#25

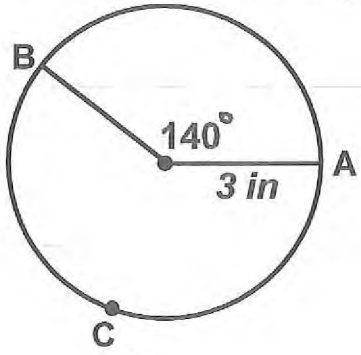
Arc Length

If an arc measures q°, you can find the length of the arc using the formula:

$$\text{arc length} = \frac{q}{360} \cdot 2\pi r$$

Example

Find the length of $\overset{\frown}{AB}$.



Relate the measure of the arc to the measure of the entire circle.

$$\frac{140}{360} = \frac{7}{18}$$

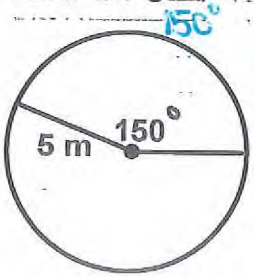
So, the measure of the arc is 7/18 the measure of the entire circumference.

Now show that the arc is 7/18 the circumference:

$$\frac{7}{18} \cdot 2 \cdot \pi \cdot 3 = 7.33$$

Example 1

Find the length of $\overset{\frown}{AB}$.



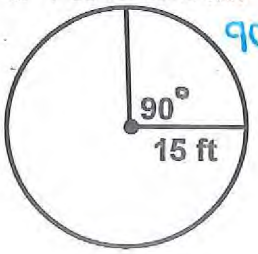
$q = 150^\circ$

$\frac{150}{360} \cdot 2 \cdot \pi \cdot 5$

13.09 m

Example 2

Find the length of $\overset{\frown}{AB}$.



$q = 90^\circ$

$\frac{90}{360} \cdot 2\pi \cdot 15$

23.56 ft

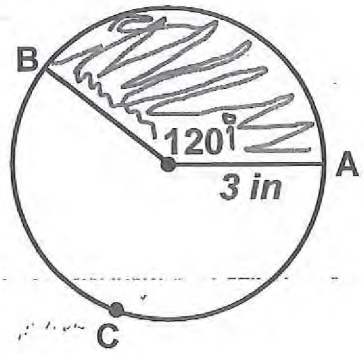
Area of a Sector

If an arc measures q°, you can find the area of the sector bounded by that arc using the formula:

$$\text{area of sector} = \frac{q}{360} \cdot \pi r^2$$

Example

Find the area of the shaded sector.



Relate the measure of the arc to the measure of the entire circle.

$$\frac{120}{360} = \frac{1}{3}$$

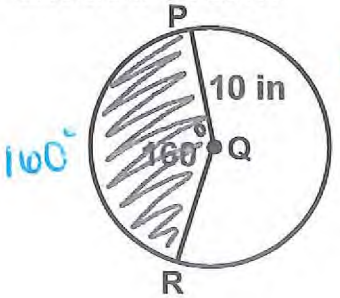
So, the area of the shaded sector is 1/3 the area of the entire circle.

Now show that the area of the sector is 1/3 the area of the circle:

$$\frac{1}{3} \cdot \pi \cdot 3^2 = 9.42$$

Example 1

Find the area of the shaded sector.



$q = 160^{\circ}$

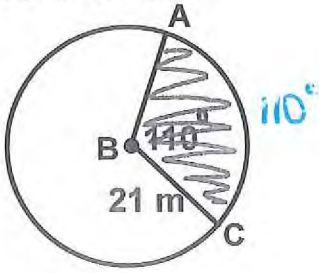
160°

$$\frac{160}{360} \cdot \pi \cdot 10^2$$

139.63 in^2

Example 2

Find the area of the shaded sector.



$q = 110^{\circ}$

$$\frac{110}{360} \cdot \pi \cdot 21^2$$

423.33 m^2