Area of a Segment

Starter

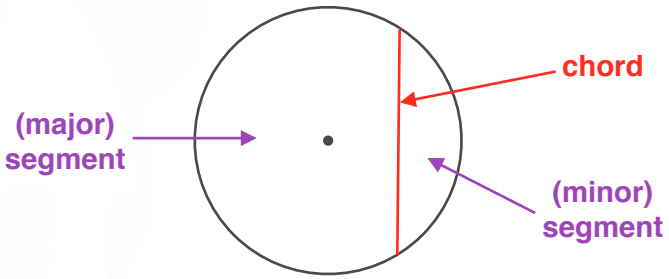
1. **(Review of last lesson)** Find the area of a sector whose radius is 10 cm and whose angle at the centre is 153°, giving your answer exactly (i.e. in terms of π).

2. **(Review of previous material)** A field in the shape of an equilateral triangle has sides of length 32 m. Find the area of the field.

Notes

A ***chord*** is a straight line whose ***endpoints lie on the circumference*** of a circle.

A ***segment*** is the ***area between a chord*** and the ***circumference*** of a circle.



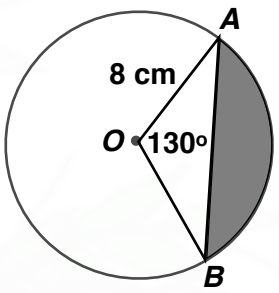
N.B. Area of triangle $= \frac{1}{2}ab\sin C$

E.g. 1 Consider the diagram to the right.

(a) Find the area of the sector OAB.

(b) Find the area of the triangle OAB.

(c) Hence, find the area of the (minor) segment (i.e. the shaded area.)

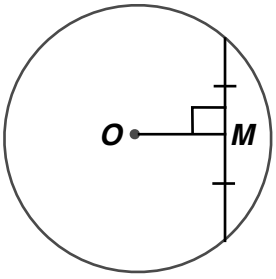


Area of segment = Area of sector − Area of triangle

Area of segment $= \frac{\theta}{360} \times \pi r^2 - \frac{1}{2}r^2\sin\theta$

E.g. 2 Find the area of the minor segment when the radius of the circle is 6 cm and angle subtended at the centre is 70°.

N.B. The line from the centre of a circle to the midpoint M of a chord bisects the chord at right angles.



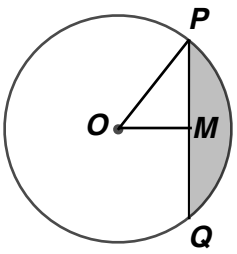
E.g. 3 The chord PQ has length 8 cm and radius of the circle is 5 cm. M is the mid-point of PQ.

(a) Calculate angle $P\hat{O}M$.

(b) Calculate the area of the triangle OPQ.

(c) Calculate the shaded area.

Hint: Sketch the diagram and put measurements on known lengths.



Video: Area of a segment

Solutions to Starter and E.g.s

Exercise

9-1 class textbook:	p433 M13.4 Qu 11-19
A*-G class textbook:	p387 E13.3 Qu 11-19
9-1 homework book:	p433 M13.3/M13.4 Qu 11-19
A*-G homework book:	p106 E13.1 Qu 1-8

Summary

A ***chord*** is a straight line whose ***endpoints lie on the circumference*** of a circle.
A ***segment*** is the ***area between a chord*** and the ***circumference*** of a circle.

Area of segment = Area of sector — Area of triangle

$$\text{Area of segment} = \frac{\theta}{360} \times \pi r^2 - \frac{1}{2} r^2 \sin\theta$$

The line from the centre of a circle to the midpoint of a chord bisects the chord at right angles.

Homework book answers (only available during a lockdown)