

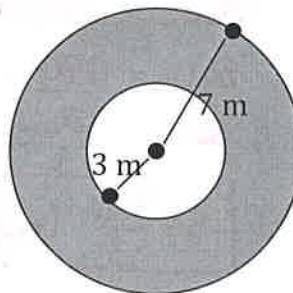
Objective: Determine the arc length and area of a sector of circles.

Warm Up:

Find the area of the shaded region.

Big Circle: $A = \pi(7)^2 = 49\pi \text{ m}^2$

Small Circle: $A = \pi(3)^2 = 9\pi \text{ m}^2$



Shading = Big - Small
 $= 49\pi - 9\pi$
 $= 40\pi \text{ m}^2$

Vocabulary:

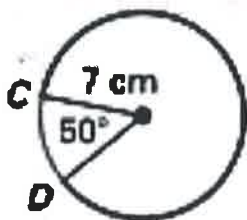
Arc Length: A fractional part of a circle's circumference.

arc length $\rightarrow \frac{s}{2\pi r} = \frac{\theta}{360^\circ}$ ← angle measure

Area of a Sector: A fractional part of a circle's area.

area of Sector $\rightarrow \frac{A}{\pi r^2} = \frac{\theta}{360^\circ}$ ← angle measure

Example 1: Find the length of the minor arc and area of the sector.



Arc Length:

~~$\frac{s}{2\pi(7)} = \frac{50^\circ}{360^\circ}$~~

$360^\circ s = 50^\circ (14\pi)$

~~$\frac{360^\circ s}{360} = \frac{700\pi}{360}$~~

$S = \frac{35\pi}{18} \text{ cm}$

Sector Area:

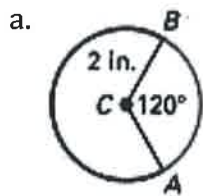
~~$\frac{A}{\pi(7)^2} = \frac{50^\circ}{360^\circ}$~~

$360^\circ A = 50^\circ (49\pi)$

~~$\frac{360^\circ A}{360} = \frac{2450\pi}{360}$~~

$A = \frac{245\pi}{36} \text{ cm}^2$

Example 2: Determine the length of the minor arc.

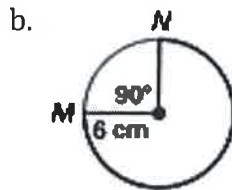


$$\frac{s}{2\pi(2)} = \frac{120^\circ}{360^\circ}$$

$$360s = 120(4\pi)$$

$$\frac{360s}{360} = \frac{480\pi}{360}$$

$$s = \frac{4\pi}{3} \text{ in.}$$



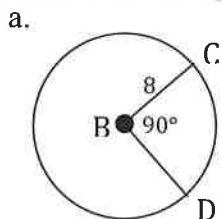
$$\frac{s}{2\pi(6)} = \frac{90^\circ}{360^\circ}$$

$$360s = 90(12\pi)$$

$$\frac{360s}{360} = \frac{1080\pi}{360}$$

$$s = 3\pi \text{ in.}$$

Example 3: Find the area of the sector:

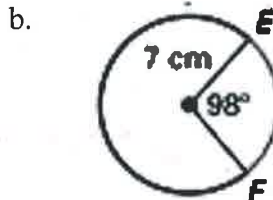


$$\frac{A}{\pi(8)^2} = \frac{90^\circ}{360^\circ}$$

$$360A = 90(64\pi)$$

$$\frac{360A}{360} = \frac{5760\pi}{360}$$

$$A = 16\pi \text{ units}^2$$



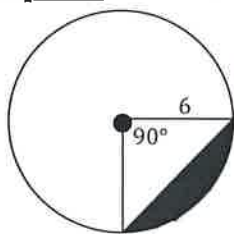
$$\frac{A}{\pi(7)^2} = \frac{98^\circ}{360^\circ}$$

$$360A = 98(49\pi)$$

$$\frac{360A}{360} = \frac{4802\pi}{360}$$

$$A = \frac{2401\pi}{180} \text{ cm}^2$$

Example 4: Find the area of the shaded segment.



Triangle: $A = \frac{1}{2} \cdot b \cdot h = \frac{1}{2}(6)(6) = 18 \text{ units}^2$

Sector: $\frac{A}{\pi(6)^2} = \frac{90^\circ}{360^\circ}$

$$360A = 90(36\pi)$$

$$\frac{360A}{360} = \frac{3240\pi}{360}$$

$$A = 9\pi$$

$$\text{Shading} = \text{Sector} - \text{Triangle} = 9\pi - 18 \text{ units}^2$$