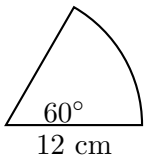
Arc Length of Sectors

Core Worksheet

Worked Examples & Guided Practice

I Do (Teacher Model) Calculate the arc length of a sector with radius $r = 12$ cm and angle $\theta = 60°$. Give your answer in terms of π.



We Do (Guided Practice) Calculate the arc length of a sector with radius $r = 9$ cm and angle $\theta = 140°$. Give your answer to 3 significant figures.

You Do (Independent Practice) A sector has an arc length of 15 cm and a radius of 10 cm. Calculate the size of the angle θ to 1 decimal place.

Challenge (Extension) A sector of a circle with radius r has an angle of 210°. The arc length of this sector is equal to the circumference of a circle of radius 7 cm. Calculate the value of r.

Practice Perfect Questions

Q1. Calculate the arc length of a sector with radius 8 cm and angle 45° to 3 s.f.

Q2. Calculate the arc length of a sector with radius 15 cm and angle 120° in terms of π.

Q3. A sector of a circle of radius 6 cm has an arc length of 8π cm. Calculate the angle of the sector.

Q4. A sector has a perimeter of 25 cm and a radius of 7 cm. Find its arc length.

Q5. Calculate the total perimeter of a sector with radius 10 cm and angle 72° to 3 s.f.

Q6. A pendulum of length 80 cm swings through an angle of 18°. Calculate the distance the tip of the pendulum travels to 3 s.f.

Answers & Worked Solutions

Model Solutions

- **I Do:** Arc $= \frac{60}{360} \times 2\pi(12) = \frac{1}{6} \times 24\pi = 4\pi$ cm
- **We Do:** Arc $= \frac{140}{360} \times 2\pi(9) = \frac{7}{18} \times 18\pi = 7\pi \approx 22.0$ cm
- **You Do:** $15 = \frac{\theta}{360} \times 2\pi(10) \implies 15 = \frac{20\pi\theta}{360} \implies \theta = \frac{15 \times 360}{20\pi} = \frac{270}{\pi} \approx 86.0°$
- **Challenge:** $\frac{210}{360} \times 2\pi r = 2\pi(7) \implies \frac{7}{12}r = 7 \implies r = 12$ cm

Practice Perfect Questions Solutions

Q1. $\frac{45}{360} \times 2\pi(8) = 2\pi \approx 6.28$ cm

Q2. $\frac{120}{360} \times 2\pi(15) = 10\pi$ cm

Q3. $\frac{\theta}{360} \times 12\pi = 8\pi \implies \frac{\theta}{360} = \frac{2}{3} \implies \theta = 240°$

Q4. Perimeter $=$ Arc $+ 2r \implies 25 =$ Arc $+ 14 \implies$ Arc $= 11$ cm

Q5. Arc $= \frac{72}{360} \times 20\pi = 4\pi \approx 12.57 \implies$ Perimeter $= 12.57 + 20 = 32.6$ cm

Q6. Distance $= \frac{18}{360} \times 2\pi(80) = 8\pi \approx 25.1$ cm