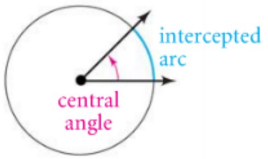
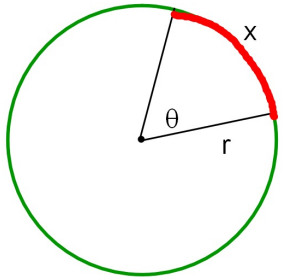
A **central angle** of a circle is an angle with a vertex at the center of a circle. An **intercepted arc** is the portion of the circle with endpoints on the sides of the central angle and remaining points within the interior of the angle.



An intercepted arc is the portion of the circumference that is "cut off" by the sides of the central angle.

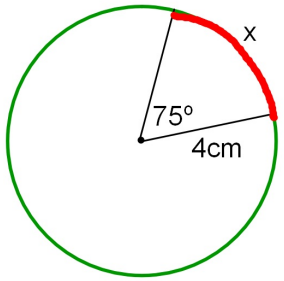
Length of an intercepted arc:



$$\frac{\text{Central } \angle}{360^\circ} = \frac{\text{Arc Length (x)}}{\text{Circumference}}$$

$$\frac{\theta}{360^\circ} = \frac{x}{2\pi r}$$

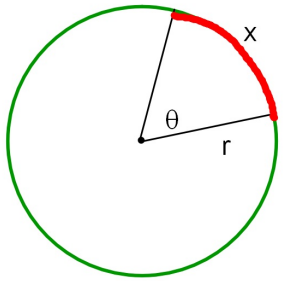
Find the length of the intercepted arc labeled x. Round to the nearest tenth.



x = 5.2 cm

$$\frac{75^\circ}{360^\circ} = \frac{x}{8\pi}$$

$$\frac{\theta}{360^\circ} = \frac{x}{2\pi r}$$



$$\frac{\text{Central } \angle}{360^\circ} = \frac{\text{Arc Length (x)}}{\text{Circumference}}$$

If angles are measured in radians:

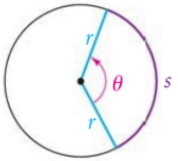
$$\frac{\theta}{2\pi} = \frac{x}{2\pi r}$$

$$\theta = \frac{x}{r}$$

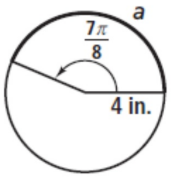
$$x = r\theta$$

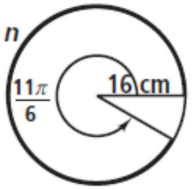
Property **Length of an Intercepted Arc**

For a circle of radius r and a central angle of measure θ (in radians), the length s of the intercepted arc is $s = r\theta$.



Find the measure of each intercepted arc.
Round to the nearest hundredth.





$4 \cdot \frac{7\pi}{8} = 10.99557$

$= 11.00$ in

$16 \cdot \frac{11\pi}{6}$

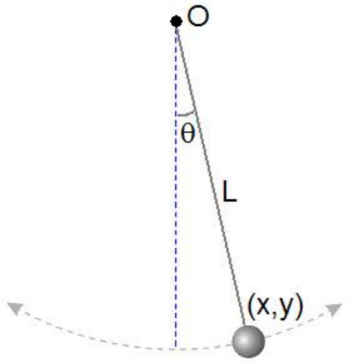
92.15 cm

A weight is attached to the end of a 18 in string to create a pendulum. The pendulum swings through an angle of $\frac{2\pi}{3}$ radians. How far, in inches, has the weight travled? Round to the nearest tenth.

$S = r\theta$

$= 18 \text{ in} \cdot \frac{2\pi}{3}$

$= 37.7$ in



A pendulum swings through an angle of 1.8 radians. The distance the tip of the pendulum travels is 32 in. How long is the pendulum?

$S = r\theta$

$32 = r(1.8)$

$17.7 = r$

Hwk #17

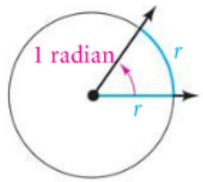
Due tomorrow

Sec 13-3

Pages 730-731

Problems 22, 23, 29, 33, 35, 36, 45

When a central angle intercepts an arc that has the same length as a radius of the circle, the measure of the angle is defined to be one **radian.** Like degrees, radians measure the amount of rotation from the initial side to the terminal side of an angle.



When you use a compass to navigate due North is on the positive y-axis and a positive angle is measured clockwise. This measure is called the bearing.

1. Find the measure of an angle in standard position that is the same as a bearing of 210°

240°

2. Given an angle in standard position has a measure of -80°, find its bearing.