

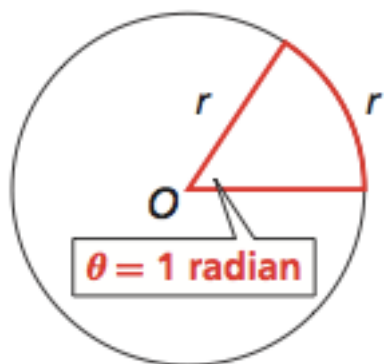
Radians and Degrees

13.3

A **Radian** is a unit of angle measure based on arc length.

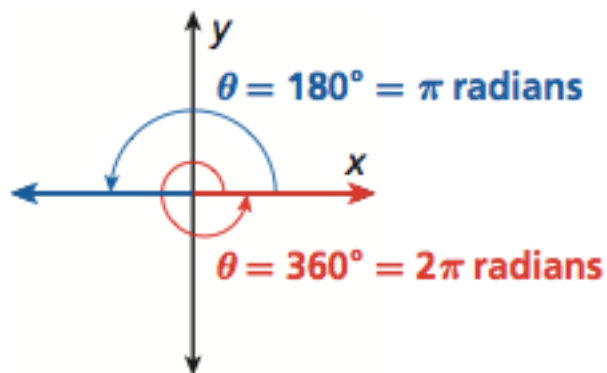
An **Arc** is an unbroken part of a circle.

If a central angle, θ , in a circle of radius r intercepts an arc of length r , then the measure of θ is defined as 1 radian.



The circumference of a circle of radius r is $2\pi r$.

360° is equal to 2π when $r = 1$.



Converting Angle Measures

DEGREES TO RADIANS

Multiply the number of degrees
by $\left(\frac{\pi \text{ radians}}{180^\circ}\right)$.

RADIANS TO DEGREES

Multiply the number of radians
by $\left(\frac{180^\circ}{\pi \text{ radians}}\right)$.

do
convert the degree to radians.

1) -45°

$$-45^\circ \left(\frac{\pi \text{ radians}}{180^\circ}\right) = -\frac{\pi}{4} \text{ radians}$$

We do:

Convert the degree to radians.

2) 60°

3) -270°

you do on your whiteboards:
Even Talk, Odd Write.

Convert the degree to radians.

1) -90°

2) 150°

Converting radians to degrees.

do.

1) $\frac{5\pi}{6} \text{ radians}$

$$\frac{5\pi}{6} \text{ radians} \left(\frac{180^\circ}{\pi \text{ radians}} \right) = 150^\circ$$

We do

Convert radians to degrees.

2) $4\pi \text{ radians}$

3) $\frac{2\pi}{9} \text{ radians}$

You do on whiteboards
Even Write Odd Talk

Convert Radians to Degrees.

1) $\frac{2\pi}{5}$ radians

2) $-\frac{\pi}{9}$ radians

do:

find a positive and a negative angle that is coterminal with the angle.

$$1) \theta = \frac{\pi}{3}$$

original radian	$\theta = \frac{\pi}{3}$
add 2π until there is a positive angle.	$\frac{\pi}{3} + 2\pi$
simplify	$\frac{\pi}{3} + \frac{6\pi}{3} = \frac{7\pi}{3}$
subtract 2π until there is a negative angle.	$\frac{\pi}{3} - 2\pi$
simplify	$\frac{\pi}{3} - \frac{6\pi}{3} = -\frac{5\pi}{3}$

We do:

find a positive and a negative angle that is coterminal with the angle.

$$2) \theta = \frac{\pi}{6}$$

original radian	
add 2π until there is a positive angle.	
simplify	
subtract 2π until there is a negative angle.	
simplify	

ou do with your partner on whiteboards.

ven Talk, odd write.

ind a positive and a negative angle that is coterminal with the
ngle.

$$1) \theta = -\frac{\pi}{4}$$

Using radians on the calculator.

Make sure you are in the right mode.

$$1) \sin 60$$

$$2) \sin\left(\frac{\pi}{9}\right)$$

closure

explain how to find coterminal angles for radians.

explain how to find coterminal angles for degrees.

think of 2 coterminal angles to $\frac{\pi}{3}$.

think 2 coterminal angles to 100° .