

**Department:** Mathematics

**Course Name:** Geometry

**Course Description:**

This course in Euclidean geometry emphasizes principles learned in Algebra I in the study of plane and solid geometry. Deductive and inductive reasoning and the two-column proof method of geometric theorems are introduced. Topics include the relationship between points, lines, and planes; parallelism; logical reasoning; proofs; geometric constructions; transformations; triangle congruence; properties of quadrilaterals, similarity, the Pythagorean Theorem, right triangle trigonometry, regular polygons, secants and tangents to circles, and elementary solid geometry. During the second semester, each student is required to complete a geometry project, which involves student research of applied geometry. We place an emphasis on critical thinking, complex communication, collaboration, creativity, and risk taking. With departmental approval, rising 10<sup>th</sup> graders may take Algebra II concurrently with Geometry.

**Content:**

Points, lines, and planes  
parallelism  
logical reasoning, proofs  
geometric constructions  
transformations  
triangle congruence  
properties of quadrilaterals  
similarity  
Pythagorean Theorem  
right triangle trigonometry  
regular polygons  
secants and tangents to circles  
coordinate geometry and elementary solid geometry

**Skills:**

Find length and midpoint of a segment. Use angle addition and segment addition postulates.  
Identify hypothesis and conclusion of a conditional statement and its converse, inverse and contrapositive.  
Use counterexamples to disprove an if-then statement. Write biconditionals using if and only if.  
Use properties of equality and congruence, definitions, postulates, and theorems to justify statements in two-column proofs using deductive reasoning.  
Find complementary and supplementary angles.  
Apply definition and theorems about vertical angles, perpendicular and parallel lines.  
Solve problems in geometry using linear systems of equations.  
Identify angles formed when two lines are cut by a transversal and determine if two lines are parallel.  
Classify triangles according to sides and to angles.  
Apply the theorem and corollaries about the sum of the measures of the angles of a triangle and use the theorem about the measure of an exterior angle of a triangle.  
Recognize and name convex polygons and regular polygons. Find the measures of interior and exterior angles of convex polygons.  
Understand and use inductive reasoning.  
Prove two triangles congruent by using the SSS, SAS, ASA, AAS, HL Postulates. Identify

corresponding parts of congruent figures and make deductions about segments and angles after proving that two triangles are congruent.

Apply theorems and corollaries about isosceles triangles.

Apply theorems and definitions of median, altitude, and perpendicular bisector.

Write indirect proofs in paragraph form.

Use properties of inequalities. Apply inequality theorems for one and for two triangles. Determine whether a triangle exists and order sides and angles.

Express ratios in simplest form, solve proportions, use properties of proportions.

Apply properties of similar polygons.

Use AA, SAS, and SSS Similarity Theorems to prove triangles similar. Use similar triangles to deduce information about segments or angles.

Apply Triangle Proportionality Theorem and the Triangle Angle-Bisector Theorem.

Determine geometric mean between two numbers.

Apply the Pythagorean Theorem and its converse and related theorems.

Determine the lengths of two sides of a  $45^\circ$ - $45^\circ$ - $90^\circ$  or a  $30^\circ$ - $60^\circ$ - $90^\circ$  triangle when the length of the third side is known.

Define the six trigonometric functions for an acute angle. Solve right triangle problems. Use inverse trigonometric functions to find an angle.

Use properties and theorems of central angles, inscribed angles, interior angles, exterior angles, arcs, chords, radii, tangents, and secants to solve circle problems.

Recognize circumscribed and inscribed polygons and circles.

Apply theorems involving concurrent lines.

Perform constructions involving circles and special segments.

Know and use formulas for areas of rectangles, parallelograms, triangles, rhombuses, trapezoids, and regular polygons. Know and use formulas for circumference and area of circles and formulas for arc lengths and areas of sectors of a circle.

Find the ratio of the areas of two triangles. Apply the relationship between scale factors, perimeters, and areas of similar figures.

Use lengths and areas to solve problems involving geometric probability.

Identify parts of prisms, pyramids, cylinders, and cones. Find the lateral areas, total areas, and volumes of these regular solids. Find area and volume of a sphere. Apply properties of similar solids.

Apply distance, midpoint, and slope formulas, and the general equation of a circle. Determine whether two lines are parallel, perpendicular, or neither.

Identify slope and y-intercept of the line specified by a given equation. Draw the graph of the line from a given equation. Write an equation of a line when given either one point and the slope of the line, or two points on the line. Determine the intersection of two lines.

**Text and Materials:**

Geometry, BIG IDEAS MATH – GEOMETRY – Virginia edition

**Methods of Instruction:**

Lecture  
Demonstration  
Guided Practice

**Methods of Evaluation:**

Homework

Classwork  
Delta Math  
Quizzes  
Tests  
Project

