

WA8MMGTW2

Two-dimensional space and structures

Core + Challenge

Semicircles, Quadrants and Composites

I can find the perimeter and area of semicircles, quadrants and sectors, and of composite shapes and shaded regions made with them.

Name: _____ Date: _____ Score: _____ / 58

Key idea

A **sector** is a fraction $\frac{\theta}{360}$ of a circle (semicircle $\frac{1}{2}$, quadrant $\frac{1}{4}$). Area = $\frac{\theta}{360} \times \pi r^2$.

Perimeter = arc + 2 radii, where arc = $\frac{\theta}{360} \times 2\pi r$. Semicircle, $r = 10$ cm, $\pi \approx 3.14$: $31.4 + 20 = 51.4$ cm.

Composite shapes: split into rectangles and circle parts. Running track = rectangle + 2 semicircles (= 1 circle).

Shaded regions: shaded area = whole shape – unshaded part. For a perimeter, count only the outside edges.

A Fluency *practise the skill*

/ 16 marks

Q1–8: $\pi \approx 3.14$ (exact answers). Q9–16: π key, round to 1 decimal place. Arc = the curved edge only.

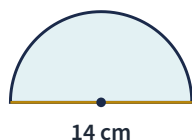
- | | |
|--|--|
| 1. Area: semicircle, $r = 10$ cm _____ | 9. Area: quadrant, $r = 6$ cm _____ |
| 2. Area: quadrant, $r = 10$ cm _____ | 10. Area: semicircle, $d = 9$ m _____ |
| 3. Arc: semicircle, $r = 10$ cm _____ | 11. Perimeter: semicircle, $d = 9$ m _____ |
| 4. Perimeter: semicircle, $r = 10$ cm _____ | 12. Perimeter: quadrant, $r = 7$ cm _____ |
| 5. Arc: quadrant, $r = 4$ m _____ | 13. Area: 60° sector, $r = 12$ cm _____ |
| 6. Perimeter: quadrant, $r = 4$ m _____ | 14. Arc: 120° sector, $r = 9$ m _____ |
| 7. Area: semicircle, $d = 12$ m _____ | 15. Area: 270° sector, $r = 2$ m _____ |
| 8. Fraction of a circle: 60° sector _____ | 16. Area: 45° sector, $r = 8$ cm _____ |

B

Core *apply the skill to problems*

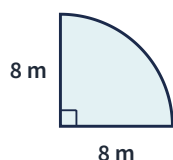
/ 22 marks

- 1 Find the area and the perimeter of this semicircle. Use the π key and round to 1 decimal place. [2 marks]



Answer: _____

- 2 Find the area and the perimeter of this quadrant. Use $\pi \approx 3.14$. [2 marks]



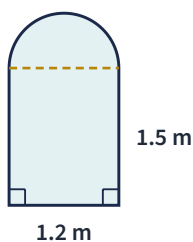
Answer: _____

- 3 A running track has two 100 m straights and semicircular ends, as shown. Use the π key to find (a) the length of the inside edge (1 decimal place) and (b) the area inside the track (nearest m^2). [3 marks]



Answer: _____

- 4 A window is a rectangle with a semicircle on top. Find its area to 2 decimal places (π key). [3 marks]



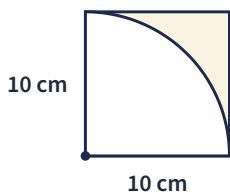
Answer: _____

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- 5 The goal circle on a netball court is a semicircle of radius 4.9 m. Find its area to 1 decimal place (π key). [2 marks]

Answer: _____

- 6 Find the shaded area. The curve is a quadrant centred at the bottom-left corner of the square. Use $\pi \approx 3.14$. [2 marks]



Answer: _____

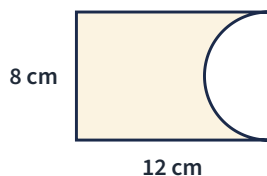
- 7 A 32 cm pizza (diameter) is cut into 8 equal slices. For one slice, find the area and the length of the curved crust, each to 1 decimal place (π key). [2 marks]

Answer: _____

- 8 A quadrant-shaped garden bed of radius 3.5 m sits in the corner of a yard. Edging goes along the curved edge only. How much edging is needed, to 1 decimal place (π key)? [2 marks]

Answer: _____

- 9 A semicircle is cut from the end of a 12 cm by 8 cm rectangle. Find the shaded area to 1 decimal place (π key). [2 marks]



Answer: _____

- 10 A sector has radius 10 cm and angle 72° . Find its area and perimeter. Use $\pi \approx 3.14$. [2 marks]

Answer: _____

C Reasoning *explain, justify and check*

/ 9 marks

- 1 Explain why the perimeter of a semicircle is not just half the circumference of the full circle. [2 marks]

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- 2 Explain why the area inside a running track (Core Q3) is a rectangle plus one full circle. [2 marks]

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- 3 Lily finds the perimeter of a quadrant with radius 6 cm as $\frac{1}{4} \times 2 \times \pi \times 6 = 9.4$ cm. Explain her mistake and find the correct perimeter to 1 decimal place (π key). [2 marks]

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- 4 True or false: "A semicircle of radius 10 cm has the same area as a full circle of radius 5 cm." Explain without using a value for π . [3 marks]

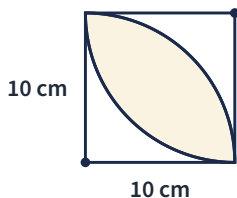
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D Challenge *multi-step and problem-solving*

/ 11 marks

- 1 Two quadrants are drawn inside a 10 cm square, centred at opposite corners. Find the area of the shaded 'leaf' to 1 decimal place (π key). [2 marks]



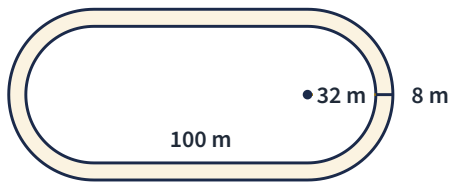
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Answer: _____

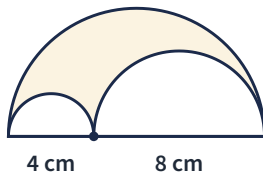
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- 2 The track in Core Q3 is surfaced 8 m wide all the way round (outside the inner edge). The straights are 100 m. Find the area of the track surface to the nearest m^2 (π key). [3 marks]



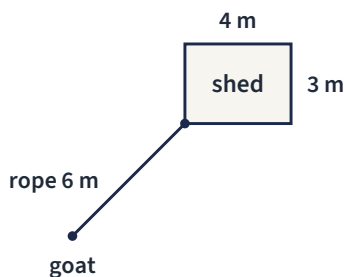
Answer: _____

- 3 The shaded shape is a semicircle of diameter 12 cm with two semicircles (diameters 4 cm and 8 cm) removed. Find its area and its perimeter, each to 1 decimal place (π key). [3 marks]



Answer: _____

- 4 A goat is tied to the corner of a 4 m by 3 m shed with a 6 m rope. The goat cannot go inside or through the shed. Find the area it can graze, to 1 decimal place (π key). [3 marks]



Answer: _____

How did I go?

Fluency ____ / 16 Core ____ / 22 Reasoning ____ / 9 Challenge ____ / 11 **Total ____ / 58**

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