Trig 1.1 ~ Angles in Degrees and Radians

You will learn to:

- Describe angles using proper vocabulary.
- Convert between degree and radian measure.
Angles in degrees and radians

- Angle
  - initial side
  - terminal side
  - Standard position
  - positive angles (counter-clockwise)
  - negative angles (clockwise)
  - coterminal angles (same initial side & terminal side)
Radian measure of an angle

A radian is the angle, $\theta$, that intercepts an arc, $S$, equal in length to $r$, the radius of the circle.

$$\theta = \frac{S}{r} \quad \frac{\text{arc length}}{\text{radius}}$$

$$S = r \theta \quad \text{radians}$$
Common angles:

Right angle
\[ 90^\circ = \frac{1}{4} (2\pi r) = \frac{\pi}{2} \, r = \frac{\pi}{2} \]

Acute angle
\[ 0^\circ \leq \theta \leq 90^\circ \quad (0, \frac{\pi}{2}) \]

Obtuse angle
\[ 90^\circ \leq \theta \leq 180^\circ \quad (\frac{\pi}{2}, \pi) \]

Straight angle
\[ 180^\circ = \pi \text{ rad} \]

Angles > \(\pi\) ?
\[ \theta > 180^\circ \quad \theta > \pi \text{ rad} \]
Coterminal angles: Have the same terminal side.
Complementary angles

sum = \( \frac{\pi}{2} \)

\( (90^\circ) \)

\[ \text{comp } \frac{\pi}{3} = \frac{\pi}{6} \]

Supplementary angles

sum = \( \pi \)

\( (180^\circ) \)

\[ \text{Supp } 2\frac{\pi}{3} = \pi - \frac{2\pi}{3} = \frac{\pi}{3} \]
CONVERTING FROM DEGREES TO RADIANS OR FROM RADIANS TO DEGREES

$$360^\circ = 2\pi \text{ radians}$$

Convert to radians:

$$\frac{8^2}{72^\circ} = \frac{2\pi}{5}$$

$$\frac{-148^\circ}{180^\circ} = -\frac{37\pi}{45 \text{ rad}}$$

Convert to degrees:

$$\frac{3\pi}{12} = 45^\circ$$

$$\frac{5\pi}{3} = 300^\circ$$

**Radians are a pure number, so if you see no unit of measure, radians are implied.**
Return to complementary and supplementary angles

**Complementary angles**

\[ \text{sum} = 90^\circ \]

**Supplementary angles**

\[ \text{sum} = 180^\circ \]

\[ \text{Comp } 45^\circ = 45^\circ \]
\[ \text{Supp } 45^\circ = 135^\circ \]