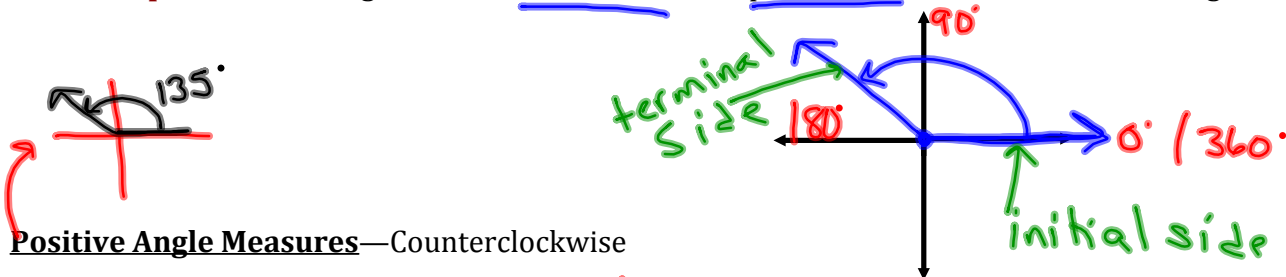## 13-2 Angles and Angle Measure

Objective: Change radian measure to degree measure and vice-versa.
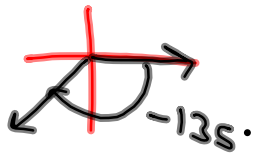   Identify Coterminal Angles.

Angle Measurement—
Standard position: an angle with an initial side on the positve x-axis and vertex at the origin.

Positive Angle Measures—Counterclockwise

Negative Angle Measures—Clockwise

360
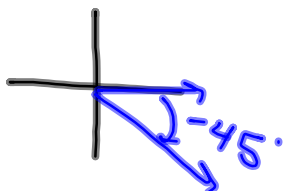
390

Ex 1) Draw an angle with the given measure in standard position.
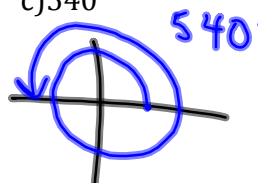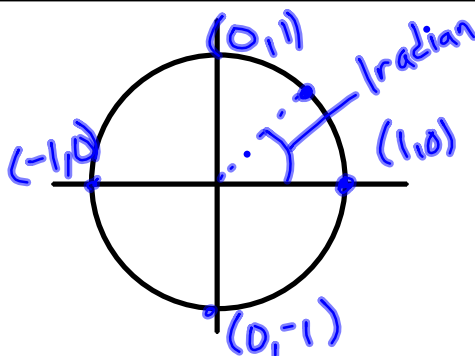a) 210   b) -45   c)540

Radian Measure—another way to measure angles.
One radian is a ratio of the arc length of a unit circle to its radius.
See page 711.

Conversion:

Radians to Degrees: multiply by $180/\pi$
Degrees to Radians: multiply by $\pi/180$

Ex 2) $30°$

$$\cancel{30} \times \frac{\pi}{\cancel{180}} = \boxed{\frac{\pi}{6}} \text{ radians}$$

Ex 3) $\frac{5\pi}{3}$

$$\frac{5\cancel{\pi}}{\cancel{3}} \times \frac{\cancel{180}^{60}}{\cancel{\pi}} = \boxed{300°}$$

Ex 4) $-45°$

$$-\cancel{45}° \times \frac{\pi}{\cancel{180}} = -\frac{\pi}{4}$$

Ex 5) $\frac{-2\pi}{3}$

$$\frac{-2\cancel{\pi}}{\cancel{3}} \times \frac{\cancel{180}^{60}}{\cancel{\pi}} = \boxed{-120°}$$
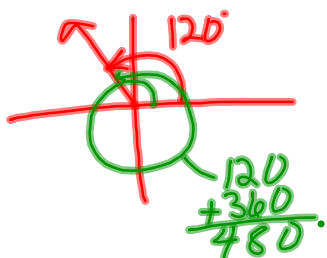
$C = 2\pi r$
$C = 2\pi(1) = 2\pi$

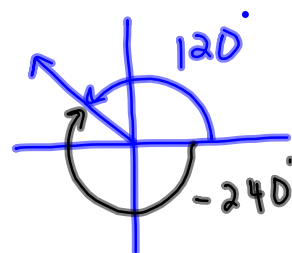$\dfrac{\text{arclength}\; 2\pi}{\text{radius}\; 1} = 360°$

$\pi = 180°$

Coterminal Angles—when 2 angles in standard form position have the same terminal side.

Ex)

120

120
480 $>$ coterminal   OR

120

-240

120
+360
480

120 − 360 = −240

Ex 6) Find 1 positive and 1 negative coterminal angle.

a) 210°

210 + 360 = $\boxed{570°}$

210 − 360 = $\boxed{-150°}$

*To Get
Coterminal
Angles
$\pm 360°$
OR
$\pm 2\pi$

b) $\frac{\pi}{3}$

$\frac{\pi}{3} + 2\pi \cdot \frac{3}{1\cdot 3} = \frac{\pi}{3} + \frac{6\pi}{3} = \boxed{\frac{7\pi}{3}}$

$\frac{\pi}{3} - 2\pi \cdot \frac{3}{1\cdot 3} = \frac{\pi}{3} - \frac{6\pi}{3} = \boxed{\frac{-5\pi}{3}}$

*Always start w/ the given angle and then ± 360 or $\pm 2\pi$.