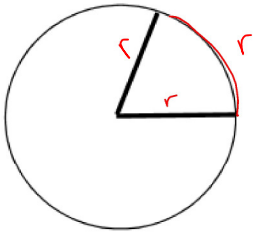
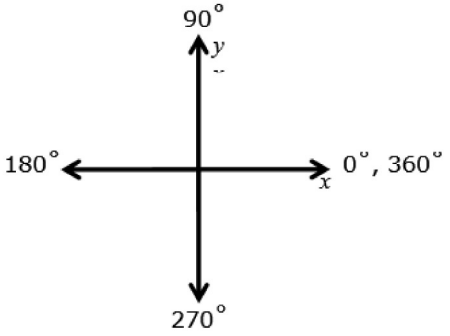
Pre-Calculus 12 Radian Measure

One ***radian measure*** is the measure of the angle formed by rotating the radius of a circle through an arc equal in length to the radius.





1 full revolution = $2\pi = 360°$

½ revolution = $\pi = 180°$

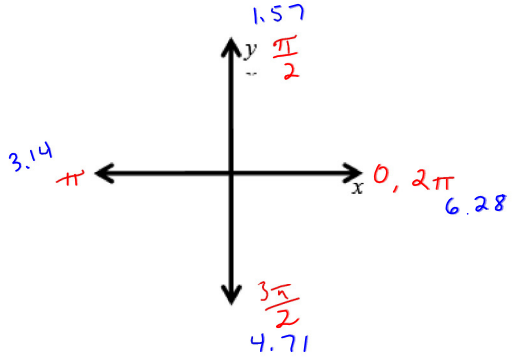
¼ revolution = $\frac{\pi}{2} = 90°$

$\frac{1}{6}$ revolution = $\frac{\pi}{3} = 60°$

1/8 revolution = $\frac{\pi}{4} = 45°$

1/12 revolution = $\frac{\pi}{6} = 30°$

÷2 ÷2 ÷3



Angle measures without units are considered to be in radians

Ex. 1) Convert $\frac{5\pi}{6}$ to degrees.

Multiply by $\frac{180°}{\pi}$

$\frac{5\pi}{6}\left(\frac{180°}{\pi}\right)$

$150°$

Radian Measure:

1 radian = $\frac{180°}{\pi} \approx 57.3°$

$1° = \frac{\pi}{180}$ radians

π radians = $180°$

$360° = 2\pi$ radians

Ex. 2) Convert 72° to radians

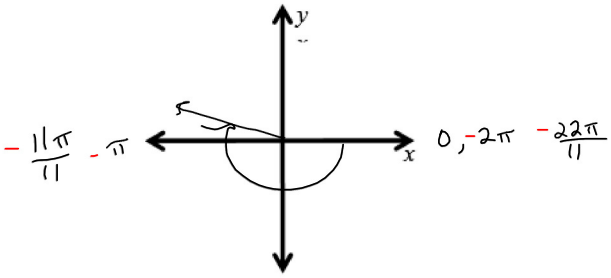
Multiply by $\frac{\pi}{180°}$

$72^\circ\left(\frac{\pi}{180^\circ}\right)$

$\frac{2\pi}{5}$

Ex. 3) Sketch $\theta = \frac{-22\pi}{11}$ in standard position.

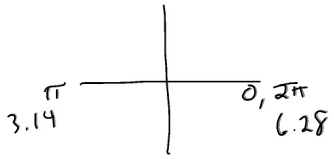
CW



Ex. 4) Given $\theta = 7.5$ radians, determine its measure to the nearest tenth of a degree.

$7.5\left(\frac{180^\circ}{\pi}\right)$

429.7°



Complementary Angles: two angles whose sum is 90° or $\frac{\pi}{2}$.

Ex. 5) Find the angle complementary to $\frac{\pi}{6}$.

(x)

$\frac{\pi}{6} + x = \frac{\pi}{2}$

$x = \frac{\pi}{2} - \frac{\pi}{6}$

$= \frac{3\pi}{6} - \frac{\pi}{6}$

$= \frac{2\pi}{6}$

$= \frac{\pi}{3}$

Supplementary Angles: are two angles whose sum is 180° or π.

Ex. 6) Find the angle supplementary to $\frac{\pi}{6}$.

$$\pi - \frac{\pi}{6}$$

$$\frac{6\pi}{6} - \frac{\pi}{6}$$

$$\frac{5\pi}{6}$$

Recall:
Coterminal angles: two angles which share the same terminal arm.

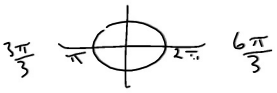
Note: To find coterminal angles in radians, add/subtract by 2π.

Ex. 7) Find a coterminal angle of $\frac{\pi}{3}$.

$$\frac{\pi}{3} + 2\pi$$

$$\frac{\pi}{3} + \frac{6\pi}{3}$$

$$\frac{7\pi}{3}$$



Assignment: [redacted]