Learning Skills

In today's lesson we will be learning to measure angles in RADIANS and understand how radians and degrees are related.

Definition. Radian describes the plane angle subtended by a circular arc as the length of the arc divided by the radius of the arc.

One radian is the angle subtended at the center of a circle by an arc that is equal in length to the radius of the circle.

In geometry, an angle subtended by an arc, line segment, or other curve is one whose two rays pass through the endpoints of the arc.

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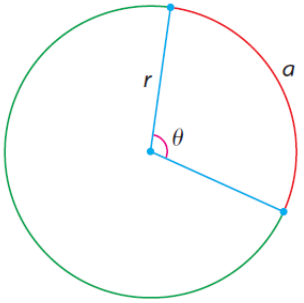
Radian Measures

You have always measured angles with degrees up until now. Recall 360° is a full circle. Degrees are not always the most useful way to measure an angle - instead most scientists and mathematicians prefer a system based on the unit circle and π. This system is called radians (short form "rads")



a = arc length
r = radius
θ = angle measure

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

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The radian measures are often shown with π in the measurement (but not always)

$$180^o = \pi\ rad = 3.1415\ rad$$

$$90^o = \frac{\pi}{2} rad = 1.5708\ rad$$

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The conversion factor:

$$\pi\ rad = 180^0$$

Radians into degrees: multiply by $\frac{180}{\pi}$

Degrees into radians: multiply by $\frac{\pi}{180}$

Ex: Convert to degrees:

$\frac{\pi}{3} rad$

$\frac{3\pi}{4} rad$

Ex: Convert to radians:

120^0

270^0

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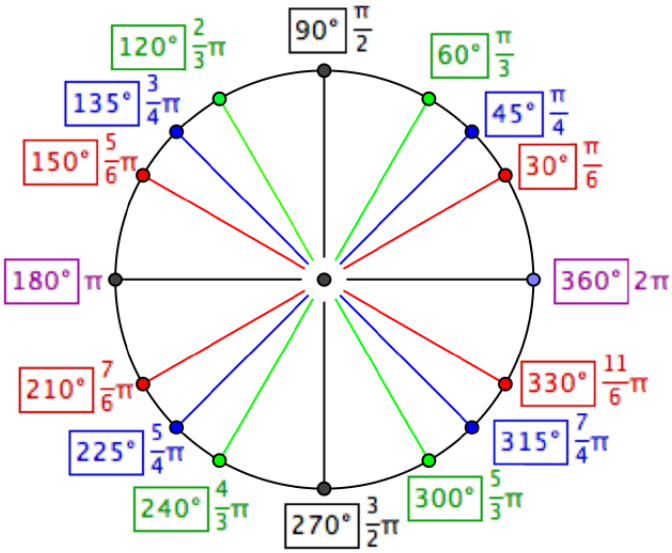

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Radian measures can be easily used to solve word problems involving rotations.

EX: You are on a ferris wheel with radius 50 m. If you rotated 5 times, how far did you travel? Assume that you are seated at the outer edge of the radius for the whole time.

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Note:
Angular velocity is a measure of the speed of rotation of an object. It is measured in degrees or radians per unit time. Ex: *rads/min or degrees/s*

Angular velocity is usually represented by the symbol omega (**Ω** or **ω**).

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Homework

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