Topic 7.2 Angles and the Unit Circle

Essential Question:

How can you extend the trigonometric ratios to angles greater than 90°?

Explore & Reason
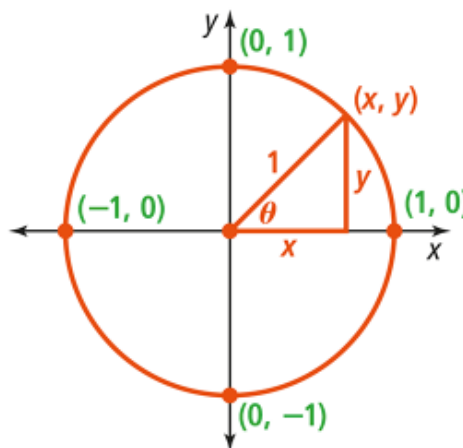
Complete online.

CONCEPT Summary

The Unit Circle

The unit circle is a circle that has its center at the origin and has a radius of 1.

In any right triangle formed with the radius as the hypotenuse, the length of the hypotenuse is 1.

Based on right triangle trigonometry

$\sin \theta = \frac{y}{1}$, or y $\cos \theta = \frac{x}{1}$, or x
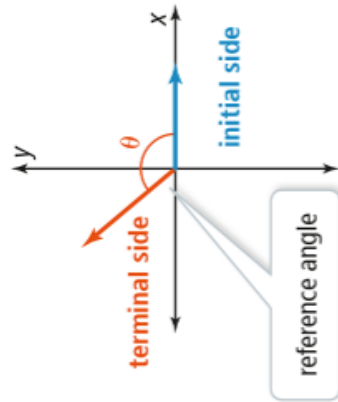
Notes:

Concept Summary:

Angles and the Unit Circle
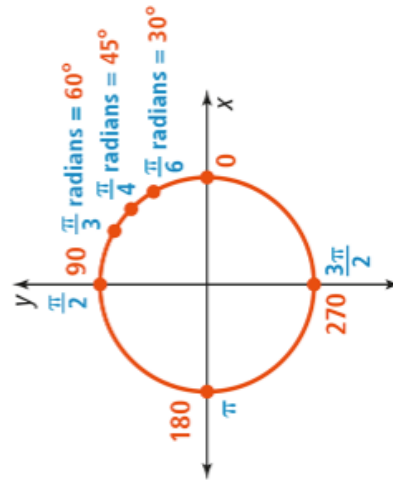
An angle is in standard position when its initial side is the positive x-axis and its vertex is at the origin.

The reference angle is the acute angle formed by the terminal side and the x-axis.

terminal side

initial side

reference angle

$\frac{\pi}{2}$ 90 $\frac{\pi}{3}$ radians = 60°

$\frac{\pi}{4}$ radians = 45°

$\frac{\pi}{6}$ radians = 30°

180 π

270 $\frac{3\pi}{2}$

$radians = \frac{\pi}{180} \cdot degrees$

$degrees = \frac{180}{\pi} \cdot radians$

Q: How can you determine the measure of an angle in Quadrant III if you are only given the measure of the reference angle?

Examples & Questions
Examples 1
Q: What statement can you make about the angle by looking at the graph?
Q: What does it mean when you say an angle is in standard position?
Q: How do you know that the triangle you formed is a right triangle?
Q: What do you notice about the positive and negative measures of an angle?
Q: How is measuring a positive angle different than measuring a negative angle?
Q: The measure of the angle could be (120+*360k*)°, where *k* is any natural number. What do you know about the number of coterminal angles?

Examples 2
Part A:
Q: How can you use information in the diagram about the different quadrants to help you sketch the angel?
Q: Is the terminal side of an angle always in a quadrant? Explain?

Part B:
Q: Can two different angles have the same reference angle?
Q: Do angles in Quadrant I have reference angle?

Part C:
Q: What do you notice about the measures of the reference angles in Quadrant I or Quadrant IV?

Examples 3
Q: How do you know that $\sin \theta = y$ and $\cos\theta = x$ on a unit circle?

Examples 4
Q: Why does the name *unit circle* accurately describe circle?
Q: How can you determine in which quadrant the terminal side of an angle with a given radian measure lies?

Examples 5
Q: How do you that 2π radians is qual to 360°?
Q: Why do you multiply the number of radians by $\frac{180^0}{\pi}$ when converting radians to degrees?

Examples 6
Q: Why is 6,720 km substituted for the radius?
Q: How can you use the formula for the radian measure to find the distance the satellite travels?

Practice and Problem Solving

Complete MathXL for School: Practice and Problem Solving (online)

Complete MathXL for School: Enrichment (online)

Lesson Quiz 7.2 & Notes