

<div style="background-color: black; color: white; padding: 10px; font-size: 2em; font-weight: bold; display: inline-block;">1</div> <div style="background-color: #00AEEF; color: white; padding: 10px; font-size: 2em; font-weight: bold; display: inline-block;">Establishing Congruence</div>						Strategies													
						Animations	Classifications	Explore Tools	Graphing Tools	Interactive Diagrams	Interactive Worksheets	Proof	Real-World Scenarios	Solvers	Worked Example				
MATHia Unit	MATHia Workspace	Overview	G.CO.1	Concept Builder	Mastery														

Topic 1 Congruence Through Transformations																		
Formal Reasoning in Euclidean Geometry	Calculating and Justifying Angle Measures	Students calculate the measure of the sought angle by following a prescribed path of angle measures.	G.CO.9		✓													
	Calculating Angle Measures	Students calculate the measure of the sought angle by following an open solution path.	G.CO.9		✓													
Triangle Congruence Theorems	Introduction to Triangle Congruence	Students practice writing and identifying triangle congruency statements, as well as corresponding sides and angles, given a diagram of congruent triangles or a triangle congruency statement. They then watch a video that introduces the four theorems of triangle congruence--SAS, SSS, AAS, and ASA. Finally, students use a sorting tool to match images of pairs of triangles with congruency markings to the theorem by which they are proven congruent.	G.CO.7 G.CO.8	✓		•	•											•
	Using Triangle Congruence	Students use SSS, SAS, AAS, and ASA congruence theorems to determine whether two triangles are congruent. They then prove two triangles are congruent by the same group of theorems when given statements about the geometric figures shown. Finally, students complete a two-column proof to identify the reasons for given congruency statements.	G.CO.10	✓													•	•

Topic 2 Justifying Line and Angle Relationships																		
Forms of Proof	Introduction to Proofs	Students are introduced to proof by answering questions related to two animations demonstrating the Triangle Sum Theorem and the Vertical Angle Theorem.	G.CO.1	✓		•	•										•	
	Completing Measure Proofs	Students complete the steps in a scaffolded proof, supplying appropriate statements and reasons to prove a variety of fundamental angle and segment theorems.	G.CO.1		✓												•	

1		Establishing Congruence				Strategies											
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Forms of Proof (continued)	Connecting Steps in Angle Proofs	Students arrange the steps of more complex proofs into logical order.	G.CO.9		✓												
	Using Angle Theorems	Students use a wide variety of postulates, properties, and theorems to solve mathematical problems related to angles in geometrical figures and diagrams. The Congruent Complements Theorem, Congruent Supplements Theorem, Angle Addition Postulate, angle bisection, Vertical Angle Theorem, and the Transitive Property are all discussed.	G.CO.9	✓													
Lines Cut by a Transversal	Classifying Angles Formed by Transversals	Students follow worked examples and complete sorting activities as they learn to identify angles and angle pairs formed by lines cut by a transversal.	G.CO.9	✓			•								•		
	Calculating Angle Measures Formed by Transversals	Calculate the measure of the sought angle by using angle relationships formed by two lines cut by a single transversal.	G.CO.9		✓						•						
	Calculating Angles Formed by Multiple Transversals	Calculate the measure of the sought angle by using angle relationships formed by three parallel lines cut by a single transversal or two parallel lines cut by two transversals.	G.CO.9		✓						•						
Proving Parallel Lines Theorems	Proving Parallel Lines Theorems	Students apply basic angle theorems to prove the alternate interior, alternate exterior, same side interior, and side side exterior parallel line theorems.	G.CO.9		✓										•		
	Proving the Converses of Parallel Lines Theorems	Students apply basic angle theorems to prove the alternate interior converse, alternate exterior converse, same side interior converse, and side side exterior converse parallel line theorems.	G.CO.9		✓										•		
Interior and Exterior Angles of Polygons	Proving Triangle Theorems	Students apply previously proved theorems to prove the triangle sum and exterior angle theorems.	G.CO.10		✓										•		
Proving Triangles Congruent	Proving Triangles Congruent using SAS and SSS	Students prove triangles congruent using the side-angle-side and side-side-side congruence theorems in a variety of diagrams.	G.CO.10		✓										•		

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Proving Triangles Congruent (continued)	Proving Triangles Congruent using AAS and ASA	Students prove triangles congruent using the angle-angle-side and angle-side-angle congruence theorems in a variety of diagrams.	G.CO.10		✓												
	Proving Theorems using Congruent Triangles	Students use congruent triangle theorems to prove the perpendicular bisector theorem, isosceles triangle base angle theorem and its converse, and the angle bisector theorem.	G.CO.10		✓												
Special Right Triangles	Introduction to Special Right Triangles	Students use what they know about the Pythagorean Theorem to identify patterns in 45-45-90 and 30-60-90 triangles. They use the relationships between the side lengths of the special right triangles to solve for unknown side lengths. Students sort triangles according to whether they are a 45-45-90 triangle, a 30-60-90 triangle, or neither.	G.SRT.4	✓													
	Calculating the Lengths of Sides of Special Right Triangles		G.SRT.4 G.SRT.5		✓												
Solving Problems with Congruence	Using Triangle Theorems	Students apply angle, parallel line, and triangle theorems to prove relationships between elements in more complex diagrams.	G.CO.10		✓												
Angle Relationships Inside and Outside Circles	Determining Interior and Exterior Angles in Circles	Students calculate the measure of an arc or an angle using Interior Angles of a Circle Theorem and Exterior Angles of a Circle Theorem.	G.C.2		✓												

Topic 3 Using Congruence Theorems																	
Extending Triangle Congruence Theorems	Proving Triangles Congruent using HL and HA	Students prove triangles congruent using the hypotenuse-leg and hypotenuse-angle congruence theorems in a variety of diagrams.	G.CO.10		✓												

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Properties of Quadrilaterals	Understanding Parallelograms	Students are given the properties of parallelograms and use the information to determine the side parallel to a given side of a parallelogram as well as the sides or angles that are congruent to a given side or angle of a parallelogram. They then determine a missing statement to prove a quadrilateral is a parallelogram using the Parallelogram/Congruent-Parallel Side Theorem. Finally, students identify quadrilaterals by properties of their sides, angles, and diagonals.	G.CO.11	✓							•		•			•
	Determining Parts of Quadrilaterals and Parallelograms	Students are given a parallelogram and asked to calculate the length of the bisected diagonals, the measure of the angles, and the length of the opposite side and base.	G.CO.11		✓						•					
Parallelogram Proofs	Proofs about Parallelograms	Students apply their knowledge of congruent triangles and parallel lines in order to prove several theorems about parallelograms.	G.CO.11		✓							•				

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Topic 1 Similarity																		
Dilating Figures to Create Similar Figures	Understanding Similarity	Students watch an animation which demonstrates that when figures are similar, a series of rigid motions and dilations can transform one figure on top of the other to match exactly. Students recall that similar figures have corresponding side lengths that are proportional and congruent corresponding angles. Students identify similar figures and determine corresponding side lengths and corresponding angle measures, given similar figures.	G.SRT.2	✓		•												
	Specifying a Sequence of Transformations	Students select multiple transformations from translation, rotation, dilation, and reflection about any line to match a pre-image to a target image, given a reference point.	G.CO.5		✓		•											
Theorems About Proportionality	Proofs Using Similar Triangles	Students use the AA Similarity Postulate, SSS Similarity Theorem, and SAS Similarity Theorem to prove the parallel segment proportionality theorem and triangle midsegment theorem.	G.SRT.5	✓		•												
Application of Similar Triangles	Calculating Corresponding Parts of Similar Triangles	Students calculate corresponding parts of similar triangles, both in context and out of context.	G.SRT.5	✓		•												
Partitioning Segments in Given Ratios	Partitioning Segments in Given Ratios	Students watch an animation describing the usefulness of directed line segments and how to interpret fractions of directed segments. Students observe directed line segments divided into two lengths by a point and determine the ratio of those lengths, starting with horizontal and vertical line segments and then moving to non-vertical and non-horizontal segments.	G.GPE.6	✓		•												
	Partitioning Segments Proportionately	Students determine the coordinates of points that partition given line segments into different ratios.	G.GPE.6	✓		•												

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Topic 2 Trigonometry																				
Trigonometric Ratios	Introduction to Trigonometric Ratios	Students use similar triangles to define and understand the trigonometric ratios sine, cosine, and tangent. Students then explore the sine, cosine, and tangent and estimating these ratios using an interactive Explore Tool with a unit circle, including describing the ratios as percents of different lengths. Students solve problems in various contexts using the trigonometric ratios and the Explore Tool.	G.SRT.6																	
	Relating Sines and Cosines of Complementary Angles	Students use the interactive unit circle trig ratio Explore Tool to explore complementary angles and to see that the sine of an angle is equal to the cosine of its complement, and vice versa.	G.SRT.7	✓																
	Using One Trigonometric Ratio to Solve Problems	Students calculate the measures of sides and angles of a right triangle using trigonometric ratios, the Pythagorean Theorem, and/or the Triangle Sum Theorem in both contextual and abstract problems.	G.SRT.8		✓															
	Using Multiple Trigonometric Ratios to Solve Problems	Students calculate the measures of sides and angles of two right triangles that share a side using trigonometric ratios, the Pythagorean Theorem, and/or the Triangle Sum Theorem in both contextual and abstract problems.	G.SRT.8		✓															

3	Connecting Geometric and Algebraic					Strategies									
	MATHia Unit	MATHia Workspace	Overview	G.CO.1	Concept Builder	Mastery	Animations	Classifications	Explore Tools	Graphing Tools	Interactive Diagrams	Interactive Worksheets	Proof	Real-World Scenarios	Solvers

Topic 1 Circles and Volume																
Similarity Relationships in Circles	Relating Arc Length and Radius	Students explore the difference between the degree measure of an arc and the length of an arc. They then practice calculating the fraction of a circle's circumference that an arc occupies and writing an expression that can be used to calculate an arc's length. Students then calculate the arc length given the radius or diameter of the circle. Next, they relate the arc length to the circle's radius and are introduced to the units radians and the theta symbol. Finally, students practice determining different measurements of a circle using the formula $\theta = s/r$.	G.C.5	✓												●
	Determining Chords in Circles	Students calculate the length of an arc using the radius or diameter, the circumference, and the arc-to-circle ratio.	G.C.2		✓						●					
	Calculating the Area of a Sector	Students are given the definition of a sector of a circle and practice identifying sectors. They then work through an example that develops the formula for determining the area of a sector of a circle before using the formula to find areas of different sectors of circles.	G.C.5	✓				●								
Volume	Creating Three-Dimensional Shapes from Two-Dimensional Figures	Students rotate two-dimensional figures about an axis to create three-dimensional shapes and relate the dimensions of the plane figure to the solid. They then identify vocabulary highlighting the difference between right and oblique solids. Finally students create solids by stacking congruent or similar shapes.	G.GMD.4	✓							●					●
	Calculating Volume of Cylinders	Students use mathematical and real-world objects to determine the volume of cylinders.	G.GMD.3		✓						●		●	●		
	Calculating Volume of Pyramids	Students calculate the volume of pyramids in mathematical and real-world contexts using given measurements.	G.GMD.3		✓						●		●	●		

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Volume (continued)	Calculating Volume of Cones	Students use mathematical and real-world objects to determine the volume of cones.	G.GMD.3		✓											
	Calculating Volume of Spheres	Students use mathematical and real-world objects to determine the volume of spheres.	G.GMD.3		✓											
Surface Area	Introduction to Formulas for the Surface Area of Solids	Students use the faces of a cylinder, square pyramid, and cone to determine surface area formulas for the solids rewritten in different ways. They use the formulas to determine the surface area of each solid.	7.G.6 G.GMD.3	✓												
	Calculating Surface Area of Solids	Students use mathematical and real-world objects to determine the surface areas of cylinders, pyramids, cones, and spheres.	7.G.6 G.GMD.3		✓											

Topic 2 Conic Sections																
Cross-Sections	Visualizing Cross Sections of Three-Dimensional Shapes	Students watch an animation showing two different intersections of a plane and a solid. They then describe cross-sections of different solids given the intersection of a plane. Finally, students identify the solid from a given cross-section.	G.GMD.4	✓												
Equation of a Circle	Deriving the Equation of a Circle	Students are given a circle on the coordinate plane with a defined center. They use the Pythagorean Theorem to derive the standard form for the equation of a circle.	G.GPE.1	✓												
	Determining the Radius and Center of a Circle	Students are given an equation for a circle. They then rewrite the equation if necessary in standard form to identify the radius and center of the circle.	G.GPE.1	✓												

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Topic 1 Independence and Conditional Probability																		
Independence and Conditional Probability	Independent Events	Students define “independent events.” They investigate different scenarios to determine whether the events given are independent or not independent. Students then investigate compound probability with “and” and use the equation $P(A \text{ and } B) = P(A) \times P(B)$ to verify whether two events are independent or not.	S.CP.2	✓												•		•

Topic 2 Computing Probabilities																		
Computing Probabilities	Understanding Frequency Tables	Students review how to read a two-way frequency table and construct a relative frequency table. Students then use two-way frequency tables to determine probabilities, including conditional and other compound probabilities, and they use information from frequency tables to check for the independence of events.	S.CP.4	✓												•		•
	Calculating Compound Probabilities from Two-Way Tables	Students determine probabilities of compound events from two-way frequency tables via the Addition Rule.	S.CP.7		✓												•	
	Conditional Probability	Students use an interactive Explore Tool to explore probability using area and random points. Students then explore the idea of conditional probability, using the interactive tool to visualize the conditional probability formula $P(A B) = P(A \text{ and } B) / P(B)$. Students apply what they know about conditional probability to make predictions and check for independence of events using the Explore Tool.	S.CP.3 S.CP.6	✓												•		
	Recognizing Concepts of Conditional Probability	Students investigate conditional probabilities using two-way frequency tables. They apply the concept of conditional probability in a variety of different situations involving a change in the sample space as a result of an event occurring.	S.CP.5	✓													•	