



For one complete Revolution of a circle, we have the circumference, $d\pi$ or $2\pi r$

Radius is the size of the circle and determines the arc measure

Radians represent the number of times the radius goes around a fixed point

Radian is define by an arc of a circle.

Radians represents the 360° needed to complete one revolution.

Therefore, in Radians the angle around the circle is

$$\frac{2\pi}{360} = \frac{\pi}{180}$$

To convert from Degrees to radians multiply the angle by $\frac{\pi}{180}$

To convert from Radians to degree multiply the angle by $\frac{180}{\pi}$

Practice:

Perform the following conversions.

1. Convert 160° to radians.

$$\frac{160^\circ \pi}{9 \times 180} = \frac{8\pi}{9}$$

2. Convert $\frac{11\pi}{6}$ radians to degrees.

$$\frac{11\pi}{6} \left(\frac{180}{\pi} \right) = 330^\circ$$

What is the length of an arc with a measure of 60° in a circle with a 10-centimeter radius?

$$\frac{x}{20\pi} = \frac{160}{360}$$

$$\frac{x}{20\pi} = \frac{1}{6}$$
$$x = \frac{20\pi}{6}$$

$$\frac{10\pi}{3}$$

$$5\sqrt{315}$$

Your turn:

Convert 315° to radians.

$$7 \cancel{315} \left(\frac{\pi}{\cancel{180}} \right)$$

$$\frac{7\pi}{4}$$

Convert $\frac{5\pi}{4}$ to degrees

$$\frac{5\pi}{4} \left(\frac{\cancel{180}}{\pi} \right)$$
$$225^\circ$$

An arc with a measure of 120° has an arc length of 10π inches.

What is the radius of the circle on which the arc sits?

$$\frac{10\pi}{d\pi} = \frac{\cancel{1} \cancel{20}}{\cancel{300}} \cdot \frac{1}{3}$$

$$\frac{10\pi}{d\pi} = \frac{1}{3}$$
$$30 = d$$
$$r = 15$$

An arc has a length of 4π units and a radius of 6 units. What is the angle of the sector in radians?

$$\frac{4\pi}{6} = \frac{x}{360}$$

$$\frac{2\pi}{3} = \frac{x}{360}$$

$$360 = 3x \quad x = 120$$

$$\frac{2\pi}{3}$$

Suppose a circle with an 11.4 inch arc intercepted by the central angle and a radius that is 3 inches long. Determine the measure of the central angle in radians.

$$\frac{11.4}{3} = \frac{x}{360}$$

$$3.8 = \frac{x}{360}$$

$$3.8 \times 360 = x$$

$$1368 = x$$

$$\frac{11.4}{6\pi} = \frac{x}{360}$$

$$217.7235\pi = x$$

$$1.2096\pi$$

$$\frac{4104 = 18.8496x}{18.8496} \quad \frac{18.8496}{18.8496}$$

$$x = 217.7235$$