



**SPRING GROVE AREA SCHOOL DISTRICT**



**PLANNED COURSE OVERVIEW**

<b>Course Title:</b> Geometry <b>Grade Level(s):</b> 9-11 <b>Units of Credit:</b> 1 <b>Classification:</b> Required	<b>Length of Course:</b> 30 cycles <b>Periods Per Cycle:</b> 6 <b>Length of Period:</b> 43 minutes <b>Total Instructional Time:</b> 129 hours
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**Course Description**

This is a course in modern geometry which is designed to help the student to do the following: Understand the basic structure of Euclidean geometry; develop spatial visualization while building the knowledge of the relationships among geometric elements; grow in understanding of the deductive method; appreciate need for precision of language; use and strengthen algebraic skills; and experience the stimulation and satisfaction that come from the understanding and synthesis of mathematical concepts.

Prerequisite: Successful completion of Algebra 1 and Algebra 2

**Instructional Strategies, Learning Practices, Activities, and Experiences**

Anticipatory Sets	Closure	Guided Practice
Assessments	Critical Thinking	High-Level Questioning
Bell Ringers	Flexible Groups	Homework
Class Discussions	Graphic Organizers	Posted Objectives

**Assessments**

Assessments (Teacher-Created, College Board) Higher-Level Questioning	Projects	Classwork
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**Materials/Resources**

<u>Big Ideas Math: A Bridge to Success Geometry</u> 1 <sup>st</sup> Edition Larson; 2019	Keystone Materials Internet Resources	SAT Materials College Board Materials
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**Adopted:** 12/7/88

**Revised:** 9/3/91; 1/20/99; 9/17/03; 8/17/09; 5/19/14; 5/20/2019

<b>Essentials of Geometry</b>	
<b>The Standards of Mathematical Practices</b>	
<p><b>Make sense of problems and persevere in solving them</b>  <b>Construct viable arguments and critique the reasoning of others.</b>  <b>Use appropriate tools strategically.</b>  <b>Look for and make use of structure.</b></p>	<p><b>Reason abstractly and quantitatively.</b>  <b>Model with mathematics.</b>  <b>Attend to precision.</b>  <b>Look for and express regularity in repeated reasoning.</b></p>
<b>CONTENT/KEY CONCEPTS</b>	<b>OBJECTIVES/STANDARDS</b>
<p><b>Essentials of Geometry</b></p> <ul style="list-style-type: none"> <li>• Name and sketch geometric figures</li> <li>• Identify points, lines, and planes</li> <li>• Use segment postulates to identify congruent segments</li> <li>• Use segments and congruence</li> <li>• Solve for lengths of segments in the coordinate plane</li> <li>• Use the Pythagorean Theorem</li> <li>• Name and measure line segments</li> <li>• Use midpoint and distance formulas</li> <li>• Name, measure, and classify angles</li> <li>• Identify congruent angles</li> <li>• Describe angle pair relationships to find angle measures</li> <li>• Use angle postulates to measure and classify angles</li> <li>• Classify polygons</li> <li>• Find perimeter, circumference, and area</li> <li>• Find dimensions of polygons</li> <li>• Estimate distances between points on the coordinate plane</li> <li>• Problem solving and using geometry terms in the real world</li> </ul>	<p><b>CC.2.3.HS.A.3</b> - Verify and apply geometric theorems as they relate to geometric figures.  <b>CC.2.3.HS.A.7</b> - Apply trigonometric ratios to solve problems involving right triangles.  <b>CC.2.3.HS.A.8</b> - Apply Geometric theorems to verify properties of circles.  <b>CC.2.3.HS.A.9</b> - Extend the concept of similarity to determine arc lengths and areas of sectors of circles.  <b>CC.2.3.HS.A.11</b> - Apply coordinate geometry to prove simple geometric theorems algebraically.  <b>CC.2.3.HS.A.13</b> - Analyze relationships between two-dimensional and three-dimensional objects.  <b>CC.2.3.HS.A.14</b> - Apply geometric concepts to model and solve real-world problems.</p> <p><b>CC.2.2.HS.C.9</b> - Prove the Pythagorean identity and use it to calculate trigonometric ratios.</p>

<b>Reasoning and Proof</b>	
<b>CONTENT/KEY CONCEPTS</b>	<b>OBJECTIVES/STANDARDS</b>
<p><b>Reasoning and Proof</b></p> <ul style="list-style-type: none"> <li>• Use inductive reasoning</li> <li>• Describe and solve patterns</li> <li>• Write mathematical conjectures</li> <li>• Analyze conditional, converse, inverse, contrapositive, and bi-conditional statements</li> <li>• Apply deductive reasoning</li> <li>• Write two-column proofs using geometric theorems</li> <li>• Use postulates and diagrams that involve angle and segment measurements</li> <li>• Reason using properties from Algebra to form logical arguments</li> <li>• Prove statements about segments and angles</li> <li>• Identify and prove angle pair relationships</li> <li>• Problem solve with real-world situations</li> </ul>	<p><b>CC.2.3.HS.A.1</b> - Use geometric figures and their properties to represent transformations in the plane.  <b>CC.2.3.HS.A.2</b> - Apply rigid transformations to determine and explain congruence.  <b>CC.2.3.HS.A.3</b> - Verify and apply geometric theorems as they relate to geometric figures.  <b>CC.2.3.HS.A.6</b> - Verify and apply theorems involving similarity as they relate to plane figures.  <b>CC.2.3.HS.A.8</b> - Apply Geometric theorems to verify properties of circles.  <b>CC.2.3.HS.A.14</b> - Apply geometric concepts to model and solve real-world problems.</p>

<b>Parallel and Perpendicular Lines</b>	
<b>CONTENT/KEY CONCEPTS</b>	<b>OBJECTIVES/STANDARDS</b>
<p><b>Parallel and Perpendicular Lines</b></p> <ul style="list-style-type: none"> <li>• Identify and solve angle pairs formed by two intersecting lines</li> <li>• Identify and solve angle pairs formed by three intersecting lines</li> <li>• Identify and solve angle pairs formed by parallel lines and a transversal</li> <li>• Use angle relationships to prove lines are parallel</li> <li>• Solve and compare slopes of lines</li> <li>• Write and graph equations of lines</li> <li>• Write equation of lines that are parallel</li> <li>• Write equation of lines that are perpendicular</li> <li>• Find the distance between two points on the coordinate plane</li> <li>• Find the distance between a point and a line</li> <li>• Problem solve with real-world situations</li> </ul>	<p><b>CC.2.3.HS.A.3</b> - Verify and apply geometric theorems as they relate to geometric figures.  <b>CC.2.3.HS.A.11</b> - Apply coordinate geometry to prove simple geometric theorems algebraically.  <b>CC.2.3.HS.A.14</b> - Apply geometric concepts to model and solve real world problems.</p>

Congruent Triangles	
CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p><b>Congruent Triangles</b></p> <ul style="list-style-type: none"> <li>• Classify sides and angles of a triangle</li> <li>• Classify sides of a triangle on the coordinate plane</li> <li>• Find the perimeter of a triangle on the coordinate plane</li> <li>• Solve the interior angles of a triangle</li> <li>• Solve the exterior angles of a triangle</li> <li>• Solve angles of a right triangle</li> <li>• Learn properties of congruent triangles</li> <li>• Apply theorems of congruent triangles</li> <li>• Prove triangles congruent by side, side, side (SSS)</li> <li>• Prove Triangles are congruent on the coordinate plane</li> <li>• Prove triangles congruent by side, angle, side (SAS) and hypotenuse, leg (HL)</li> <li>• Prove triangles congruent by angle, side, angle (ASA) and angle, angle, side (AAS)</li> <li>• Write two-column proofs proving triangles are congruent</li> <li>• Use congruent triangles to prove corresponding parts are congruent</li> <li>• Solve for angle measurements using isosceles and equilateral triangles theorems</li> <li>• Problem solve with real-world situations</li> </ul>	<p><b>CC.2.3.HS.A.1</b> - Use geometric figures and their properties to represent transformations in the plane.</p> <p><b>CC.2.3.HS.A.3</b> - Verify and apply geometric theorems as they relate to geometric figures.</p> <p><b>CC.2.3.HS.A.4</b> - Apply the concept of congruence to create geometric constructions.</p> <p><b>CC.2.3.HS.A.5</b> - Create justifications based on transformations to establish similarity of plane figures.</p> <p><b>CC.2.3.HS.A.6</b> - Verify and apply theorems involving similarity as they relate to plane figures.</p> <p><b>CC.2.3.HS.A.7</b> - Apply trigonometric ratios to solve problems involving right triangles.</p> <p><b>CC.2.3.HS.A.11</b> - Apply coordinate geometry to prove simple geometric theorems algebraically.</p> <p><b>CC.2.3.HS.A.13</b> - Analyze relationships between two-dimensional and three-dimensional objects.</p> <p><b>CC.2.3.HS.A.14</b> - Apply geometric concepts to model and solve real-world problems.</p> <p><b>CC.2.2.HS.C.9</b> - Prove the Pythagorean identity and use it to calculate trigonometric ratios.</p>

<b>Relationships Within Triangles</b>	
<b>CONTENT/KEY CONCEPTS</b>	<b>OBJECTIVES/STANDARDS</b>
<p><b>Relationships Within Triangles</b></p> <ul style="list-style-type: none"> <li>• Prove the mid-segment theorem of a triangle</li> <li>• Solve and identify perpendicular bisector theorems for triangles</li> <li>• Solve and identify angle bisector theorems for triangles</li> <li>• Use the angle bisector to find distance relationships</li> <li>• Find the medians and altitudes of triangles</li> <li>• Use properties of Inequalities in a Triangle to estimate side and angle measurements</li> <li>• Use the Hinge Theorem to describe the restrictions for side lengths or angle measurements.</li> <li>• Problem solve with real-world situations</li> </ul>	<p><b>CC.2.3.HS.A.3</b> - Verify and apply geometric theorems as they relate to geometric figures.</p> <p><b>CC.2.3.HS.A.9</b> - Extend the concept of similarity to determine arc lengths and areas of sectors of circles.</p> <p><b>CC.2.3.HS.A.11</b> - Apply coordinate geometry to prove simple geometric theorems algebraically.</p> <p><b>CC.2.3.HS.A.13</b> - Analyze relationships between two-dimensional and three-dimensional objects.</p> <p><b>CC.2.3.HS.A.14</b> - Apply geometric concepts to model and solve real-world problems.</p> <p><b>CC.2.2.HS.C.9</b> - Prove the Pythagorean identity and use it to calculate trigonometric ratios.</p>

<b>Surface Area and Volume of Solids</b>	
<b>CONTENT/KEY CONCEPTS</b>	<b>OBJECTIVES/STANDARDS</b>
<p><b>Surface Area and Volume of Solids</b></p> <ul style="list-style-type: none"> <li>• Find the areas of triangles and parallelograms</li> <li>• Solve areas of trapezoids, rhombuses, and kites</li> <li>• Draw-three dimensional figures</li> <li>• Identify and explore solids</li> <li>• Solve surface area of prisms and cylinders</li> <li>• Solve surface area of pyramids and cones</li> <li>• Solve volume of prisms and cylinders</li> <li>• Solve volume of pyramids and cones</li> <li>• Solve surface area and volume of spheres</li> <li>• Explore similar solids</li> <li>• Problem solve with real-world situations</li> </ul>	<p><b>CC.2.3.HS.A.3</b> - Verify and apply geometric theorems as they relate to geometric figures.</p> <p><b>CC.2.3.HS.A.4</b> - Apply the concept of congruence to create geometric constructions.</p> <p><b>CC.2.3.HS.A.6</b> - Verify and apply theorems involving similarity as they relate to plane figures.</p> <p><b>CC.2.3.HS.A.8</b> - Apply Geometric theorems to verify properties of circles.</p> <p><b>CC.2.3.HS.A.9</b> - Extend the concept of similarity to determine arc lengths and areas of sectors of circles.</p> <p><b>CC.2.3.HS.A.10</b> - Translate between the geometric description and the equation for a conic section.</p> <p><b>CC.2.3.HS.A.12</b> - Explain volume formulas and use them to solve problems.</p> <p><b>CC.2.3.HS.A.13</b> - Analyze relationships between two-dimensional and three-dimensional objects.</p> <p><b>CC.2.3.HS.A.14</b> - Apply geometric concepts to model and solve real-world problems.</p> <p><b>CC.2.2.HS.C.9</b> - Prove the Pythagorean identity and use it to calculate trigonometric ratios.</p>

<b>Similarity</b>	
<b>CONTENT/KEY CONCEPTS</b>	<b>OBJECTIVES/STANDARDS</b>
<p><b>Similarity</b></p> <ul style="list-style-type: none"> <li>• Simplify and write ratios</li> <li>• Solve problems by writing ratios into proportions</li> <li>• Determine the Geometric Mean</li> <li>• Create proportions to solve geometry problems</li> <li>• Use proportions to identify similar polygons</li> <li>• Prove triangles are similar by angle, angle (AA), SSS and SAS</li> <li>• Use proportions with similar triangles</li> <li>• Problem solve with real-world situations</li> </ul>	<p><b>CC.2.3.HS.A.1</b> - Use geometric figures and their properties to represent transformations in the plane.</p> <p><b>CC.2.3.HS.A.3</b> - Verify and apply geometric theorems as they relate to geometric figures.</p> <p><b>CC.2.3.HS.A.4</b> - Apply the concept of congruence to create geometric constructions.</p> <p><b>CC.2.3.HS.A.5</b> - Create justifications based on transformations to establish similarity of plane figures.</p> <p><b>CC.2.3.HS.A.6</b> - Verify and apply theorems involving similarity as they relate to plane figures.</p> <p><b>CC.2.3.HS.A.11</b> - Apply coordinate geometry to prove simple geometric theorems algebraically.</p> <p><b>CC.2.3.HS.A.13</b> - Analyze relationships between two-dimensional and three-dimensional objects.</p> <p><b>CC.2.3.HS.A.14</b> - Apply geometric concepts to model and solve real-world problems.</p> <p><b>CC.2.2.HS.C.9</b> - Prove the Pythagorean identity and use it to calculate trigonometric ratios.</p>



<p><b>Quadrilaterals</b></p>	
<p><b>CONTENT/KEY CONCEPTS</b></p>	<p><b>OBJECTIVES/STANDARDS</b></p>
<p><b>Quadrilaterals</b></p> <ul style="list-style-type: none"> <li>• Establish the classifications of polygons</li> <li>• Find the interior and exterior angle measures in polygons</li> <li>• Develop the properties of parallelograms</li> <li>• Discover the theorems for angles and sides of a parallelogram</li> <li>• Show by proving on the coordinate plane that a quadrilateral is a parallelogram</li> <li>• Discover and use properties of rhombuses, rectangles, and squares</li> <li>• Show by proving on the coordinate plane that a quadrilateral is a parallelogram and then prove if it is a rhombus, rectangle, or square</li> <li>• Discover and use properties of trapezoids and kites</li> <li>• Solve for isosceles trapezoids</li> <li>• Use and prove the mid-segment of a trapezoid</li> <li>• Show by proving on the coordinate plane that a quadrilateral is a trapezoid or kite</li> <li>• Identify special quadrilaterals</li> <li>• Use the coordinate plane to prove the specific type of quadrilateral</li> <li>• Problem solve with real-world situations</li> </ul>	<p><b>CC.2.3.HS.A.1</b> - Use geometric figures and their properties to represent transformations in the plane.  <b>CC.2.3.HS.A.3</b> - Verify and apply geometric theorems as they relate to geometric figures.  <b>CC.2.3.HS.A.4</b> - Apply the concept of congruence to create geometric constructions.  <b>CC.2.3.HS.A.5</b> - Create justifications based on transformations to establish similarity of plane figures.  <b>CC.2.3.HS.A.6</b> - Verify and apply theorems involving similarity as they relate to plane figures.  <b>CC.2.3.HS.A.9</b> - Extend the concept of similarity to determine arc lengths and areas of sectors of circles.  <b>CC.2.3.HS.A.11</b> - Apply coordinate geometry to prove simple geometric theorems algebraically.  <b>CC.2.3.HS.A.13</b> - Analyze relationships between two-dimensional and three-dimensional objects.  <b>CC.2.3.HS.A.14</b> - Apply geometric concepts to model and solve real-world problems.</p>

Right Triangles and Trigonometry	
CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p><b>Right Triangles and Trigonometry</b></p> <ul style="list-style-type: none"> <li>• Apply the Pythagorean theorem</li> <li>• Formulate Pythagorean Triples</li> <li>• Use the converse of the Pythagorean Theorem to prove right triangles</li> <li>• Classify triangles angles by the three side lengths</li> <li>• Identify the altitudes of a triangle</li> <li>• Use similar right triangles and sketch</li> <li>• Solve segment lengths by using similar right triangles</li> <li>• Use the theorems for special right triangles to solve for sides and angles</li> <li>• Apply the tangent, sine, and cosine ratios to solve for side lengths</li> <li>• Apply the inverse tangent, sine, and cosine ratios to solve for angle measurements</li> <li>• Problem solve with real-world situations</li> </ul>	<p><b>CC.2.3.HS.A.3</b> - Verify and apply geometric theorems as they relate to geometric figures.</p> <p><b>CC.2.3.HS.A.7</b> - Apply trigonometric ratios to solve problems involving right triangles.</p> <p><b>CC.2.3.HS.A.13</b> - Analyze relationships between two-dimensional and three-dimensional objects.</p> <p><b>CC.2.3.HS.A.14</b> - Apply geometric concepts to model and solve real-world problems.</p> <p><b>CC.2.2.HS.C.9</b> - Prove the Pythagorean identity and use it to calculate trigonometric ratios.</p>

<p><b>Properties of Circles</b></p>	
<p><b>CONTENT/KEY CONCEPTS</b></p>	<p><b>OBJECTIVES/STANDARDS</b></p>
<p><b>Properties of Circles</b></p> <ul style="list-style-type: none"> <li>• Solve for the circumference and area of circles</li> <li>• Find lengths in circles in a coordinate plane</li> <li>• Use Properties of Tangents to solve for angles and segments</li> <li>• Find arc measures</li> <li>• Identify arcs, congruent arcs and congruent circles</li> <li>• Use congruent chords to find an arc measurement</li> <li>• Apply Properties of Chords</li> <li>• Use Inscribed Angles and Polygons to solve for angles and arc measurements</li> <li>• Find the measure of an intercepted arc</li> <li>• Use inscribed polygons and circumscribed circles to solve for angle measurements</li> <li>• Apply and find angle measurements inside and outside a circle</li> <li>• Find segment lengths in circles</li> <li>• Write and graph equations of circles</li> <li>• Problem solve with real-world situations</li> </ul>	<p><b>CC.2.3.HS.A.3</b> - Verify and apply geometric theorems as they relate to geometric figures.</p> <p><b>CC.2.3.HS.A.8</b> - Apply Geometric theorems to verify properties of circles.</p> <p><b>CC.2.3.HS.A.9</b> - Extend the concept of similarity to determine arc lengths and areas of sectors of circles.</p> <p><b>CC.2.3.HS.A.13</b> - Analyze relationships between two-dimensional and three-dimensional objects.</p> <p><b>CC.2.3.HS.A.14</b> - Apply geometric concepts to model and solve real-world problems.</p> <p><b>CC.2.2.HS.C.9</b> - Prove the Pythagorean identity and use it to calculate trigonometric ratios.</p>

Measuring Length and Area	
CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p><b>Measuring Length and Area</b></p> <ul style="list-style-type: none"> <li>• Find the ratios of similar polygons</li> <li>• Find the perimeter and area of similar figures</li> <li>• Use the circumference to find the distance traveled</li> <li>• Find arc length</li> <li>• Use arc lengths to find measures and distances</li> <li>• Solve for the area of circles and sectors</li> <li>• Find the measure of the central angle</li> <li>• Find the perimeter and area of regular polygons inscribed in a circle</li> <li>• Use lengths and segments to find the geometric probability</li> <li>• Use area to find the geometric probability</li> <li>• Problem solve with real-world situations</li> </ul>	<p><b>CC.2.3.HS.A.3</b> - Verify and apply geometric theorems as they relate to geometric figures.</p> <p><b>CC.2.3.HS.A.8</b> - Apply Geometric theorems to verify properties of circles.</p> <p><b>CC.2.3.HS.A.9</b> - Extend the concept of similarity to determine arc lengths and areas of sectors of circles.</p> <p><b>CC.2.3.HS.A.13</b> - Analyze relationships between two-dimensional and three-dimensional objects.</p> <p><b>CC.2.3.HS.A.14</b> - Apply geometric concepts to model and solve real-world problems.</p>

Properties of Transformations	
CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p><b>Properties of Transformations</b></p> <ul style="list-style-type: none"> <li>• Translate a figure in the coordinate plane</li> <li>• Reflect a figure in a line</li> <li>• Rotate a figure about a point</li> <li>• Dilate a figure to change the size but not the shape of a polygon</li> <li>• Create the image that is congruent to a given triangle by performing congruence transformations</li> <li>• Use scale factor of a dilation to reduce or enlarge a polygon</li> <li>• Identify lines of symmetry</li> <li>• Problem solve with real-world situations</li> </ul>	<p><b>CC.2.3.HS.A.1</b> - Use geometric figures and their properties to represent transformations in the plane.  <b>CC.2.3.HS.A.2</b> - Apply rigid transformations to determine and explain congruence.  <b>CC.2.3.HS.A.3</b> - Verify and apply geometric theorems as they relate to geometric figures.  <b>CC.2.3.HS.A.4</b> - Apply the concept of congruence to create geometric constructions.  <b>CC.2.3.HS.A.5</b> - Create justifications based on transformations to establish similarity of plane figures.  <b>CC.2.3.HS.A.6</b> - Verify and apply theorems involving similarity as they relate to plane figures.</p>