

# C5.3 Circles, arcs and sectors

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

Total: 20 marks

**KEY WORDS** circle 圆 • radius 半径 • circumference 圆周 • diameter 直径 • sector 扇形

## Objective

Use circles, arcs and sectors to solve Core IGCSE Mathematics problems.

**You must be able to:**

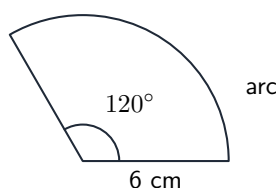
- Use radius and diameter correctly in circle formulas
- Use the sector fraction for arcs and areas
- Include straight radii in a sector perimeter

## 1 Key knowledge and worked examples

### ■ 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  $\theta$  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  $360^\circ$ . Keep  $\pi$  exact when asked.

### ■ Worked example: Circles, arcs and sectors



For radius  $6\text{ cm}$  and sector angle  $120^\circ$ , the fraction is  $f = 120/360 = 1/3$ .

- Arc:  $L = f(2\pi r) = (1/3)(12\pi) = 4\pi\text{ cm}$ .
- Sector area:  $S = f\pi r^2 = (1/3)(36\pi) = 12\pi\text{ cm}^2$ .
- Sector perimeter:  $P = L + 2r = 4\pi + 12\text{ cm}$ .

### ■ Method check

The arc is only the curved part of a sector boundary. Add the two radii for the whole perimeter, and keep pi exact until a decimal answer is requested.

## 2 Practice

---

**2.1** Find the circumference of a circle of diameter 10 cm, in terms of  $\pi$ . [2]

---

---

**2.2** Find the area of a circle of radius 4 cm, in terms of  $\pi$ . [2]

---

---

**2.3** Find the arc length for a  $90^\circ$  sector of radius 8 cm. [2]

---

---

**2.4** Find the area of a semicircle of radius 5 cm. [2]

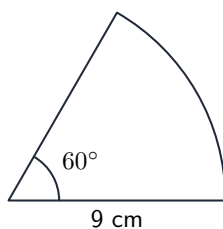
---

---

## 3 Exam-style questions

---

**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  $60^\circ$ . Find its arc length in terms of  $\pi$ . [2]

---

---

---

(b) Find its area in terms of  $\pi$ . [2]

---

---

---

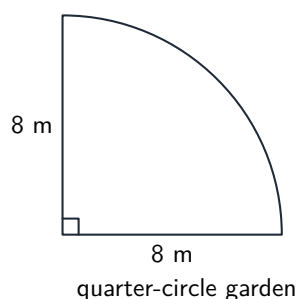
(c) Find its perimeter to one decimal place. [2]

---

---

---

**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]

---

---

---

---

(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]

---

---

---

---