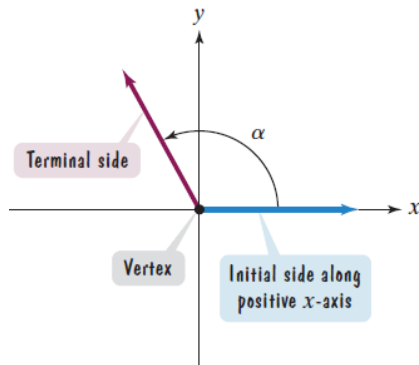
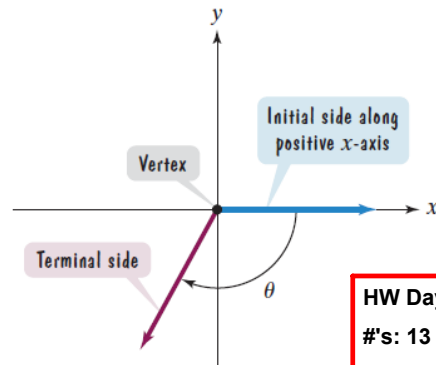


Trigonometry 4.1 Day 1 - Angles and Radians

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.



(a) α in standard position;
 α positive



(b) θ in standard position;
 θ negative

HW Day 1: p.505:
#s: 13 - 27 odds,
41 - 69 odds

Ex.



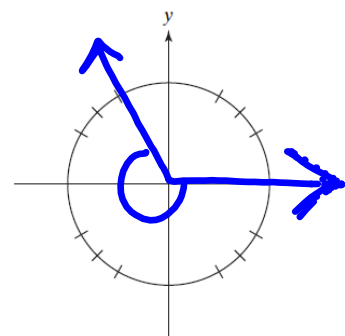
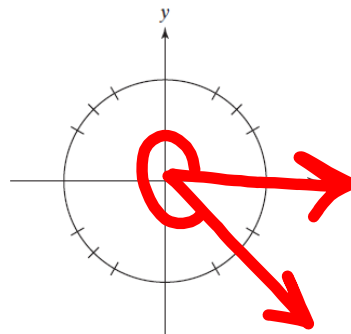
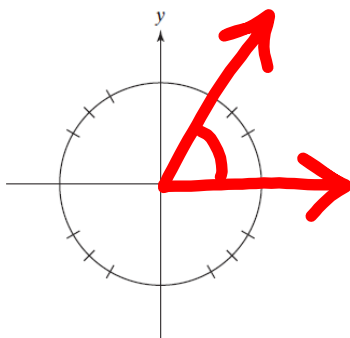
Sketching Angles in Degrees

Ex1. Sketch the following angles in standard position.

60°

315°

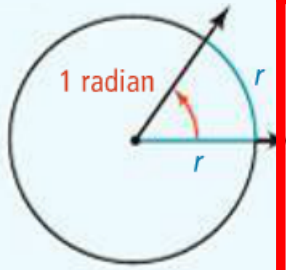
-240°



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 $\frac{180}{\pi}$

Converting Angles

Ex.2 Rewrite each degree measure into radians and each radian measure into degrees.

$$45^\circ \cdot \frac{\pi}{180} = \frac{45\pi}{180} = \boxed{\frac{\pi}{4}}$$

$$\frac{5\pi}{3} \cdot \frac{180}{\pi} = \frac{900}{3} = \boxed{300^\circ}$$

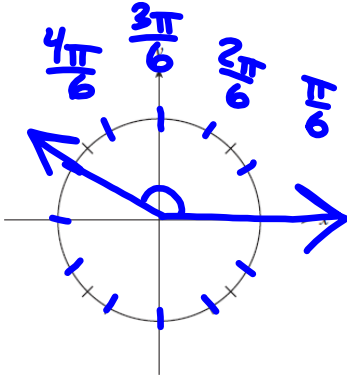
$$120^\circ \cdot \frac{\pi}{180} = \frac{120\pi}{180} = \boxed{\frac{2\pi}{3}}$$

$$\frac{-13\pi}{6} \cdot \frac{180}{\pi} = \frac{-2340}{6} = \boxed{-390^\circ}$$

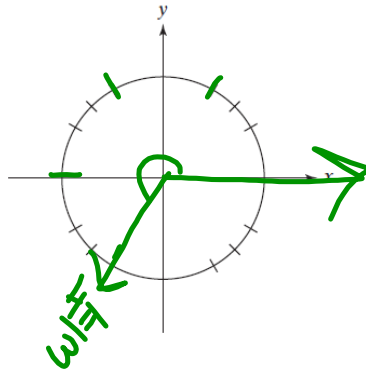
Sketching Angles in Radians

Ex3. Sketch the following angles in standard position.

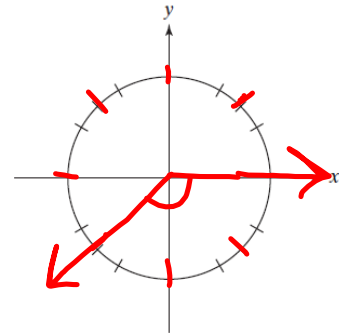
$$\frac{5\pi}{6} \quad (150^\circ)$$



$$\frac{4\pi}{3} \quad (240^\circ)$$



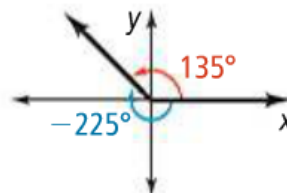
$$-\frac{3\pi}{4} \quad (-135^\circ)$$



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

Ex4. Find one angle with positive measure and one angle with negative measure **coterminal** with each given angle.

For 250° :

$$250^\circ + 360^\circ = 610^\circ$$

$$250^\circ - 360^\circ = -110^\circ$$

For 495° :

$$495^\circ + 360^\circ = 855^\circ$$

$$495^\circ - 360^\circ = 135^\circ$$

$$135^\circ - 360^\circ = -225^\circ$$

Ex5. Find one angle with positive measure and one angle with negative measure **coterminal** with each given angle.

$$\frac{5\pi}{8} \pm \frac{16\pi}{8} \quad \text{(+2}\pi\text{)}$$

$$\frac{21\pi}{8}, \frac{-11\pi}{8}$$

$$\frac{-7\pi}{4} \pm \frac{8\pi}{4}$$

$$\frac{\pi}{4}, \frac{-15\pi}{4}$$