Advanced Algebra Concepts and Connections Unit 6: Trigonometry and the Unit Circle

Overview:

Students will begin exploring angles within the unit circle as a fraction of the circumference all the way around the unit circle. They will fluently convert between degree measures and radian measures. They will explore the concepts of terminal angles on the unit circle. Students will define and analyze the x (cosine), y (sine), and r (1) values of each angle measure of $30°$ $\left(\frac{\pi}{6}\right)$, $45°$ $\left(\frac{\pi}{4}\right)$, and $60°$ $\left(\frac{\pi}{3}\right)$, and their associated reflected angles within one counterclockwise revolution of the unit circle. Students will also be able to find the sine, cosine, and tangent at all of these radian measures, as well. Lastly, students will solve simple trigonometric equations.

Learning Targets

In Unit 6, students will:

- Connect the parts of the right triangle in the first quadrant to the corresponding parts of the unit circle where the hypotenuse is the radius, the adjacent side is x, and the opposite side is y.
- Articulate the pattern associated with angle measures in all four quadrants of the unit circle, e.g., $150°$ as $180° - 30°$, $210°$ as $180° + 30°$, $330°$ as $360° - 30°$, etc.
- Explore, interpret, and use radian measures based on conversions from degree measures, such as $150°$, $210°$, etc., and articulate the patterns associated with those radian measures, including the connection of $\frac{5\pi}{6} \approx 2.617$ radius units measured along the arc length of the circle.
- Develop an understanding that a unit circle has a radius equal to 1.

Key Vocabulary: (linked to GA DOE Interactive Glossary)

Arcsine	Circumference	Initial Side	Radian	Sine
Arccosine	Coordinate	Intercept	Radius	Standard Position
Arctangent	Cosine	Minor Arc	Reference Angle	Terminal Side
Central Angle	Coterminal Angle	Pi	Reference Side	Unit Circle
Circle	Degrees	Quadrant	Rotation	

Supporting Resources:

http://ctlslearn.cobbk12.org/	Sine, Cosine and Tangent	45°-45°-90° Triangle
https://gavirtual.instructure.com/courses/34342	30-60-90 Triangle	Unit circle