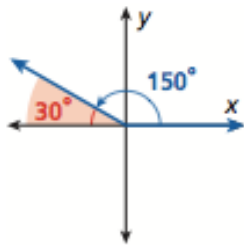


Reference Angles, Radians and Degrees and the Unit Circle  
Lesson 20  
11.12.15

The ***Reference Angle*** is the positive acute angle formed by the terminal side of  $\theta$  and the x-axis.

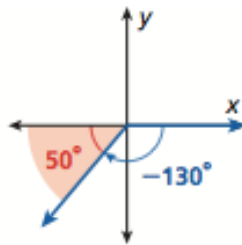
Find the measure of the reference angle for each given angle.

**A**  $\theta = 150^\circ$



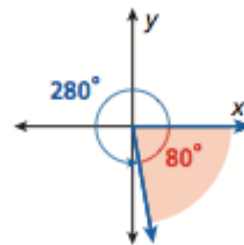
The measure of the reference angle is  $30^\circ$ .

**B**  $\theta = -130^\circ$



The measure of the reference angle is  $50^\circ$ .

**C**  $\theta = 280^\circ$



The measure of the reference angle is  $80^\circ$ .

**Reference angles are ALWAYS  $< 90^\circ$ , and one side has to be touching the x-axis.**

**I Try:**

**Find the measure of the reference angle.**

$$\theta = 450^\circ$$

Given Angle	$\theta = 450^\circ$
Identify the quadrant	Quadrant:
Find the angle of the ray on the x-axis and the coterminal side.	

I do:

$$\theta = -100^\circ$$

Given Angle	$\theta = -100$
Identify the quadrant	
Find the angle of the ray on the x-axis and the coterminal side.	

**We Try:**

**Find the measure of the reference angle.**

$$\theta = 220^\circ$$

Given Angle	$\theta = 220^\circ$
Identify the quadrant	
Find the angle of the ray on the x-axis and the coterminal side.	

$$\theta = -150^\circ$$

Given Angle	$\theta = -150$
Identify the quadrant	

Find the angle of the ray on the x-axis and the coterminal side.	
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**You Try with your partner on the whiteboard.  
Left Talk, Right write.  
Find the measure of the reference angle.**

$$\theta = -290^\circ$$

Given Angle	$\theta = -290^\circ$
Identify the quadrant	

Find the angle of the ray on the x-axis and the coterminal side.	

**You Try with your partner on the whiteboard.  
Right Talk, Left write.  
Find the measure of the reference angle.**

$$\theta = 120^\circ$$

Given Angle	$\theta = -290^\circ$
Identify the quadrant	

Find the angle of the ray on the x-axis and the coterminal side.	
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**You Try solo.**

**Find the measure of the reference angle.**

$$\theta = -500^\circ$$

Given Angle	$\theta = -500^\circ$
Identify the quadrant	
Find the angle of the ray	

on the x-axis and the coterminal side.	
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## Radians and Degrees

### I Try:

To convert from Degrees to Radians

Convert  $50^\circ$  to radians

Multiply by $\frac{\pi}{180}$	
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$50 \cdot \frac{\pi}{180} = \frac{5\pi}{18}$
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Convert  $\frac{2\pi}{3}$  radians to Degrees

Multiply by $\frac{180}{\pi}$	
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$\frac{2\pi}{3} \cdot \frac{180}{\pi} = \frac{360}{3} = 120^\circ$
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**We Try:**

Convert  $\frac{4\pi}{5}$  radians to Degrees

Multiply by $\frac{180}{\pi}$	
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**You Try SOLO :**

Convert  $\frac{2\pi}{3}$  radians to Degrees

Multiply by $\frac{180}{\pi}$	
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## **Exit Slip**

- 1) Explain how you would find the reference angle to  $100^\circ$ .**
- 2) Convert  $45^\circ$  to radians.**
- 3) Convert  $\frac{2\pi}{3}$  to degrees.**