



Topic B:

Arcs and Sectors

G-C.A.1, G-C.A.2, G-C.B.5

Focus Standards:	G-C.A.1	Prove that all circles are similar.
	G-C.A.2	Identify and describe relationships among inscribed angles, radii, and chords. <i>Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.</i>
	G-C.B.5	Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.
Instructional Days:	4	
Lesson 7:	The Angle Measure of an Arc (S) ¹	
Lesson 8:	Arcs and Chords (E)	
Lesson 9:	Arc Length and Areas of Sectors (P)	
Lesson 10:	Unknown Length and Area Problems (P)	

In Topic B, students continue studying the relationships between chords, diameters, and angles and extend that work to arcs, arc length, and areas of sectors. Students use prior knowledge of the structure of inscribed and central angles together with repeated reasoning to develop an understanding of circles, secant lines, and tangent lines (MP.7). In Lesson 7, students revisit the inscribed angle theorem, this time stating it in terms of inscribed arcs (**G-C.A.2**). This concept is extended to studying similar arcs, which leads students to understand that all circles are similar (**G-C.A.1**). Students then look at the relationships between chords and subtended arcs and prove that congruent chords lie in congruent arcs. They also prove that arcs between parallel lines are congruent using transformations (**G-C.A.2**). Lessons 9 and 10 switch the focus from angles to arc length and areas of sectors. Students combine previously learned formulas for area and circumference of circles with concepts learned in this module to determine arc length, areas of sectors, and similar triangles (**G-C.B.5**). In Lesson 9, students are introduced to radians as the ratio of arc length to the radius of a circle. Lesson 10 reinforces these concepts with problems involving unknown length and area. Topic B requires that students use and apply prior knowledge to see the structure in new applications and to see the repeated patterns in these problems in order to arrive at theorems relating chords, arcs, angles, secant lines, and tangent lines to circles (MP.7). For example, students know that an inscribed angle has a measure of half the central angle intercepting the same arc. When they discover that the measure of a central angle is equal to

¹ Lesson Structure Key: **P**-Problem Set Lesson, **M**-Modeling Cycle Lesson, **E**-Exploration Lesson, **S**-Socratic Lesson

the angle measure of its intersected arc, they conclude that the measure of an inscribed angle is half the angle of its intercepted arc. Students then conclude that congruent arcs have congruent chords and that arcs between parallel chords are congruent.