



## GEOMETRY HONORS

*Counselors are available to assist parents and students with course selections and career planning. Parents may arrange to meet with the counselor by calling the school's guidance department.*

### **COURSE DESCRIPTION**

Geometry Honors is a mathematics course for students who exhibit high mathematical ability and achievement. The course is designed to prepare students for Scientific, Technology, Engineering, and Mathematics (STEM) fields. The course focuses on the development of problem-solving skills and the acquisition of mathematical vocabulary and symbols. The active engagement of students along with the use of manipulatives and technology, such as computer programs and calculators, will allow students to develop an understanding of the geometric principles they are learning. Topics include reasoning and proof, lines and their relationships, triangles and their relationships, polygons and quadrilaterals, similarity, right triangles, properties of circles, properties of transformations, and area and volume. Students will gain an appreciation of the structure of geometry and develop powers of spatial visualization. **Students cannot receive credit for both Geometry Honors and Geometry Parts 1 and 2 (MA 3221 and MA 3223).**

### **PREREQUISITE**

Algebra I Honors or Algebra I Parts 1 and 2

### **OPTIONS FOR NEXT COURSE**

Algebra II, Algebra II/Trigonometry, or Algebra, Functions, and Data Analysis

### **REQUIRED STUDENT TEXTBOOK**

*Glencoe Geometry* (Virginia Edition). John A. Carter, Ph.D., Gilbert J. Cuevas, Ph.D., Roger Day, Ph.D., and Carol Malloy, Ph.D. Glencoe McGraw-Hill, 2012

### **RECOMMENDED CALCULATOR**

TI-83 Plus or TI-84 Plus

Students should purchase a compass, ruler, and protractor.

**Virginia Beach Instructional Objectives**  
**Geometry Honors – MA 3225**

School Net Objective	Objective
<b>Foundations of Geometry</b>	
<b>GH.RL.1.1</b>	The student will identify a point, line, ray, angle, line segment, and plane when given an appropriate diagram and use standard notation for each.
<b>GH.RL.1.2</b>	The student will use the definitions, theorems, postulates, and pictorial representations to draw conclusions about line segments and angles, including: linear measure, using the distance and midpoint formulas; using the segment addition postulate and angle addition postulate. <b>(SOL G.3 a)</b>
<b>GH.RL.1.3</b>	The student will apply the definitions and theorems for complementary, supplementary, right, straight, vertical, and adjacent angles to problems including Science, Technology, Engineering, and Mathematics (STEM).
<b>GH.RL.1.4</b>	The student will apply the definitions and relationships of perpendicular lines in Science, Technology, Engineering, and Mathematics (STEM). <b>(SOL G.3 a, b)</b>
<b>GH.RL.1.5</b>	The student will construct a line segment congruent to a given line segment, the perpendicular bisector of a line segment, an angle congruent to a given angle, and the bisector of an angle. <b>(SOL G.4 a, b, e, f)</b>
<b>Reasoning and Proof</b>	
<b>GH.RL.2.1</b>	The student will diagram arguments involving quantifiers using Venn Diagrams, identify the hypothesis and conclusion of a conditional statement (including statements involving quantifiers such as all, no, none, and some), and write it and its converse in <i>if-then</i> form. <b>(SOL G.1 a, c)</b>
<b>GH.RL.2.2</b>	The student will construct and judge the validity of a logical argument consisting of a set of premises and a conclusion, including: being able to define and state the converse, inverse, and contrapositive of an if-then statement; translating short verbal arguments into symbolic form; using truth tables to assess the validity of compound statements; and use valid forms of inductive and deductive reasoning to include applications in Science, Technology, Engineering, and Mathematics (STEM). <b>(SOL G.1 a, b, d)</b>
<b>GH.RL.2.3</b>	The student will solve problems, including those in Science, Technology, Engineering, and Mathematics (STEM), by drawing conclusions about points, lines, planes, and angles and justify statements using definitions, theorems, and postulates using properties of equality and problem-solving techniques.
<b>Lines and Their Relationships</b>	
<b>GH.RL.3.1</b>	The student will draw conclusions that lines and/or planes are parallel using definitions of parallel, perpendicular, and skew lines; justify parallel lines and/or planes using algebraic and coordinate methods, including slope and equations and deductive proofs, including flow, paragraph, or two-column proof. <b>(SOL G.2 a, b, c, G.3 a, b)</b>
<b>GH.RL.3.2</b>	The student will verify relationships between pairs of angles in situations involving Science, Technology, Engineering, and Mathematics (STEM), using the definition of transversal and the types of angles formed justifying lines are parallel based on angle relationships. <b>(SOL G.2 a, b, c,)</b>
<b>GH.RL.3.3</b>	The student will construct the perpendicular segment to a given line from a point not on the line, the perpendicular segment to a given line from a point on the line, and a line parallel to a given line through a point not on the given line. <b>(SOL G.4 c, d, g)</b>
<b>Triangles and Their Relationships</b>	
<b>GH.TR.4.1</b>	The student will apply properties of triangles in situations involving Science, Technology, Engineering, and Mathematics (STEM), including: classifying triangles based on sides and angles; applying the triangle sum theorem; and applying the exterior-angle theorem.

<b>GH.TR.4.2</b>	The student will show that triangles are congruent by SSS, SAS, ASA, AAS, or HL using algebraic and coordinate methods as well as deductive proofs, including flow, paragraph, or two-column proof. <b>(SOL G.6)</b>
<b>GH.TR.4.3</b>	The student will draw conclusions about segments or angles using the corresponding parts of congruent triangles theorem, including the use of altitude and median of a triangle, and overlapping triangles. <b>(SOL G.6)</b>
<b>GH.TR.4.4</b>	The student will apply the inequality relationships for angles or sides of one or two triangles in situations involving Science, Technology, Engineering, and Mathematics (STEM), including ordering the sides and angles of a triangle. <b>(SOL G.5 a, b, c, d)</b>
<b>Similarity</b>	
<b>GH.TR.5.1</b>	The student will use the properties of similar polygons, including: identifying corresponding parts of similar polygons; writing equivalent proportions; and applying proportions to solve problems involving Science, Technology, Engineering, and Mathematics (STEM). <b>(SOL G.14 a, b, c, d)</b>
<b>GH.TR.5.2</b>	The student will show that triangles are similar by AA, SAS, or SSS using algebraic and coordinate methods as well as deductive proofs, including: investigating and identifying similarity between triangles and computing lengths of segments of similar triangles. <b>(SOL G.7)</b>
<b>Right Triangles</b>	
<b>GH.TR.6.1</b>	The student will use the Pythagorean Theorem and its converse to solve problems involving Science, Technology, Engineering, and Mathematics (STEM), and recognize Pythagorean triples. <b>(SOL G.8)</b>
<b>GH.TR.6.2</b>	The student will apply properties of special right triangles to problems involving Science, Technology, Engineering, and Mathematics (STEM) and find decimal approximations for the solutions. <b>(SOL G.8)</b>
<b>GH.TR.6.3</b>	The student will solve problems involving Science, Technology, Engineering, and Mathematics (STEM), using sine, cosine, and tangent functions of acute angles in right triangles. <b>(SOL G.8)</b>
<b>Polygons and Quadrilaterals</b>	
<b>GH.PC.7.1</b>	The student will use measurements of interior and exterior angles of convex and regular polygons to solve problems involving Science, Technology, Engineering, and Mathematics (STEM). <b>(SOL G.10)</b>
<b>GH.PC.7.2</b>	The student will classify a given quadrilateral as a parallelogram, rectangle, rhombus, square, trapezoid, or kite according to its properties and justify the conclusion. <b>(SOL G.9)</b>
<b>GH.PC.7.3</b>	The student will investigate and identify properties of quadrilaterals and use them to solve problems involving Science, Technology, Engineering, and Mathematics (STEM), and prove properties of quadrilaterals using algebraic and coordinate methods as well as deductive proofs, including flow, paragraph, or two-column proof. <b>(SOL G.2 b, G.9)</b>
<b>Transformations</b>	
<b>GH.RL.8.1</b>	The student will determine the image of a figure under a dilation, reflection, rotation, or translation, including defining image, preimage, mapping, identity mapping, inverse of a mapping, and isometry. <b>(SOL G.3 c, d)</b>
<b>GH.RL.8.2</b>	The student will determine if a figure has point, line, or rotational symmetry and identify how many lines of symmetry exist and the magnitude and order of rotational symmetry. <b>(SOL G.3 a, c, d)</b>
<b>GH.RL.8.3</b>	The student will identify the image of an object on the coordinate plane under a dilation through the origin, a rotation through the origin, a reflection through a line, and a translation. <b>(SOL G.3)</b>

	<b>Circles</b>
<b>GH.PC.9.1</b>	The student will investigate and use the properties of angles, arcs, chords, tangents, and secants including: defining, identifying, and using standard notation for chord, secant, tangent, major and minor arc, intercepted arc, and central and inscribed angle; and defining congruent arcs, congruent circles, concentric circles, and common tangent. <b>(SOL G.11 a, b, c)</b>
<b>GH.PC.9.2</b>	The student will apply properties of circles to problems involving Science, Technology, Engineering, and Mathematics (STEM), including: solving problems using angles formed by radii, chords, secants, tangents; and solving problems using the lengths of arcs, chords, secant segments, and tangent segments. <b>(SOL G.11 a, b, c)</b>
<b>GH.PC.9.3</b>	The student will calculate circumference and arc length and relate measures of central angles to fractions of a circle. <b>(SOL G.11 c)</b>
<b>GH.PC.9.4</b>	The student, given the coordinates of the center of a circle and a point on the circle, will write the equation of the circle. <b>(SOL G.12)</b>
	<b>Area and Volume</b>
<b>GH.PC.10.1</b>	The student will calculate the area of a triangle, rectangle, rhombus, square, trapezoid, kite, parallelogram, and apply this knowledge to find the area of other polygons, including regular polygons. <b>(SOL G.14)</b>
<b>GH.PC.10.2</b>	The student will calculate area of a circle and area of a sector of a circle given the measure of its central angle involving Science, Technology, Engineering, and Mathematics (STEM). <b>(SOL G.11 b, c)</b>
<b>GH.3D.10.3</b>	The student will calculate the lateral area, surface area, and volume of three-dimensional objects. <b>(SOL G.13)</b>
<b>GH.3D.10.4</b>	The student will calculate the ratio of the areas or the volumes of similar figures in terms of the ratio of the sides or perimeters and investigate relationships between linear, square, and cubic measures of similar geometric objects and describe how changes in one measure affect the others, involving Science, Technology, Engineering, and Mathematics (STEM). <b>(SOL G.14 a, b, c, d)</b>
	<b>Advanced Algebra Concepts</b>
<b>GH.TR.11.1</b>	The student will solve problems involving Science, Technology, Engineering, and Mathematics (STEM), using the Laws of Sines and Cosines.



**VIRGINIA BEACH CITY PUBLIC SCHOOLS**  
A H E A D O F T H E C U R V E

**MISSION STATEMENT**

**The Virginia Beach City Public Schools, in partnership with the entire community, will empower every student to become a life-long learner who is a responsible, productive and engaged citizen within the global community.**

**DEPARTMENT OF CURRICULUM AND INSTRUCTION**  
2512 George Mason Drive P.O. Box 6038  
Virginia Beach, VA 23456-0038

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Alternative formats of this publication which may include taped, Braille, or large print materials are available upon request for individuals with disabilities. Call or write The Department of Curriculum and Instruction, Director of Secondary Instructional Services, Virginia Beach City Public Schools, 2512 George Mason Drive, P.O. Box 6038, Virginia Beach, VA 23456-0038, Telephone (757) 263-1070 or (757) 263-1429, fax (757) 263-1412.