Perimeter of Sectors

Practice Worksheet (Exact Values)

I Do

Calculate the total perimeter of a sector with radius r = 12 cm and angle θ = 60°. Give your answer in terms of π.

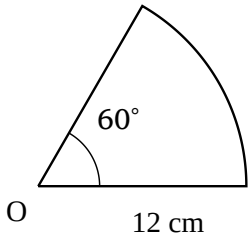


Diagram not to scale

…… cm

(Total for Question is 3 marks)

We Do

Calculate the total perimeter of a sector with radius r = 9 cm and angle θ = 140°. Give your answer in terms of π.

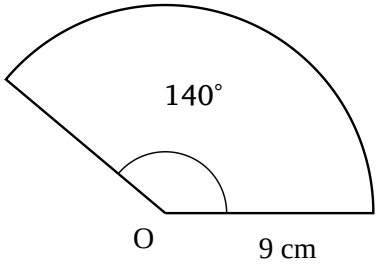


Diagram not to scale

…… cm

(Total for Question is 3 marks)

You Do 1

Calculate the total perimeter of a sector with radius r = 8 cm and angle θ = 45°. Give your answer in terms of π.

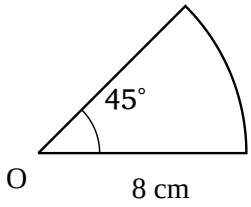


Diagram not to scale

…… cm

(Total for Question is 3 marks)

You Do 2

Calculate the total perimeter of a sector with radius r = 15 cm and angle θ = 120°. Give your answer in terms of π.

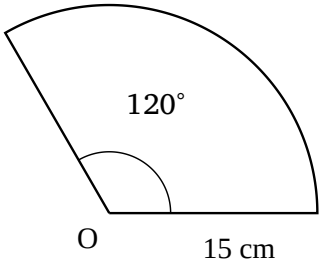


Diagram not to scale

…… cm

(Total for Question is 3 marks)

You Do 3

Calculate the total perimeter of a sector with radius r = 6 cm and angle θ = 240°. Give your answer in terms of π.

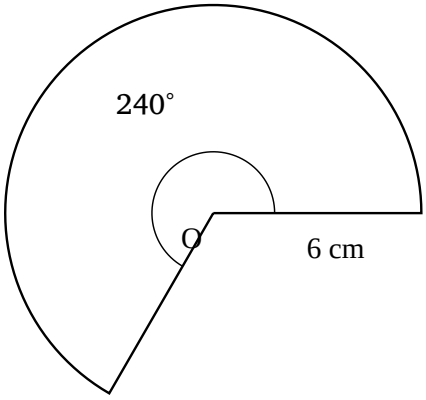


Diagram not to scale

…… cm

(Total for Question is 3 marks)

Challenge 1

A sector has angle 135° and arc length 6π cm. Calculate its total perimeter. Give your answer exactly in terms of π.

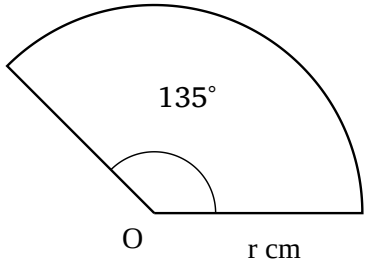


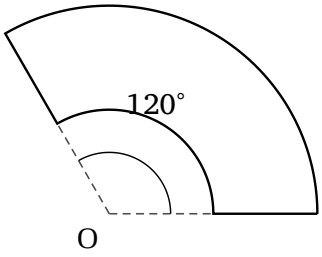
Diagram not to scale

…… cm

(Total for Question is 4 marks)

Challenge 2

An annular sector has outer radius 12 cm, inner radius 6 cm and angle 120°. Calculate its total perimeter, including both straight sides. Give your answer exactly in terms of π.



Outer radius: 12 cm

Inner radius: 6 cm

Diagram not to scale

…… cm

(Total for Question is 4 marks)

Extreme Challenge

A sector has arc length 8π cm and area 48π cm^2. Calculate its total perimeter. Give your answer exactly in terms of π.

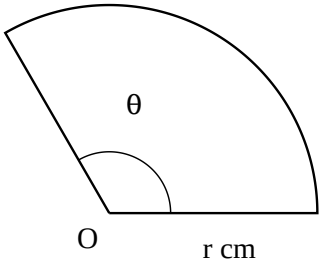


Diagram not to scale

…… cm

(Total for Question is 4 marks)

Answers & Worked Solutions

I Do

$$\text{Arc length} = \frac{60}{360} \times 2\pi \times 12 = 4\pi \text{ cm}.$$

$$\text{Perimeter} = 2r + \text{arc length} = 24 + 4\pi \text{ cm}.$$

We Do

$$\text{Arc length} = \frac{140}{360} \times 2\pi \times 9 = 7\pi \text{ cm}.$$

$$\text{Perimeter} = 2 \times 9 + 7\pi = 18 + 7\pi \text{ cm}.$$

You Do 1

$$\text{Arc length} = \frac{45}{360} \times 2\pi \times 8 = 2\pi \text{ cm}.$$

$$\text{Perimeter} = 16 + 2\pi \text{ cm}.$$

You Do 2

$$\text{Arc length} = \frac{120}{360} \times 2\pi \times 15 = 10\pi \text{ cm}.$$

$$\text{Perimeter} = 30 + 10\pi \text{ cm}.$$

You Do 3

$$\text{Arc length} = \frac{240}{360} \times 2\pi \times 6 = 8\pi \text{ cm}.$$

$$\text{Perimeter} = 12 + 8\pi \text{ cm}.$$

Answers & Worked Solutions

Challenge 1

$6\pi = \frac{135}{360} \times 2\pi r = \frac{3\pi r}{4}$, so $r = 8$ cm.

Perimeter $= 2 \times 8 + 6\pi = 16 + 6\pi$ cm.

Challenge 2

Outer arc $= \frac{120}{360} \times 2\pi \times 12 = 8\pi$ cm.

Inner arc $= \frac{120}{360} \times 2\pi \times 6 = 4\pi$ cm.

Two straight sides $= 2(12 - 6) = 12$ cm.

Total perimeter $= 8\pi + 4\pi + 12 = 12 + 12\pi$ cm.

Extreme Challenge

For a sector, area $= \frac{1}{2} \times$ radius $\times$ arc length.

$48\pi = \frac{1}{2} \times r \times 8\pi = 4\pi r$, so $r = 12$ cm.

Perimeter $= 2 \times 12 + 8\pi = 24 + 8\pi$ cm.