STAFFORD COUNTY PUBLIC SCHOOLS

Curriculum Overview
Geometry

Course Description:

This course is designed for students who have successfully completed Algebra I. Geometry is a unified study of plane, solid, and coordinate geometric concepts which provides students with the prerequisite skills that will facilitate the study of advanced mathematics. Investigations of lines, planes, congruencies, similarities, geometric inequalities, parallelism, perpendicularity, polygons, areas, volumes, circles, and three-dimensional figures are incorporated to provide a complete course of study. Formal and informal deductive reasoning skills are developed and applied to the construction of formal proof. Methods of justification will include paragraph proofs, two-column proofs, indirect proofs, coordinate proofs, and verbal arguments. Inductive and intuitive approaches to proof as well as deductive axiomatic methods will be used. Opportunities are provided for discovery learning through hands-on activities and experiences that allow for utilizing technology to explore major concepts and develop problem-solving skills.

Students enrolled in this course will take the Standards of Learning Geometry test. Students who successfully complete this course may take Algebra, Functions and Data Analysis or Algebra II.

Essential Skills/Processes:

Geometry has its own language. The vocabulary and symbols are very important to a student's understanding of geometrical concepts. Students will use mathematical skills, symbols, and vocabulary to read and communicate about geometry. Students will apply geometric concepts in solving practical problems.

The secondary mathematics program will provide the opportunity for students to develop strong mathematical knowledge and skills in order to pursue higher education, to compete in a technologically oriented workforce, and to see mathematics as an integrated field of study. The development of problem solving skills and logical reasoning is another major goal of the mathematics program at every level.

- Students will develop a wide range of mathematical skills and strategies for understanding and solving a variety of problem types.
- Students will be able to clearly communicate mathematical ideas and use mathematical representations, such as graphs, tables, and charts to model and interpret practical situations.
- Students will recognize that graphical numerical, algebraic, verbal, and physical representations are both to organize one's thinking and a way to represent the solution to a problem.
- Students will use technology to appropriately estimate and reason logically and to effectively explore and verify mathematical concepts.
- Students will be active participants in the learning process and accept responsibility for mastery of the course content objectives.

Students are more likely to be successful if they are:
> -self-motivated
> -able to recall and use prior math skills
> -willing to practice skills regularly, including homework, and
> -persistent in problem solving.

Essential Knowledge:

Reasoning, Lines and Transformations (18 items)
- Construct and judge the validity of a logical argument consisting of a set of premises and a conclusion including identifying the converse, inverse, and contrapositive of a conditional statement; translating a short verbal argument into symbolic form, using Venn diagrams to represent set relationships and using deductive reasoning.
- Use the relationships between angles formed by two lines cut by a transversal to determine whether two lines are parallel, verify the parallelism, using algebraic and coordinate methods as well as deductive proofs
- Solve real-world problems involving angles formed when parallel lines are cut by a transversal
- Use pictorial representations, including computer software, constructions, and coordinate methods, to solve problems involving symmetry and transformation.
- Investigate and use formulas for finding distance, midpoint, and slope

- Apply slope to verify and determine whether lines are parallel or perpendicular
- Investigate symmetry and determining whether a figure is symmetric with respect to a line or a point
- Determine whether a figure has been translated, reflected, rotated, or dilated, using coordinate methods
- Construct and justify the constructions of a line segment congruent to a given line segment; the perpendicular bisector of a line segment; a perpendicular to a given line from a point not on the line; a perpendicular to a given line at a given point on the line; the bisector of a given angle, an angle congruent to a given angle; and a line parallel to a given line through a point not on the given line

Triangles (14 items)

- Given information concerning the lengths of sides and/or measures of angles in triangles, will order the sides by length, given the angle measures; order the angles by degree measure, given the side lengths; determine whether a triangle exists; and determine the range in which the length of the third side must lie
  These concepts will be considered in the context of real-world situations.
- Given information in the form of a figure or statement, will prove two triangles are congruent, using algebraic and coordinate methods as well as deductive proofs
- Given information in the form of a figure or statement, will prove two triangles are similar, using algebraic and coordinate methods as well as deductive proofs
- Solve real-world problems involving right triangles by using the Pythagorean Theorem and its converse, properties of special right triangles, and right triangle trigonometry

Polygons, Circles and Three-Dimensional Figures (18 items)

- Verify characteristics of quadrilaterals and use properties of quadrilaterals to solve real-world problems
- Solve real-world problems involving angles of polygons.
- Use angles, arcs, chords, tangents, and secants to investigate, verify, and apply properties of circles; solve real-world problems involving properties of circles; and find arc lengths and areas of sectors in circles
- Given the coordinates of the center of a circle and a point on the circle, will write the equation of the circle
- Use formulas for surface area and volume of three-dimensional objects to solve real-world problems
- Use similar geometric objects in two- or three-dimensions to compare ratios between side lengths, perimeters, areas, and volumes; determine how changes in one or more dimensions of an object affect area and/or volume of the object; determine how changes in area and/or volume of an object affect one or more dimensions of the object; and solve real-world problems about similar geometric objects

Resources:
- Stafford County Public Schools: http://stafford.schoolfusion.us/ .
- High School Course Catalog: http://stafford.schoolfusion.us/ . Click on "For Parents/Students" tab.
- VA Mathematics Standards of Learning: http://www.doe.virginia.gov/testing/sol/standards_docs/mathematics/index.shtml
- School Report Card (VA Department of Education): http://www.doe.virginia.gov/statistics_reports/school_report_card/index.shtml
- Prentice Hall textbook: http://phschool.com/atschool/phmath/program_page.html