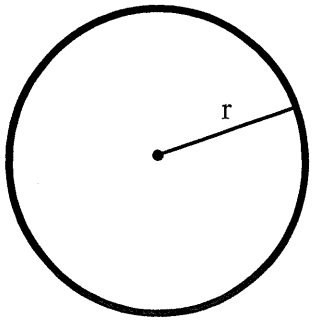
Warm-Up

1. **Find the circumference of a circle with a diameter of 10ft. Round your answer to the nearest tenth.**
2. **Find the circumference of ⊙A if the radius is 2.5. Round your answer to the nearest hundredth.**
3. **Find the radius of a circle with a circumference of 56.5 m.**

Area

The amount of space occupied.

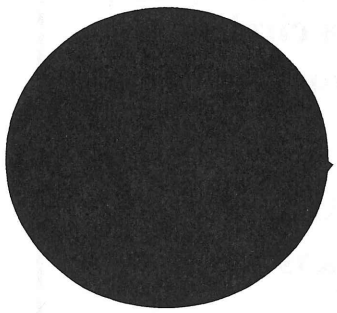


$$A = \pi r^2$$

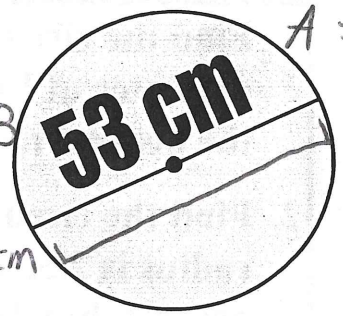
$A = \pi r^2$ $\quad A = \pi\left(\frac{d}{2}\right)^2$

Find the area.

$A = \frac{\pi d^2}{4}$



diameter = 53



$r = 26.5\text{cm}$

$A = \pi(26.5)^2$

$\boxed{A \approx 2206.2 \text{ cm}^2}$

Example 1

If ⊙S has a circumference of 10π inches, find the area of the circle to the nearest hundredth.

$C = 2\pi r$ $\quad A = \pi r^2$

1) find radius
2) find Area

$C = 10\pi$

$C = 2\pi r$

$\downarrow$

$\frac{10\cancel{\pi}}{2\cancel{\pi}} = \frac{\cancel{2}\pi r}{\cancel{2\pi}}$

$5 = r$

$r = 5 \text{ in.}$

$A = \pi r^2$

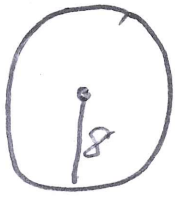
$A = \pi(5)^2$

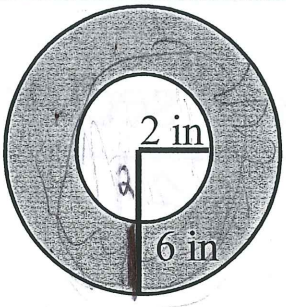
$\boxed{A \approx 78.53 \text{ in}^2}$

$A = \pi r^2$

Example 2

Find the area of the shaded region.





$A_{large} = \pi(8)^2 \approx 201.06 \text{ in}^2$

$A_{small} = \pi(2)^2 = 12.56 \text{ in}^2$

1) Area of large circle
2) Area of small circle
3) subtract $A_L - A_{small}$

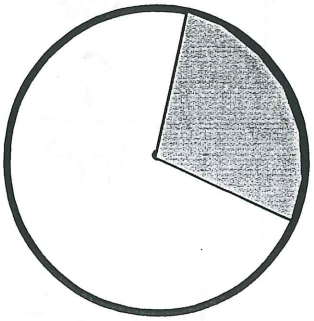
$A_{shaded} = A_{large} - A_{small}$

$= 201.06 - 12.56$

$A_{shaded} = 188.5 \text{ in}^2$

Sector

the region bounded by two radii of the circle and their intercepted arc.

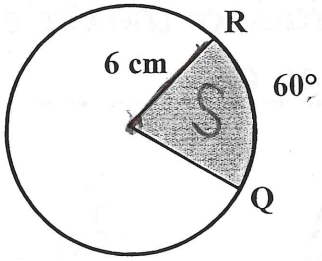


$$\frac{S}{\pi r^2} = \frac{\widehat{Arc}}{360^\circ}$$

Area of a Sector

$$\frac{\text{measure of arc}}{360^\circ} = \frac{\text{area of sector}}{\pi r^2}$$

Example 3 Find the area of the sector.



$$\frac{m\widehat{RQ}}{360^\circ} = \frac{\text{area of sector}}{\pi r^2}$$

$$\frac{S}{\pi r^2} = \frac{\widehat{Arc}}{360^\circ}$$

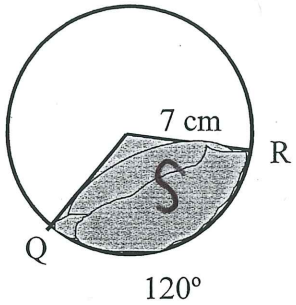
$$\frac{S}{\pi(6)^2} = \frac{60}{360}$$

$$\frac{S}{113.1} = \frac{1}{6}$$

$$\frac{6S}{6} = \frac{113.1}{6}$$

$$S = 18.85\ cm^2$$

Example 4 Find the area of the sector.



$$\frac{m\widehat{RQ}}{360^\circ} = \frac{\text{area of sector}}{\pi r^2}$$

$$\frac{S}{\pi r^2} = \frac{\widehat{Arc}}{360}$$

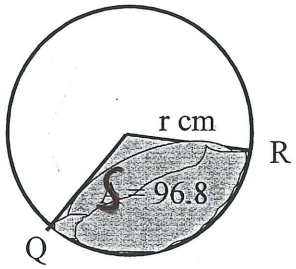
$$\frac{S}{\pi(7)^2} = \frac{120}{360}$$

$$\frac{35}{3} = \frac{153.9}{3}$$

$$\frac{S}{153.9} = \frac{1}{3}$$

$$\boxed{S = 51.31\ cm^2}$$

Example 5 Find the radius if the area of the sector is 96.8. cm^2



mArc = 110°

$$\frac{m\widehat{RQ}}{360^\circ} = \frac{\text{area of sector}}{\pi r^2}$$

$$\frac{S}{\pi r^2} = \frac{\widehat{Arc}}{360}$$

$$\frac{96.8}{\pi r^2} = \frac{110}{360}$$

$$\pi r^2(11) = 96.8(36)$$

$$\frac{96.8}{\pi r^2} = \frac{11}{36}$$

$$\frac{34.5 r^2}{34.5} = \frac{3484.8}{34.5}$$

$$\sqrt{r^2} = \sqrt{101.0}$$

$$\boxed{r \approx 10.04\ cm}$$