

Exercise walk-through

C5.3

Circles, arcs and sectors

IGCSE Mathematics

You must be able to

- Use radius and diameter correctly in circle formulas
- Use the sector fraction for arcs and areas
- Include straight radii in a sector perimeter

1

The method

Method — Key knowledge: Circles, arcs and sectors

For a circle, circumference $C = 2\pi r = \pi d$ and area $A = \pi r^2$. A sector angle θ gives fraction $f = \theta/360$ of the circle. Arc length is $L = f(2\pi r)$; sector area is $S = f\pi r^2$. A sector perimeter includes its two radii: $P = L + 2r$. Core sector angles here are factors of 360° . Keep π exact when asked.

Exercises 2.1·2.3

2.1 Find the circumference of a circle of diameter 10 cm, in terms of π . [2]

2.2 Find the area of a circle of radius 4 cm, in terms of π . [2]

2.3 Find the arc length for a 90° sector of radius 8 cm. [2]

Exercises 2.1·2.3

2.1 Find the circumference of a circle of diameter 10 cm, in terms of π . [2]

2.1

- $C = \pi d = \mathbf{10\pi}$ cm.

2.2 Find the area of a circle of radius 4 cm, in terms of π . [2]

2.2

- $A = \pi r^2 = \pi(4)^2 = \mathbf{16\pi}$ cm².

2.3 Find the arc length for a 90° sector of radius 8 cm. [2]

2.3

- $L = (90/360)(2\pi \times 8) = \mathbf{4\pi}$ cm.

Exercise 2.4

2.4 Find the area of a semicircle of radius 5 cm.

[2]

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2.4 Find the area of a semicircle of radius 5 cm.

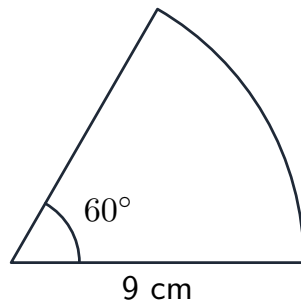
[2]

2.4

- $S = (1/2)\pi(5)^2 = \mathbf{12.5\pi \text{ cm}^2}.$

Exercise 3.1 (a)

3.1 Apply the circles, arcs and sectors methods below. Show working and include units where appropriate.

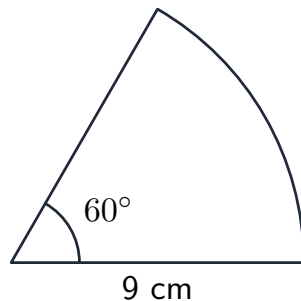


(a) A sector has radius 9 cm and angle 60° . Find its arc length in terms of π .

[2]

Exercise 3.1 (a)

3.1 Apply the circles, arcs and sectors methods below. Show working and include units where appropriate.



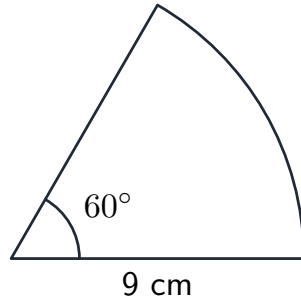
(a) A sector has radius 9 cm and angle 60° . Find its arc length in terms of π . [2]

(a)

- $L = (60/360)(2\pi \times 9) = 3\pi$ cm.

Exercise 3.1 (b)

3.1 Apply the circles, arcs and sectors methods below. Show working and include units where appropriate.

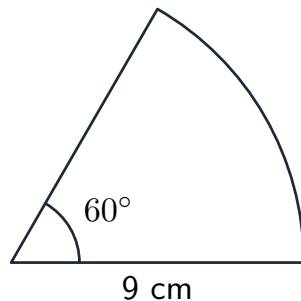


(b) Find its area in terms of π .

[2]

Exercise 3.1 (b)

3.1 Apply the circles, arcs and sectors methods below. Show working and include units where appropriate.



(b) Find its area in terms of π .

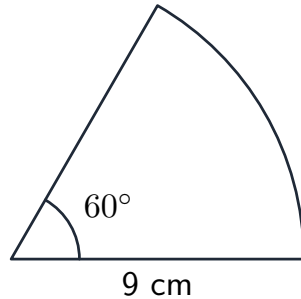
[2]

(b)

- $S = (60/360)\pi(9)^2 = \mathbf{13.5\pi \text{ cm}^2}$.

Exercise 3.1 (c)

3.1 Apply the circles, arcs and sectors methods below. Show working and include units where appropriate.

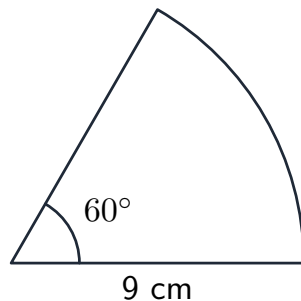


(c) Find its perimeter to one decimal place.

[2]

Exercise 3.1 (c)

3.1 Apply the circles, arcs and sectors methods below. Show working and include units where appropriate.



(c) Find its perimeter to one decimal place.

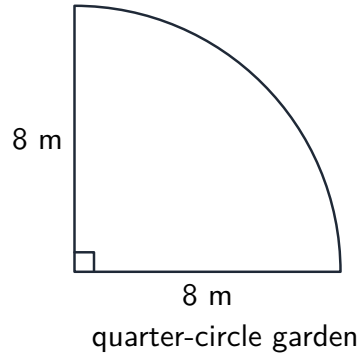
[2]

(c)

- $P = L + 2r = 3\pi + 18 = 27.4247\dots = \mathbf{27.4}$ cm.

Exercise 3.2 (a)

3.2 A quarter-circle garden has radius 8 m.

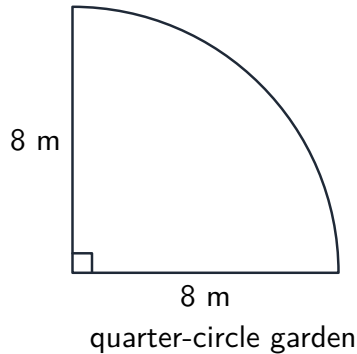


(a) Find the garden area and the curved boundary length in terms of π .

[3]

Exercise 3.2 (a)

3.2 A quarter-circle garden has radius 8 m.



(a) Find the garden area and the curved boundary length in terms of pi.

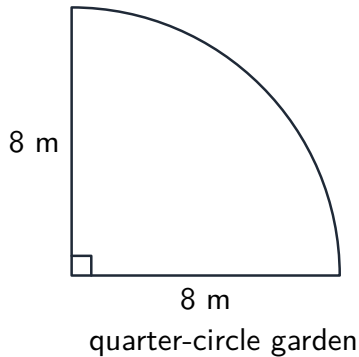
[3]

(a)

- Fraction $f = 90/360 = 1/4$.
- Area $A = f\pi r^2 = \mathbf{16\pi \text{ m}^2}$.
- Arc $L = f(2\pi r) = \mathbf{4\pi \text{ m}}$.

Exercise 3.2 (b)

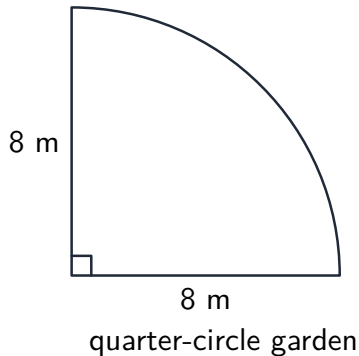
3.2 A quarter-circle garden has radius 8 m.



(b) A fence follows the whole boundary except for a 2 m gate in one straight edge. Find the fencing length to one decimal place and explain which edges you count. [3]

Exercise 3.2 (b)

3.2 A quarter-circle garden has radius 8 m.



(b) A fence follows the whole boundary except for a 2 m gate in one straight edge. Find the fencing length to one decimal place and explain which edges you count. [3]

(b)

- Count the arc and both radii, then subtract the gate.
- $F = L + 2r - 2 = 4\pi + 16 - 2$, so $F \approx \mathbf{26.6}$ m.