Plan for Geometry Unit 2: Congruence

Relevant Unit(s) to review: Grade 8 Unit 1 (especially lessons 11-13)

Essential prior concepts to engage with this unit	Before starting this unit, students are familiar with rigid transformations and congruence from grade 8. They have experimentally confirmed properties of rigid transformations, and informally justified that figures are congruent by finding a sequence of rigid motions that takes one figure onto the other. As long as students remember what congruence means and are familiar with the term, they are ready for this unit.
Brief narrative of approach	In this unit, rigid transformations are used to justify the triangle congruence theorems of Euclidean geometry: Side-Side-Side Triangle Congruence, Side-Angle-Side Triangle Congruence, and Angle-Side-Angle Triangle Congruence. Students justify that for each set of criteria, a sequence of rigid motions exist that will take one triangle onto the other. In middle school, they focused on specific examples and finding specific sequences of rigid motions (for example, students might justify that two triangles on the coordinate plane are congruent because they can find a reflection across the *x*-axis and a horizontal translation of two units that takes one triangle onto the other). In this unit, students learn to explain how two triangles with all three pairs of corresponding side lengths congruent can be taken onto one another using a more general sequence of rigid motions. Students then practice writing a significant amount of proofs using rigid transformations to prove images congruent. This guide does not recommend specific lessons be cut or modified because in grade 8 the year was not interrupted. However, current learning should dictate if the optional lesson is included and possibly eliminate low priority lessons if students are struggling with getting into the routine of school.

Lessons to Add	Lessons to Remove or Modify
For this unit, there are no lessons that need to be added, because most students will have completed the prerequisite lessons in Grade 8 Unit 1. However, Lessons 11–13 are about congruence and might make a nice reference to activate prior knowledge.	This unit does not require any lessons to be removed. However, the middle lessons really go in depth with proofs and if time is an issue, you can skip some of the heavy mathematics and still have students succeed in the course by highlighting important theorems and topics.
Lessons added: 0	Lessons removed: 0

Modified Plan for Geometry Unit 2

Day	IM lesson	Notes
	assessment	Check Your Readiness
1	G.2.1	Corresponding parts and angles in congruent figures
2	G.2.2	All about congruence! Congruence statements, naming corresponding parts from congruence statements, and using rigid transformations to explain congruence
3	G.2.3	Triangle congruence
4	G.2.4	Triangle congruence: How much information is needed?
5	G.2.5	Prove segments are congruent if and only if they have the same length
6	G.2.6	Side-angle-side triangle congruence
7	G.2.7	Angle-side-angle triangle congruence
8	G.2.8	Perpendicular Bisector Theorem
9	G.2.9	Side-side-side triangle congruence
10	G.2.10	Practicing proofs

11	G.2.11	The ambiguous case: side-side-angle (sometimes) congruence
12	G.2.12	Prove (in writing) theorems about quadrilaterals
13	G.2.13	Proofs about parallelograms
14	G.2.14	Prove constructions work for angle bisector and perpendicular bisector
15	G.2.15	Prove congruence for quadrilaterals
16	assessment	End of Unit

Priority and Category List for Lessons

High priority (+), Medium priority (0), Low priority (-)

E: Explore, Play, and Discuss, D: Deep Dive, A: Synthesize and Apply

Lesson	Priority (+, 0, -)	Category (E, D, A)	Notes
G.2.1	+	E	This lesson re-introduces students to the concept that if two figures are congruent, then each pair of corresponding parts of the figures are also congruent. They will use this concept throughout the unit as they prove triangles and other figures congruent.
G.2.2	+	D	In this lesson, students continue to apply the concept of corresponding parts. Students have the opportunity to explore a different direction, for example if corresponding parts are congruent, then the figures are congruent as well.
G.2.3	+	E	This lesson introduces students to proofs of triangle congruence using transformations. Students will use point-by-point transformations and also recognize the right set of transformations will work for *any* set of triangles with the right congruent corresponding parts, regardless of position and orientation.
G.2.4	+	D	This lesson invites the question, “How much information is needed to guarantee that two triangles are congruent?” Students start to answer this question in an Info Gap. Throughout this lesson, students are developing and testing conjectures about how much information they need to prove triangles are congruent.
G.2.5	+	D	In this lesson, students will attend to precision while proving all points are congruent and all segments of the same length are congruent. This will allow students to skip the steps they prove here when proving triangles congruent in the next several lessons. This lesson allows them to start by saying a transformation exists to take a segment to a congruent segment and focus their attention on using the remaining information to prove the triangles congruent.
G.2.6	+	D	In this lesson, students use these ideas to prove the *Side-Angle-Side Triangle Congruence Theorem.* That is, they justify that if you know that two pairs of

			corresponding sides and the pair of corresponding angles between those sides are congruent, then there must be a sequence of rigid motions that takes one triangle exactly onto the other. Students are then given the opportunity to apply the theorem to prove the base angles are congruent in isosceles triangles.
G.2.7	+	D	In this lesson, they are asked to come up with most of the language for a proof of the *Angle-Side-Angle Triangle Congruence Theorem* (MP3). They are explicitly encouraged to use previous work and refer to the template as scaffolding. Students are again given the opportunity to apply the theorem, proving opposite sides of parallelograms are congruent.
G.2.8	0	D	In this lesson, they prove the *Perpendicular Bisector Theorem*, confirming their conjecture about equidistant points and perpendicular bisectors. The purpose of completing this proof now is to prepare to use the Perpendicular Bisector Theorem in the proof of the Side-Side-Side Triangle Congruence Theorem.
G.2.9	0	D	In this lesson, students complete their proofs of the triangle congruence theorems, studying the *Side-Side-Side Triangle Congruence Theorem*. They then have the opportunity to apply the theorem to a proof about parallelograms. Students continue to work on writing clear proofs.
G.2.10	0	D	In this lesson, students first use manipulatives to make conjectures about diagonals of quadrilaterals. Then they have a chance to practice using diagrams to recognize when the Side-Side-Side, Angle-Side-Angle, and Side-Angle-Side Triangle Congruence Theorems apply. Finally, students match diagrams with statements about quadrilaterals, and write a proof using the analyses they did earlier.
G.2.11	-	D	This lesson is optional. In this lesson, students study the ambiguous case of triangle congruence. Students know that two pairs of corresponding sides are congruent and a pair of corresponding angles not between the two sides are congruent.
G.2.12	0	D	In this lesson students prove the important result that all rectangles are parallelograms. Then groups of students tackle different relationships among quadrilaterals and their diagonals.

G.2.13	0	D	In this lesson, students prove two statements about the diagonals of parallelograms (The diagonals of a parallelogram bisect each other. And, if the diagonals of a parallelogram are congruent, then the parallelogram is a rectangle.). Students can use new strategies, such as working backwards and overlapping triangles, to further their proof-writing skills.
G.2.14	0	D	In this lesson students return to conjectures they made in a previous unit that the construction of an angle bisector is valid, and that isosceles triangles have a line of symmetry.
G.2.15	-	A	In this lesson, students apply the triangle congruence theorems to parallelograms in order to generate and prove congruence theorems for parallelograms.