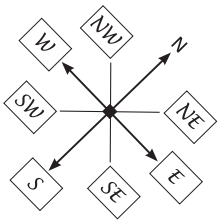
What to do next

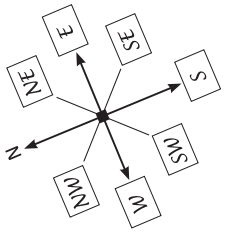
rectangular prism (square) cube (square) square pyramid (triangle) triangular prism (rectangle) hexagonal prism (hexagon) hexagonal pyramid (triangle) pentagonal pyramid (pentagon) pentagonal prism

Pages 38–39

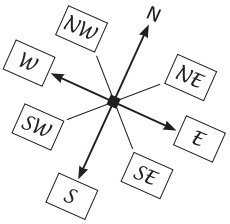
1b



c



d



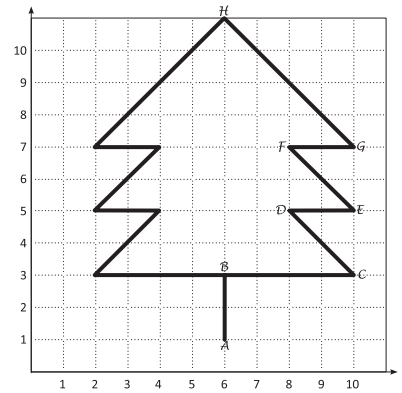
2 8 of each

Answers will vary. Possible answers:

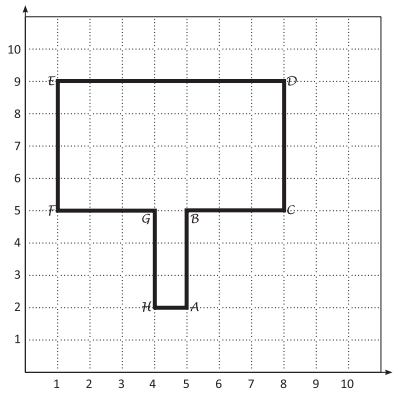
half turns	north to south
quarter turns	south to west
three-quarter turns	north to west
eighth turns	north to north-east

3 Observe students.

4



5



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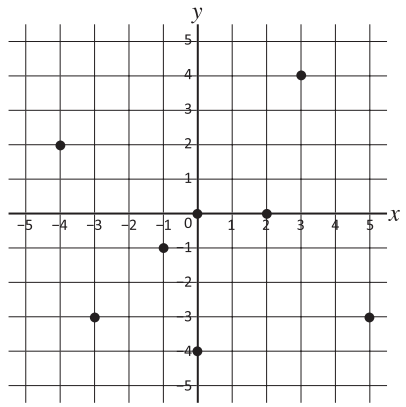
1



2a (1, 2)

b (–4, 0)

c (–3, –2)

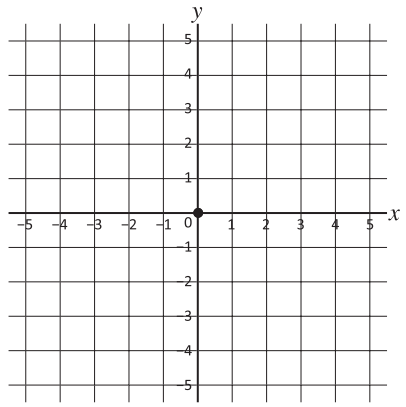
d (3, –5)

e (5, 1)

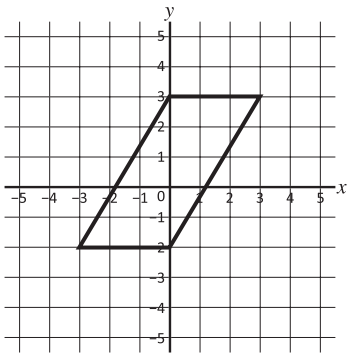
f (–5, 4)

g (1, –3)

3 Answers will vary.

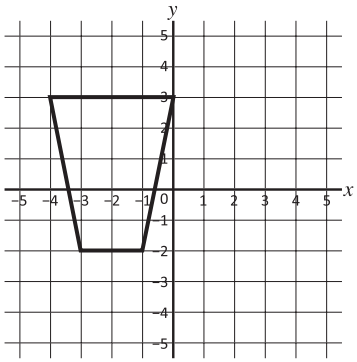


4a parallelogram



b Answers will vary.

c (–3, –2)



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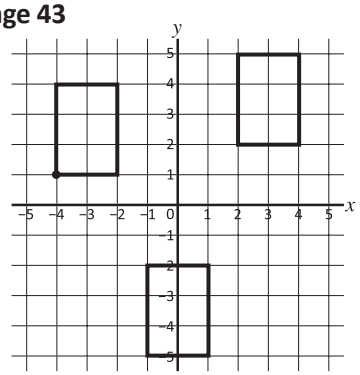
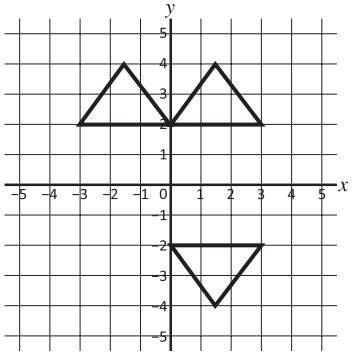
1a



b



Page 44

What to do

Observe students.

What to do next

Teacher check.

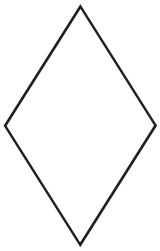
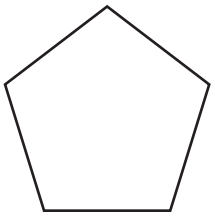
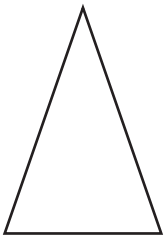
Lines and angles

Name _____

1 **Use a ruler and pencil to draw:**

a 2 parallel lines	**b** 2 intersecting lines	**c** 2 perpendicular lines

2 **Complete the following:**

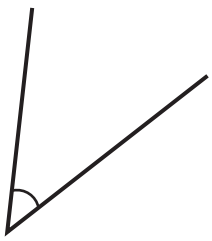
a draw the diagonals on this shape 	**b** mark the interior angles on this shape 	**c** mark equal sides on this isosceles triangle 

3 **Label these angles as reflex, right, obtuse, acute, straight or revolution:**

a

_____ angle

b

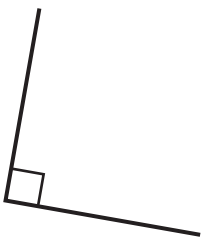


_____ angle

c

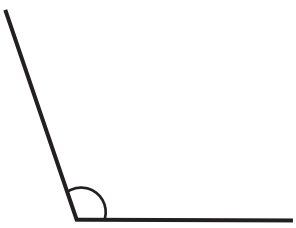
_____ angle

d



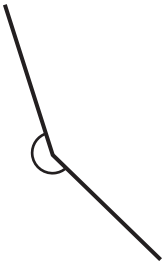
_____ angle

e



_____ angle

f



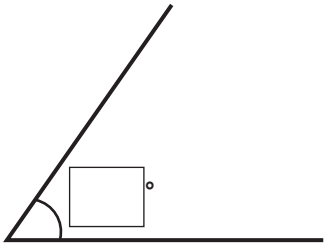
_____ angle

Lines and angles

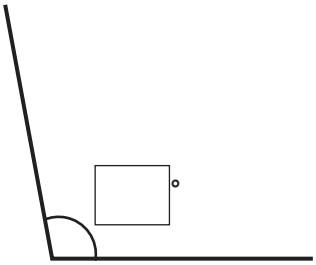
Name _____

4 **Use a protractor to measure the interior angles of the following angles. Label each measured angle:**

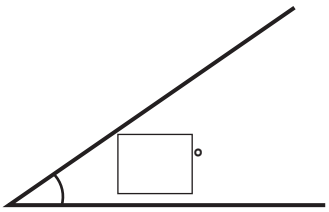
a



b



c



5 **Use a protractor, ruler and pencil to complete the following angles:**

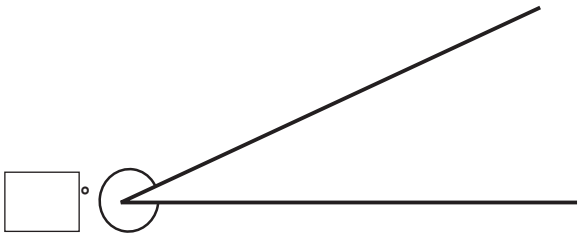
a 45°

b 90°

c 33°

d 125°

6 **Use a protractor, ruler, pencil and strategy of your choice to measure this exterior angle:**



Skills	Not yet	Kind of	Got it
• Knows terms parallel, perpendicular, intersecting, diagonal and interior, and identifies and marks equal sides			
• Recognises and labels acute, obtuse, straight, right angled, revolution and reflex angles			
• Measures and draws acute, right angled and obtuse angles			
• Measures reflex angles using strategy of choice			

2D shapes

Name _____

1 **What is a polygon? Use words and diagrams to explain your answer:**

2 **Name the mystery polygons:**

a I have 4 equal sides and 4 equal angles. I'm a _____

b I'm a 3 sided polygon. I have 2 equal sides and angles. I'm an _____

c I have 4 sides and 4 angles. I have 1 pair of parallel lines. I'm a _____

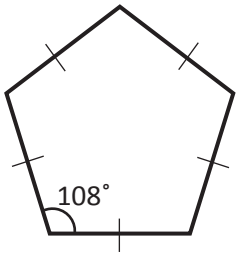
d I have 8 sides and 8 angles. I'm an _____

e I have 6 sides and 6 angles. My angle sum is 720˚. I'm a _____

f I'm a quadrilateral. Both pairs of opposite sides are parallel. I'm a _____

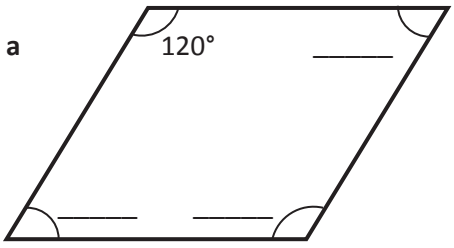
3 **Look at the regular pentagon on the right:**

What is its angle sum? ☐

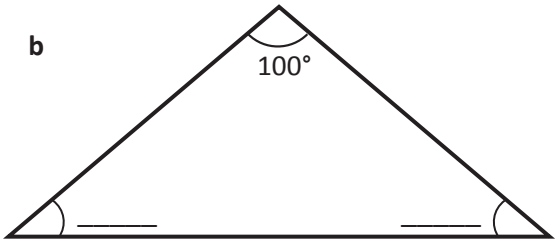


4 **Find the missing angles:**

a



b

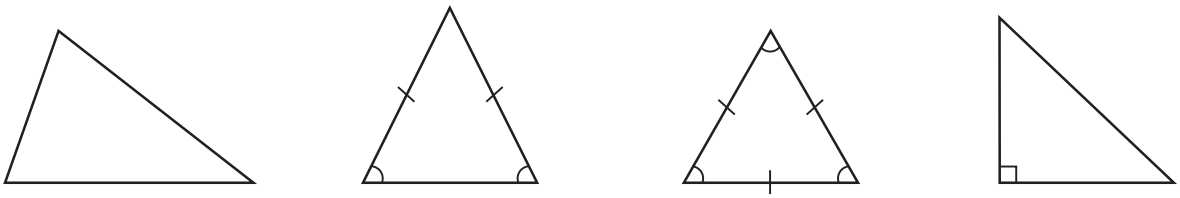


5 **Draw a polygon with 6 sides and 4 right angles. You may like to sketch some practice shapes on scrap paper first.**

2D shapes

Name _____

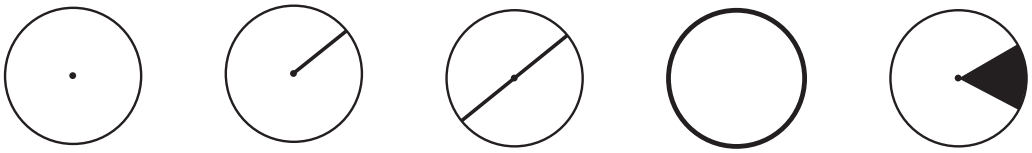
6 **Match the triangles with their correct names:**



isosceles | right angle | scalene | equilateral

7 **Use a protractor to help you draw a triangle where one of the angles is double one of the others. Label each measurement.**

8 **Match the correct term with the parts of a circle:**



radius | centre | circumference | sector | diameter

9 **If the radius of a circle is 8 cm, what is its diameter?** _____

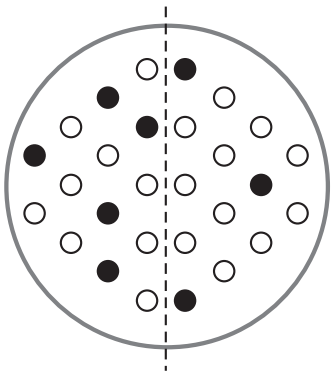
Skills	Not yet	Kind of	Got it
• Recognises properties of simple polygons and uses these to draw and name shapes			
• Finds unknown angles			
• Recognises different types of triangles			
• Knows that the angle sum of a triangle is 180˚ and uses this knowledge to construct a triangle			
• Names parts of a circle			
• Understands relationship between radius and diameter			

Transformation, tessellation and symmetry

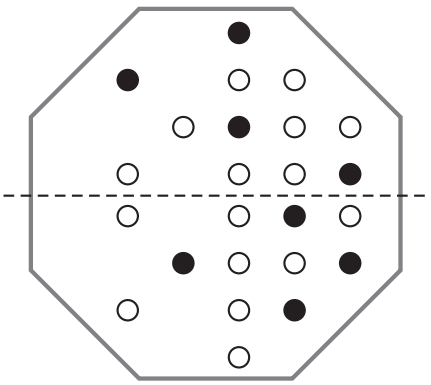
Name _____

1 **In each example, shade more dots to make the dotted line a line of symmetry:**

a



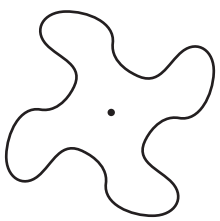
b



2 **Draw a shape that has 4 lines of symmetry. You may like to sketch out some ideas on scrap paper first.**

3 **Do these pictures have rotational symmetry? If so, to which order?**

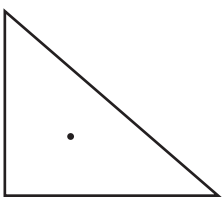
a



Yes / No

Order:_____

b



Yes / No

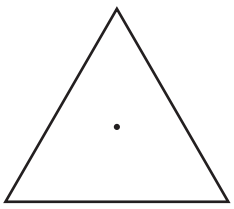
Order:_____

c

Yes / No

Order:_____

d



Yes / No

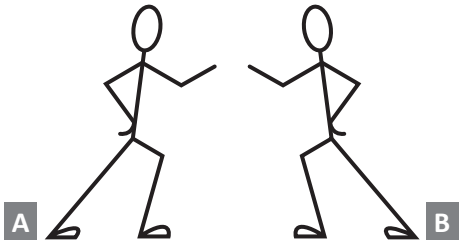
Order:_____

Transformation, tessellation and symmetry

Name _____

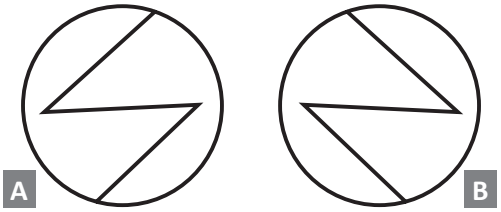
4 **Look at each pair of figures. Decide if Shape A has been reflected, translated or rotated to arrive at Shape B.**

a

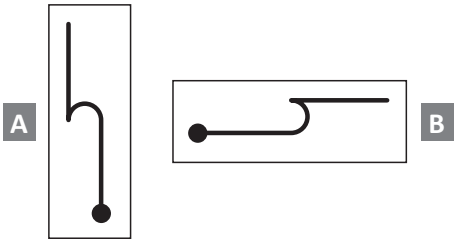


b

c



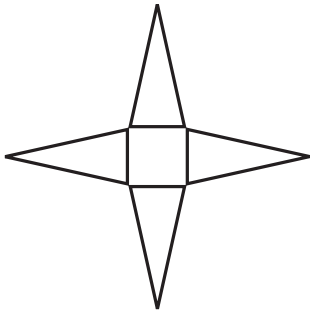
d



5 **Shade shapes a and b to show:**

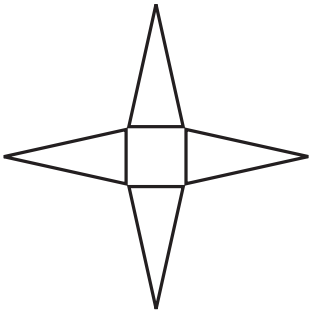
original

a



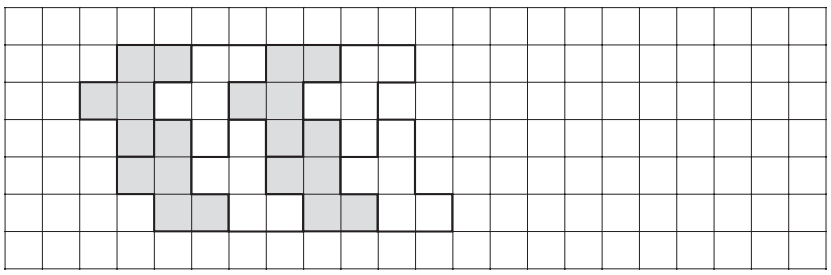
a reflection

b



a 180˚ rotation

6 **Continue this tessellation across the grid:**

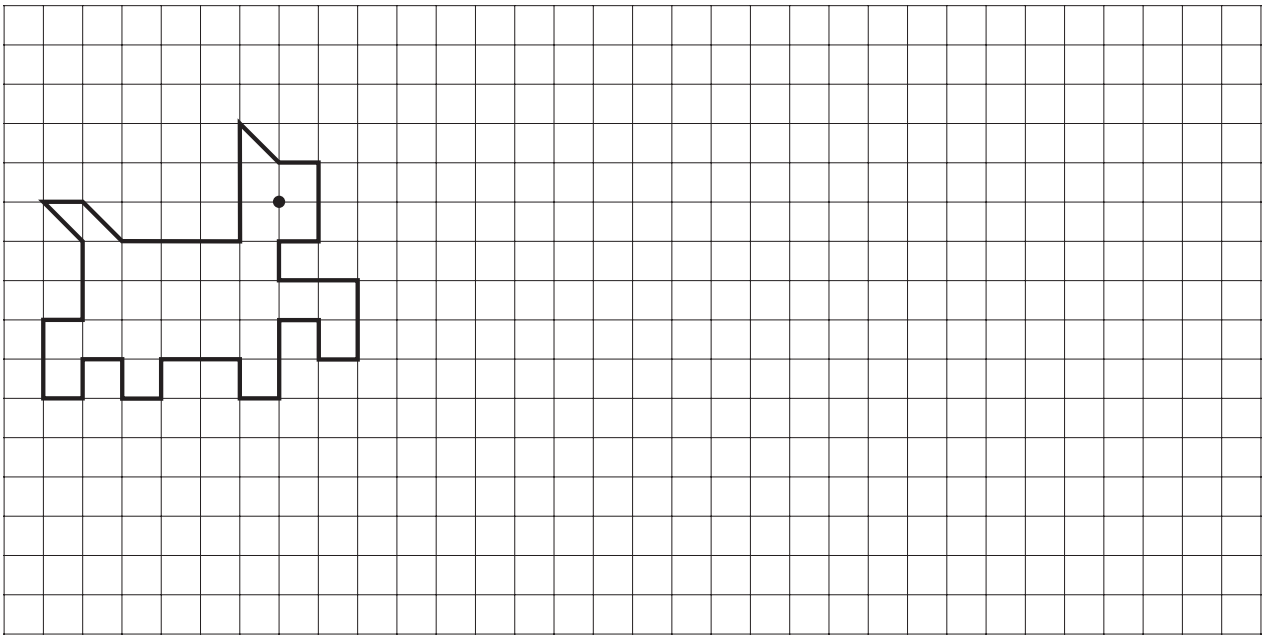


Transformation, tessellation and symmetry

Name _____

7 **Why do quadrilaterals tessellate? Choose a quadrilateral to use as an example and explain using words and diagrams:**

8 **Recreate this diagram so that it is twice as big:**



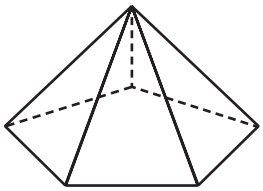
Skills	Not yet	Kind of	Got it
• Identifies and draws lines of symmetry			
• Identifies rotational symmetry and order			
• Visualises, recognises and represents transformations – reflections, translations and rotations			
• Continues tessellations			
• Demonstrates understanding of why shapes tessellate			
• Enlarges simple drawings			

3D shapes

Name _____

1 **Name the following 3D shapes and list their properties:**

a



_____

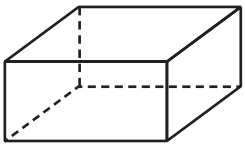
_____

_____ faces

_____ edges

_____ vertices

b



_____

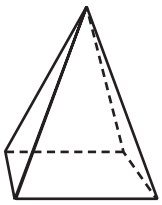
_____

_____ faces

_____ edges

_____ vertices

c



_____

_____

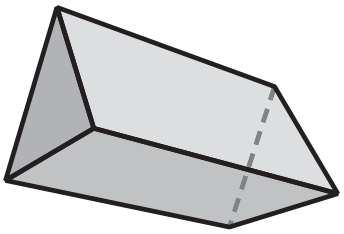
_____ faces

_____ edges

_____ vertices

2 **How are prisms and pyramids similar? How are they different? Explain using words and/or diagrams:**

3 **Demonstrate Euler's formula, using this triangular prism as an example:**



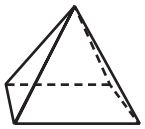
triangular prism

F + V − E = ☐

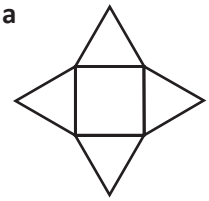
3D shapes

Name _____

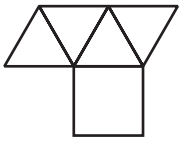
4 **Circle the nets that will fold to make this square based pyramid:**



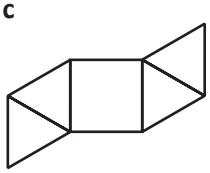
a



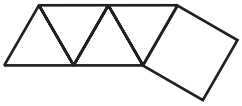
b



c



d



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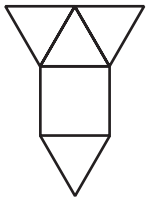
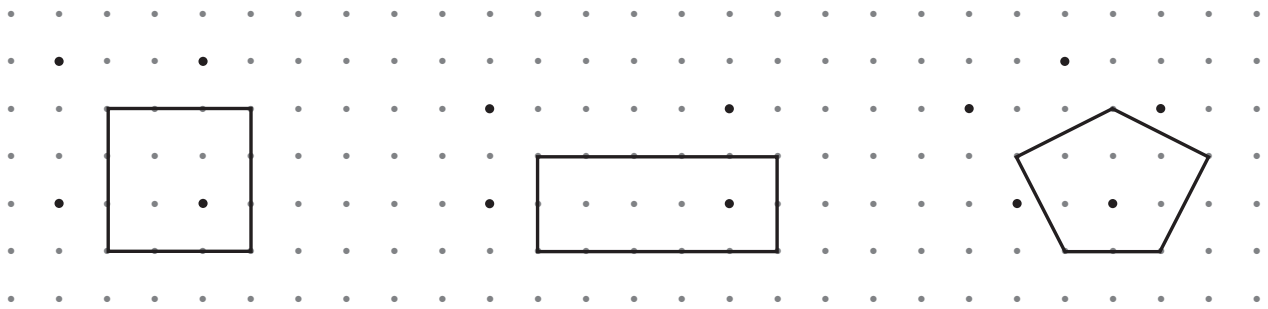
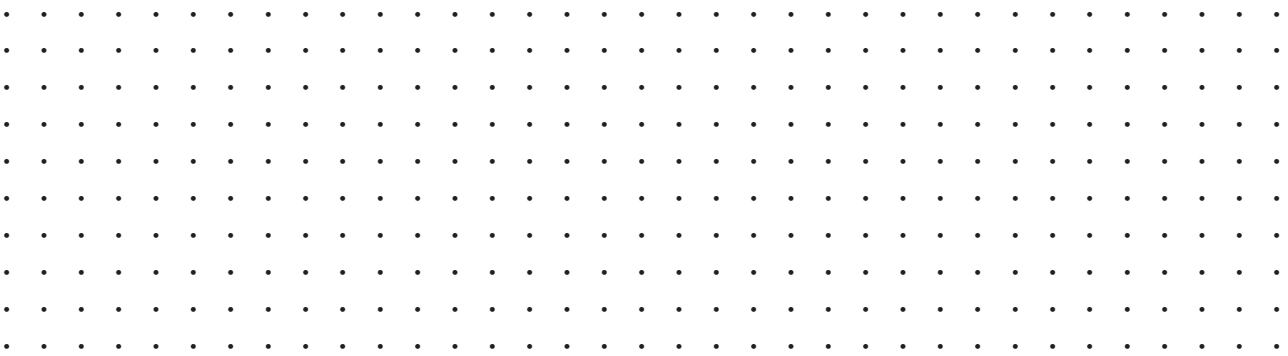


5 **Finish the drawings using the bigger dots to guide you:**



6 **Use the dots to draw a triangular prism and a triangular pyramid:**



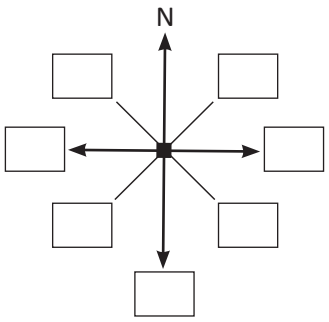
Skills	Not yet	Kind of	Got it
• Identifies and names simple polyhedrons			
• Lists faces, edges and vertices of simple polyhedrons			
• Describes similarities and differences between pyramids and prisms			
• Demonstrates a working knowledge of Euler's formula and how it applies to simple polyhedrons			
• Visualises solids from nets			
• Draws simple 3D shapes			

Position

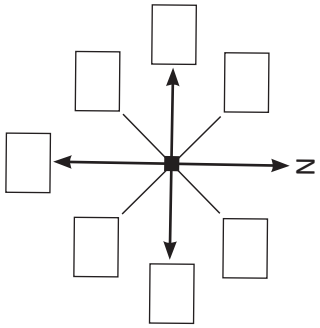
Name _____

1 **Add the missing compass points:**

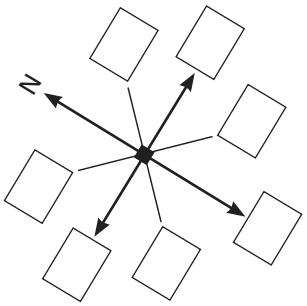
a



b



c



d If you were facing north and then made a clockwise three quarter turn, what new direction would you be facing?

_____

e If you were facing north-west and then made a half turn, what direction would you be facing?

_____

2 **Draw a dot at each of the following coordinates on the grid:**

a (2, 5)

b (1, 1)

c (4, −2)

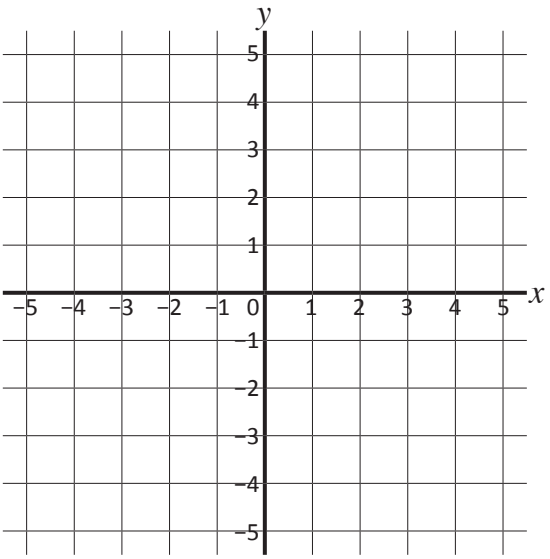
d (2, −3)

e (−4, −3)

f (−1, 4)

g (−3, −5)

h (0, 0)

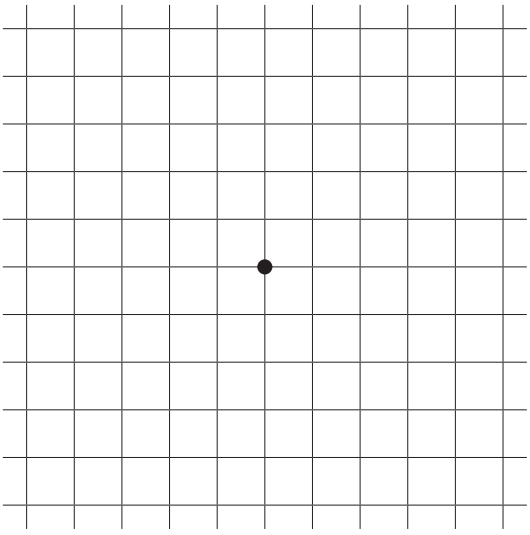


3 **Draw and label a pair of axes for all four quadrants. The dot marks the point (0, 0). Mark six different coordinate points with letters A to F and write their coordinates in the boxes.**

a A ☐ **b** B ☐

c C ☐ **d** D ☐

e E ☐ **f** F ☐

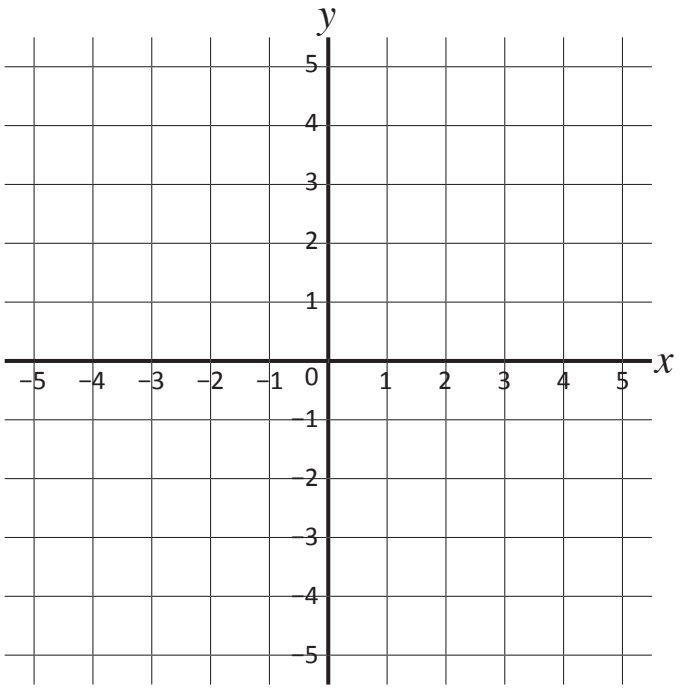


Position

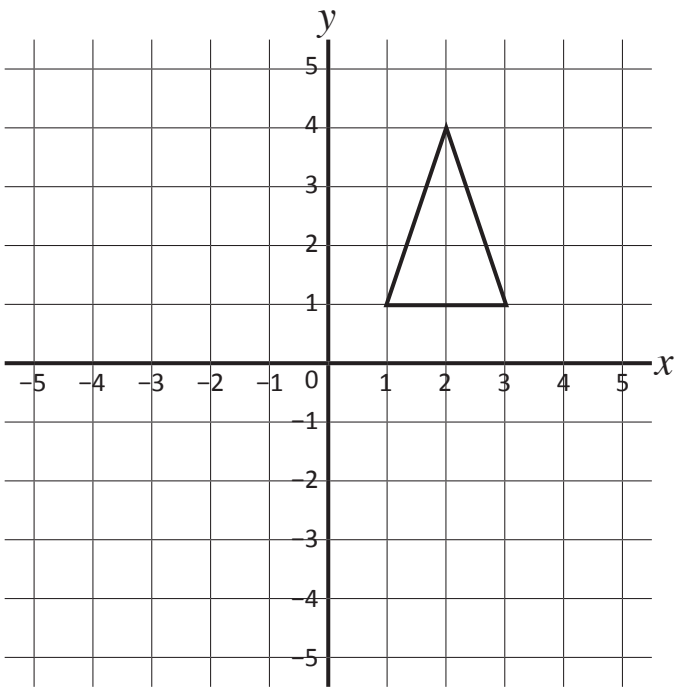
Name _____

4 **These are the coordinates to draw a parallelogram, but one of them is missing. Draw the parallelogram on the grid to the right and fill in the missing coordinate.**

(−2, −3) (3, −3) (5, 4) ☐



5 **Translate the triangle so that point (1, 1) becomes point (−4, −2), and then reflect the original triangle in the x axis.**



Skills	Not yet	Kind of	Got it
• Names compass points and identifies locations			
• Describes positions on the full coordinate grid			
• Draws and labels axes in four quadrants			
• Draws shapes on the grid and finds missing coordinates			
• Translates shapes and reflects shapes in the axes			

Series G – Geometry – Student Progress Record

Name_____ Class_____ Date _____

What went well: _____

_____

_____

_____

What I need to improve: _____

_____

_____

_____

Series G – Geometry – Student Progress Record

Name_____ Class_____ Date _____

What went well: _____

_____

_____

_____

What I need to improve: _____

_____

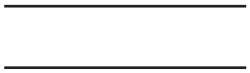
_____

_____

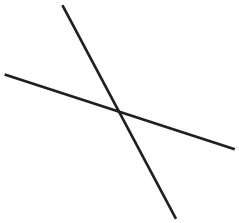
ASSESSMENT ANSWERS

Pages 6–7

1a



b



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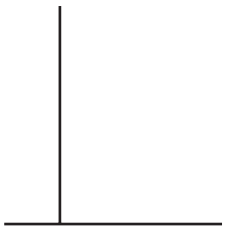
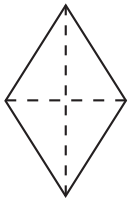


2a



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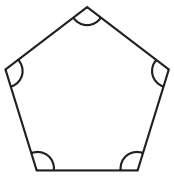

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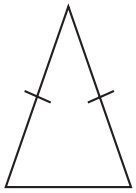


3a straight

b acute

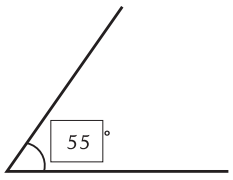
c revolution

d right

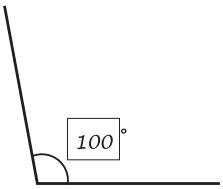
e obtuse

f reflex

4a



4b



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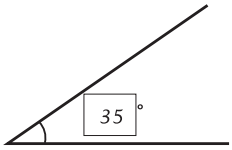
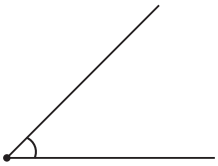


5a



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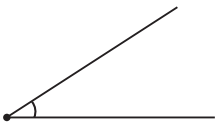
c



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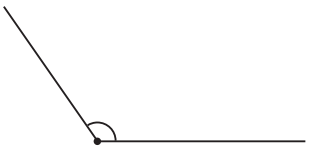


6 335

Pages 8–9

1 Answers will vary and may include:
straight sided closed shape

2a square

b isosceles triangle

c trapezium

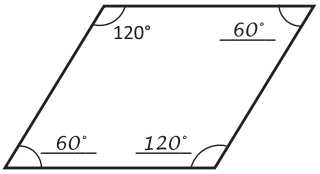
d octagon

e hexagon

f rhombus or parallelogram or square

3 540°

4a



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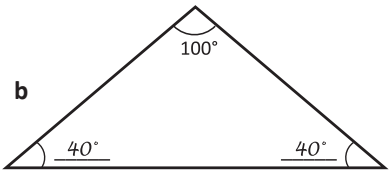
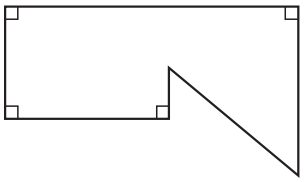


5 Answers will vary.



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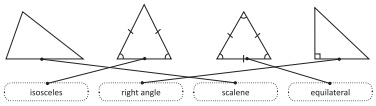
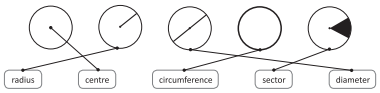


7 Answers will vary.

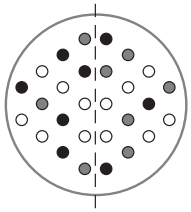
8



9 16 cm

Pages 10–12

1a



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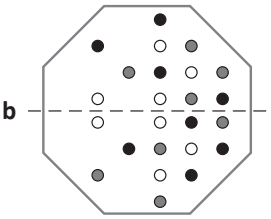


2 Answers will vary.

3a Yes; 4

b No

c No

d Yes; 3

Series G – Geometry

Pages 10–12

4a reflected

b translated

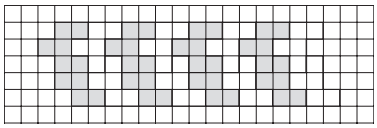
c reflected

d rotated

5a

b

6



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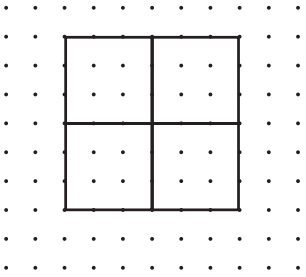
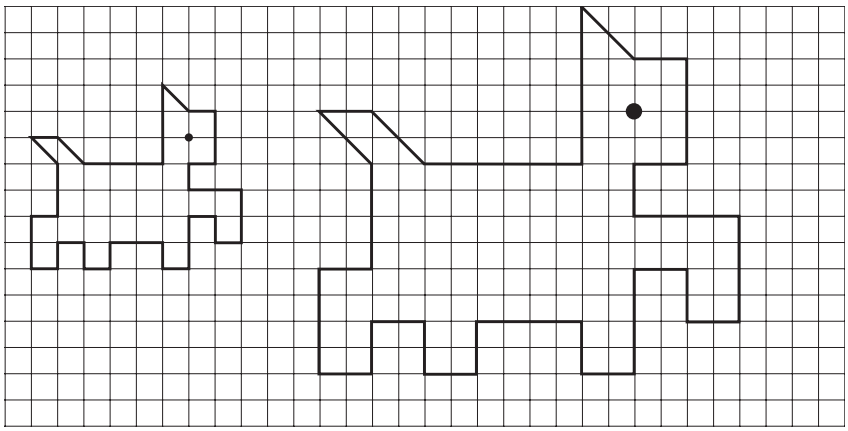


Answers will vary.
The vertices form 360° when they meet.

8



Pages 13–14

1a pentagonal; based pyramid;
6 faces; 10 edges; 6 vertices

b rectangular; based prism;
6 faces; 12 edges; 8 vertices

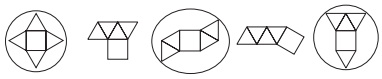
c square based; pyramid;
5 faces; 8 edges; 5 vertices

2 Answers will vary and may include:
Similiarities:
– straight edges
– 3D shapes

Differences:
– pyramids come to 1 point at the top
– prisms have 2 matching ends

3 F + V – E = 2
5 + 6 – 9 = 2

4



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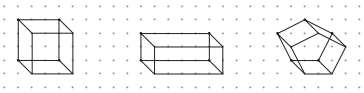
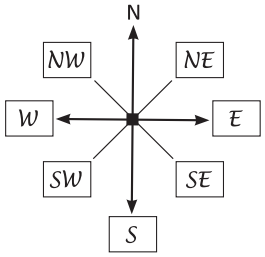


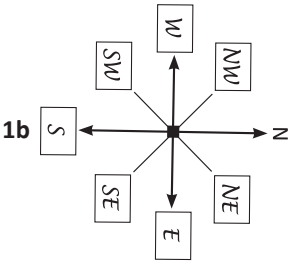
6 Answers will vary.

Pages 15–16

1a



1b



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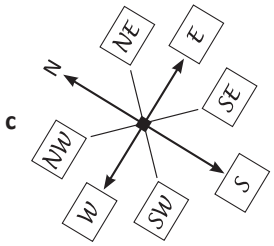

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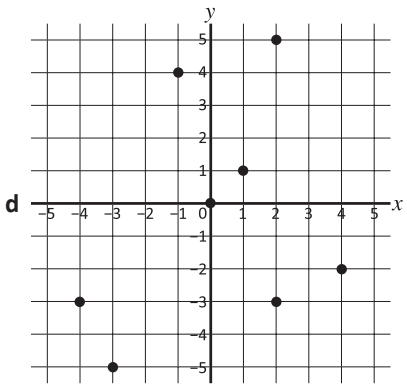
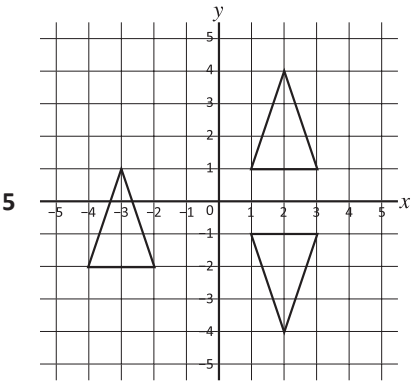


3a–f Answers will vary.

4 (0, 4)

5



Series G – Geometry

Topic	Reference	Strand	Substrand	Objective
Lines and Angles	6G4b	Geometry	Properties of shapes	Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.
2D Shapes	6G2a	Geometry	Properties of shapes	Compare and classify geometric shapes based on their properties and sizes.
2D Shapes	6G3a	Geometry	Properties of shapes	Draw 2D shapes using given dimensions and angles.
2D Shapes	6G4a	Geometry	Properties of shapes	Find unknown angles in any triangles, quadrilaterals, and regular polygons.
2D Shapes	6G5	Geometry	Properties of shapes	Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius.
Transformation, Tessellation and Symmetry	6P2	Geometry	Position and direction	Draw and translate simple shapes on the coordinate plane, and reflect them in the axes.
3D Shapes	6G2b	Geometry	Properties of shapes	Describe simple 3D shapes.
3D Shapes	6G3b	Geometry	Properties of shapes	Recognise and build simple 3D shapes, including making nets.
Position	6P3	Geometry	Position and direction	Describe positions on the full coordinate grid (all four quadrants).