

Name: _____ Class Period: _____

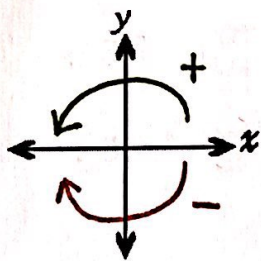
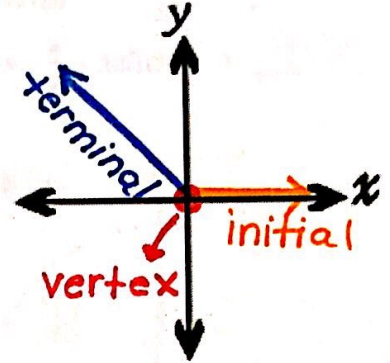
Precalculus - Unit 1 Day 2 Angles and Their Measures

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 position.

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



Positive Angles are generated by counter clockwise rotation.

Negative Angles are generated by clockwise rotation.

Coterminal Angles have the same initial and terminal side.
adding + subtracting 360°

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

1. 60°

-300°

420°

2. 30°

-330°

390°

3. 230°

-130°

590°

4. -20°

-380°

340°

5. 460°

-260°

100°

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

Ex. Find the complement of each angle:

1. 40°

50°

2. 120°

no complement

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

Ex. Find the supplement of each angle:

1. 40°

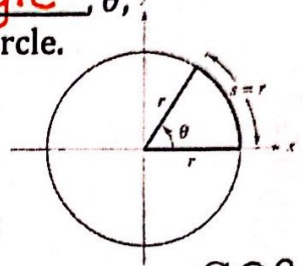
140°

2. 120°

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.

$$C = 2\pi r$$

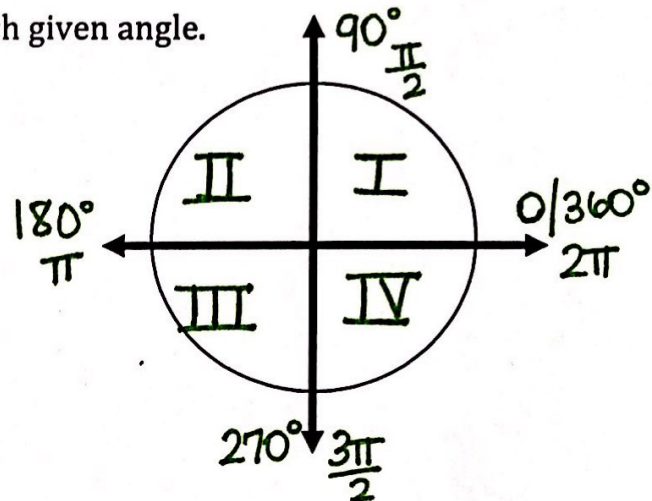


Because the circumference of a circle is $2\pi r$ units, it follows that

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



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

Ex. Find a coterminal angle.

- | | | |
|--|---|---|
| 1. $\frac{\pi}{6} \pm \frac{12\pi}{6}$ $\frac{-11\pi}{6}, \frac{13\pi}{6}$ | 2. $\frac{13\pi}{4} \pm \frac{8\pi}{4}$ $\frac{-3\pi}{4}, \frac{5\pi}{4}$ | 3. $\frac{\pi}{5} \pm \frac{10\pi}{5}$ $\frac{-9\pi}{5}, \frac{11\pi}{5}$ |
|--|---|---|

Ex. Find the complement and supplement of each angle. **[C]** sum to $\frac{\pi}{2}$ **[S]** sum to π

- | | |
|--|---|
| 1. $\frac{2\pi}{5}$ [C] $\frac{\pi}{2} - \frac{2\pi}{5} = \frac{5\pi}{10} - \frac{4\pi}{10} = \frac{\pi}{10}$ | 2. $\frac{2\pi}{3}$ [C] no complement |
| [S] $\pi - \frac{2\pi}{5} = \frac{5\pi}{5} - \frac{2\pi}{5} = \frac{3\pi}{5}$ | [S] $\pi - \frac{2\pi}{3} = \frac{3\pi}{3} - \frac{2\pi}{3} = \frac{\pi}{3}$ |

Conversions:

- Degrees to Radians: $\times \frac{\pi}{180^\circ}$
- Radians to Degrees: $\times \frac{180^\circ}{\pi}$

Ex. Convert -270° to radians. $-270 \times \frac{\pi}{180} = -\frac{3\pi}{2}$

Ex. Convert $\frac{9\pi}{2}$ radians to degrees. $\frac{9\pi}{2} \times \frac{180}{\pi} = 810^\circ$

Ex. Convert 2 radians to degrees. $2 \times \frac{180}{\pi} = \left(\frac{360}{\pi}\right)^\circ \approx 114.591^\circ$