Warm-Up

1) What is the *terminal side* of an angle?

The ray that "opens", creating the angle.

2) What does it mean if two angles are *coterminal*?

They have the same initial and terminal sides.

3) Can an angle measured in degrees be coterminal with an angle measured in radians?   Yes.

4) Factor: $8x^2 - 51x + 18$

$(x - 6)(8x - 3)$

5) Factor: $27x^2 - 108x + 96$

$3(3x - 8)(3x - 4)$

7-4 Notes

Reference Angles

Learning Targets:

- To evaluate trig functions of any angle
- Use reference angles to evaluate trig functions.
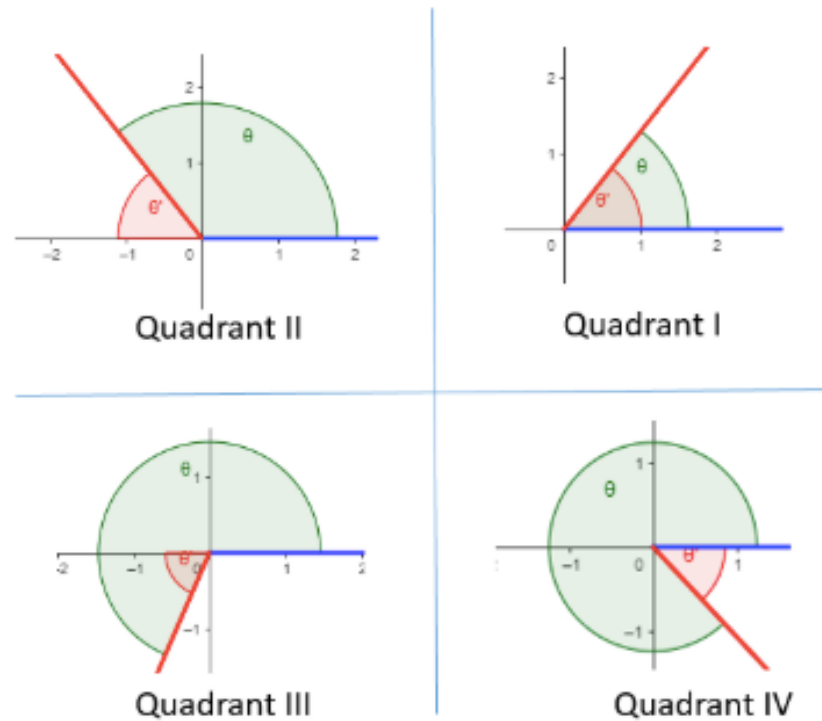- Evaluate trig functions of real number.

Reference Angles

Let θ be an angle in standard position. Its *reference angle* is the acute angle θ' formed by the terminal side of θ and the horizontal axis.
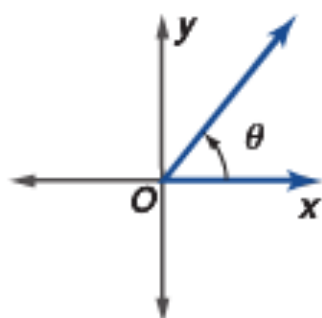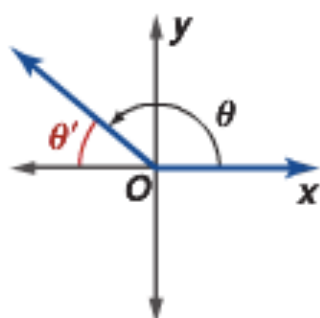
If θ is an angle in standard position, its reference angle θ' is the acute angle formed by the terminal side of θ and the x-axis. The reference angle θ' for any angle θ, $0° < \theta < 360°$ or $0 < \theta < 2\pi$, is defined as follows.

Quadrant I	Quadrant II	Quadrant III	Quadrant IV

$\theta' = \theta$

$\theta' = 180° - \theta$

$\theta' = \pi - \theta$

$\theta' = \theta - 180°$

$\theta' = \theta - \pi$
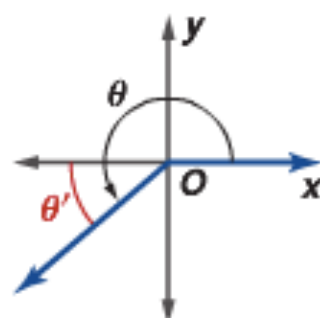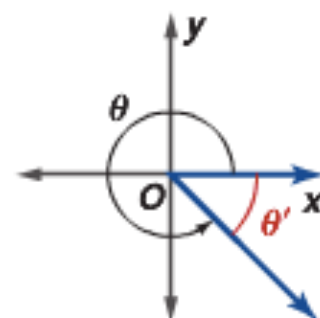
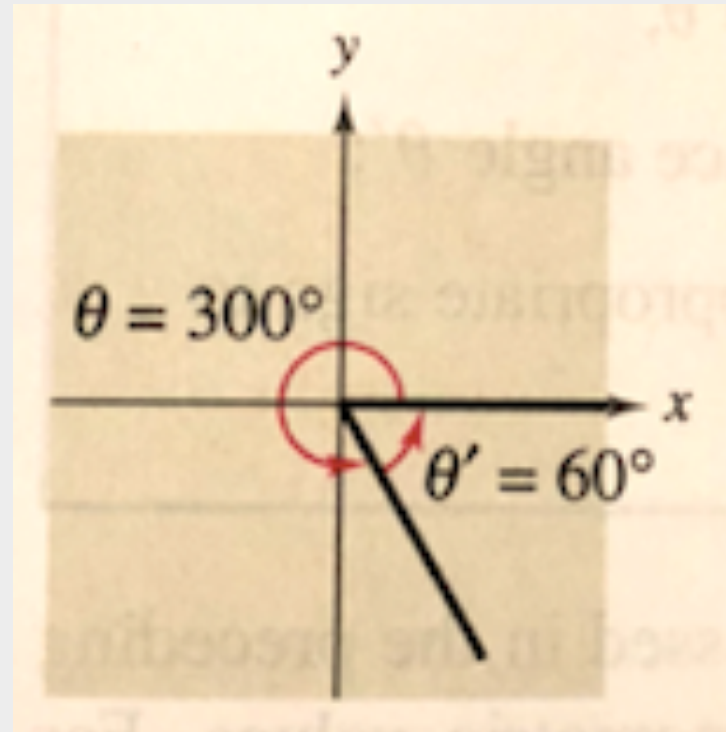$\theta' = 360° - \theta$

$\theta' = 2\pi - \theta$

Example 1: Find the reference angle θ' for:

a) $\theta = 300°$

300° lies in Quadrant 4.

The angle it makes with the x-axis is:
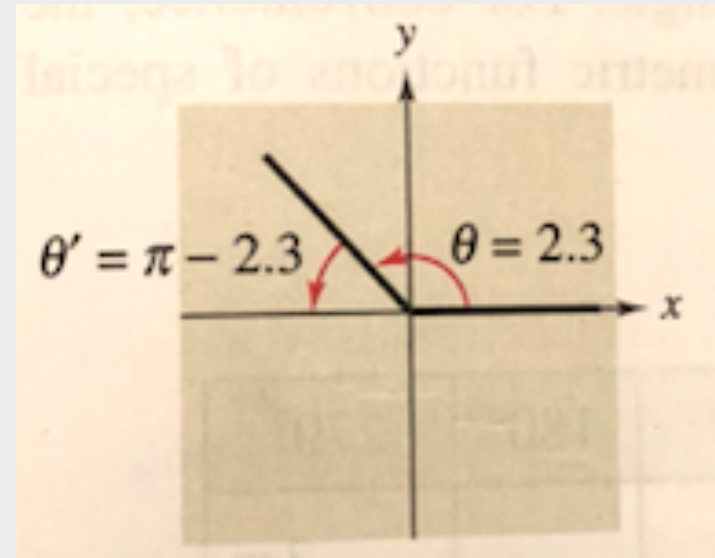
$\theta' = 360° - 300° = 60°$

Example 1: Find the reference angle θ' for:

b) $\theta = 2.3$ radians

2.3 radians is between $\dfrac{\pi}{2}$ and π, so it lies in quadrant 2. So:

$$\theta' = \pi - 2.3 \approx 0.8416$$

Example 1: Find the reference angle θ' for:

c) $\theta = -135°$

$-135°$ is coterminal with 225°, which lies in Quadrant 3. So:

$\theta' = 225° - 180° = 45°$