

Reasoning and Problem Solving

Step 7: Lengths and Angles in Shapes

National Curriculum Objectives:

Mathematics Year 5: (5G2a) [Use the properties of rectangles to deduce related facts and find missing lengths and angles](#)

Mathematics Year 5: (5G4b) [Identify: angles at a point and one whole turn \(total 360\), angles at a point on a straight line and \$\frac{1}{2}\$ a turn \(total 180\) other multiples of \$90^\circ\$](#)

Differentiation:

Questions 1, 4 and 7 (Reasoning)

Developing Use knowledge of angles in shapes, including squares, rectangles and 6 sided rectilinear compound shapes, to explain if a given angle is correct or not.

Expected Use knowledge of angles in shapes, including triangles, squares, rectangles and 6 sided rectilinear compound shapes, to explain if a given angle is correct or not.

Questions using adjoining shapes.

Greater Depth Use knowledge of angles in shapes, including triangles, quadrilaterals and 8 sided rectilinear compound shapes, to explain if a given angle is correct or not. More than one adjoining shape per question.

Questions 2, 5 and 8 (Problem Solving)

Developing Use clues about the properties of a shape, including squares, rectangles and 6 sided rectilinear compound shapes to determine the possible length of the sides.

Expected Use clues about the properties of a shape, including triangles, squares, rectangles and 6 sided rectilinear compound shapes, to determine the length of the sides.

Greater Depth Use clues about the properties of a shape, including triangles, quadrilaterals and 8 sided rectilinear compound shapes to determine the length of the sides or the angles within.

Questions 3, 6 and 9 (Reasoning)

Developing Given two statements about the properties of shapes, including squares, rectangles and 6 sided rectilinear compound shapes, determine which is correct, including angles of 90° and 45° .

Expected Given two statements about the properties of shapes, including triangles, squares, rectangles and 6 sided rectilinear compound shapes, determine which is correct, including any angles.

Greater Depth Given two always, sometimes, never statements about the properties of shapes, including triangles, quadrilaterals and 8 sided rectilinear compound shape, determine which is correct.

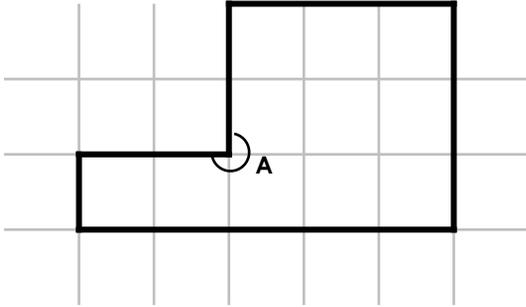
More [Year 5 Properties of Shapes](#) resources.

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Lengths and Angles in Shapes

Lengths and Angles in Shapes

1a. Jack thinks he has picked the correct degrees for angle A.



135° ✓

270°

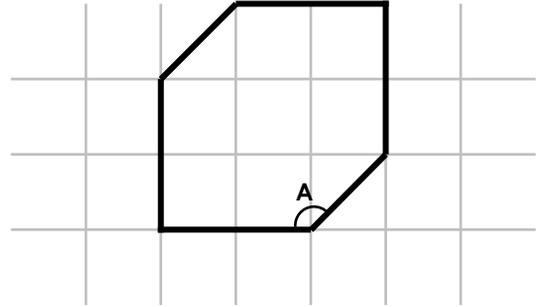
90°

Do you agree? Explain why.



R

1b. Lizzy thinks she has picked the correct degrees for angle A.



90°

180° ✓

135°

Do you agree? Explain why.



R

2a. Arron has a rectangle with a perimeter of 26cm.

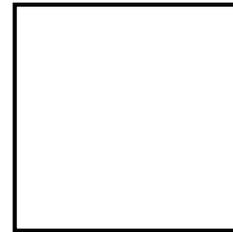


What length is each side? Give 3 possible answers.



PS

2b. Rhonda has a square with a perimeter less than 50cm.



What length is each side? Give 3 possible answers.



PS

3a. Elvis and Willow are discussing the properties of a shape.



Elvis

If a square is split diagonally, it will have 4 angles of 45° and 2 right angles.

If a square is split diagonally, it will have 4 angles of 45° and 4 right angles.



Willow

Who is correct? Why?



R

3b. April and Charlie are discussing right angles in a shape.



April

A rectangle has 2 sets of parallel sides but it could have angles smaller than a right angle.

A rectangle has 2 sets of parallel sides and always has 4 right angles.



Charlie

Who is correct? Why?

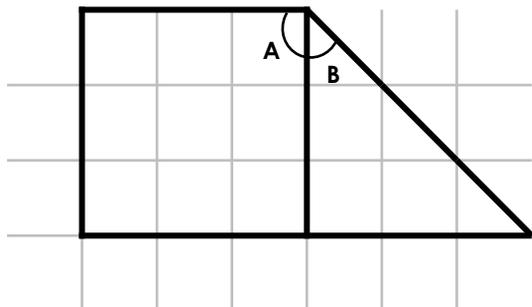


R

Lengths and Angles in Shapes

Lengths and Angles in Shapes

4a. Lola thinks she has picked the correct degrees for the total of angle A and angle B.



135°

270° ✓

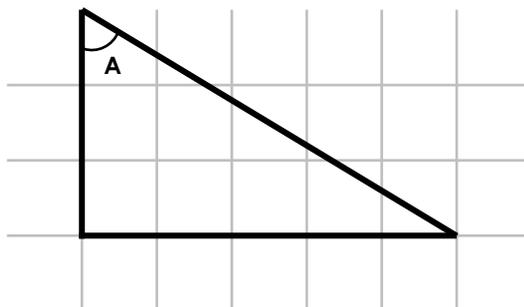
90°

Do you agree? Explain why.



R

4b. Alfie thinks he has picked the correct degrees for angle A.



90°

60°

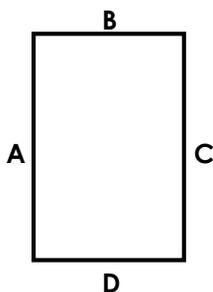
45° ✓

Do you agree? Explain why.



R

5a. Jack has a rectangle with a perimeter between 20cm and 30cm. Sides A and C are 4cm longer than sides B and D.

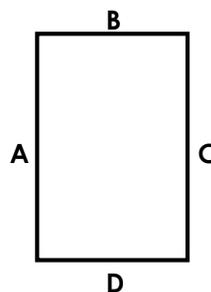


What length is each side? Give 3 possible answers.



PS

5b. Mia has a rectangle with a perimeter between 30cm and 40cm. Sides B and D are 5cm shorter than sides A and C.



What length is each side? Give 3 possible answers.



PS

6a. Sophie and Will are calculating angles in a shape.



Sophie

If a triangle has one angle of 87° and another of 36° , the last angle must be 58° .

If a triangle has one angle of 87° and another of 36° , the last angle must be 57° .



Will

Who is correct? Why?



R

6b. Niko and Sara are calculating angles in a shape.



Niko

Angles in a rectangle equal 360° . If one angle is 90° , the remaining angles are also 90° .

Angles in a rectangle equal 360° . If one angle is 90° , the remaining angles must equal 180° .



Sara

Who is correct? Why?

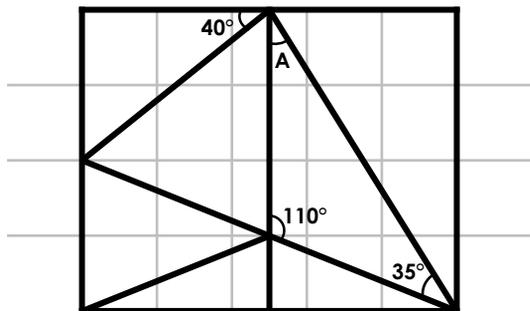


R

Lengths and Angles in Shapes

Lengths and Angles in Shapes

7a. Liam thinks he has picked the correct degrees for angle A.



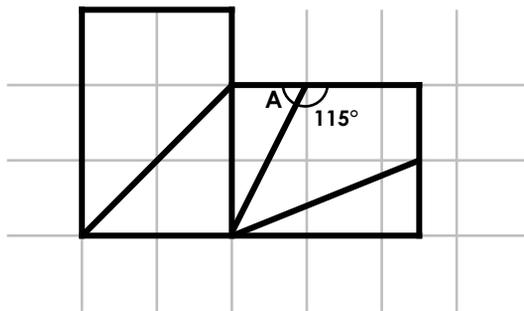
- 35°
- 50° ✓
- 45°

Do you agree? Explain why.



R

7b. Nadia thinks she has picked the correct degrees for angle A.



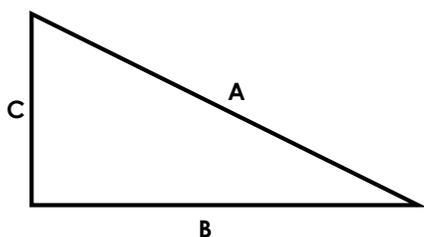
- 20°
- 45°
- 65° ✓

Do you agree? Explain why.



R

8a. Bridget has a triangle with a perimeter of between 15cm and 30cm. Side A is 2cm longer than side B. Side B is 5cm longer than side C.

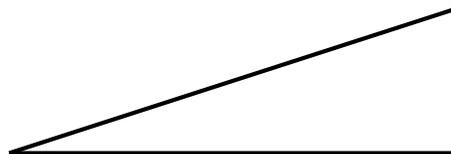


What length is each side? Give 3 possible answers.



PS

8b. Josef is calculating the angles in a triangle. He knows that the second angle is twice as big as the first and the third angle is three times as big as the first.



What are the three angles? Is there more than one answer?



PS

9a. Jordan and Tia are calculating angles in a shape.



Jordan

A quadrilateral always has at least one right angle.

A quadrilateral sometimes has a right angle but can have angles less and more than 90°.



Tia

Who is correct? Why?



R

9b. Mina and Logan are calculating angles in a shape.



Mina

If you are given 1 angle of a triangle, you can sometimes calculate the remaining angles.

If you are given 1 angle of a triangle, you can always calculate the remaining angles.



Logan

Who is correct? Why?



R

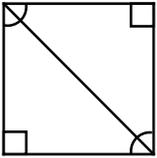
Reasoning and Problem Solving Lengths and Angles in Shapes

Developing

1a. Jack is not correct because the angle is a combination of three 90° angles, which is 270° .

2a. Various possible answers including; 7cm and 6cm; 8cm and 5cm; 9cm and 4cm; 10cm and 3cm; 11cm and 2cm; or 12cm and 1cm.

3a. Elvis is correct as the shape will have four 45° angles and 2 right angles:



Expected

4a. Lola is not correct because $90^\circ + 45^\circ = 135^\circ$.

5a. Answers include: A and C = 7cm, B and D = 3cm; A and C = 8cm, B and D = 4cm; A and C = 9cm, B and D = 5cm

6a. Will is correct as $180^\circ - 87^\circ - 36^\circ = 57^\circ$.

Greater Depth

7a. Liam is not correct because the internal angles of a triangle equal 180° . If one angle is 110° , the other is 35° , the third angle must be 35° .

8a. Answers include: A = 8cm, B = 6cm and C = 1cm; A = 10cm, B = 8cm and C = 3cm; A = 12cm, B = 10cm and C = 5cm.

9a. Tia is correct as a quadrilateral such as a square or rectangle has a right angle but other quadrilaterals have no right angles.

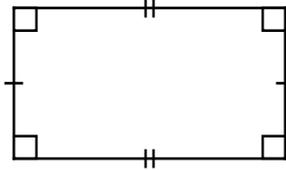
Reasoning and Problem Solving Lengths and Angles in Shapes

Developing

1b. Lizzy is incorrect because the angle is a combination of a right angle and half a right angle, which is 135° .

2b. Various possible answers including; 1; 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; or 12.

3b. Charlie is correct as a rectangle always has 4 right angles and 2 sets of parallel sides:



Expected

4b. Alfie is not correct because the angle would only be 45° if it cut through one square on the grid exactly.

5b. Answers include: A and C = 10cm, B and D = 5cm; A and C = 11cm, B and D = 6cm; A and C = 12cm, B and D = 7cm

6b. Niko is correct, rectangles always have four 90° angles. Sara's angles do not equal 360° .

Greater Depth

7b. Nadia is correct because angles on a straight line = 180° . If one part of the angle is 115° , the other part must be 65° .

8b. 30° , 60° and 90° . There is only one answer.

9b. Mina is correct as other angles could be calculated easily if it was a right angle, or if it was an isosceles or equilateral triangle, but if it was a scalene triangle, more information would be needed to calculate the other angles.