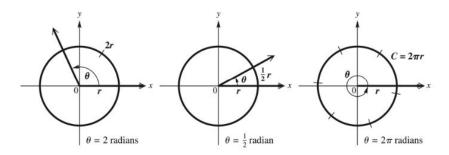
Radian Measure

Radian

An angle with its vertex at the center of a circle that intercepts an arc on the circle equal in length to the radius of the circle has a measure of



In general, if θ is a central angle of radius r, and θ intercepts an arc of length s, then the radian measure of θ is ______.

The ratio $\frac{s}{r}$ is a pure number, where s and r are expressed in the same units. Thus, "radians" is not a unit of measure like feet or centimeters.

Conversions between Degrees and Radians

$$360^{\circ} =$$
_____ radians
 $180^{\circ} =$ ____ radians = ____ radians

Converting between Degrees and Radians

- 1. Multiply a degree measure by _____ radian and simplify to convert to radians.
- 2. Multiply a radian measure by and simplify to convert to degrees.
 - 1. Convert each degree measure to radians.
 - a. 108°

b. -135°

c. 325.7°

2. Convert each radian measure to degrees.

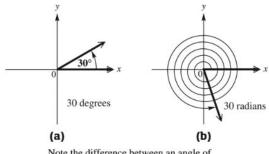
(a)
$$\frac{11\pi}{12}$$

(b)
$$-\frac{7\pi}{6}$$

Agreement on Angle Measurement Units

If no unit of angle measure is specified, then the angle is understood to be measured in radians.

For example, the figure on the left shows an angle of 30°, and the figure on the right shows and angle of 30 (which means 30 radians). An angle with measure 30 radians is coterminal with an angle of approximately 279°.

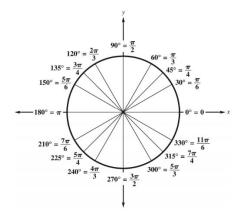


Note the difference between an angle of 30 *degrees* and an angle of 30 *radians*.

Equivalent Angle Measures

Degrees	Ra	dians	Degrees	Radians	
	Exact	Approximate		Exact	Approximate
0°	0	0	90°		
30°		0.52			3.14
45°	-		270°		
	$\frac{\pi}{3}$		360°		
	*	*		1	,

These exact values are *rational multiples* of π .



Learn the equivalences in this figure. They will appear often in trigonometry.

Arc Length on a Circle

Arc Length

The length s of the arc intercepted on a circle of radius r by a central angle of measure θ radians is given by the product of the radius and the radian measure of the angle.

 $s = r\theta$, where θ is in radians

When the formula $s = r\theta$ is applied, the value of θ MUST be expressed in ______, not ______.

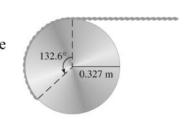
- 3. A circle has radius 25.60 cm. Find the length of the arc intercepted by a central angle having each of the following measures.
 - a. $\frac{7\pi}{8}$

4.

b. 54°

A rope is being wound around a drum with radius 0.327 m. (See the figure.) How much rope will be wound around the drum if the

drum is rotated through an angle of 132.6°?



A intercepted by a central angle.	is the portion of the i	nterior of a circle
Area of a Sector The area \mathcal{A} of a sector of a circle of r formula.	adius r and central angle θ is given	by the following
$\mathcal{A} = \frac{1}{2}r$	$^{2}\theta$, where θ is in radians	
As in the formula for arc length, the formula is used for the area of a sec		when this

5. Find the area of a sector of a circle having radius 15.20 ft and central angle 108.0° .