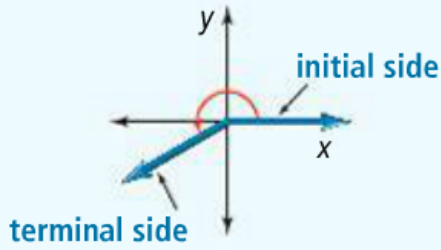


Unit 6 - Day 4 - Angles and Radians

Standard Position

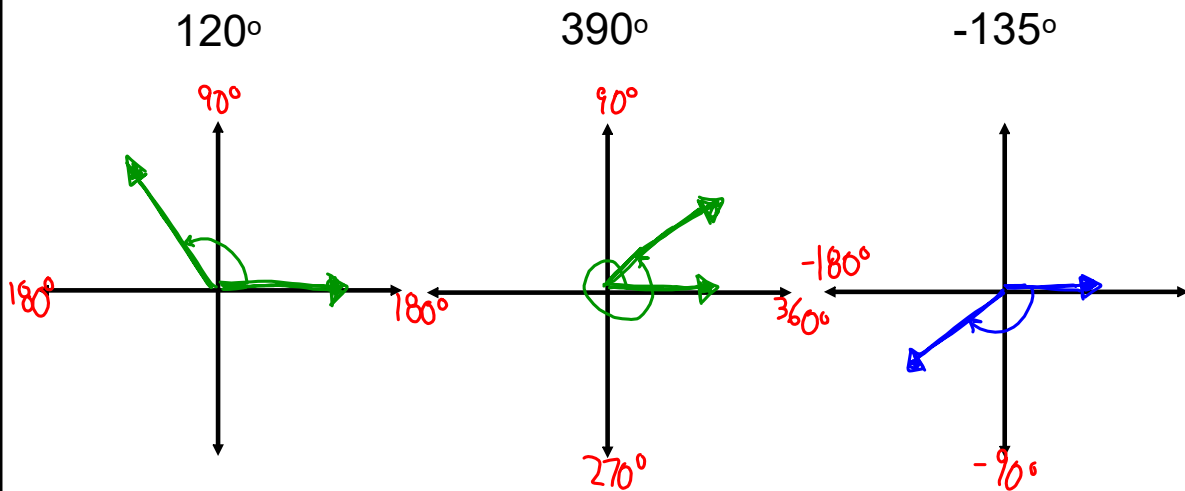


An angle is determined by two rays. The degree measure of an angle is described by the amount and direction of rotation from the **initial side** (where the angle starts) along the positive x-axis to the **terminal side** (where the angle ends). A counterclockwise rotation is associated with positive angle measure, and a clockwise rotation is associated with negative angle measure.



Apr 2-9:22 AM

Ex. Sketch the following angles in standard position.

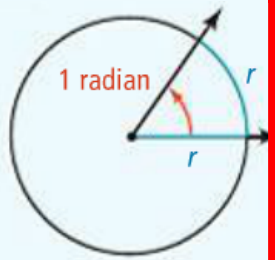


Apr 2-9:30 AM

Radians:

A **radian** is the measure of a central angle that intercepts an arc with length equal to the radius of the circle. Radians, like degrees, measure the amount of rotation from the initial side to the terminal side of an angle.

Essential Understanding An angle with a full circle rotation measures 2π radians. An angle with a semicircle rotation measures π radians.



To rewrite **DEGREE** to **RADIANS**: Multiply by $\frac{\pi}{180}$

To rewrite **RADIANS** to **DEGREE**: Multiply by $\frac{180}{\pi}$

Apr 2-9:31 AM

Rewrite each degree measure into radians and each radian measure into degrees.

$$45^\circ \cdot \frac{\pi}{180} = \frac{45\pi}{180} \xrightarrow{\text{simplify}} \frac{\pi}{4} \quad \frac{5\pi}{3} \cdot \frac{180}{\pi} = \frac{900}{3} \rightarrow 300^\circ$$

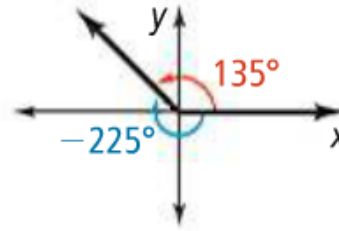
$$410^\circ \cdot \frac{\pi}{180} = \frac{410\pi}{180} \xrightarrow{\text{simplify}} \frac{41\pi}{18} \quad \frac{-13\pi}{6} \cdot \frac{180}{\pi} = \frac{-2340}{6} \rightarrow -390^\circ$$

Apr 2-9:38 AM

Coterminal Angles:

When two angles in standard position have the same terminal sides, they are called **coterminal angles**.

Ex. Angles of 135° and -225° are coterminal.



To find a coterminal angle to a given angle.....	Add/Subtract by multiples of.....
In DEGREES	360°
In RADIANS	2π

Ex. Find one angle with positive measure and one angle with negative measure **coterminal** with each given angle.

250°
 $+360$ ← -360
 $\boxed{610^\circ}$ $\boxed{-110^\circ}$

60°
 $\boxed{420^\circ}$, $\boxed{-300^\circ}$

Apr 2-9:42 AM

Ex. Find one angle with positive measure and one angle with negative measure **coterminal** with each given angle.

$\frac{5\pi}{8}$ $\frac{-7\pi}{4}$
 $\frac{+16\pi}{8}$ $\frac{-16\pi}{8}$ $\frac{+8\pi}{4}$ $\frac{-8\pi}{4}$
 $\boxed{\frac{21\pi}{8}}$ $\boxed{\frac{-11\pi}{8}}$ $\boxed{\frac{\pi}{4}}$ $\boxed{\frac{-15\pi}{4}}$

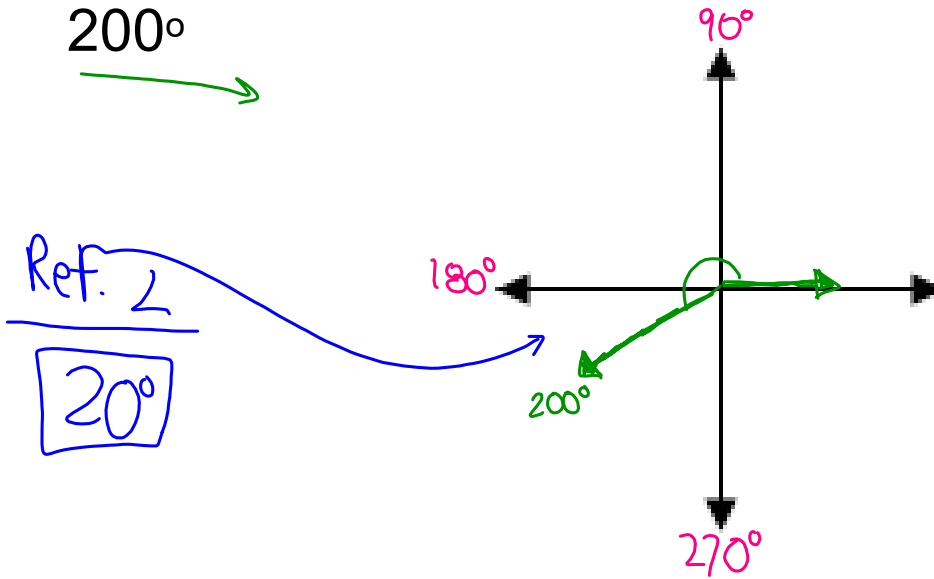
Apr 2-9:45 AM

Reference Angles

Easy way to see 'em: "How far is the terminal side from the x-axis?"

Ex. Sketch each angle. Then find its reference angle:

200°



Apr 2-9:46 AM

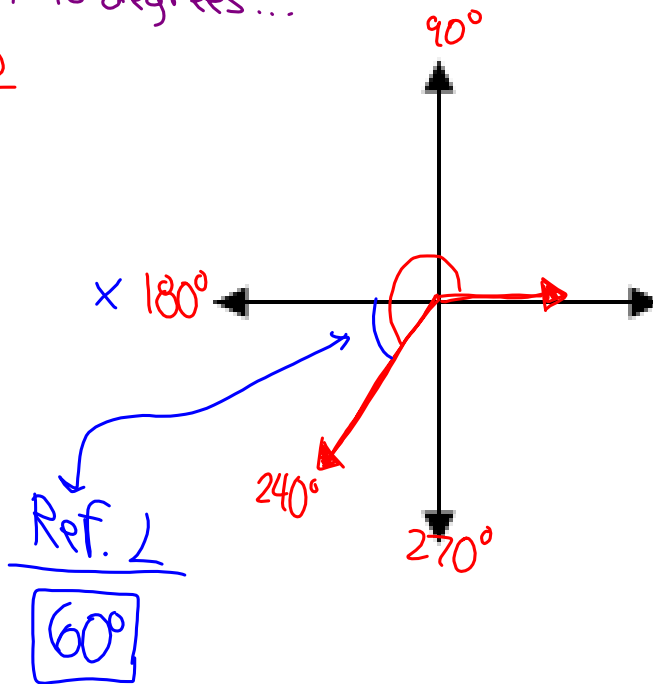
Ex. Sketch each angle. Then find its reference angle:

convert to degrees...

$$\frac{4\pi}{3} \cdot \frac{180}{\pi}$$

$$\frac{720}{3}$$

240°



Apr 2-9:48 AM

WARM - UP

ex1. Find the exact value of $\cos 315^\circ$

Draw the angle first!

a. $\frac{\sqrt{3}}{2}$
 b. $\frac{1}{2}$
 c. $\frac{\sqrt{2}}{2}$
 d. $\frac{2\sqrt{3}}{3}$

= $\frac{\text{adj}}{\text{hyp}}$

= $\frac{\frac{\sqrt{2}}{2}}{1} = \frac{\sqrt{2}}{2}$

May 20-7:29 AM

WARM - UP

ex2. Find the exact value of $\cot 240^\circ$

a. $\frac{2\sqrt{3}}{3}$
 b. $\frac{1}{2}$
 c. $\frac{\sqrt{2}}{2}$
 d. $\frac{\sqrt{3}}{3}$

May 20-7:29 AM



May 13-9:42 AM



May 13-9:42 AM

WARM - UPex2. Find the exact value of $\cot 240^\circ$

a. $\frac{2\sqrt{3}}{3}$

b. $\frac{1}{2}$

c. $\frac{\sqrt{2}}{2}$

d. $\frac{\sqrt{3}}{3}$

May 20-7:29 AM

WARM - UPex1. Find the exact value of $\cos 315^\circ$

a. $\frac{\sqrt{3}}{2}$

b. $\frac{1}{2}$

c. $\frac{\sqrt{2}}{2}$

d. $\frac{2\sqrt{3}}{3}$

May 20-7:29 AM