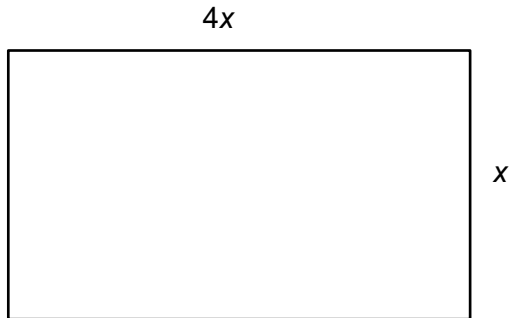
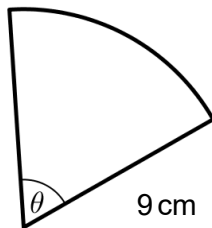


Higher Check In - 10.02 Perimeter calculations

1. Calculate the radius of a circle with a circumference of 43.2 cm.
2. The perimeter of the rectangle is 75 cm. Work out the value of x .

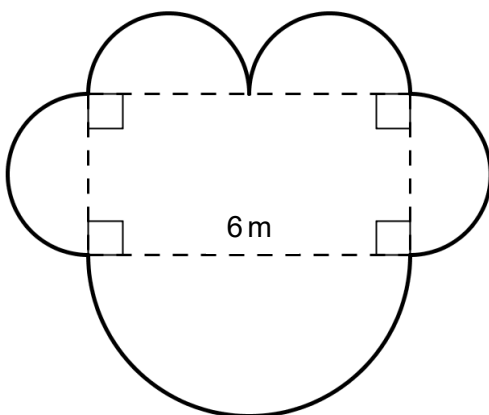


3. ABC is a right-angled triangle with AB perpendicular to BC. Given that AB = 6 cm and BC = 8 cm, find the perimeter of the triangle ABC.
4. The circular sector has radius 9 cm and perimeter 7π cm. Work out the size of angle θ .



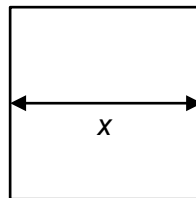
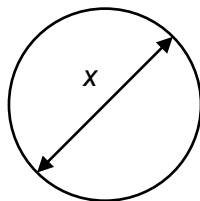
5. The framework below is made out of wire. It is made from 5 semicircles. Four of the semicircles are congruent. The other semicircle has diameter 6 m.

Work out the length of wire used, leaving your answer in terms of π . [10.02b/c initial]



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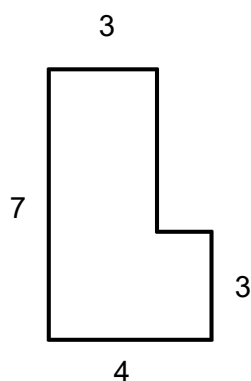
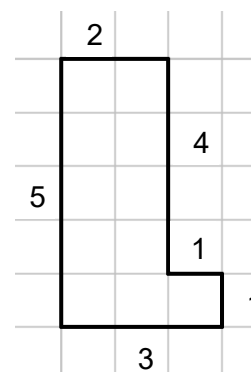
6. The circle below has diameter x cm. The square has side length x cm. Explain which shape has a greater perimeter. Does it matter what the value of x is? [10.02a/b]



7. Florence draws some rectangles on a square cm grid. Her first rectangle is 2 cm by 3 cm and has perimeter 10 cm. Her next rectangle has perimeter 18 cm. She keeps drawing rectangles and always ends up with a perimeter that is an even number. Will this always happen? Explain your answer.

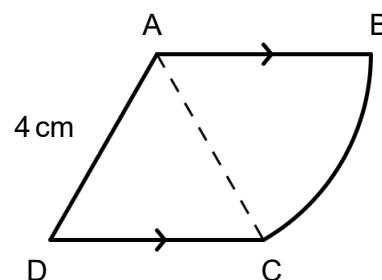
8. Harry is investigating the perimeter of objects in the shape of the letter L drawn on a square grid. For example, this L shape has perimeter 16.

Harry notices that he can get the same answer of 16 by adding the lengths on the left (5) and bottom (3) of this L shape and doubling the answer.

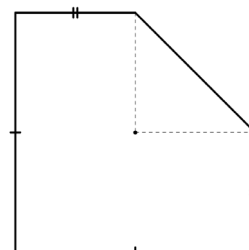


Will Harry's method work for the L shape on the left? Will it work for any L shape? Explain your reasoning.

9. In the shape ABCD on the right, ACD is an equilateral triangle with side length 4 cm. ABC is a circular sector with AB parallel to DB. Calculate the perimeter of ABCD correct to 1 decimal place.



10. Freddie has a piece of paper in the shape of a square with sides of length 8 cm. He folds the square so that one of its corners touches the centre of the square, forming the pentagon shown on the right. Find the exact perimeter of the pentagon.



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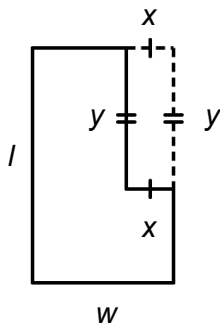
Extension

A rectangle has perimeter 50 cm and area 18 cm^2 . Find the length and the width of the rectangle.

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Answers

- $r = \frac{C}{2\pi} = 6.88 \text{ cm (3 sf)}$
- $2(4x + x) = 75, x = 7.5 \text{ cm}$
- Using Pythagoras' theorem, $BC = \sqrt{6^2 + 8^2} = 10$ so perimeter is 24 cm
- $9 + 9 + \left(\frac{\theta}{360} \times 2\pi \times 9\right) = 7\pi \Rightarrow \theta = 25.4^\circ$
- $4 \times \frac{3\pi}{2} + \frac{6\pi}{2} = 9\pi \text{ m}$
- The square's perimeter is $4x$. The circle's perimeter (more usually called its circumference) is πx . Since $4 > \pi$ then the perimeter of the square is always larger than that of the circle.
- If Florence always draws rectangles that are on grid lines, she will end up with a width and length that are an integer. If the length is l and the width is w , her rectangle will have perimeter $2w + 2l = 2(w + l)$. Multiplying an integer by 2 will always give an even number, hence her perimeter will always be even. However, if she draws rectangles that are not on the gridlines (e.g. 1.5 cm by 2 cm) she may get a rectangle with a perimeter that is odd (e.g. 7 cm).
- Harry's method works for the second L shape, since $7 + 3 + 4 + 1 + 3 + 4 = 22$ and $2(7 + 4) = 22$. The edges of an L shape can always be rearranged to turn it into a rectangle (the edge marked x can be moved up to the top, the edge marked y can be moved to the right) The perimeter of the L shape would be the same as for a rectangle, $2(w + l)$ so his method always works.



- The angle BAC is 60° because it is alternate to ADC.
 $3 \times 4 + \frac{60}{360} \times 2 \times \pi \times 4 = 16.2$ (1dp)
- Using Pythagoras' theorem, the folded line has length $\sqrt{4^2 + 4^2} = \sqrt{32} = 4\sqrt{2}$ cm.
The perimeter of the pentagon is therefore $8 + 8 + 4 + 4 + 4\sqrt{2} = 24 + 4\sqrt{2}$ cm.

GCSE (9–1)

MATHEMATICS

Extension

Let length of rectangle = x

Let width of rectangle = y

Perimeter $2(x + y) = 50$

Area $xy = 18$ so $y = \frac{18}{x}$

$$2x + \frac{36}{x} = 50$$

$$2x^2 - 50x + 36 = 0$$

$$x = 24.3, 0.742$$

So length is 24.3 cm and width is 0.7 cm

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AO1	1	Calculate radius given circumference of a circle			
AO1	2	Find side of a rectangle using the perimeter			
AO1	3	Find perimeter of a triangle using Pythagoras' theorem			
AO1	4	Find angle of sector given the perimeter			
AO1	5	Find perimeter of compound shape of semicircles			
AO2	6	Compare perimeter of square and circle			
AO2	7	Use properties of odd and even numbers with the perimeter of a rectangle			
AO2	8	Manipulate compound rectilinear shape to find perimeter			
AO3	9	Find perimeter of compound shape			
AO3	10	Find perimeter of compound shape			

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