

1.4 Circular measure

Name: _____ Class: _____ Date: _____ **Total: 13 marks**

KEY WORDS radian 弧度 • sector 扇形 • arc length 弧长 • sector area 扇形面积 • segment 弓形

Objective

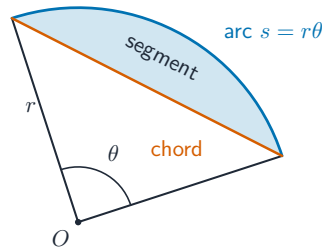
Build the skills to answer exam questions on **circular measure** 弧度制 — **radians** 弧度, **arc length** 弧长, **sector area** 扇形面积 and the area of a **segment** 弓形.

You must be able to:

- convert between degrees and radians
- use $s = r\theta$ and $A = \frac{1}{2}r^2\theta$ (with θ in radians)
- find a segment area as sector minus triangle

1 Worked examples

■ Sector and segment



The shaded segment is the part of the sector between the chord and the arc

For a sector (angle θ in radians): $s = r\theta$, $A = \frac{1}{2}r^2\theta$. Segment = $\frac{1}{2}r^2\theta - \frac{1}{2}r^2\sin\theta = \frac{1}{2}r^2(\theta - \sin\theta)$.

A sector has $r = 6$, $\theta = \frac{2}{3}\pi$. Arc = $6 \cdot \frac{2}{3}\pi = 4\pi$; area = $\frac{1}{2}(36)\frac{2}{3}\pi = 12\pi$.

2 Practice

2.1 Convert 120° to radians (exact). [1]

2.2 A sector has $r = 5$ cm and $\theta = 0.8$ rad. Find its arc length. [1]

3 Exam-style questions

3.1 The area of a sector with $r = 4$ and $\theta = \frac{\pi}{6}$ is: [1]

- | | |
|---|---|
| A | B |
| C | D |
- A $\frac{2\pi}{3}$
B $\frac{4\pi}{3}$
C $\frac{\pi}{3}$
D 2π

3.2 A sector OAB has centre O , radius 10 cm and angle $AOB = 1.2$ radians.

(a) Find the perimeter of the sector. [3]

(b) Find the area of the **segment** between the chord AB and the arc. [3]

3.3 A sector has perimeter 20 cm and area 16 cm². Show that the radius r satisfies $r^2 - 10r + 16 = 0$, and hence find the two possible radii. [4]
