Geometry
Core Resource: Illustrative Mathematics Geometry
Semester 1

Unit 1: Rigid Transformations (~12 days, IM Unit 1)

Essential Learning

In this unit, students first informally explore geometric properties using straightedge and compass constructions. This allows them to build conjectures and observations before formally defining rotations, reflections, and translations. In middle school, students studied transformations of figures in the coordinate plane. In this unit, they transition to more formal definitions that don't rely on the coordinate plane, and the focus shifts from transforming whole figures towards a more point-by-point analysis. Students then begin to use the rigorous definitions they developed to prove statements involving angles and distances, preparing them for congruence proofs in the next unit.

Priority Standards

HSG-CO.A.5: Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.

Co-Requisite Skills/Knowledge	Non-Negotiable New Skills/Knowledge/Concepts
Vocabulary: Perpendicular, Bisector, Rotation, Reflection, Translation, Congruent, Parallel, Symmetry	Calculate 5 Number Summary Create Box Plot Determine shape of data distribution Interpret histograms, dot plots, and box plots. Identify, interpret, and compare measures of center and spread (variability) Interpret how extremes affect center and spread (variability)

Unit 2: Angle Relationships and Parallel Lines (~12 days, IM Unit 1)

Essential Learning

In the final lessons of the unit, students learn ways to express their reasoning more formally. Students create conjectures about angle relationships and prove them using what they know about rigid transformations. As a tool for communicating more precisely, students begin to label and mark figures to indicate congruence. In the culminating lesson of the study of constructions, students build on their experiences with perpendicular bisectors to answer questions about allocating resources in a real-world situation.

Priority Standards

HSG-CO.A.1: Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.

HSG-CO.C.9: Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are cong

HSG-CO.C.10: Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a

Co-Requisite Skills/Knowledge	Non-Negotiable New Skills/Knowledge/Concepts
Solve linear equations (Weavable Algebra) Solve systems of equations (Weavable Algebra)	Naming and labeling angles, lines, segments Types of angles Types of triangles Angle pairs: linear pair, vertical angles, complementary, supplementary Parallel Lines and Transversals Triangle Angle Sum

Unit 3: Congruence (~16 days, IM Unit 2)

Essential Learning

In this unit, students begin by reasoning about the relationships between congruent parts of figures, and congruent figures. They use transformations as tools for reasoning and generalizing. Students use transformations to prove three theorems about triangle congruence: Side-Angle-Side Triangle Congruence, Angle-Side-Angle Triangle Congruence, and Side-Side-Side Triangle Congruence. As students prove new theorems, they apply those theorems to prove results about quadrilaterals, isosceles triangles, and other figures. Finally, students have a chance to apply their skills to conjecture and explore congruences and properties of quadrilaterals.

Priority Standards

HSG-CO.A.1: Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.

HSG-CO.A.5: Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.

HSG-CO.C.9: Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are cong

HSG-CO.C.10: Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a

HSG-SRT.B.5: Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

Co-Requisite Skills/Knowledge	Non-Negotiable New Skills/Knowledge/Concepts
Solve linear equations (Weavable Algebra) Solve systems of equations (Weavable Algebra)	

Unit 4: Similarity (~16 days, IM Unit 3)

Essential Learning

In this unit, students use dilations and rigid transformations to justify triangle similarity theorems including the Angle-Angle Triangle Similarity Theorem. Students explicitly build on their work with congruence and rigid motions, establishing that triangles are similar by dilating them strategically. The unit balances a focus on proof with a focus on using similar triangles to find unknown side lengths and angle measurements.

Priority Standards

HSG-SRT.B.5: Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

Co-Requisite Skills/Knowledge	Non-Negotiable New Skills/Knowledge/Concepts
Rewriting radical expressions (Weavable Algebra) Pythagorean Theorem Work with proportions (Weavable Algebra)	

Unit 5: Trigonometry (~15 days, IM Unit 4)

Essential Learning

In this unit students build an understanding of ratios in right triangles which leads to naming cosine, sine, and tangent as trigonometric ratios. Practicing without naming the ratios allows students to connect similarity, proportional reasoning, and scale factors to right triangles with a congruent acute angle before the calculator takes over some of the computation. Students encounter several contexts to both make sense of and apply right triangle measurement.

Priority Standards

HSG-SRT.C.8: Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.*

Co-Requisite Skills/Knowledge	Non-Negotiable New Skills/Knowledge/Concepts
Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to highlight resistance R. (HSA-CED.A.4) Rewriting radical expressions - operations (multiplying, rationalizing denominator) (Weavable Algebra)	

Semester 2

Unit 6: Circles (~15 days, IM Unit 7)

Essential Learning

In this unit, students analyze relationships between segments and angles in circles, which leads to the construction of inscribed and circumscribed circles of triangles. Students solve problems involving arc length and sector area, and they use the similarity of all circles and ideas of arc length to develop the concept of radian measure for angles.

Priority Standards

HSG-CO.C.9: Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are cong

HSG-CO.C.10: Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a t

HSG-SRT.B.5: Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

HSG-SRT.C.8: Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.*

Co-Requisite Skills/Knowledge	Non-Negotiable New Skills/Knowledge/Concepts
Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$. (HSA-SSE.A.2) Solving linear equations (Weavable Algebra) Multiplying polynomials (Weavable Algebra) Solving quadratics (Weavable Algebra	Power theorems Angle relationships

Unit 7: Solid Geometry (~21 days, IM Unit 5)
Essential Learning
In this unit, students practice spatial visualization in three dimensions, study the effect of dilation on area and volume, derive volume formulas using dissection arguments and Cavalieri's Principle, and apply volume formulas to solve problems involving surface area to volume ratios, density, cube roots, and square roots.
Priority Standards
HSG-GMD.A.3: Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.*

Co-Requisite Skills/Knowledge	Non-Negotiable New Skills/Knowledge/Concepts
Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to highlight resistance R. (HSA-CED.A.4)	

Unit 8: Coordinate Geometry (~19 days, IM Unit 6)
Essential Learning
This unit brings together students' experience from previous years with their new understanding from this course for an in-depth study of coordinate geometry. Students encounter a new coordinate transformation notation such as , which connects transformations to functions. Then they use transformations and the Pythagorean Theorem to build equations of circles, parabolas, parallel lines, and perpendicular lines from definitions. Students apply these ideas to proofs, such as classifying quadrilaterals. Finally, students use weighted averages to partition segments, scale figures, and locate the intersection point of the medians of a triangle.
Priority Standards
HSG-CO.C.10: Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.
HSG-GPE.B.4: Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, √3) lies on the circle centered at the origin and containing the point (0, 2).

Co-Requisite Skills/Knowledge	Non-Negotiable New Skills/Knowledge/Concepts
Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. (HSA-CED.A.2) Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. (HSA-SSE.B.3) Rewriting radical expressions - operations (adding/subtracting for perimeter and area) (Weavable Algebra)	Relate properties of quadrilaterals to the coordinate plane Distance formula as the pythagorean theorem Point-slope form for linear equations

Unit 9: Probability (~15 days, IM Unit 8)
Essential Learning
In this unit, students extend what they learned about probability in grade 7 by considering events that are combined in various ways including both occurring, at least one occurring, and one event happening under the condition that the other happens as well. This unit introduces the relationship between probabilities of some combinations of events using the Addition Rule, . Conditional probability is discussed. In particular, the Multiplication Rule is used to determine conditional probabilities as well as independence of events A and B. Independence is further explored using everyday language as well as through the equation when events A and B are independent.
Priority Standards
HSS-CP.A.4: Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.

Co-Requisite Skills/Knowledge	Non-Negotiable New Skills/Knowledge/Concepts
Solving linear equations (Weavable Algebra)	

Mathematical Practices	Definitions
Make sense of problems and persevere in solving them	**Co-Requisite Skills/Knowledge:** These are the skills and concepts that students should have encountered prior to the unit of study. Teachers should gather data regularly on their students and might use the Pre-Unit readiness assessments to determine their students' mastery of these skills. Based on data collected and teacher observation, these skills may need to be re-engaged with in order to best support students in learning the content in the unit. These are things that can be differentiated based on the students who need additional support or can be re-engaged whole class if necessary.
Reason abstractly and quantitatively	**Priority Standards:** These are the course standards from the unit that represent the major content of the course and should be re-engaged with if students need additional support or time to master them. These are standards that we guarantee students will master before the end of the course.

	Non-Negotiable New SKills/Knowledge/Concepts: These are the new skills/concepts that students should know and be able to do by the completion of the unit. These are the skills/knowledge/concepts that students will be expected to have as they move into the next course. These skills/concepts are aligned to the priority standards within the unit.							
Construct viable arguments and critique the reasoning of others								
Model with mathematics								
Use appropriate tools strategically								
Attend to precision								
Look for and make use of structure								
Look for and express regularity in repeated reasoning								