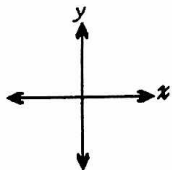
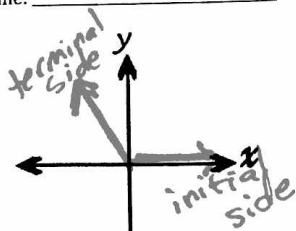


Name: _____

An angle is determined by rotating a ray about its endpoint.

The starting position is called the initial position.
The ending position is called the terminal side.

★ Standard Position: Vertex is at the origin, and the initial side is on the positive x-axis.



Positive Angles are generated by counterclockwise rotation.

Negative Angles are generated by clockwise rotation.

Coterminal Angles have the same initial and terminal side.

Ex. Determine two coterminal angles, one positive and one negative, for each angle below:

1. 60° 2. 30° 3. 230° 4. -20° 5. 460°

Add or sub. 360°

420° 390° 590° 340° 820°
 -300° -330° -130° -380°

100°
 -260°

Complementary Angles: the sum of the two angles is 90° .

Ex. Find the complement of each angle:

1. 40° 2. 120°
 50° no complement

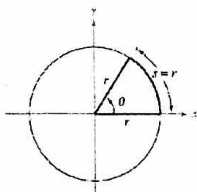
Supplementary Angles: the sum of the two angles is 180° .

Ex. Find the supplement of each angle:

1. 40° 2. 120°
 140° 60°

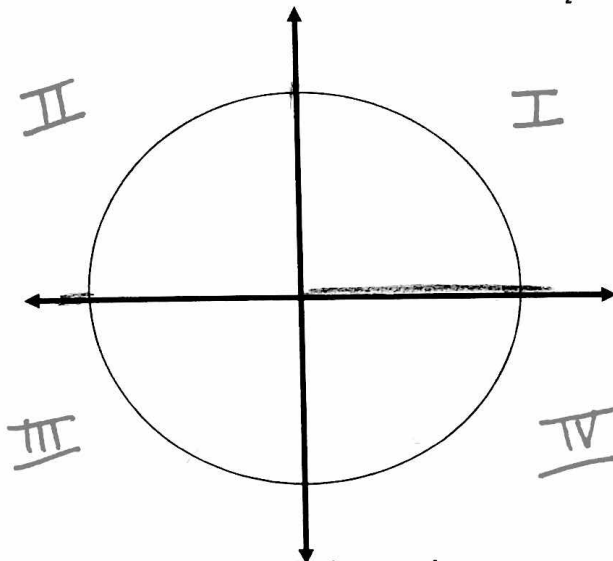
Radian Measure: One radian is the measure of the central angle θ , that intercepts an arc, s , that is equal in length to the radius r of the circle.

$$C = 2\pi r$$



Because the circumference of a circle is $2\pi r$ units, it follows that

- 2π radians = 360°
- π radians = 180°
- $\frac{\pi}{2}$ radians = 90°



Ex. Determine the quadrant of the terminal side of each given angle.

- | | | |
|---------------------------------|--------------------------------|---------------------------|
| 1. $\frac{\pi}{3}$ <u>I</u> | 4. 371° <u>II</u> | 8. -240° <u>II</u> |
| 2. $\frac{7\pi}{12}$ <u>II</u> | 5. $\frac{14\pi}{5}$ <u>II</u> | 9. 1000° <u>IV</u> |
| 3. $-\frac{2\pi}{3}$ <u>III</u> | 6. -156° <u>III</u> | |
| | 7. $-\frac{9\pi}{8}$ <u>II</u> | |

Finding Coterminal Angles Using Radians: add or subtract 2π .

Ex. Find a coterminal angle.

1. $\frac{\pi}{6}$ $\frac{13\pi}{6}$, $-\frac{11\pi}{6}$ 2. $\frac{13\pi}{4}$ $\frac{21\pi}{4}$ 3. $\frac{\pi}{5}$ $-\frac{9\pi}{5}$

Ex. Find the complement and supplement of each angle.

1. $\frac{2\pi}{5}$ 2. $\frac{2\pi}{3}$

Conversions:

Degrees to Radians: Multiply by $\frac{\pi}{180^\circ}$ Radians to Degrees: Multiply by $\frac{180^\circ}{\pi}$

Ex. Convert -270° to radians. Ex. Convert $\frac{9\pi}{2}$ radians to degrees. Ex. Convert 2 radians to degrees.

$$-270^\circ * \frac{\pi}{180^\circ} =$$

$$\frac{9\pi}{2} * \frac{180^\circ}{\pi} =$$

$$\frac{-270\pi}{180} = \boxed{\frac{-3\pi}{2}}$$