Guide to:
Area of a segment

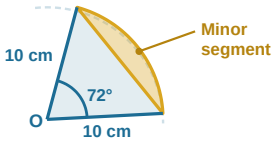
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Explanation:

A segment is the region enclosed between a chord and an arc of a circle. To find the area of a minor segment with radius **r** and central angle **θ**, subtract the area of the isosceles triangle formed by the two radii and the chord from the area of the sector:

Area of segment = Area of sector − Area of triangle = $\left(\frac{\theta}{360} \times \pi r^2\right) - \left(\frac{1}{2} r^2 \sin\theta\right)$. To find the perimeter of a segment, add the arc length ($\frac{\theta}{360} \times 2\pi r$) to the chord length (found using the Cosine Rule).

Example 1: Find the area of the minor segment of a circle with radius 10 cm and central angle 72° (3 s.f.).



Solution:

Area of sector = $\frac{72}{360} \times \pi \times 10^2 = 20\pi =$ **62.8318... cm²**

Area of triangle = $\frac{1}{2} \times 10^2 \times \sin 72° =$ **47.5528... cm²**

Segment area = 62.8318... − 47.5528... = 15.2790...

Answer: 15.3 cm² (3 s.f.)

Example 2: Find the exact area of a minor segment with radius 6 cm and central angle 60°.

Solution:

Area of sector = $\frac{60}{360} \times \pi \times 6^2 =$ **6π cm²**

Area of triangle = $\frac{1}{2} \times 6^2 \times \sin 60° = 18 \times \frac{\sqrt{3}}{2} =$ **9√3 cm²**

Subtract triangle from sector:

Answer: (6π − 9√3) cm²

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ken@mathslinks.co.uk