Topic B

Constructing Triangles

7.G.A.2

Focus Standard:	7.G.A.2	Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.
Instructional Days:	11	
Lesson 5:	Identical Triangles (S)[1]	
Lesson 6:	Drawing Geometric Shapes (E)	
Lesson 7:	Drawing Parallelograms (P)	
Lesson 8:	Drawing Triangles (E)	
Lesson 9:	Conditions for a Unique Triangle—Three Sides and Two Sides and the Included Angle (E)	
Lesson 10:	Conditions for a Unique Triangle—Two Angles and a Given Side (E)	
Lesson 11:	Conditions on Measurements That Determine a Triangle (E)	
Lesson 12:	Unique Triangles—Two Sides and a Non-Included Angle (E)	
Lessons 13–14:	Checking for Identical Triangles (P, P)	
Lesson 15:	Using Unique Triangles to Solve Real-World and Mathematical Problems (P)	

Lesson 5 provides the foundation for almost every other lesson in Topic B. Students learn how to label two triangles as identical or different by understanding triangle correspondence and learning the relevant notation and terminology pertaining to it. In Lesson 6, students practice using a ruler, protractor, and compass to construct geometric shapes set by given conditions (e.g., constructing circles of radius 5 cm and 12 cm or constructing a triangle so that one angle is 100°). Students use a new tool, a set square, to draw parallelograms in Lesson 7. With an understanding of how to use the construction tools, students focus next on drawing triangles. Exercises in Lesson 8 demonstrate how a given set of conditions determines how many different triangles can be drawn. For example, the number of triangles that can be drawn with a requirement of a 90° angle is different from the number that can be drawn with a requirement of side lengths 4 cm, 5 cm, and 6 cm.

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

Next, students consider whether the triangles they construct are identical. In fact, standard **7.G.A.2** asks students to construct triangles from three measures of angles or sides, "noticing when the conditions determine a unique triangle, more than one triangle, or no triangle." The guiding question is then: What conditions determine a unique triangle (i.e., the construction always yields identical triangles), more than one triangle (i.e., the construction leads to non-identical triangles), or no triangle (i.e., a triangle cannot be formed by the construction)? In Lessons 9–10, students explore the conditions that determine a unique triangle. Note that the discussion regarding the conditions that determine a unique triangle is distinct from the discussion regarding whether two figures are congruent, which requires a study of rigid motions (Grade 8 Module 2). However, the study of what constitutes uniqueness is inextricably linked to the notion of identical figures. In Lesson 11, students discover the side-length conditions and angle-measurement conditions that determine whether or not a triangle can be formed. Lesson 12 focuses on the conditions that do not guarantee a unique triangle. With all these conditions covered, Lessons 13 and 14 ask students to practice constructing viable arguments to explain whether provided information determines a unique triangle, more than one triangle, or no triangle. Finally, in Lesson 15, students solve real-world and mathematical problems by applying their understanding of the correspondences that exist between identical triangles.