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

Course Description

This course offers a similar approach as that of geometry but will require further in-depth analysis of all geometric concepts and proofs. The content of this course 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 understanding and synthesis of mathematical concepts.

Prerequisite: Honors Program criteria for Algebra 2 or Algebra 2 Honors and proficient score on the Keystone Algebra 1

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)	Projects	Classwork
Higher-Level Questioning		

Materials/Resources

Big Ideas Math: A Bridge to Success Geometry	Internet Resources	Sat Materials
1st Edition Larson; Copyright 2019	Teacher-prepared Worksheets	College Board Materials

Adopted: 9/17/03
Revised: 8/17/09; 5/19/14; 5/20/2019

Essentials of Geometry

The Standards of Mathematical Practices

Make sense of problems and persevere in solving them **Construct viable arguments and critique the reasoning of others.** **Use appropriate tools strategically.** **Look for and make use of structure.**	**Reason abstractly and quantitatively.** **Model with mathematics.** **Attend to precision.** **Look for and express regularity in repeated reasoning.**
CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
Essentials of Geometry • Name and sketch geometric figures • Identify points, lines, and planes • Use segment postulates to identify congruent segments • Use segments and congruence • Solve for lengths of segments in the coordinate plane • Use the Pythagorean Theorem • Name and measure line segments • Use midpoint and distance formulas • Name, measure, and classify angles • Identify congruent angles • Describe angle pair relationships to find angle measures. • Use angle postulates to measure and classify angles • Classify polygons • Find perimeter, circumference, and area • Find dimensions of polygons • Estimate distances between points on the coordinate plane • Problem solve and use geometry terms in the real-world	**CC.2.3.HS.A.3** - Verify and apply geometric theorems as they relate to geometric figures. **CC.2.3.HS.A.7** - Apply trigonometric ratios to solve problems involving right triangles. **CC.2.3.HS.A.8** - Apply geometric theorems to verify properties of circles. **CC.2.3.HS.A.9** - Extend the concept of similarity to determine arc lengths and areas of sectors of circles. **CC.2.3.HS.A.11** - Apply coordinate geometry to prove simple geometric theorems algebraically. **CC.2.3.HS.A.13** - Analyze relationships between two-dimensional and three-dimensional objects. **CC.2.3.HS.A.14** - Apply geometric concepts to model and solve real-world problems. **CC.2.2.HS.C.9** Prove the Pythagorean identity and use it to calculate trigonometric ratios.

Reasoning and Proof	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Reasoning and Proof • Use Inductive Reasoning • Describe and solve patterns • Write mathematical conjectures • Use deductive reasoning • Analyze conditional, converse, inverse, contrapositive, and bi-conditional statements • Apply deductive reasoning • Write two-column proofs using geometric theorems • Use postulates and diagrams that involve angle and segment measurements • Reason using properties from algebra to form logical arguments • Prove statements about segments and angles • Identify and prove angle pair relationships • Problem solve with real-world situations	**CC.2.3.HS.A.1** - Use geometric figures and their properties to represent transformations in the plane. **CC.2.3.HS.A.2** - Apply rigid transformations to determine and explain congruence. **CC.2.3.HS.A.3** - Verify and apply geometric theorems as they relate to geometric figures. **CC.2.3.HS.A.6** - Verify and apply theorems involving similarity as they relate to plane figures. **CC.2.3.HS.A.8** - Apply Geometric theorems to verify properties of circles. **CC.2.3.HS.A.14** - Apply geometric concepts to model and solve real world problems.

Parallel and Perpendicular Lines	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Parallel and Perpendicular Lines • Identify and solve angle pairs formed by two intersecting lines • Identify and solve angle pairs formed by three intersecting lines. • Identify and solve angle pairs formed by parallel lines and a transversal • Use angle relationships to prove lines are parallel • Write paragraph proofs using geometric theorems • Solve and compare slopes of lines • Write and graph equations of lines • Write equation of lines that are parallel • Write equation of lines that are perpendicular • Find the distance between two points on the coordinate plane • Find the distance between a point and a line • Problem solve with real-world situations	**CC.2.3.HS.A.3** - Verify and apply geometric theorems as they relate to geometric figures. **CC.2.3.HS.A.11** - Apply coordinate geometry to prove simple geometric theorems algebraically. **CC.2.3.HS.A.14** - Apply geometric concepts to model and solve real-world problems.

Congruent Triangles

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
Congruent Triangles • Classify sides and angles of a triangle • Classify sides of a triangle on the coordinate plane • Find the perimeter of a triangle on the coordinate plane • Solve the interior angles of a triangle • Solve the exterior angles of a triangle • Solve angles of a right triangle • Learn properties of congruent triangles • Apply theorems of congruent triangles • Prove triangles congruent by side, side, side (SSS) • Prove triangles are congruent on the coordinate plane • Prove triangles congruent by side, angle, side (SAS) and hypotenuse, leg (HL) • Prove triangles congruent by angle, side, angle (ASA) and angle, angle, side (AAS) • Write two-column proofs proving triangles are congruent • Use congruent triangles to prove corresponding parts are congruent • Solve for angle measurements using isosceles and equilateral triangles theorems • Problem solve with real-world situations	**CC.2.3.HS.A.1** - Use geometric figures and their properties to represent transformations in the plane. **CC.2.3.HS.A.3** - Verify and apply geometric theorems as they relate to geometric figures. **CC2.3.HS.A.4** - Apply the concept of congruence to create geometric constructions. **CC.2.3.HS.A.5** - Create justifications based on transformations to establish similarity of plane figures. **CC.2.3.HS.A.6** - Verify and apply theorems involving similarity as they relate to plane figures. **CC.2.3.HS.A.7** - Apply trigonometric ratios to solve problems involving right triangles. **CC.2.3.HS.A.11** - Apply coordinate geometry to prove simple geometric theorems algebraically. **CC.2.3.HS.A.13** - Analyze relationships between two-dimensional and three-dimensional objects. **CC.2.3.HS.A.14** - Apply geometric concepts to model and solve real-world problems. **CC.2.2.HS.C.9** - Prove the Pythagorean identity and use it to calculate trigonometric ratios.

Relationships Within Triangles	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Relationships Within Triangles • Prove the mid-segment theorem of a triangle • Solve and identify perpendicular bisector theorems for triangles • Solve and identify angle bisector theorems for triangles • Use the angle bisector to find distance relationships • Find the medians and altitudes of triangles • Use properties of inequalities in a triangle to estimate side and angle measurements • Use the hinge theorem to describe the restrictions for side lengths or angle measurements. • Write indirect proofs • Problem solve with real-world situations	**CC.2.3.HS.A.3** - Verify and apply geometric theorems as they relate to geometric figures. **CC.2.3.HS.A.9** - Extend the concept of similarity to determine arc lengths and areas of sectors of circles. **CC.2.3.HS.A.11** - Apply coordinate geometry to prove simple geometric theorems algebraically. **CC.2.3.HS.A.13** - Analyze relationships between two-dimensional and three-dimensional objects. **CC.2.3.HS.A.14** - Apply geometric concepts to model and solve real-world problems. **CC.2.2.HS.C.9** - Prove the Pythagorean identity and use it to calculate trigonometric ratios.

Surface Area and Volume of Solids	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Surface Area and Volume of Solids • Find the areas of triangles and parallelograms • Solve areas of trapezoids, rhombuses, and kites • Draw three-dimensional figures • Identify and explore solids • Solve surface area of prisms and cylinders • Solve surface area of pyramids and cones • Solve volume of prisms and cylinders • Solve volume of pyramids and cones • Solve surface area and volume of spheres • Explore similar solids • Problem solve with real-world situations	**CC.2.3.HS.A.3** - Verify and apply geometric theorems as they relate to geometric figures. **CC2.3.HS.A.4** - Apply the concept of congruence to create geometric constructions. **CC.2.3.HS.A.6** - Verify and apply theorems involving similarity as they relate to plane figures. **CC.2.3.HS.A.8** - Apply Geometric theorems to verify properties of circles. **CC.2.3.HS.A.9** - Extend the concept of similarity to determine arc lengths and areas of sectors of circles. **CC.2.3.HS.A.10** - Translate between the geometric description and the equation for a conic section. **CC.2.3.HS.A.12** - Explain volume formulas and use them to solve problems. **CC.2.3.HS.A.13** - Analyze relationships between two-dimensional and three-dimensional objects. **CC.2.3.HS.A.14** - Apply geometric concepts to model and solve real-world problems. **CC.2.2.HS.C.9** - Prove the Pythagorean identity and use it to calculate trigonometric ratios.

Similarity	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Similarity • Simplify and write ratios • Solve problems by writing ratios into proportions • Determine the Geometric Mean • Create proportions to solve geometry problems • Use proportions to identify similar polygons • Prove triangles are similar by angle, angle, (AA), SSS and SAS • Use proportions with similar triangles • Problem solve with real-world situations	**CC.2.3.HS.A.1** - Use geometric figures and their properties to represent transformations in the plane. **CC.2.3.HS.A.3** - Verify and apply geometric theorems as they relate to geometric figures. **CC2.3.HS.A.4** - Apply the concept of congruence to create geometric constructions. **CC.2.3.HS.A.5** - Create justifications based on transformations to establish similarity of plane figures. **CC.2.3.HS.A.6** - Verify and apply theorems involving similarity as they relate to plane figures. **CC.2.3.HS.A.11** - Apply coordinate geometry to prove simple geometric theorems algebraically. **CC.2.3.HS.A.13** - Analyze relationships between two-dimensional and three-dimensional objects. **CC.2.3.HS.A.14** - Apply geometric concepts to model and solve real-world problems. **CC.2.2.HS.C.9** - Prove the Pythagorean identity and use it to calculate trigonometric ratios.

Quadrilaterals	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Quadrilaterals • Establish the classifications of polygons • Find the interior and exterior angle measures in polygons • Develop the properties of parallelograms • Discover the theorems for angles and sides of a parallelogram • Show by proving on the coordinate plane that a quadrilateral is a parallelogram • Discover and use properties of rhombuses, rectangles, and squares • Show by proving on the coordinate plane that a quadrilateral is a parallelogram and then prove if it is a rhombus, rectangle, or square • Discover and use properties of trapezoids and kites • Solve for isosceles trapezoids • Use and prove the mid-segment of a trapezoid • Show by proving on the coordinate plane that a quadrilateral is a trapezoid or kite • Identify special quadrilaterals • Use the coordinate plane to prove the specific type of quadrilateral • Problem solve with real-world situations	**CC.2.3.HS.A.1** - Use geometric figures and their properties to represent transformations in the plane. **CC.2.3.HS.A.3** - Verify and apply geometric theorems as they relate to geometric figures. **CC2.3.HS.A.4** - Apply the concept of congruence to create geometric constructions. **CC.2.3.HS.A.5** - Create justifications based on transformations to establish similarity of plane figures. **CC.2.3.HS.A.6** - Verify and apply theorems involving similarity as they relate to plane figures. **CC.2.3.HS.A.9** - Extend the concept of similarity to determine arc lengths and areas of sectors of circles. **CC.2.3.HS.A.11** - Apply coordinate geometry to prove simple geometric theorems algebraically. **CC.2.3.HS.A.13** - Analyze relationships between two-dimensional and three-dimensional objects. **CC.2.3.HS.A.14** - Apply geometric concepts to model and solve real-world problems.

Right Triangles and Trigonometry	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Right Triangles and Trigonometry • Apply the Pythagorean Theorem • Formulate Pythagorean Triples • Use the converse of the Pythagorean Theorem to prove right triangles • Classify triangles angles by the three side lengths • Identify the altitudes of a triangle • Use similar right triangles and sketch • Solve segment lengths by using similar right triangles • Use the theorems for special right triangles to solve for sides and angles • Apply the tangent, sine, and cosine ratios to solve for side lengths • Apply the inverse tangent, sine, and cosine ratios to solve for angle measurements • Problem solve with real-world situations	**CC.2.3.HS.A.3** - Verify and apply geometric theorems as they relate to geometric figures. **CC.2.3.HS.A.7** - Apply trigonometric ratios to solve problems involving right triangles. **CC.2.3.HS.A.13** - Analyze relationships between two-dimensional and three-dimensional objects. **CC.2.3.HS.A.14** - Apply geometric concepts to model and solve real-world problems. **CC.2.2.HS.C.9** - Prove the Pythagorean identity and use it to calculate trigonometric ratios.

Properties of Circles	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Properties of Circles - Solve for the circumference and area of circles - Find lengths in circles in a coordinate plane - Use Properties of Tangents to solve for angles and segments - Find arc measures - Identify arcs, congruent arcs and congruent circles - Use congruent chords to find an arc measurement - Apply Properties of Chords - Use inscribed angles and polygons to solve for angles and arc measurements - Find the measure of an intercepted arc - Use inscribed polygons and circumscribed circles to solve for angle measurements - Apply and find angle measurements inside and outside a circle - Find segment lengths in circles - Write and graph equations of circles - Problem solve with real-world situations	**CC.2.3.HS.A.3** - Verify and apply geometric theorems as they relate to geometric figures. **CC.2.3.HS.A.8** - Apply Geometric theorems to verify properties of circles. **CC.2.3.HS.A.9** - Extend the concept of similarity to determine arc lengths and areas of sectors of circles. **CC.2.3.HS.A.13** - Analyze relationships between two-dimensional and three-dimensional objects. **CC.2.3.HS.A.14** - Apply geometric concepts to model and solve real-world problems. **CC.2.2.HS.C.9** - Prove the Pythagorean identity and use it to calculate trigonometric ratios.

Measuring Length and Area

CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
Measuring Length and Area • Find the ratios of similar polygons • Find the perimeter and area of similar figures • Use the circumference to find the distance traveled • Find arc length • Use arc lengths to find measures and distances • Solve for the area of circles and sectors • Find the measure of the central angle • Find the perimeter and area of regular polygons inscribed in a circle • Use lengths and segments to find the geometric probability • Use area to find the geometric probability • Problem solve with real-world situations	**CC.2.3.HS.A.3** - Verify and apply geometric theorems as they relate to geometric figures. **CC.2.3.HS.A.8** - Apply geometric theorems to verify properties of circles. **CC.2.3.HS.A.9** - Extend the concept of similarity to determine arc lengths and areas of sectors of circles. **CC.2.3.HS.A.13** - Analyze relationships between two-dimensional and three-dimensional objects. **CC.2.3.HS.A.14** - Apply geometric concepts to model and solve real world problems.

Properties of Transformations	
CONTENT/KEY CONCEPTS	**OBJECTIVES/STANDARDS**
Properties of Transformations • Translate a figure in the coordinate plane • Reflect a figure in a line • Rotate a figure about a point • Dilate a figure to change the size but not the shape of a polygon • Create the image that is congruent to a given triangle by performing congruence transformations • Use scale factor of a dilation to reduce or enlarge a polygon • Identify lines of symmetry • Problem solve with real-world situations	**CC.2.3.HS.A.1** - Use geometric figures and their properties to represent transformations in the plane. **CC.2.3.HS.A.2** - Apply rigid transformations to determine and explain congruence. **CC.2.3.HS.A.3** - Verify and apply geometric theorems as they relate to geometric figures. **CC2.3.HS.A.4** - Apply the concept of congruence to create geometric constructions. **CC.2.3.HS.A.5** - Create justifications based on transformations to establish similarity of plane figures. **CC.2.3.HS.A.6** - Verify and apply theorems involving similarity as they relate to plane figures.