

## MATH MCS MYP UNIT PLANNER

<b>Teacher(s)</b>	Schumacher, Hull	<b>Subject group and discipline</b>	Geometry - Honors		
<b>Unit title</b>	Unit 2 – Similarity, Congruence, and Proofs	<b>MYP year</b>	5	<b>Unit duration (hrs)</b>	30 hours (9 weeks)

### Inquiry: Establishing the purpose of the unit

Key concept	Related concept(s)	Global context
Logic	Equivalence Justification	Identities and relationships

### Statement of inquiry

Mathematicians use congruent & similar triangles to generalize and prove relationships.

### Inquiry questions

#### Factual—

- What is dilation and how does this transformation affect a figure in the coordinate plane?
- What strategies can I use to determine missing side lengths and areas of similar figures?
- Under what conditions are similar figures congruent?

#### Conceptual—

- How do I know which method to use to prove two triangles congruent?
- How do I know which method to use to prove two triangles similar?
- How do I prove geometric theorems involving lines, angles, triangles, and parallelograms?
- In what ways can I use congruent triangles to justify many geometric constructions?
- How do I make geometric constructions?

#### Debatable—

- Are identical twins considered congruent or similar?

MYP Objectives	Assessments
MYP Assessment – Rubric A MYP Assessment – Rubric B	<ul style="list-style-type: none"> <li>● Dilations MYP B</li> <li>● Dilations and Similar Figures CFA</li> <li>● Parallel Lines and Triangle Congruence Test</li> <li>● Congruent Triangles and Parallel Lines MYP A and CFA</li> <li>● Cumulative Unit 2 Test</li> </ul>

Approaches to learning (ATL)
<ul style="list-style-type: none"> <li>● Combine knowledge, understanding and skills to create products or solutions</li> <li>● Students are transferring their knowledge and skills of similarity and congruence into an authentic real-life problem.</li> <li>● Considering content (What did I learn today? What do I not yet understand? What questions do I have now?)</li> <li>● Students are expected to reflect on their results and methods through all activities and tasks to understand better the relationship between dilations, similarity, and congruence.</li> </ul>

**Action: Teaching and learning through inquiry**

Content Standards
<p><b><u>Understand similarity in terms of similarity transformations</u></b></p> <p><b>MGSE9-12.G.SRT.1</b> Verify experimentally the properties of dilations given by a center and a scale factor.</p> <ol style="list-style-type: none"> <li>a. The dilation of a line not passing through the center of the dilation results in a parallel line and leaves a line passing through the center unchanged.</li> <li>b. The dilation of a line segment is longer or shorter according to the ratio given by the scale factor.</li> </ol> <p><b>MGSE9-12.G.SRT.2</b> Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain, using similarity transformations, the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.</p> <p><b>MGSE9-12.G.SRT.3</b> Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.</p> <p><b><u>Prove theorems involving similarity</u></b></p> <p><b>MGSE9-12.G.SRT.4</b> Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, (and its converse); the Pythagorean Theorem using triangle similarity.</p> <p><b>MGSE9-12.G.SRT.5</b> Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.</p> <p><b><u>Understand congruence in terms of rigid motions</u></b></p> <p><b>MGSE9-12.G.CO.6</b> Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.</p> <p><b>MGSE9-12.G.CO.7</b> Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.</p> <p><b>MGSE9-12.G.CO.8</b> Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions. (Extend to include HL and AAS.)</p> <p><b>MGSE9-12.G.CO.9</b> 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 congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment’s endpoints.</p> <p><b>MGSE9-12.G.CO.10</b> Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180 degrees; 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.</p> <p><b>MGSE9-12.G.CO.11</b> Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.</p>

**Make Geometric Constructions** \*Honors

**MGSE9-12.G.CO.12** Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.

**MGSE9-12.G.CO.13** Construct an equilateral triangle, a square, and a regular hexagon, each inscribed in a circle

**Learning Activities and Experiences**

Topic	Resource	Content Covered	Standards Addressed
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**Subunit – Parallel Lines and Triangle Congruence**  
Unit Test and Quiz  
# of Days - 14

Angles formed by Parallel Lines	<b>2-1 Parallel Lines</b> <b>Pearson enVision pg. 71 – 77</b>	<ul style="list-style-type: none"> <li>● Define parallel lines using the undefined terms <i>point</i> and <i>line</i>.</li> <li>● Prove theorems about lines and angles</li> <li>● Use theorems to find the measures of angles formed by parallel lines and a transversal.</li> </ul>	CO.9
	<b>2-2 Proving Lines Parallel</b> <b>Pearson enVision pg. 78 – 84</b>	<ul style="list-style-type: none"> <li>● Prove that two lines cut by a transversal are parallel using the converses of parallel line angle relationship theorems.</li> <li>● Use properties of parallel lines and transversals to solve real-world and mathematical problems.</li> <li>● Write and use flow proofs.</li> </ul>	CO.9
	<b>2-3 Parallel Lines and Triangles</b> <b>Pearson enVision pg. 85 – 91</b>	<ul style="list-style-type: none"> <li>● Use lines constructed parallel to another line to solve problems and prove theorems.</li> <li>● Use the sum of the angle measures in a triangle to solve problems.</li> </ul>	CO.10
	<b>Additional Resources:</b> <ul style="list-style-type: none"> <li>● DOE Framework Tasks                             <ul style="list-style-type: none"> <li>○ Centers of Triangles</li> <li>○ Triangle Proofs</li> <li>○ Lunch Lines</li> </ul> </li> </ul>		
Triangle Congruence	<b>4-1 Congruence</b> <b>Pearson enVision pg. 149 – 156</b>	<ul style="list-style-type: none"> <li>● Relate Congruence to rigid motions.</li> <li>● Demonstrate that two figures are congruent by using one or more rigid motions to map one onto the other.</li> </ul>	CO. 6

	<b>4-2 Isosceles and Equilateral Triangles</b> Pearson enVision pg. 157 – 165	<ul style="list-style-type: none"> <li>Use properties of and theorems about isosceles and equilateral triangles to solve problems.</li> <li>Identify congruent triangles using properties of isosceles and equilateral triangles.</li> </ul>	CO. 10
	<b>3-Act Task</b> Pearson enVision pg. 166		CO. 8
	<b>4-3 Proving and Applying the SAS and SSS Congruence Criteria</b> Pearson enVision pg. 167 – 1738	<ul style="list-style-type: none"> <li>Prove triangle congruence by SAS and SSS criteria and use triangle congruence to solve problems.</li> <li>Understand that corresponding parts of congruent triangles are congruent and use CPCTC to prove theorems and solve problems.</li> </ul>	CO.6, CO.7, CO.8
	<b>4-4 Proving and Applying the ASA and AAS Congruence Criteria</b> Pearson enVision pg. 174 – 181	<ul style="list-style-type: none"> <li>Prove that two triangles are congruent using ASA and AAS criteria and apply ASA to solve problems.</li> <li>Prove that when all corresponding sides and angles of two polygons are congruent, the polygons are congruent.</li> </ul>	CO.6, CO.7, CO.8
	<b>4-5 Congruence in Right Triangles</b> Pearson enVision pg. 182 – 187	<ul style="list-style-type: none"> <li>Prove and use the Hypotenuse-Leg Theorem.</li> <li>Use congruence criteria for triangles to solve problems and to prove relationships in geometric figures.</li> </ul>	CO.6, CO.7, CO.8
	<b>4-6 Congruence in Overlapping Triangles</b> Pearson enVision pg. 188 – 193	<ul style="list-style-type: none"> <li>Apply congruence criteria to increasingly difficult problems involving triangles and multiple triangles.</li> <li>Prove triangles are congruent by identifying corresponding parts and using theorems.</li> </ul>	CO.6, CO.7, CO.8
	<p><b>Additional Resources:</b></p> <ul style="list-style-type: none"> <li>DOE Framework Tasks <ul style="list-style-type: none"> <li>Introducing Congruence Spotlight</li> <li>Analysing Congruence Proofs</li> <li>Formalising Triangle Congruence</li> </ul> </li> <li>Teacher Created Resources <ul style="list-style-type: none"> <li>MYP Congruence Proofs</li> <li>Congruent Triangles Packet</li> </ul> </li> </ul>		
<b>Subunit – Triangle Similarity and Quadrilaterals</b> Unit Test and Quiz # of Days - 10			
Triangle Inequalities	<b>5-4 Inequalities in One Triangle</b> Pearson enVision pg. 226 – 232	<ul style="list-style-type: none"> <li>Triangle Inequality Theorem and properties</li> </ul>	CO. 10
	<b>5-5 Triangle Inequality in Two Triangles</b> Pearson enVision pg. 233 – 238	<ul style="list-style-type: none"> <li>Prove the Hinge Theorem and use the Hinge Theorem to compare side lengths.</li> <li>Prove the Converse of the Hinge Theorem and use the Converse of the Hinge Theorem to compare angle measures.</li> </ul>	CO. 10
Quadrilaterals	<b>6-1 The Polygon Angle-Sum Theorems</b> Pearson enVision pg. 245 - 251	<ul style="list-style-type: none"> <li>Show that the sum of the exterior angles of a polygon is <math>360^\circ</math> and use that to solve problems.</li> </ul>	CO.11

		<ul style="list-style-type: none"> <li>Show that the sum of the interior angles of a polygon is the product of <math>180^\circ</math> and two less than the number of sides, and use that to solve problems.</li> </ul>	
	<b>3-Act Task The Mystery Sides</b> <b>Pearson enVision pg. 252</b>	<ul style="list-style-type: none"> <li>Polygon definitions and theorems</li> <li>Prove theorems for kites and trapezoids and apply theorems</li> </ul>	CO.11
	<b>6-2 Kites and Trapezoids</b> <b>Pearson enVision pg. 253-261</b>	<ul style="list-style-type: none"> <li>Polygon definitions and theorems</li> <li>Prove theorems for kites and trapezoids and apply theorems</li> </ul>	CO.11
Parallelograms	<b>6-3 Properties of Parallelograms</b> <b>Pearson enVision pg. 262 – 270</b>	<ul style="list-style-type: none"> <li>Show that the consecutive angles of a parallelogram are supplementary and opposite angles are congruent.</li> <li>Show that opposite sides of a parallelogram are congruent.</li> <li>Show that diagonals of a parallelogram bisect each other.</li> </ul>	CO. 11
	<b>6-5 Properties of Special Parallelograms</b> <b>Pearson enVision pg. 279 – 285</b>	<ul style="list-style-type: none"> <li>Prove that the diagonals of rhombuses are perpendicular bisectors of each other and angle bisectors of the angles of the rhombus.</li> <li>Prove that the diagonals of a rectangle are congruent.</li> <li>Use properties of rhombuses, rectangles, and squares to solve problems.</li> </ul>	CO. 11
	<b>6-4 Proving a Quadrilateral is a Parallelogram</b> <b>Pearson enVision pg. 271 – 278</b>	<ul style="list-style-type: none"> <li>Demonstrate that a quadrilateral is a parallelogram based on its sides and diagonals.</li> <li>Demonstrate that a quadrilateral is a parallelogram based on its angles.</li> </ul>	CO. 11
	<b>6-6 Conditions of Special Parallelograms</b> <b>Pearson enVision pg. 286 – 293</b>	<ul style="list-style-type: none"> <li>Identify rhombuses, rectangles, and squares by the characteristics of diagonals of parallelograms.</li> </ul>	CO. 11
	<b>Additional Resources:</b> <ul style="list-style-type: none"> <li>DOE Framework Tasks <ul style="list-style-type: none"> <li>Introductory Spotlight Task (DOE)</li> <li>Geometry Gardens (DOE)</li> </ul> </li> </ul>		
Dilations	<b>7-1 Dilations</b> <b>Pearson enVision pg. 301 – 309</b>	<ul style="list-style-type: none"> <li>Dilations on a coordinate plane</li> <li>Properties of Dilations</li> </ul>	SRT. 1 a, SRT.1b
	<b>7-2 Similarity Transformations</b> <b>Pearson enVision pg. 310 – 316</b>	<ul style="list-style-type: none"> <li>Understand that two figures are similar if there is a similarity transformation that maps configure to the other.</li> <li>Identify a combination of rigid motions and dilation that maps one figure to a similar figure.</li> <li>Identify the coordinates of an image under a similarity transformation.</li> </ul>	SRT.1, G.C.1

	<p><b>Additional Resources:</b></p> <ul style="list-style-type: none"> <li>● DOE Framework Tasks <ul style="list-style-type: none"> <li>○ Dilations in the Coordinate Plane</li> <li>○ Similar Triangles</li> </ul> </li> </ul>		
Triangle Similarity	<p><b>7-3 Proving Triangles Similar</b> Pearson enVision pg. 317 – 323</p>	<ul style="list-style-type: none"> <li>● Use dilations and rigid motions to prove triangles are similar.</li> <li>● Prove and use the AA~, SSS~, and SAS~ theorems to prove triangles are similar.</li> </ul>	SRT.2, SRT.3, SRT.5
	<p><b>3-Act Task Make It Right</b> Pearson enVision pg. 332</p>	<ul style="list-style-type: none"> <li>● Triangle Proportions (Similar Figures)</li> </ul>	SRT. 5
	<p><b>7-4 Similarities in Right Triangles</b> Pearson enVision pg. 324 – 331</p>	<ul style="list-style-type: none"> <li>● Use similarity of right triangles to solve problems.</li> <li>● Use length relationships of the sides of right triangles and an altitude drawn to the hypotenuse to solve problems</li> </ul>	CO.10, SRT.4
	<p><b>7-5 Proportions in Triangles</b> Pearson enVision pg. 333 – 339</p>	<ul style="list-style-type: none"> <li>● Use the Side-Splitter Theorem and the Triangle Midsegment Theorem to find the lengths of sides and segments of triangles.</li> <li>● Use the Triangle-Angle-Bisector Theorem to find lengths of sides and segments of triangles</li> </ul>	CO.10, SRT.4
	<p><b>Additional Resources:</b></p> <ul style="list-style-type: none"> <li>● DOE Tasks &amp; Older Content <ul style="list-style-type: none"> <li>○ Proving Similar Triangles</li> <li>○ Pythagorean Theorem using Triangles</li> <li>○ Triangle Proportionality Theorem</li> <li>○ Shadow Math</li> <li>○ Solving Geometry Problems - Floodlight</li> <li>○ Similar Triangle Proofs</li> <li>○ Hopewell Geometry (DOE)</li> </ul> </li> <li>● Guided Notes</li> <li>● Savvas <ul style="list-style-type: none"> <li>○ Additional Practice 7-3</li> <li>○ Reteach 7-3</li> </ul> </li> </ul>		
<b>Personalized Learning and Differentiation</b>			
<p>Teachers differentiate by providing examples (work samples or task-specific clarifications of assessment criteria); structuring support (advance organizers, flexible grouping, peer relationships); establishing flexible deadlines, and adjusting the pace.</p> <ul style="list-style-type: none"> <li>-SWD/504- Accommodations provided</li> <li>-ELL- Five Principle ELL Curriculum Framework and Vocabulary Supports</li> <li>-Intervention Support- Re-teaching Activities in Small Groups with Progress Monitoring</li> <li>-Extensions- Enrichment Tasks and Projects</li> </ul>			
<b>Resources</b>			

