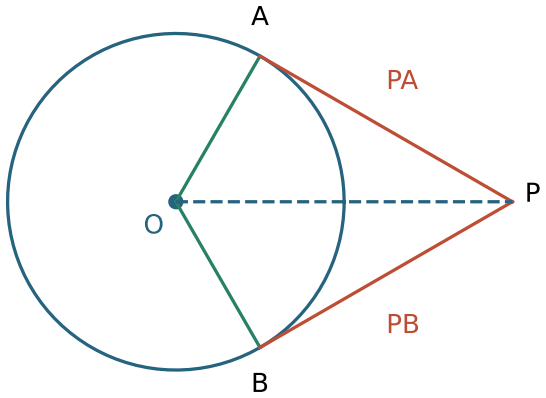
Exercise walk-through

4.2.7
Sector Measure

AQA · GCSE · Mathematics

Figure: Congruence, similarity and circles (4)

Shared OP and equal radii → RHS → PA = PB



- Equal radii, shared OP and right angles give congruent triangles (RHS), so PA = PB
- Match each part of the diagram to the text.

Perimeter, area and volume

- Triangle: $\frac{1}{2} \times b \times h$, where h is the **perpendicular height** .
- Parallelogram: $b \times h$.
- Trapezium: $\frac{1}{2}(a+b)h$, where a and b are the parallel sides.
- Circle: $A = \pi r^2$, and the **circumference** is $C = 2\pi r = \pi d$.

$$\text{arc length} = \frac{\theta}{360} \times 2\pi r \qquad \text{sector area} = \frac{\theta}{360} \times \pi r^2$$

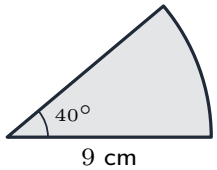
Pythagoras and trigonometry

- **Pythagoras' theorem.** In a right-angled triangle, $a^2 + b^2 = c^2$, where c is the **hypotenuse**, the longest side, opposite the right angle.
- A ladder whose foot is 3 m from a wall and whose top is 4 m up the wall is $\sqrt{9+16} = 5$ m long.
- **Trigonometric ratios.** Label the sides from the angle θ: opposite, **adjacent** (next to the angle) and **hypotenuse**.
- **Worked example 12.** In a right-angled triangle the hypotenuse is 23.7 cm and x is the side **adjacent** to an angle of $52°$.

$$\sin\theta = \frac{\text{opp}}{\text{hyp}} \qquad \cos\theta = \frac{\text{adj}}{\text{hyp}} \qquad \tan\theta = \frac{\text{opp}}{\text{adj}}$$

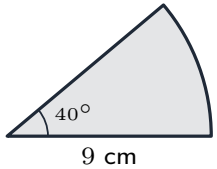
Exercise 2.1

2.1 A sector has a radius of 9 cm and an angle of 40°. Work out its arc length and its area. Give your answers to 2 decimal places. [2]



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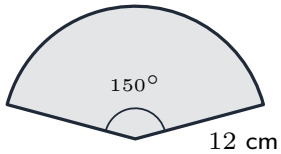


2.1

- arc $2\pi = \mathbf{6.28}$ cm
- area $9\pi = \mathbf{28.27}$ cm^2

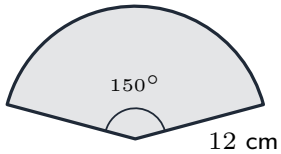
Exercise 2.2

2.2 A sector has a radius of 12 cm and an angle of 150°. Work out its area and its arc length in terms of π. [2]



Exercise 2.2

2.2 A sector has a radius of 12 cm and an angle of 150°. Work out its area and its arc length in terms of π. [2]

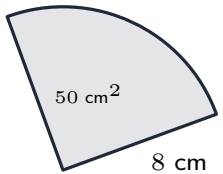


2.2

- area $\mathbf{60}\pi$ cm^2
- arc $\mathbf{10}\pi$ cm

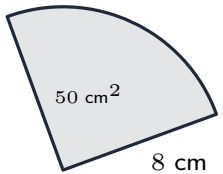
Exercise 3.1

3.1 A sector has a radius of 8 cm and an area of 50 cm^2. Work out the angle of the sector. [3]



Exercise 3.1

3.1 A sector has a radius of 8 cm and an area of 50 cm^2. Work out the angle of the sector. [3]



3.1

- $\dfrac{\theta}{360} \times 64\pi = 50$
- $\theta = \dfrac{50 \times 360}{64\pi}$
- $\mathbf{89.5}^\circ$

Exercise 3.2 (a)

3.2 A garden sprinkler turns through 135°. It waters a sector with a radius of 6 m.

(a) Work out the area of grass watered. [2]

Exercise 3.2 (a)

3.2 A garden sprinkler turns through 135°. It waters a sector with a radius of 6 m.

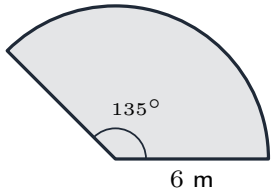
(a) Work out the area of grass watered. [2]

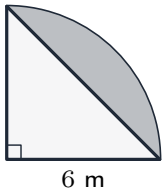
(a) $\frac{135}{360} \times \pi \times 36 = \mathbf{42.4}$ m^2

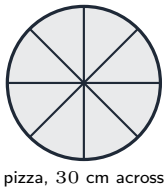
Exercise 3.2 (b)

3.2 A garden sprinkler turns through 135°. It waters a sector with a radius of 6 m.

(b) Work out the arc length and the perimeter of the watered sector. [3]



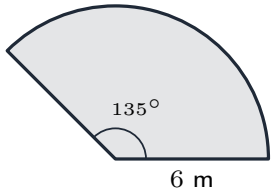


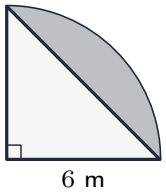

pizza, 30 cm across

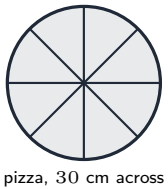
Exercise 3.2 (b)

3.2 A garden sprinkler turns through 135°. It waters a sector with a radius of 6 m.

(b) Work out the arc length and the perimeter of the watered sector. [3]







(b) $\frac{135}{360} \times 12\pi = \mathbf{14.14}$ m; $14.14 + 12 = \mathbf{26.14}$ m

Exercise 3.2 (c)

3.2 A garden sprinkler turns through 135°. It waters a sector with a radius of 6 m.

(c) A second sprinkler waters a quarter circle with a radius of 6 m. Work out the area of the segment between the chord and the arc. [4]

Exercise 3.2 (c)

3.2 A garden sprinkler turns through 135°. It waters a sector with a radius of 6 m.

(c) A second sprinkler waters a quarter circle with a radius of 6 m. Work out the area of the segment between the chord and the arc. [4]

(c) sector $\frac{1}{4} \times 36\pi = 28.27$; triangle $\frac{1}{2} \times 6 \times 6 = 18$; $28.27 - 18 = \mathbf{10.3}$ m^2

Exercise 3.2 (d)

3.2 A garden sprinkler turns through 135°. It waters a sector with a radius of 6 m.

(d) A pizza with a diameter of 30 cm is cut into 8 equal slices. Work out the arc length and the area of one slice. A shop sells slices with an area of 100 cm^2 from the same size of pizza. What angle is each of these slices? [5]

Exercise 3.2 (d)

3.2 A garden sprinkler turns through 135°. It waters a sector with a radius of 6 m.

(d) A pizza with a diameter of 30 cm is cut into 8 equal slices. Work out the arc length and the area of one slice. A shop sells slices with an area of 100 cm^2 from the same size of pizza. What angle is each of these slices? [5]

(d) angle 45°; arc $\frac{1}{8} \times 30\pi = \mathbf{11.8}$ cm; area $\frac{1}{8} \times 225\pi = \mathbf{88.4}$ cm^2; $\dfrac{\theta}{360} \times 225\pi = 100$; $\theta = \mathbf{50.9}°$