

**Course Description:**

In the first semester of Geometry, students build foundational knowledge in geometric notation, tools, and definitions. They apply these concepts through constructions and transformations. Students then study logic, where they identify statement types, evaluate and order statements, to develop skills for constructing formal proofs. Initial proofs focus on angle relationships and triangle properties, then expand to congruence and similarity. The semester concludes with right triangle trigonometry. Students are introduced to the sine, cosine, and tangent ratios, as well as their applications in problem-solving.

Module	Lesson Title	Objectives
<b>Module 1: Geometric Tools</b>	Lesson 1: The Notation of Geometry	<ul style="list-style-type: none"> <li>Define the terms point, line segment, line, ray, angle, and plane.</li> <li>Label geometric objects using appropriate notation.</li> <li>Calculate the distance between two points on a horizontal or vertical line.</li> </ul>
	Lesson 2: Definitions & Postulates	<ul style="list-style-type: none"> <li>Differentiate between definitions and postulates.</li> <li>Explain Euclid's 5 postulates.</li> <li>Solve problems using the segment addition postulate.</li> <li>Explain the types of geometry.</li> </ul>
	Lesson 3: Basic Geometric Shapes	<ul style="list-style-type: none"> <li>Identify basic geometric shapes.</li> <li>Name the properties of basic geometric shapes.</li> <li>Distinguish between convex and concave polygons.</li> </ul>
	Lesson 4: Perimeter and Area	<ul style="list-style-type: none"> <li>Calculate the perimeter and area of polygons.</li> <li>Calculate the circumference and area of circles.</li> <li>Estimate the perimeter, area, or circumference of an irregular figure.</li> </ul>
	Lesson 5: Transformations	<ul style="list-style-type: none"> <li>Define the properties of transformations.</li> <li>Identify a transformation that will carry a preimage to its image.</li> <li>Predict how a given rigid motion will affect a preimage.</li> </ul>
	Lesson 6: Applying Transformations	<ul style="list-style-type: none"> <li>Name the transformations that carry a given figure onto another.</li> <li>Dilate a line segment and compare it to its preimage.</li> <li>Sketch the image of transformed figures.</li> </ul>
	Lesson 7: Congruency and Similarity	<ul style="list-style-type: none"> <li>Distinguish between congruency and similarity.</li> <li>Identify congruent shapes and similar shapes.</li> <li>Transform figures to determine if they are congruent or similar.</li> </ul>

Module	Lesson Title	Objectives
	Lesson 8: Constructions	<ul style="list-style-type: none"> <li>• Copy a line segment.</li> <li>• Copy an angle.</li> <li>• Construct perpendicular and parallel lines.</li> <li>• Make conjectures about the geometric relationships shown in these constructions.</li> </ul>
	Lesson 9: Other Constructions	<ul style="list-style-type: none"> <li>• Bisect a line segment.</li> <li>• Bisect an angle.</li> <li>• Construct a perpendicular bisector.</li> <li>• Make conjectures about the geometric relationships shown in these constructions.</li> </ul>
	Lesson 10: Truth Tables	<ul style="list-style-type: none"> <li>• Define terms related to truth tables.</li> <li>• Write negations, conjunctions, disjunctions, and conditional statements.</li> <li>• Complete a truth table.</li> </ul>
<b>Module 2: Logic and Proofs</b>	Lesson 1: Recognizing Patterns	<ul style="list-style-type: none"> <li>• Recognize patterns.</li> <li>• Write conjectures.</li> <li>• Determine if a conjecture is false.</li> </ul>
	Lesson 2: Conjecture	<ul style="list-style-type: none"> <li>• Create a Venn Diagram.</li> <li>• Evaluate a conjecture using a Venn Diagram.</li> <li>• Distinguish between a conjecture and a proof.</li> </ul>
	Lesson 3: Conditional Statements	<ul style="list-style-type: none"> <li>• Define conditional, biconditional, and converse statements.</li> <li>• Write conditional, biconditional, and converse statements.</li> <li>• Distinguish among conditional, biconditional, and converse statements.</li> </ul>
	Lesson 4: Conditional Forms	<ul style="list-style-type: none"> <li>• Explain what an inverse and a contrapositive statement is.</li> <li>• Write inverse and contrapositive statements.</li> <li>• Write a simple algebraic proof using a contrapositive statement.</li> </ul>
	Lesson 5: Syllogism	<ul style="list-style-type: none"> <li>• Identify a syllogism.</li> <li>• Validate a conclusion using a syllogism.</li> <li>• Write a syllogism.</li> </ul>

Module	Lesson Title	Objectives
	Lesson 6: Types of Reasoning	<ul style="list-style-type: none"> <li>Distinguish between inductive and deductive reasoning.</li> <li>Identify the best type of reasoning for a scenario.</li> <li>Write conjectures using reasoning.</li> </ul>
	Lesson 7: Counterexamples	<ul style="list-style-type: none"> <li>Identify the types of counterexamples.</li> <li>Select the most appropriate counterexample for a scenario.</li> <li>Write a counterexample for a false conditional statement.</li> </ul>
	Lesson 8: Informal Proof	<ul style="list-style-type: none"> <li>Distinguish between informal and formal proof.</li> <li>Describe the process of creating informal proof.</li> <li>Write informal proof.</li> </ul>
	Lesson 9: Formal Proof	<ul style="list-style-type: none"> <li>Define the types of proof formats.</li> <li>Translate a proof from one form to another.</li> <li>Order statements logically.</li> </ul>
	Lesson 10: Writing Proofs	<ul style="list-style-type: none"> <li>Explain the types of justifications you can use in a geometric proof.</li> <li>Verify a proof is correct.</li> <li>Write a formal proof using logic statements.</li> </ul>
<b>Module 3: Angles and Lines</b>	Lesson 1: Angle Measures	<ul style="list-style-type: none"> <li>Measure an angle.</li> <li>Identify the parts of an angle.</li> <li>Draw an angle using a protractor.</li> </ul>
	Lesson 2: Classifying Angles	<ul style="list-style-type: none"> <li>Classify angles based on their measure.</li> <li>Identify angle types in real world scenarios.</li> <li>Draw angles of a given measure using technology.</li> </ul>
	Lesson 3: Angle Relationships	<ul style="list-style-type: none"> <li>Define adjacent, complementary, supplementary, interior, and exterior angles.</li> <li>Distinguish between angle types in context.</li> <li>Solve equations for missing angle measures using angle relationships.</li> </ul>
	Lesson 4: Perpendicular Lines	<ul style="list-style-type: none"> <li>Identify perpendicular lines.</li> <li>Construct perpendicular lines and a perpendicular bisector.</li> <li>Explain and apply the perpendicular bisector theorem.</li> </ul>

Module	Lesson Title	Objectives
	Lesson 5: Parallel Lines	<ul style="list-style-type: none"> <li>Identify parallel lines.</li> <li>Name the properties of parallel lines.</li> <li>Distinguish parallel lines from perpendicular and skew lines.</li> <li>Describe parallel lines in spherical geometry.</li> </ul>
	Lesson 6: Equations of Lines	<ul style="list-style-type: none"> <li>Write the equation of a line that is parallel to a given line.</li> <li>Write the equation of a line that is perpendicular to a given line.</li> <li>Identify the graphs and equations of parallel and perpendicular lines.</li> </ul>
	Lesson 7: Distance and Midpoint	<ul style="list-style-type: none"> <li>Graph a line segment on the coordinate plane.</li> <li>Calculate the length of a line segment using the distance formula.</li> <li>Calculate the midpoint of a line segment.</li> <li>Show that a perpendicular bisector is equidistant from the endpoints of a line segment.</li> </ul>
	Lesson 8: Angles and Parallel Lines	<ul style="list-style-type: none"> <li>Identify the angle relationships created when two parallel lines are crossed by a transversal.</li> <li>Write and solve equations to determine the measure of a missing angle based on the relationships of the other angles.</li> <li>Write proofs about angle relationships.</li> </ul>
	Lesson 9: Line & Angle Proofs	<ul style="list-style-type: none"> <li>Prove the alternate interior theorem converse.</li> <li>Prove the consecutive interior angle theorem converse.</li> <li>Prove the right angles theorem.</li> </ul>
	Lesson 10: More Line and Angle Proofs	<ul style="list-style-type: none"> <li>Prove the vertical angles theorem.</li> <li>Prove the alternate interior angles theorem.</li> <li>Prove the consecutive interior angles theorem.</li> <li>Identify properties or theorems you could use to write proofs.</li> </ul>
<b>Module 4: Congruent &amp; Similar Triangles</b>	Lesson 1: Triangles Defined	<ul style="list-style-type: none"> <li>Relate angles to triangles.</li> <li>Identify different types of triangles using their properties.</li> <li>Read diagrams to determine if two triangles are congruent.</li> </ul>

Module	Lesson Title	Objectives
	Lesson 2: Triangle Congruence	<ul style="list-style-type: none"> <li>Name congruent parts of triangle pairs.</li> <li>Explain the criteria for triangle congruence.</li> <li>Write congruence statements about pairs of triangles.</li> </ul>
	Lesson 3: Hypotenuse-Leg Theorem	<ul style="list-style-type: none"> <li>Explain the hypotenuse-leg theorem.</li> <li>Determine if two triangles are congruent by the hypotenuse-leg theorem.</li> <li>Write an informal proof for triangle congruence.</li> </ul>
	Lesson 4: Prove Triangles Congruent	<ul style="list-style-type: none"> <li>Read a diagram to determine which theorem to use to prove triangles are congruent.</li> <li>Write proofs to show triangles are congruent using relevant theorems.</li> <li>Derive the midpoint formula.</li> <li>Prove the perpendicular bisector theorem.</li> </ul>
	Lesson 5: Congruence Applications	<ul style="list-style-type: none"> <li>Calculate missing side lengths and angle measures using triangle congruence.</li> <li>Write true statements using triangle congruence theorems.</li> <li>Solve real world problems involving triangle congruence.</li> </ul>
	Lesson 6: Ratio & Proportion	<ul style="list-style-type: none"> <li>Define similarity.</li> <li>Calculate the common ratio between similar figures.</li> <li>Write proportions.</li> <li>Solve proportions using cross multiplication.</li> </ul>
	Lesson 7: Similarity	<ul style="list-style-type: none"> <li>Define similarity in terms of dilation in the coordinate plane.</li> <li>Explain that all congruent shapes are also similar.</li> <li>Determine if shapes are congruent or similar based on transformations.</li> </ul>
	Lesson 8: Similar Triangles	<ul style="list-style-type: none"> <li>Distinguish between congruence and similarity.</li> <li>Explain the criteria for triangle similarity.</li> <li>Write similarity statements about pairs of triangles.</li> </ul>
	Lesson 9: Triangle Sum Theorem	<ul style="list-style-type: none"> <li>Explain the triangle sum theorem and use it to calculate the missing angle measures.</li> <li>Connect the triangle sum theorem to the AA postulate.</li> <li>Explain and apply the remote interior angles theorem.</li> <li>Describe the triangle sum theorem in spherical geometry.</li> </ul>

Module	Lesson Title	Objectives
	Lesson 10: Proving Triangles Similar	<ul style="list-style-type: none"> <li>Read a diagram to determine which theorem to use to prove triangles are similar.</li> <li>Write proofs to show triangles are similar using relevant theorems.</li> <li>Partition a line segment.</li> </ul>
<b>Module 5: Triangles</b>	Lesson 1: Triangle Constructions	<ul style="list-style-type: none"> <li>Construct an equilateral triangle, an obtuse isosceles triangle, and a right scalene triangle.</li> <li>Define an auxiliary line and apply it to proof creation.</li> <li>Prove the triangle sum theorem.</li> </ul>
	Lesson 2: Pythagorean Theorem	<ul style="list-style-type: none"> <li>Verify the Pythagorean theorem.</li> <li>Calculate the unknown length of a hypotenuse or leg of a right triangle using the Pythagorean Theorem.</li> <li>Identify Pythagorean triples.</li> </ul>
	Lesson 3: Pythagoras & Other Proof	<ul style="list-style-type: none"> <li>Prove the Pythagorean theorem using triangle similarity.</li> <li>Prove the triangle proportionality theorem.</li> <li>Calculate missing triangle side lengths using triangle theorems.</li> </ul>
	Lesson 4: Isosceles Triangles	<ul style="list-style-type: none"> <li>Define the properties of an isosceles triangle.</li> <li>Prove that the base angles of an isosceles triangle are congruent.</li> <li>Calculate missing measures in an isosceles triangle.</li> </ul>
	Lesson 5: Median & Altitude	<ul style="list-style-type: none"> <li>Sketch the medians and altitudes of a triangle.</li> <li>Calculate length of a median using the centroid theorem.</li> <li>Identify the location of the orthocenter for an acute, right, and obtuse triangle.</li> <li>Prove the altitude to the hypotenuse theorem.</li> </ul>
	Lesson 6: Midsegment Theorem	<ul style="list-style-type: none"> <li>Sketch the midsegments of a given triangle.</li> <li>Calculate the length of a midsegment.</li> <li>Informally prove the midsegment theorem and use it to solve problems.</li> </ul>
	Lesson 7: Triangle Inequality	<ul style="list-style-type: none"> <li>Determine if three given side lengths can form a triangle.</li> <li>Calculate the range that the third side of a triangle can have when given the lengths of two sides of a triangle.</li> </ul>

Module	Lesson Title	Objectives
		<ul style="list-style-type: none"> <li>Apply the triangle inequality theorem for angles.</li> </ul>
	Lesson 8: Indirect Proof	<ul style="list-style-type: none"> <li>Define indirect proof.</li> <li>Differentiate between direct and indirect proof.</li> <li>Prove that a triangle can have only one right angle using an indirect method.</li> <li>Write an indirect proof.</li> </ul>
	Lesson 9: Hinge Theorem	<ul style="list-style-type: none"> <li>Explain the Hinge Theorem and its converse.</li> <li>Prove the converse of the Hinge Theorem is true using the indirect method.</li> <li>Solve problems using the Hinge Theorem and its converse.</li> </ul>
	Lesson 10: Altitude and Leg Rules	<ul style="list-style-type: none"> <li>Calculate a geometric mean.</li> <li>Explain the altitude and leg rule.</li> <li>Write a proof plan for the altitude rule.</li> <li>Prove the leg rule.</li> <li>Solve for missing lengths using the leg rule and altitude rule.</li> </ul>
<b>Module 6: Trigonometric Ratios</b>	Lesson 1: Right Triangles	<ul style="list-style-type: none"> <li>Name the properties right triangles.</li> <li>Calculate the geometric mean to determine segment lengths.</li> <li>Solve problems using similarity relationships in right triangles.</li> </ul>
	Lesson 2: Special Right Triangles	<ul style="list-style-type: none"> <li>State the properties and side ratios for right special triangles.</li> <li>Prove the side ratios for special right triangles.</li> <li>Solve problems using special right triangles.</li> </ul>
	Lesson 3: The Tangent Ratio	<ul style="list-style-type: none"> <li>Write statements about right triangles using the tangent ratio.</li> <li>Calculate the point where a radius meets the circle using the tangent ratio.</li> <li>Connect the slope formula to the tangent ratio.</li> </ul>
	Lesson 4: Sine and Cosine Ratios	<ul style="list-style-type: none"> <li>Write statements about right triangles using the sine and cosine ratios.</li> <li>Derive the sine formula for the area of a triangle and use it to calculate area.</li> <li>Explain the complementary relationship between sine and cosine.</li> </ul>

Module	Lesson Title	Objectives
	Lesson 5: Applications of Ratios	<ul style="list-style-type: none"> <li>• Select the best trigonometric ratio to solve a problem.</li> <li>• Solve for an unknown side length using one of sine, cosine, or tangent.</li> <li>• Write trigonometric ratios using the relationship between similar triangles.</li> </ul>
	Lesson 6: Law of Sines	<ul style="list-style-type: none"> <li>• Prove the law of sines.</li> <li>• Solve for missing side lengths and angle measures using the law of sines.</li> <li>• Identify the ambiguous case for the law of sines.</li> </ul>
	Lesson 7: Law of Cosines	<ul style="list-style-type: none"> <li>• Prove the law of cosines.</li> <li>• Solve for missing side lengths and angle measures using the law of cosines.</li> <li>• Choose the correct version of the law of cosines for each problem.</li> </ul>
	Lesson 8: Solving Triangles	<ul style="list-style-type: none"> <li>• Solve right triangles.</li> <li>• Solve triangles that are not right triangles</li> </ul>
	Lesson 9: Deriving Distance	<ul style="list-style-type: none"> <li>• Calculate distances in two dimensions using the Pythagorean theorem.</li> <li>• Calculate distances in three dimensions using the Pythagorean theorem.</li> <li>• Derive the two-dimensional distance formula.</li> </ul>
	Lesson 10: Triangles and Rectangles	<ul style="list-style-type: none"> <li>• Identify rectangles using properties.</li> <li>• Explain how to use triangles to create a rectangle.</li> <li>• Calculate lengths within rectangle using triangle properties and theorems.</li> <li>• Calculate the area of a rectangle using triangle relationships.</li> </ul>