8.B Arc Length and Sector Area

Parts of a circle:

Radius – a line segment with endpoints on the circle & on the circle
Arc – a portion of the circle between two points
Sector – region bounded by an arc and two radii
Chord – a line segment with both endpoints on the circle
Diameter chord that passes through the center
Segment – a region bounded by a chord & an arc
Secant – a line that intersects the circle at two points
Tangent – a line, segment or ray that intersects circle at one point

Ex1. Find the area of the shaded region, and its arc length.

d) \[ A = \frac{112\pi}{360} \text{ yd}^2 = \frac{126}{5} \text{ yd}^2 \approx 79.2 \text{ yd}^2 \]

\[ \ell = \frac{112\pi}{360} = \frac{22\pi}{5} = 12.6 \text{ yd} \]
c)

\[ A = \frac{2}{2\pi} \cdot \pi \cdot 14^2 \]

\[ A = 196 \text{ cm}^2 \]

\[ l = \frac{2}{2\pi} \cdot 2\pi \cdot 14 = 28 \text{ cm} \]

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**Arc Length**

In the diagram the arc length AB is \( l \).

If \( \theta \) is measured in radians:

\[ l = \theta r \]

If \( \theta \) is measured in degrees:

\[ l = \frac{\theta}{360} \times 2\pi r \]
Area of a Sector

In the diagram the area of minor sector $XOY$ is shaded.

If $\theta$ is measured in radians:

$$A = \frac{1}{2} \theta r^2$$

If $\theta$ is measured in degrees:

$$A = \frac{\theta}{360} \times \pi r^2$$

Ex2. A sector has radius 12 cm and angle 3 radians. Use radians to find its:

a) arc length

$$\ell = 3(12) = 36 \text{ cm}$$

b) area

$$A = \frac{1}{2} \cdot 3(12)^2 = 216 \text{ cm}^2$$
Ex3. A sector has radius 8.2 cm and arc length 13.3 cm. Find the area of this sector.

\[
\frac{13.3}{8.2} = \theta \\
\theta = \frac{13.3}{8.2} \\
A = \frac{1}{2} \left( \frac{13.3}{8.2} \right) \cdot 8.2^2 \\
A = 13.3 \times 4.1 \\
A = 54.53 \text{ cm}^2
\]

Ex4.

The end wall of a building has the shape illustrated, where the centre of arc AB is at C. Find:

a) \( \alpha \) to 4 significant figures
b) \( \theta \) to 4 significant figures
c) the area of the wall.

Area \( \text{Sector} + 2 \Delta s \)

\[
\frac{143.1}{360} \cdot \pi \cdot 250 + 2 \cdot \frac{1}{2} (15) (5)
\]

\[143.1 \frac{1}{360} \pi = 250 + 2 \cdot \frac{1}{2} (15) (5) \]

\[
387 \text{ m}^2
\]
HW:
 p.201  #1a, 3, 5bc, 7, 8, 10, 12

Quiz Friday 8.A-C
You may use a calculator and a unit circle
you created
On your unit circle you:
May Have radius lines, coordinates, degrees, radians
May Not Have sine=y, cos=x, the chart, drawings of Unicorns, Pegasus, non-sleep deprived IB students or any other mythical creatures