Topic E

Trigonometry

G-SRT.C.6, G-SRT.C.7, G-SRT.C.8

Focus Standards:

- G-SRT.C.6: Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.
- G-SRT.C.7: Explain and use the relationship between the sine and cosine of complementary angles.
- G-SRT.C.8: Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

Instructional Days:

10

Lesson 25: Incredibly Useful Ratios (E)
Lesson 26: The Definition of Sine, Cosine, and Tangent (P)
Lesson 27: Sine and Cosine of Complementary Angles and Special Angles (P)
Lesson 28: Solving Problems Using Sine and Cosine (P)
Lesson 29: Applying Tangents (P)
Lesson 30: Trigonometry and the Pythagorean Theorem (P)
Lesson 31: Using Trigonometry to Determine Area (P)
Lesson 32: Using Trigonometry to Find Side Lengths of an Acute Triangle (S)
Lesson 33: Applying the Laws of Sines and Cosines (P)
Lesson 34: Unknown Angles (P)

Students begin the study of trigonometry in the final topic of the module. The emphasis in the module on side length relationships within similar triangles (Topic C) and the specific emphasis on right triangles (Topic D) help set the foundation for trigonometry. Lesson 25 is a last highlight of the side length ratios within and between right triangles. Students are guided to the idea that the values of the ratios depend solely on a given acute angle in the right triangle before the basic trigonometric ratios are explicitly defined in Lesson 26 (G.SRT.C.6). After practice with ratios labeled as shorter leg: hypotenuse (Lesson 21) and opp: hyp (Lesson 25), students are introduced to the trigonometric ratios sine, cosine, and tangent (G-SRT.C.6) in Lesson 26. Students examine the relationship between sine and cosine in Lesson 27, discovering that the sine and cosine of complementary angles are equal (G-SRT.C.7). They are also

1Lesson Structure Key: P-Problem Set Lesson, M-Modeling Cycle Lesson, E-Exploration Lesson, S-Socratic Lesson
introduced to the common sine and cosine values of angle measures frequently seen in trigonometry. Students apply the trigonometric ratios to solve for unknown lengths in Lessons 28 and 29; students also learn about the relationship between tangent and slope in Lesson 29 (G-SRT.C.8). In Lesson 30, students use the Pythagorean theorem to prove the identity \( \sin^2 \theta + \cos^2 \theta = 1 \) and also show why \( \tan \theta = \frac{\sin \theta}{\cos \theta} \). In Lessons 31–33, students study the application of trigonometry to determine area and solve for unknown lengths using the laws of sines and cosines (G-SRT.9, G-SRT.10, G-SRT.11). Finally, in Lesson 34, students learn how to determine the unknown measure of an angle of a right triangle. Students are introduced to the trigonometric functions arcsin, arccos, and arctan. These inverse functions are taught formally in Algebra II. For now, students should understand the meaning of and how to use arcsin, arccos, and arctan to determine unknown measures of angles.