

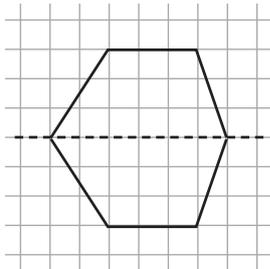
Unit 13: Geometry – Properties of shapes

Lesson 1: Measuring with a protractor

→ pages 6–8

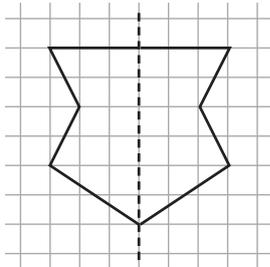
- 130°
 - 25°
 - 90°
 - 73°
- 1st angle = 110°
 - 2nd angle = 75°
 - 3rd angle = 72°
 - 4th angle = 113°
- Angles clockwise from top left: $77^\circ, 132^\circ, 111^\circ, 116^\circ, 104^\circ$ (total 540°);
 $66^\circ, 230^\circ, 66^\circ, 112^\circ, 134^\circ, 112^\circ$ (total 720°)
 - B. All angles are the same size (120°) and all sides are the same length.
- No, all the angles are the same size (38°).

5. a)



Angles clockwise from top left: $122^\circ, 109^\circ, 142^\circ, 109^\circ, 122^\circ, 116^\circ$ (total 720°).

b)



Angles clockwise from top left: $65^\circ, 65^\circ, 235^\circ, 95^\circ, 95^\circ, 110^\circ, 235^\circ$ (total 900°).

Reflect

Look for answers identifying using wrong scale or misreading the scale; placing the protractor incorrectly or inaccurately.

Lesson 2: Drawing shapes accurately

→ pages 9–11

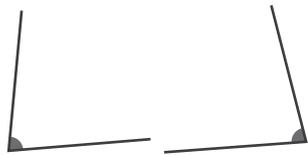
1. a)



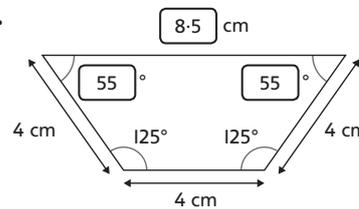
b)



c)

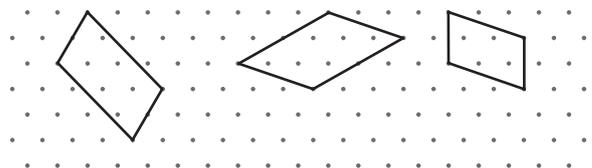


2.



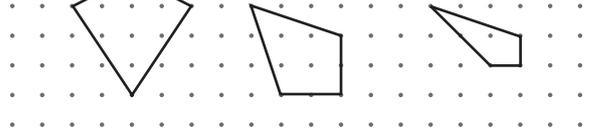
Missing angles are both 55° . Missing length is 8.5 cm.

3.

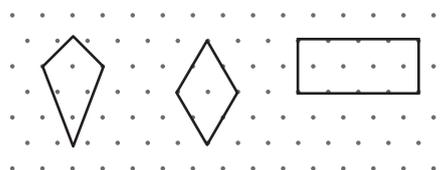


Answers will vary for the third parallelogram.

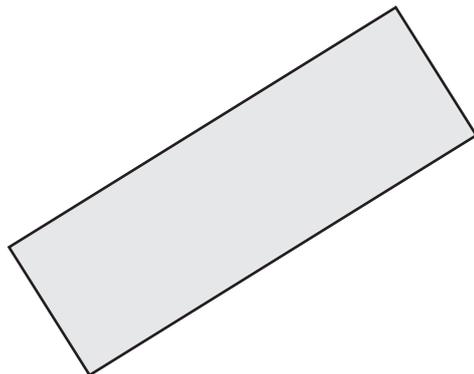
4.



5. Answers will vary; for example:

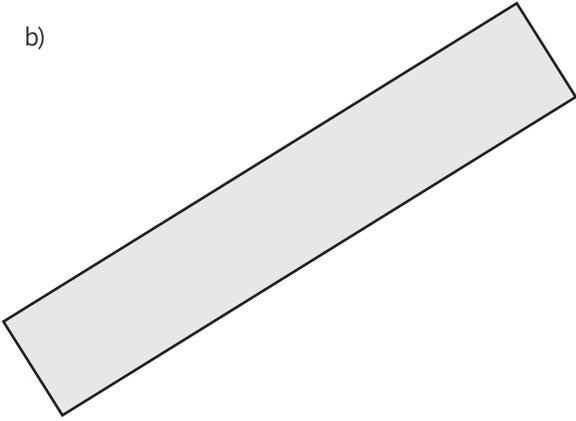


6. a)



Rectangle 6 cm by 2 cm

b)



Rectangle 8 cm by 1.5 cm

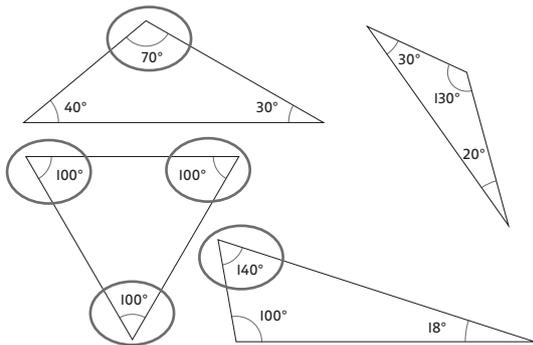
Reflect

Answers will vary; for example: Lee needs to read the correct scale and to place the protractor accurately.

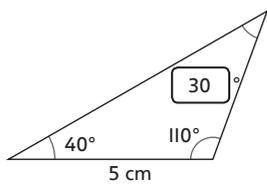
Lesson 3: Angles in triangles (I)

→ pages 12–14

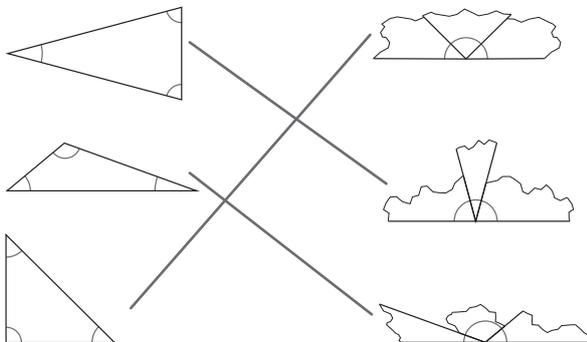
1. a)



b)



2.



A triangle has ...	Always true	Sometimes true	Never true
... three acute angles.		✓	
... two right angles.			✓
... a right angle and an obtuse angle.			✓
... three different angles.		✓	
... angles that add up to 180°.	✓		
... at least two acute angles.	✓		

4. Answers will vary; for example: 45°/45°/90°. Check angles add to 180° and any isosceles triangles have two angles the same.

Reflect

180-degree angles in a triangle can be shown to make a straight line. Angles on a straight line add to 180°.

Lesson 4: Angles in triangles (2)

→ pages 15–17

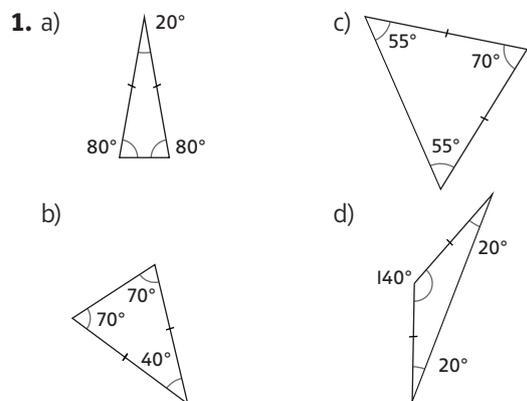
- a) 80° c) 25°
b) 39° d) 30°
- a = 70° b = 45° c = 65°
- p = 18° q = 108° r = 54°
- Groups will vary; for example: 40°/80°/60°; 85°/35°/60°; 50°/45°/85°; 25°/35°/120°
- a = 90° b = 260°
x = 40° y = 65°

Reflect

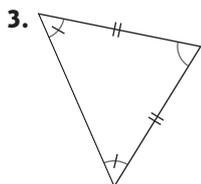
Children should mention that the other angles in the triangle have to make 130°.

Lesson 5: Angles in triangles (3)

→ pages 18–20

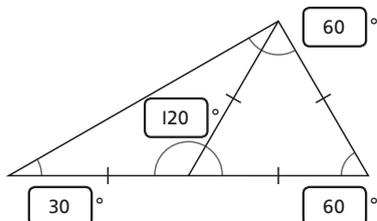


- a) 65°, 65° b) 12°, 156° c) 45°, 45°



4. Amelia: 2 solutions: $56^\circ / 56^\circ / 68^\circ$ and $56^\circ / 62^\circ / 62^\circ$
 Bella: 1 solution: $156^\circ / 12^\circ / 12^\circ$. Double $156^\circ > 180^\circ$
 so cannot be one of the equal angles.

5. a) 335° c) 55°
 b)



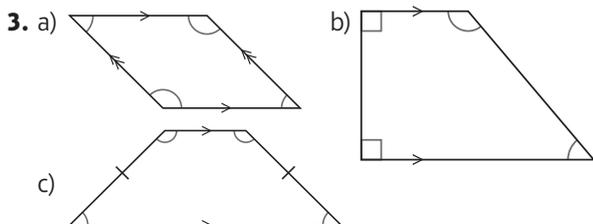
Reflect

Answers will vary.

Lesson 6: Angles in polygons (I)

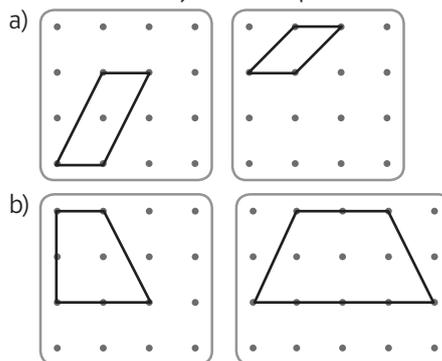
→ pages 21–23

- a) Right-angled trapezium
 b) Scalene trapezium
 c) Isosceles trapezium
 d) Parallelogram
- a) Angles from top left clockwise: $70^\circ, 110^\circ, 70^\circ, 110^\circ$
 b) $93^\circ, 93^\circ$



- a) $125^\circ, 125^\circ$ b) $114^\circ, 114^\circ$
- A parallelogram has three acute angles: Never true:
 It has 2 equal acute and 2 equal obtuse, $1 \text{ acute} + 1 \text{ obtuse} = 180^\circ$;
 A trapezium has four different angles: Sometimes true:
 Scalene trapezium only

6. Answers will vary; for example:



c) Both are quadrilaterals, both can be split into two triangles: $2 \times 180^\circ = 360^\circ$

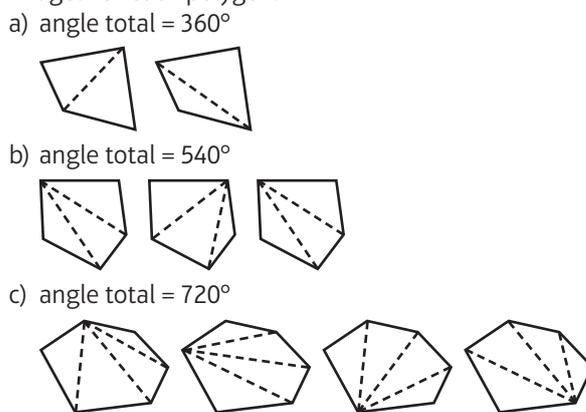
Reflect

Look for indicators of equal angles and shapes split into 2 triangles.

Lesson 7: Angles in polygons (2)

→ pages 24–26

- a) $a = 25^\circ$ c) $c = 50^\circ$
 b) $b = 100^\circ$ d) $d = 27^\circ$
- a) $b = 150^\circ$ b) $d = 21^\circ$
- Diagonals must start at the same vertex for each polygon. Children should show one of the possible images for each polygon.



- She has used more than one vertex to draw the diagonals.
- angle total = $1,440^\circ$ ($8 \times 180^\circ$)
 each interior angle = 144° ($1,440 \div 10$)
- a) $a = 30^\circ$ b) $b = 60^\circ$
 b) Interior angles of pentagon = 108° ; angles in all surrounding triangles: $30^\circ, 60^\circ$ and 90° .

Reflect

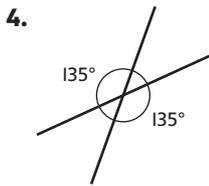
Answers will vary.



Lesson 8: Vertically opposite angles

→ pages 27–29

- 1st missing angle = 110°
2nd missing angle = 70°
3rd missing angle = 55°
4th missing angle = 125°
- Third diagram should be circled.
- Missing angles from the top going clockwise:
 - $135^\circ, 45^\circ, 135^\circ$
 - $142^\circ, 142^\circ, 38^\circ$
 - $114^\circ, 66^\circ, 66^\circ$



5.

	Angle a	Angle b	Angle c	Angle d
Experiment 1	80°	100°	80°	100°
Experiment 2	120°	60°	120°	60°
Experiment 3	30°	150°	30°	150°

- Missing angles from the top going clockwise:
 - $70^\circ, 25^\circ, 25^\circ, 85^\circ$
 - $14^\circ, 104^\circ, 76^\circ$
 - 61°

Reflect

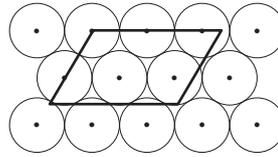
Children should mention that two pairs of angles on a line = 180° such as $a + b = 180^\circ, b + c = 180^\circ$ so $a = c$.

Lesson 9: Equal distance

→ pages 30–32

- The dots children draw should form a circle. The dots are on a circle with a radius of 25 mm.
- Radius; Radius = 13 mm, Diameter = 26 mm
 - Diameter; Radius = 4 mm, Diameter = 8 mm
 - Diameter; Radius = 20 mm, Diameter = 40 mm
- Second and third statements ticked:
The diameter passes through the centre of the circle.
If the radius is x , then the diameter is $x + x$.
- 4 mm
 - 5.5 cm
 - 3.4 cm
 - 4.95 m
- Radius = 1.3 cm
 - The line is 72 mm.

- The radius of one of the circles is 1.4 cm.
 - Answers will vary: The perimeter needs to be 14 radii altogether ($19.6 \div 1.4$) or 7 diameters ($19.6 \div 2.8$). Side lengths therefore need to be a total of 7 radii or 3.5 diameters. For example:



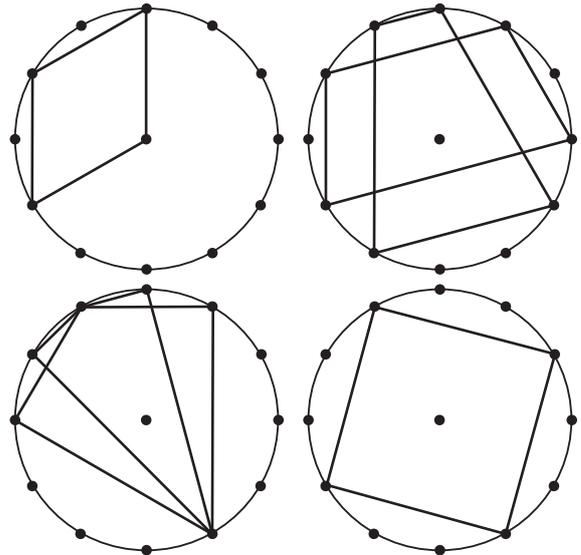
Reflect

Use a pair of compasses set at a radius of 2 cm.

Lesson 10: Parts of a circle

→ pages 33–35

- Third diagram ticked.
- Answers will vary.
 - Isosceles triangles
- Answers will vary; for example:



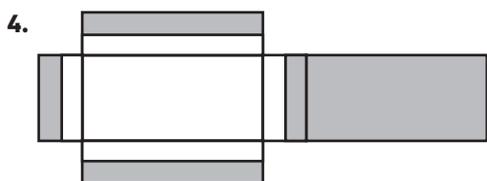
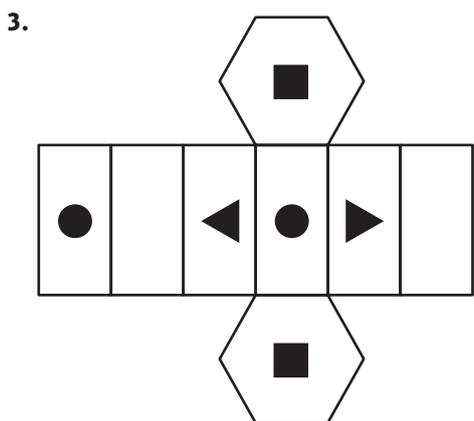
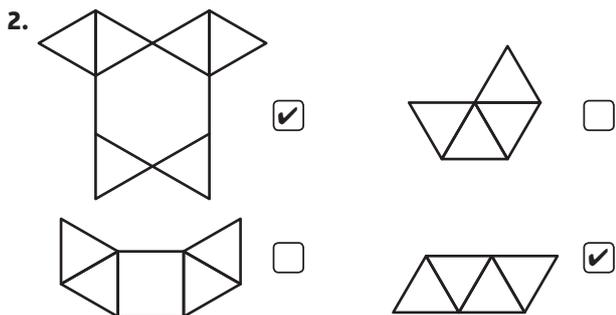
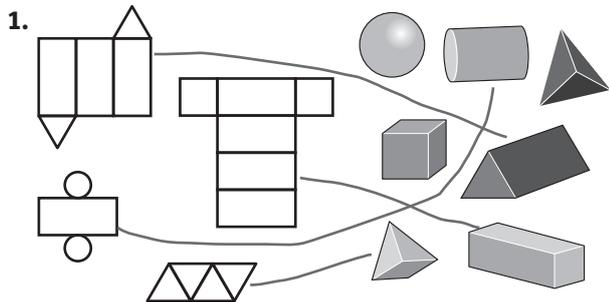
- The angle formed on the circumference will be 90° ; the other two angles should add to 90° .
- Children should count the whole and more than half squares; the area is approximately $112\text{--}115\text{ cm}^2$.

Reflect

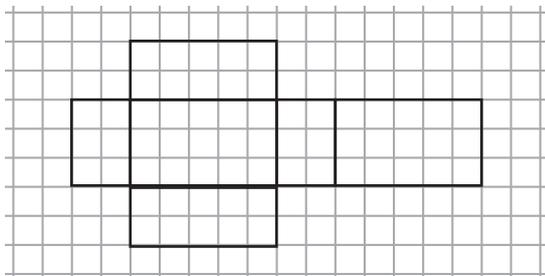
Answers will vary; children should mention using the radii for the equal sides and diameter for 3rd side.

Lesson 11: Nets (I)

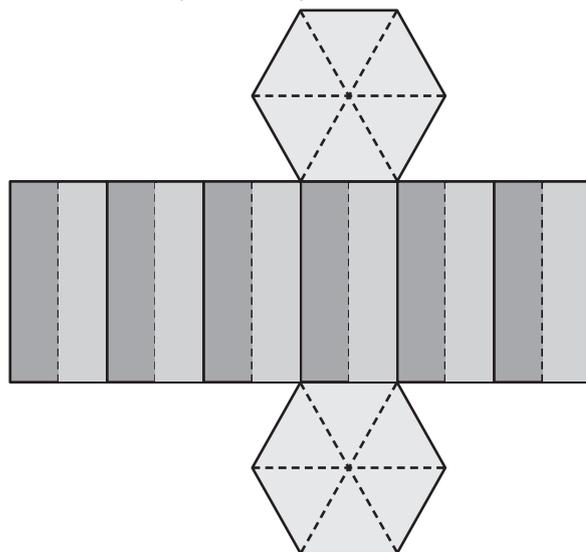
→ pages 36–39



5. Answers will vary; for example:

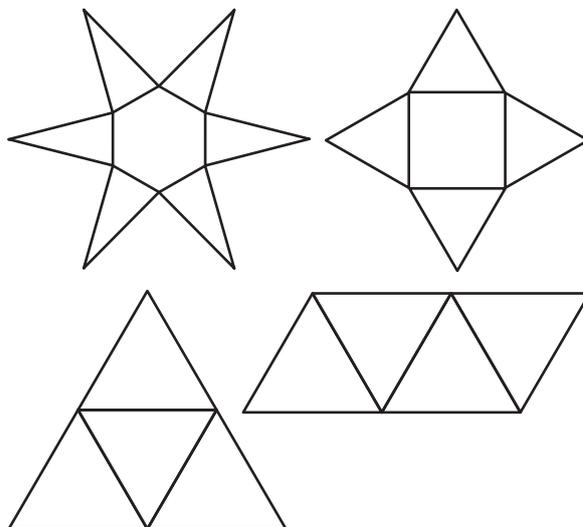


6. Answers will vary; for example:



Reflect

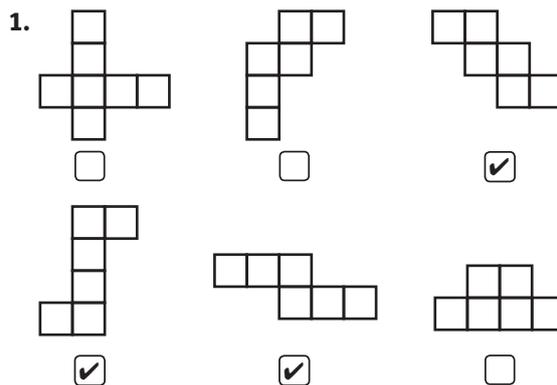
Answers will vary; for example:



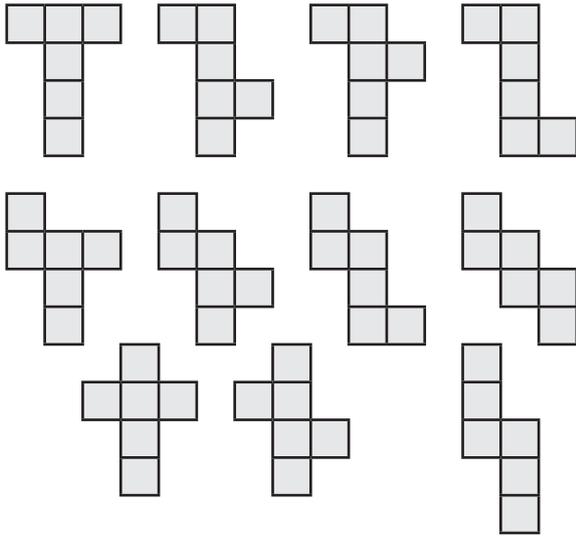
The easiest way is to show a base with the same number of triangles as sides on the base.

Lesson 12: Nets (2)

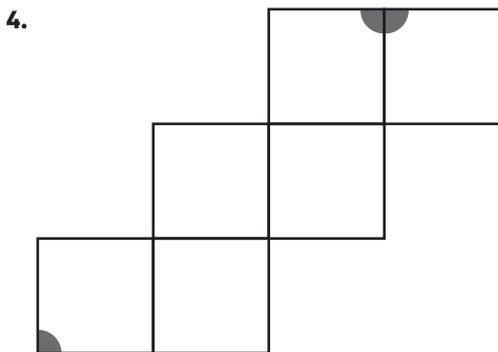
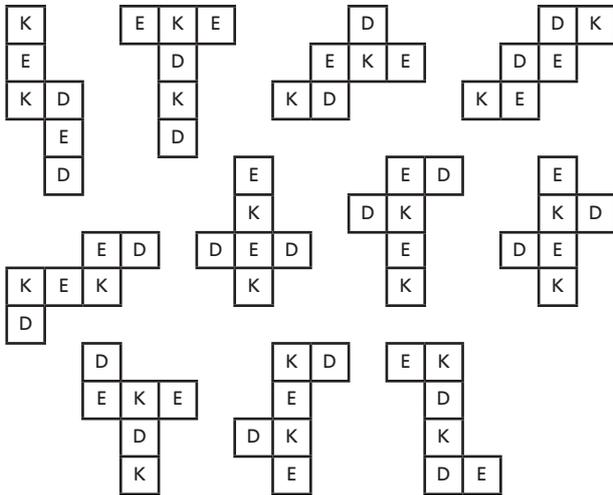
→ pages 39–41



2. Answers will vary but should be one of these shapes (in any orientation):



3. Answers will vary but pairs of letters show where the opposites are. The letters can be interchanged.



5. The volume is 1,000 cm³.

Reflect

Answers will vary; for example: The net will have 6 identical square faces. There will generally be a middle row of square faces, with at least one face on either side.

End of unit check

→ pages 42–44

My journal

1. $a = 63^\circ$ $b = 63^\circ$ $c = 99^\circ$
 $d = 72^\circ$ $e = 81^\circ$ $f = 117^\circ$
 $g = 81^\circ$ $h = 63^\circ$ $i = 81^\circ$

Explanations will vary but look for: opposite angles are equal; angles on a line add to 180°; angles in a quadrilateral add to 360°. Angles in a square are right angles.

2. A: Does not make a 3D shape
 B: Pyramid
 C: Pyramid
 D: Cube
 E: Prism
 F: Does not make a 3D shape
 G: Prism
 H: Prism

Power puzzle

Look for evidence of a variety of different shapes – not the same ones in different orientations.

Children may group in many different ways, so talk to them about which properties they were thinking about. Could they group them differently?

They should find plenty of parallelograms, rectangles, squares, trapeziums, kites and rhombii.

For example:

