Unit I2: Angles and properties of shapes

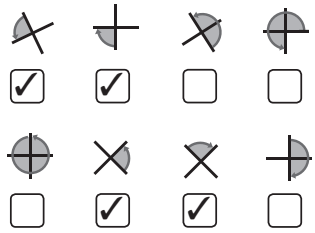
Lesson I: Turns and angles

→ pages 71–73

1. a) Now he faces the café.

b) Now he faces the pond.

2.



3. Answers will vary, but children should notice that they end up facing in the same direction.

4. a) She is facing west.

b) She could be facing west or east.

c) Southwest

d) One right angle anticlockwise or three right angles clockwise

5.

Starting position	Quarter turn clockwise	Two right-angle turns anticlockwise	Quarter turn anticlockwise	Three-quarter turn anticlockwise then a quarter turn clockwise

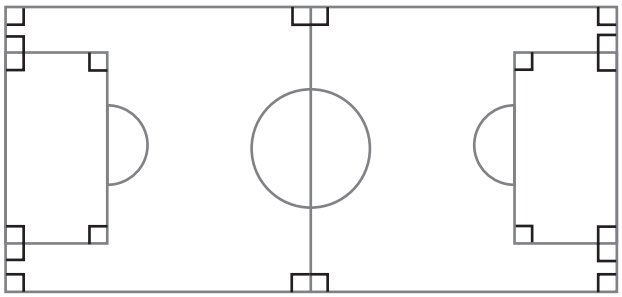
Reflect

When I turn by two right angles, I will face the opposite direction.
When I turn by four right angles, I will face the same direction.

Lesson 2: Right angles in shapes

→ pages 74–76

1.



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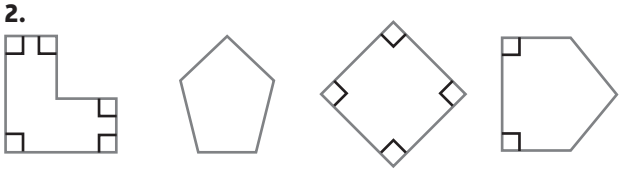
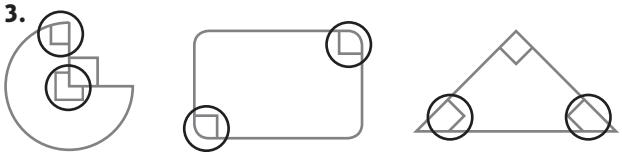


A B C D

3.



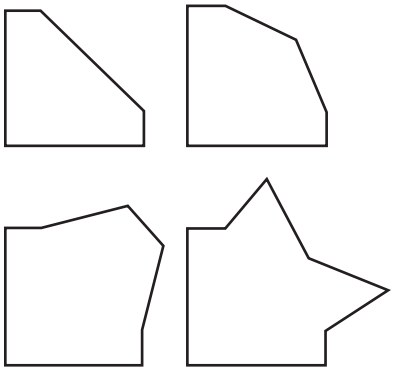
4. Answers will vary. Children should have drawn a line that is perpendicular to the existing line, to create at least one right angle. Children can draw their own pair of perpendicular lines in the final two diagrams.

5. Answers will vary. Typical items that show right angles include books, doors, tables or the whiteboard.

6. Children should have coloured the cross.

Reflect

Answers will vary. Ensure that children are drawing accurately with a ruler and that the shape has at least three internal right angles. Possible answers include a square, a rectangle, an irregular pentagon with three right angles, and an L shape. Children who interpret the question as specifying 'exactly three right angles' will discover that they need to draw an irregular polygon with five or more sides, either convex or concave, that looks like three corners of a square or rectangle with extra sides added. Some possibilities are shown.



Lesson 3: Comparing angles

➜ pages 77–79

1. First angle joined to 'less than a right angle'
Second angle joined to 'greater than a right angle'
Third angle joined to 'a right angle'

2. Drawings will vary. Children should show three angles of between 0 and 90 degrees in the top row and three angles of between 90 and 180 degrees in the bottom row.

3. obtuse acute obtuse

4. Answers will vary. Using the points of the peg board, children should show three angles of between 0 and 90 degrees in the top row, three angles of between 90 and 180 degrees in the second row, and three angles of 90 degrees in the final row.

5. Answers may vary, but the following is the correct prediction:
12 acute angles (2 × 2 complementary; 8 supplementary with the obtuse angles)
6 right angles (2 × 2 supplementary, + 2)
8 obtuse angles (8 supplementary with the acute angles)
(Children will not know the vocabulary 'supplementary' and 'complementary' but they may be able to spot and use the principles in their predictions.)

Reflect

Answers will vary. Typical obtuse and acute angles can be formed in open books, open doors, two pencils or rulers. Children may discover shapes around the room that have acute or obtuse angles. Children can use an angle measurer (or a right angle) to decide whether an angle is acute or obtuse.

Lesson 4: Drawing accurately

➜ pages 80–82

1. Lines drawn of the following lengths:
A: 3 cm
B: 4 cm
C: 5 cm

2. Ensure the child measures accurately, marking both the top and bottom lines to find 5 cm before drawing a line to connect the marks.

3. a) Shapes measured, sides labelled and then shapes copied:
A: horizontal line = 29 mm; diagonal line = 39 mm
B: vertical line = 23 mm; horizontal line = 35 mm
C: vertical line = 23 mm; horizontal line = 38 mm
b) Answers will vary. Ensure the child has justified their reasons.

4. a) Rectangle will be 11 cm × 55 mm.
b) Square will be 55 mm × 55 mm.
c) Each right-angled triangle will have perpendicular sides of length 55 mm and hypotenuse approximately 78 mm long.

Reflect

Step 1: Place your ruler flat on your paper and find 0.
Step 2: Place your pencil on 0 and draw a line to 5 cm.
Step 3: Extend your line for 5 smaller intervals (mm).
You will have drawn a line 5 cm and 5 mm long.

Lesson 5: Types of line (I)

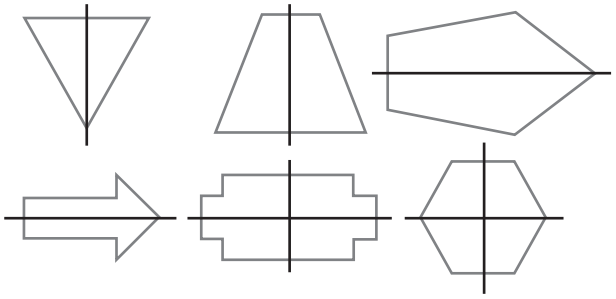
➜ pages 83–85

1. neither horizontal neither vertical

2. There are 2 horizontal lines and 8 vertical lines.

3. Answers will vary. Child should show 3 horizontal, 3 vertical and 3 neither horizontal nor vertical lines.

4.



5. Turn all shapes by a quarter-turn (right-angle turn) to change the symmetry lines from vertical to horizontal or vice versa.

6. Lines ticked:
From top to bottom: middle line (horizontal)
From left to right: the first, third and fourth lines (vertical)

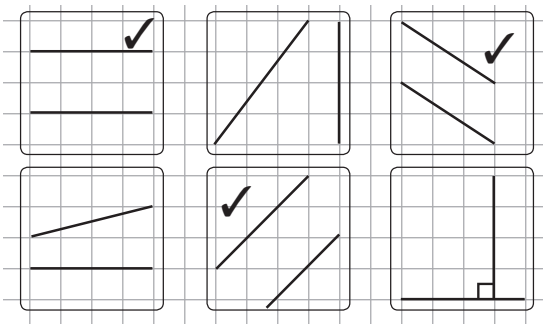
Reflect

Answers will vary. Typical answers might include:
horizontal – the playground, tables
vertical – trees, lampposts, wall of the school

Lesson 6: Types of line (2)

➜ pages 86–88

1. a)



b) Answers will vary. Children should draw lines with lengths that differ from the original lines but that are demonstrably parallel to them using the grid.

2. Answers will vary. Check that children demonstrate understanding of the difference between parallel and perpendicular lines, labelling accurately.

3. Answers will vary.
Examples of parallel lines include: train tracks, lanes in an athletics track, road markings, edges of buildings, edges of a slide.
Examples of perpendicular lines include: adjacent edges of window and door frames, line where the road meets a lamppost or building, chair and table legs to the floor.

4. Dexter is wrong: the lines are parallel. When you measure a distance from a line, you should place the ruler so that it is perpendicular to the line. Dexter needs to move the right-hand ruler so that it is vertical. This will show that the lines are the same (perpendicular) distance apart.

5. a) Answers will vary. Ensure each pair of lines drawn are parallel using opposing pairs of dots.
b) Answers will vary. Ensure each pair of lines drawn are perpendicular. In the first two diagrams the only solutions use the vertices of a kite shape. There are more possibilities for the third and fourth diagrams.

Reflect

1. Parallel lines always stay the same distance apart so they will never touch.

2. Parallel lines do not have to be the same length.

3. Perpendicular lines will meet at right angles.

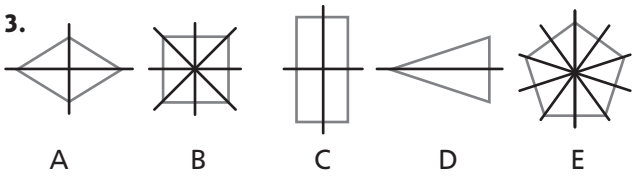
Lesson 7: Recognising and describing 2D shapes

➜ pages 89–91

1. triangle pentagon rectangle hexagon

2. Shape E is not a quadrilateral. A quadrilateral is a shape with 4 sides; this shape has 6 sides so it is a hexagon.

3.



A B C D E

4. a) Children should draw and label two rectangles (possibly including squares).
b) Answers will vary. The shapes that show one pair of perpendicular sides and no parallel sides include a right-angled triangle, a kite with just one right angle or an irregular quadrilateral with just one right angle.
c) Answers will vary. Shapes that show no perpendicular or parallel sides but have one line of horizontal symmetry include kites or semicircles.

5. A3 B1 F6 E2 C4

Reflect

A rectangle is a quadrilateral that has 2 pairs of parallel sides, 4 right angles and 4 pairs of perpendicular lines.

Lesson 8: Recognising and describing 3D shapes

➜ pages 92–94

1. cube cuboid triangular prism
square-based pyramid sphere cylinder

2. Numbers written into table as follows:

Vertices:	8	4	5	8
Faces:	6	4	5	6
Edges:	12	6	8	12

3. a) matched to ii)
b) matched to i)
c) matched to iii)

4. Answers written into the table as follows:

Prism	B, D	
Not a prism	C	A

5. Answers will vary. A possible response could be:
Both shapes have at least one square face, have some parallel and perpendicular edges and have lines of symmetry.
The cuboid has 6 faces, 8 vertices and 12 edges, but the pyramid has 5 faces, 5 vertices and 8 edges.

Reflect

A cube has 6 square faces, 8 vertices and 12 edges. The cube has parallel and perpendicular edges and faces.

Lesson 9: Constructing 3D shapes

➜ pages 95–97

1. 6 cubes; 6 cubes; 5 cubes
8 cubes; 6 cubes; 6 cubes

2. Reena has made 4 different cuboids.

3. A: 12 sticks; 8 marshmallows
B: 8 sticks; 5 marshmallows
C: 6 sticks; 4 marshmallows

4. Children should have circled 2 shapes from: triangular prism, square-based pyramid, cuboid

5. Answers will vary. An example answer could be: First make two triangles of the same size with 6 sticks and 6 marshmallows. Then attach the two triangle faces parallel to each other using 3 sticks to join the vertices.

6. Table completed:

Sticks:	9	12	15	18
Marshmallows:	6	8	10	12

Answers may vary. One possible pattern is that the number of sticks is always 3 times the number of sides of the non-rectangular face in the prism. The number of marshmallows is always 2 times this number.

Reflect

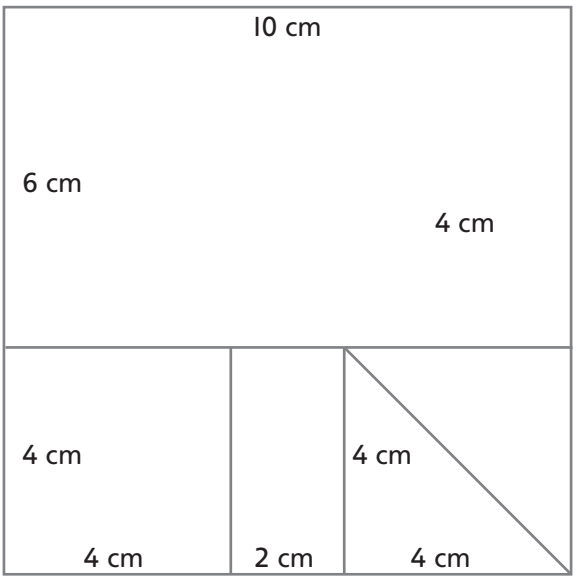
Answers will vary. Children might mention: learning that angles (acute, obtuse and right) are part of a turn; drawing and measuring lines accurately; learning about parallel and perpendicular lines; learning how to describe 2D and 3D shapes; learning how to make 3D shapes.

End of unit check

➜ pages 98–100

My journal

1 a. How the child splits up the square will vary. This is a possible solution



1 b. Answers will vary. Children should provide an explanation of how they used a ruler to measure and draw horizontal and vertical lines, making sure lines were perpendicular or parallel when necessary.

2. Answers will vary. This is a possible solution.