Topic C:

**Secants and Tangents**

G-C.A.2, G-C.A.3

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| Focus Standards: | G-C.A.2 | Identify and describe relationships among inscribed angles, radii, and chords. |
|  | G-C.A.3 | Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle. |
| Instructional Days: | 6 |  |
| Lesson 11: | Properties of Tangents (E)[[1]](#footnote-1) |
| Lesson 12:  | Tangent Segments (P) |
| Lesson 13: | The Inscribed Angle Alternate a Tangent Angle (E) |
| Lesson 14: | Secant Lines; Secant Lines That Meet Inside a Circle (S) |
| Lesson 15: | Secant Angle Theorem, Exterior Case (E) |
| Lesson 16: | Similar Triangles in Circle-Secant (or Circle-Secant-Tangent) Diagrams (E) |

Topic C focuses on secant and tangent lines intersecting circles, the relationships of angles formed, and segment lengths. In Lesson 11, students study properties of tangent lines and construct tangents to a circle through a point outside the circle and through points on the circle (**G-C.A.4**). Students prove that at the point of tangency, the tangent line and radius meet at a right angle. Lesson 12 continues the study of tangent lines proving segments tangent to a circle from a point outside the circle are congruent. In Lesson 13, students inscribe a circle in an angle and a circle in a triangle with constructions (**G-C.A.3**) leading to the study of inscribed angles with one ray being part of the tangent line (**G-C.A.2**). Students solve a variety of missing angle problems using theorems introduced in Lessons 11–13 (MP.1). The study of secant lines begins in Lesson 14 as students study two secant lines that intersect inside a circle. Students prove that an angle whose vertex is inside a circle is equal in measure to half the sum of arcs intercepted by it and its vertical angle. Lesson 15 extends this study to secant lines that intersect outside of a circle. Students understand that an angle whose vertex is outside of a circle is equal in measure to half the difference of the degree measure of its larger and smaller intercepted arcs. This concept is extended as the secant rays rotate to form tangent rays, and that relationship is developed. Topic C and the study of secant lines concludes in Lesson 16 as students discover the relationships between segment lengths of secant lines intersecting inside and outside of a circle. Students find similar triangles and use proportional sides to develop this relationship
(**G-SRT.B.5**). Topic C highlights MP.1 as students persevere in solving missing angle and missing length problems; it also highlights MP.6 as students extend known relationships to limiting cases.

1. Lesson Structure Key: **P**-Problem Set Lesson, **M**-Modeling Cycle Lesson, **E-**Exploration Lesson, **S-**Socratic Lesson [↑](#footnote-ref-1)