



Geometry Concepts and Connections Unit 6: Making Sense of Circles



Overview:

In this unit, students will examine and apply theorems involving angle relationships, find arc lengths, and areas of sectors of circles. Students will graph and write equations of circles. Students will extend their understanding of arc length in circles and 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 degrees and radians. Students will use special right triangles concepts to define the value of the sine, cosine, and tangent while understanding that x (cosine), y (sine), and r (1) values of each angle measure found at all terminal angles that are multiples of $\frac{\pi}{6}$, $\frac{\pi}{3}$, and $\frac{\pi}{4}$ around the unit circle. Students will be able to find the sine, cosine, and tangent at all these radians measures, as well.

Learning Targets

In Unit 6, students will:

- Identify and apply angle relationships formed by chords, tangents, secants, and radii with circles
- Derive the fact that the length of the arc intercepted by an angle is proportional to the radius using similarity
- Derive the formula for the area of a sector using similarity
- Solve problems involving the application of arc length and area of sector
- Explore and interpret a radian as the ratio of the arc length to the radius of circle
- Explain the relationship between radian measures and degree measures
- Convert fluently between degree and radian measures.
- Graph equation of a circle in standard form
- Write the equation of a circle in standard form
- Convert between General and Standard forms of the equation of circle
- Use special right triangles on the unit circle to determine the values of sine, cosine, and tangent (30° ($\pi/6$), 45° ($\pi/4$) and 60° ($\pi/3$))
- Use reflections of triangles to determine reference angles and identify coordinate values in all four quadrants of the coordinate plane.

Key Vocabulary: (linked to GA DOE Interactive Glossary)

Arc	Chord	Circumscribed Circle	Inscribed Circle	Secant Line
Arc Length	Circumcenter	Inscribed	Major Arc	Secant Segment
Arc Measure	Circumference	Inscribed Angle	Minor Arc	Sector
Central Angle			Point of Tangency	Tangent Line

Supporting Resources:

[http://ctlslearn.cobbk12.org/Circle Theorems \(mathsisfun.com\)](http://ctlslearn.cobbk12.org/Circle%20Theorems%20(mathsisfun.com))

<https://gavirtual.instructure.com/courses/34328>

[Features of a circle from its expanded equation | Analytic geometry \(video\) | Khan Academy](#)

[How Do You Find the Measure of an Inscribed Angle When You Know the Measure of the Intercepted Arc? | Virtual Nerd](#)