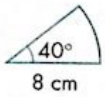
Sectors

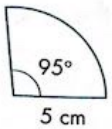
EXERCISE 4C

1 For each of these sectors, calculate **i** the arc length **ii** the sector area

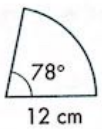
a



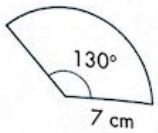
b



c



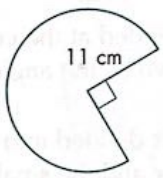
d



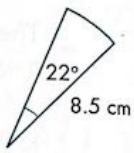
2 Calculate the arc length and the area of a sector whose arc subtends an angle of 60° at the centre of a circle with a diameter of 12 cm. Give your answer in terms of π.

3 Calculate the total perimeter of each of these sectors.

a

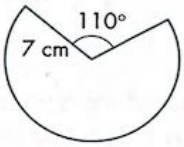


b

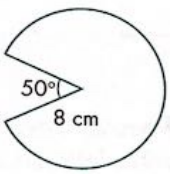


4 Calculate the area of each of these sectors.

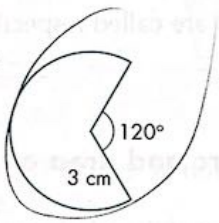
a



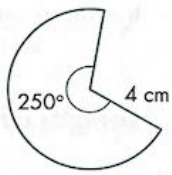
b



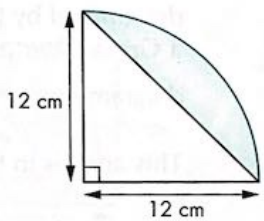
c



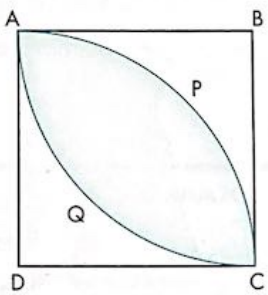
d



5 Calculate the area of the shaded shape giving your answer in terms of π.

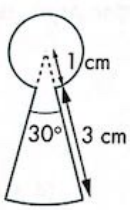


6 ABCD is a square of side length 8 cm. APC and AQC are arcs of the circles with centres D and B. Calculate the area of the shaded part.



7 A pendulum of length 72 cm swings through an angle of 15°. Through what distance does the bob swing? Give your answer in terms of π.

8 Find **i** the perimeter and **ii** the area of this shape.



2 Calculate the arc length and the area of a sector whose arc subtends an angle of 60° at the centre of a circle with a diameter of 12 cm. Give your answer in terms of π.

Diameter = 12 cm

$\Rightarrow$ radius = 6 cm

Arc length $= 2\pi r \times \frac{60}{360}$

$= 2\pi \times 6 \times \frac{1}{6}$

$= 2\pi$ cm

Area

$= \pi r^2 \times \frac{60}{360}$

$= \pi \times 6^2 \times \frac{1}{6}$

$= 6\pi$ cm^2

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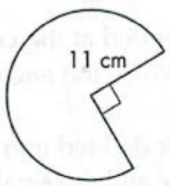
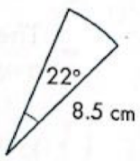
3 Calculate the total perimeter of each of these sectors.

a



b



a) $2\pi r \times \frac{3}{4} + 11 + 11$

$= 2\pi \times 11 \times \frac{3}{4} + 22$

$= 73.8$ cm

b) $2\pi r \times \frac{22}{360} + 8.5 + 8.5$

$= 2\pi \times 8.5 \times \frac{22}{360} + 17$

$= 20.3$ cm

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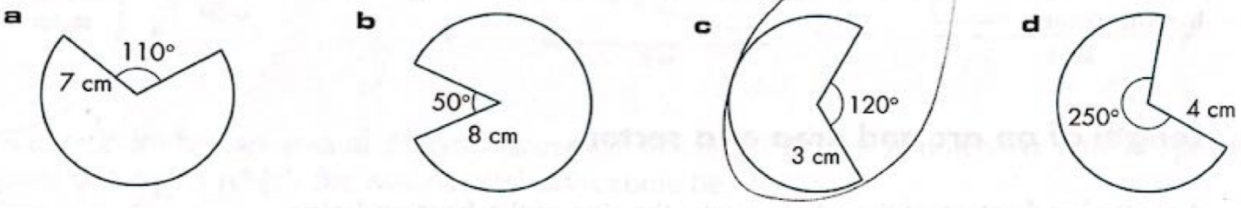
4 Calculate the area of each of these sectors.



a) $\pi r^2 \times \frac{250}{360}$

$= \pi \times 7^2 \times \frac{250}{360}$

$= 106.9\ cm^2$

b) $\pi r^2 \times \frac{310}{360}$

$= \pi \times 8^2 \times \frac{310}{360}$

$= 173.1\ cm^2$

c) $\pi r^2 \times \frac{240}{360}$

$= \pi \times 3^2 \times \frac{2}{3}$

$= 18.8\ cm^2$

d) $\pi r^2 \times \frac{250}{360}$

$= \pi \times 4^2 \times \frac{250}{360}$

$= 34.9\ cm^2$

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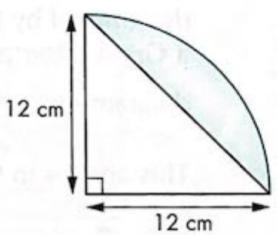
5 Calculate the area of the shaded shape giving your answer in terms of π.



Quarter Circle − Triangle

$= \frac{\pi r^2}{4} - \frac{1}{2} \times \text{base} \times \text{height}$

$= \frac{\pi \times 12^2}{4} - \frac{1}{2} \times 12 \times 12$ or $(36\pi - 72)\ cm^2$

$= 41.1\ cm^2$

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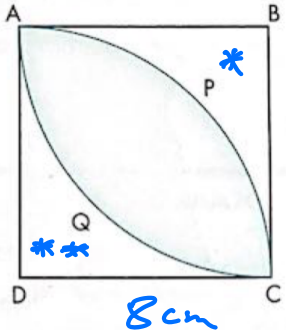
6 ABCD is a square of side length 8 cm. APC and AQC are arcs of the circles with centres D and B. Calculate the area of the shaded part.



Area of *

= Area of square − Quarter Circle

$= 8 \times 8 - \frac{\pi \times 8^2}{4} = 13.73\ cm^2$

** = * by symmetry

Shaded area = Square − * − **

$= 64 - 13.73 - 13.73$

$= 36.54$

$= 36.5 \text{ cm}^2$

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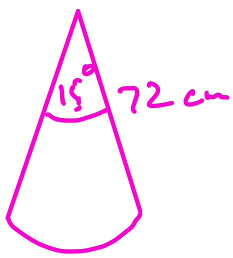
7 A pendulum of length 72 cm swings through an angle of 15°. Through what distance does the bob swing? Give your answer in terms of π.



$$\text{Arc} = 2\pi r \times \frac{15}{360}$$

$$= 2\pi \times 72 \times \frac{15}{360}$$

$$= 6\pi \text{ cm}$$

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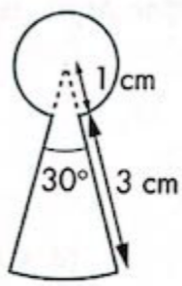
8 Find **i** the perimeter and **ii** the area of this shape.



i) Perimeter

$= \frac{330}{360}$ of 1 cm radius circle

$+ \frac{30}{360}$ of 4 cm radius circle

$+ 3$

$+ 3$

$$= \frac{330}{360} \times 2\pi \times 1 + \frac{30}{360} \times 2\pi \times 4 + 3 + 3$$

$= 13.85$ cm $= 13.9$ cm to 3 s.f.

ii) Area

$= \frac{30}{360}$ of 4cm radius circle $+ \frac{330}{360}$ of 1cm radius circle

$= \frac{30}{360} \times \pi \times 4^2 + \frac{330}{360} \times \pi \times 1^2$

$= 7.07\ cm^2$
