High School Course Description for **Geometry Support**

Course Title: Geometry Support
Course Number: MTH060
Grade Level: 9
(first time Geometry students only) Exception by IEP/SST plan or 10th grade transfer students that are first-time Geometry students.

Curricular Area: Mathematics
Length: One year
Prerequisites: Previously enrolled in Algebra1 Support and/or Algebra 1 teacher recommendation. Student scores consistently low. Enrolled Concurrently in Geometry.

Meets a UC a-g Requirement: No

Meets NCAA Requirement: No

Meets High School Graduation Requirement for:
Elective

Course Description:
The goal of Geometry Support is to allow students the extra time needed to master the Geometry standards in a single school year. This class is to be taken concurrently with Geometry. During this additional period of instruction students will be given time to build competency with the expected entry level knowledge components needed for each unit in the Geometry course. They will also be given additional modeling tasks and concrete practice of the current unit of study in the Geometry course. Geometry Support is a one year course aligned to the Common Core Mathematics Standards for Geometry along with the prerequisite topics for those standards.

Alignment
This course is aligned to select California Common Core State Standards from Geometry and prerequisite standards.

Instructional Materials

Required Textbook(s)
1. Houghton Mifflin Harcourt: Geometry

Exit Criteria

Activities	Percentage
Coursework	50%
Assessments	30%
Culminating Activity (in lieu of final)	20%
Total:	100%

Development Team
This course of study was developed in spring 2015 by a Team of teachers from Bloomington High School

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High School Course Description for **Geometry Support**

Semester 1

Unit 1 Foundations of Geometry	
Prerequisite topics include:	*Support topics include:*
CCSS.Math.Content.4.G.A.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. Graph points on the coordinate plane to solve real-world and mathematical problems. CCSS.Math.Content.5.G.A.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate). CCSS.Math.Content.5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. CCSS.Math.Content.7.G.B.5 Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure. Understand congruence and similarity using physical models, transparencies, or geometry software. CCSS.Math.Content.8.G.A.1 Verify experimentally the properties of rotations, reflections, and translations: CCSS.Math.Content.8.G.A.1a Lines are taken to lines, and line segments to line segments of the same length. CCSS.Math.Content.8.G.A.1b Angles are taken to angles of the same measure. CCSS.Math.Content.8.G.A.1c Parallel lines are taken	Identify and give examples of the undefined terms *point, line,* and *plane*. Identify rays, opposite rays, and line segments. Identify basic shapes including squares, rectangles, triangles, circles, trapezoids, rhombuses. Identify and give examples of axioms/postulates and theorems. Recognize and use the properties of supplementary and complementary angles. Recognize and use the properties of linear pairs of angles and vertical angles. Identify and use the properties of alternate interior, alternate exterior, same side interior, and corresponding angles. Know and use the properties of bisectors of segments. Know and use the properties of bisectors of angles. Know and use the properties of perpendicular bisectors. Know and use the distance formula to find the lengths of segments. Construct congruent segments and congruent angles. Construct perpendicular bisectors of segments. Construct angle bisectors. Construct a line perpendicular to a line through a point not on the line. Construct a line parallel to a line through a point not on the line. Measure segments using a ruler. Measure angles using a protractor. Know the effects of translations, rotations, and reflections on points in the coordinate plane. Know the effects of dilations on the coordinates of a point. Determine symmetry in figures and identify lines of symmetry. Use the segment addition postulate to solve for the lengths of segments. Use the angle addition postulate to solve for the

to parallel lines. CCSS.Math.Content.8.G.A.2 Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them. CCSS.Math.Content.8.G.A.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. CCSS.Math.Content.8.G.A.5 Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.	measures of angles. Understand and calculate the perimeter of basic figures. Understand and calculate the area of basic figures.

Unit 2 Triangle Congruence	
Prerequisite topics include:	*Support topics include:*
CCSS.Math.Content.5.G. 3. Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. CCSS.Math.Content.5.G. 4. Classify two-dimensional figures in a hierarchy based on properties. CCSS.Math.Content.7.G.2. Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle. CCSS.Math.Content.7.G.5. Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure. CCSS.Math.Content.8.G.2. Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them. CCSS.Math.Content.8.G.5. Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.	Classify triangles by their angles measures (acute, right, obtuse, equiangular). Classify triangles by their side lengths (equilateral, isosceles, scalene). Find measures of interior and exterior angles of triangles Apply inequalities in one triangle. Identify corresponding sides and angles in triangles. Identify congruent polygons. Use properties of congruent triangles to solve problems. Prove triangles congruent using definition of congruence. Recognize an included angle of a triangle. Recognize an included side of a triangle. Prove triangles are congruent by using a sequence of isometries to map one triangle onto another. Use transformations to demonstrate the triangle congruence theorems. Prove triangles congruent by SSS, SAS, ASA, AAS, and HL. Apply SSS, SAS, ASA, AAS, and HL to solve problems. Identify corresponding parts of congruent triangles. Use CPCTC to prove parts of triangles are congruent. Identify the base, legs, base angles, and vertex angle of isosceles triangles. Apply properties of isosceles triangles to solve problems. Apply properties of equilateral triangles to solve problems. Prove theorems about isosceles triangles. Prove theorems about equilateral triangles.

Unit 3 Polygons	
Prerequisite topics include:	*Support topics include:*
CCSS.Math.Content.2.G. 1. Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes. CCSS.Math.Content.3.G. 1. Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories. CCSS.Math.Content.4.G. 2. Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles. (Two-dimensional shapes should include special triangles, e.g., equilateral, isosceles, scalene, and special quadrilaterals, e.g., rhombus, square, rectangle, parallelogram, trapezoid.) CA CCSS.Math.Content.5.G. 3. Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles CCSS.Math.Content.5.G. 4. Classify two-dimensional figures in a hierarchy based on properties. CCSS.Math.Content.7.G. 5. Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure. CCSS.Math.Content.8.G. 5. Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.	Identify parts of a polygon (side, vertex, diagonal). Identify regular polygons. Distinguish between concave and convex polygons. Classify polygons based on number of sides. Find and use measures of interior and exterior angles of polygons. Know and use the relationship between interior and exterior angles of polygons. Identify and know the properties of parallelograms. Prove properties of parallelograms. Apply properties of parallelograms to solve problems. Prove that a given quadrilateral is a parallelogram. Identify special parallelograms (rectangle, rhombus, square). Prove properties of rectangles, rhombuses, and squares. Apply properties of rectangles, rhombuses, and squares to solve problems. Prove a given quadrilateral is a rectangle, rhombus, or square. Identify kites, trapezoids, and isosceles trapezoids. Identify parts of a trapezoid (leg, base, base angles, mid-segment). Use properties of kites and trapezoids to solve problems.

Unit 4 Similarity

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Prerequisite topics include:	*Support topics include:*
CCSS.Math.Content.3.G.A.1 Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories. CCSS.Math.Content.3.G.A.2 Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. CCSS.Math.Content.4.G.A.2 Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles. CCSS.Math.Content.5.G.B.3 Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles. CCSS.Math.Content.6.G.A.3 Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems. CCSS.Math.Content.7.G.A.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. CCSS.Math.Content.8.G.A.4 Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. CCSS.Math.Content.8.G.A.5 Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.	Prove theorems involving similarity. Write paragraph proofs. Write two-column proofs Identify the appropriate postulates for proof. Logically organize an argument. Construct similar objects. Prove objects similar. Apply basic algebraic properties applied to geometric figures (i.e., reflexive angles, congruent angles). Apply the AA, SSS, and SAS Similarity Theorems Use ratios to solve for missing dimensions of similar figures. Write a similarity statement for similar polygons. Write a proportionality statement for similar polygons. Solve problems using proportions. Write a proportion for the corresponding parts of similar figures. Use ratios to solve for perimeters of similar figures. Use ratios to solve for areas of similar figures. Use ratios to solve for volumes of similar figures. Identify the ratio of the corresponding sides (scale factor). Find the ratio to use for problem solving. Prove theorems using the distance formula. Prove the Pythagorean theorem using similar triangles. Solve problems using the corresponding sides of similar figures.

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Culminating Activity for Geometry Semester 1 material
Semester 2

Unit 5 Special Right Triangles and Trigonometry	
Prerequisite topics include:	*Support topics include:*
CCSS.Math.Content.4.G.A.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. CCSS.Math.Content.4.G.A.2 Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles. CCSS.Math.Content.8.G.B.6 Explain a proof of the Pythagorean Theorem and its converse. CCSS.Math.Content.8.G.B.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. CCSS.Math.Content.8.G.B.8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	Use the Pythagorean Theorem to find the unknown lengths of sides of right triangles. Recognize that only the positive value of the square root is used to determine the length of sides. Apply the converse of the Pythagorean Theorem to classify triangles as right, acute, or obtuse. Know the definition of the sine, cosine, and tangent of an acute angle of a right triangle. Know and use the basic identities of trigonometry. Apply the definition of the sine, cosine, and tangent of an angle. Solve for an unknown length of a right triangle, given an angle and side length Compute the trigonometric value of an acute angle with a calculator or a table of values. Determine the appropriate trigonometric function to use given an acute angle, a side length, and an unknown measure. Calculate the length of a side of a right triangle given an acute angle and a side length. Calculate the measure of an acute angle of a right triangle given the lengths of two sides of the triangle. Know the special angle and side relationship of 30°, 60°, and 90° triangles and use them to find the lengths of missing sides. Know the special angle and side relationship of 45°, 45°, and 90° triangles and use them to find the lengths of missing sides.

Unit 6 Area and Volume	
Prerequisite topics include:	*Support topics include:*
CCSS.Math.Content.2.G.A.1 Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces.1 Identify triangles, quadrilaterals, pentagons, hexagons, and cubes. CCSS.Math.Content.6.G.A.2 Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas V = l w h and V = b h to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems. CCSS.Math.Content.6.G.A.4 Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems. CCSS.Math.Content.7.G.A.3 Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids. CCSS.Math.Content.7.G.B.4 Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle. CCSS.Math.Content.7.G.B.6 Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres. CCSS.Math.Content.8.G.C.9 Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	Understand the concepts of perimeter and area of polygons. Calculate the perimeter of a polygon and the circumference of a circle. Know the formulas for the area of squares, rectangles, parallelograms, rhombi, trapezoids, kites, and circles. Calculate the area of a regular polygon. Use area formulas to solve problems. Find the missing length of a side or the height of a polygon given the area or perimeter. Understand the concepts of lateral area, surface area, and volume. Calculate the lateral area, surface area, and volume of prisms, cylinders, pyramids, cones, and spheres. Understand and use the relationship between slant height and height. Solve problems involving surface area and volume of prisms, cylinders, pyramids, cones, and spheres. Solve problems involving surface area and volume of composite figures. Use the scale factor to find the surface area and volume of similar figures. Determine how changes in dimensions affect the perimeter, area, and volume of common geometric figures and solids. Use area and volume to compute density and solve problems involving density.

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Unit 7 Circles	
Prerequisite topics include:	*Support topics include:*
CCSS.Math.Content.G.C.1 Prove that all circles are similar. CCSS.Math.Content.G.C.2 Identify and describe relationships among inscribed angles, radii, and chords. CCSS.Math.Content.G.C.3 Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle. CCSS.Math.Content.G.MG.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). CCSS.Math.Content.G.MG.3 Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios). CCSS.Math.Content.G.SRT.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. CCSS.Math.Content.G.GPE.1 Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation. CCSS.Math.Content.G.CO.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. CCSS.Math.Content.G.CO.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. Students prove and solve problems regarding relationships among chords, secants, tangents, inscribed angles, arc lengths, area of sectors of circles, and inscribed and circumscribed polygons of circles. Solve properties of circles in real-world applications. CCSS.Math.Content.G.C.5 Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector. Convert between degrees and radians. [In Geometry, this standard introduces radians only as units of measure.]	Identify tangents, secants, chords, arcs, and inscribed angles of circles. Distinguish between major arcs, minor arcs, and semicircles. Use the relationship between central angles and inscribed angles to solve problems. Use the relationships between the angles formed when two lines intersect a circle to find the measures of angles. Calculate the lengths of segments when two lines intersect a circle. Know the properties and relationships among chords, arcs, angles, and tangents of a circle. Calculate arc lengths and areas of sectors of circles. Locate the center of any circle using the perpendicular bisectors of chords. Use inscribed angles to find the measures of arcs and other angles. Write the equation of a circle in the Cartesian plane Find the center and radius of a circle given the equation of the circle. Apply theorems and properties of circles in real life situations.

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Unit 8 Coordinate Geometry	
Prerequisite topics include:	*Support topics include:*
CCSS.Math.Content.5.G.A.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate). CCSS.Math.Content.5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. CCSS.Math.Content.5.G.B.4 Classify two-dimensional figures in a hierarchy based on properties. CCSS.Math.Content.6.G.A.1 Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. CCSS.Math.Content.6.G.A.3 Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems. CCSS.Math.Content.8.G.A.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. CCSS.Math.Content.8.G.A.4 Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. CCSS.Math.Content.HSA.CED.A.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	Plot points in the coordinate plane. Graph lines in the coordinate plane given an equation in slope-intercept form, point-slope form, or standard form. Write the equation of a line from its graph. Determine the coordinates of a midpoint. Calculate the slope of a line given its graph in the coordinate plane. Calculate the slope of a line given the coordinates of two points on the line. Determine whether lines in the coordinate plane are perpendicular, parallel, or neither based on slope. Use the distance formula to find the lengths of segments. Determine the name of a quadrilateral based on the properties of quadrilaterals. Write the equation of a circle from its graph. Draw the graph of circle given its equation. Calculate the perimeter of polygons in the coordinate plane. Calculate the area of circles and quadrilaterals in the coordinate plane. Estimate the area of irregular figures using the coordinate plane. Determine the coordinates of a point after a given translation. Determine the coordinates of a point after a given rotation. Determine the coordinates of a point after a given reflection. Determine the coordinates of a point after a given dilation. Place geometric figures in the coordinate plane. Prove theorems about triangles and quadrilaterals using coordinate geometry.

Unit 9 Probability	
Prerequisite topics include:	*Support topics include:*
CCSS.Math.Content.7.SP.7. Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. CCSS.Math.Content.7.SP.7. a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. CCSS.Math.Content.7.SP.7. b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. CCSS.Math.Content.7.SP.8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. CCSS.Math.Content.7.SP.8. a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. CCSS.Math.Content.7.SP.8. b. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event. CCSS.Math.Content.7.SP.8. c. Design and use a simulation to generate frequencies for compound eventsCCSS.Math.Content.1A.S.ID.5. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.	Describe a sample space. Describe events as subsets of sample spaces. Use "or" and "and" to describe unions and intersections of events. Describe the complement of an event. Distinguish between theoretical and experimental probabilities. Calculate theoretical probabilities. Calculate experimental probabilities. Construct two-way tables from data. Calculate probabilities from two-way tables. Calculate conditional probabilities. Determine if events are independent. Determine if events are disjoint. Apply the Addition Rule for calculating probability of events that are not disjoint. Use the rules for addition to compute probabilities of particular events in finite sample spaces. Use the rules for multiplication to compute probabilities of particular events in finite sample spaces.

Culminating Activity for Geometry Semester 2 material