



STAFFORD COUNTY PUBLIC SCHOOLS

Curriculum Overview Algebra, Functions, and Data Analysis

Course Description:

The following standards outline the content for Algebra, Functions, and Data Analysis. This course is designed for students who have successfully completed the standards for Algebra I and Geometry. Within the context of mathematical modeling and data analysis, students will study functions and their behaviors, systems of inequalities, probability, experimental design and implementation, and analysis of data. Data will be generated by practical applications arising from science, business, and finance. Students will solve problems that require the formulation of linear, quadratic, exponential, or logarithmic equations or a system of equations. Through the investigation of mathematical models and interpretation/analysis of data from real life situations, students will strengthen conceptual understandings in mathematics and further develop connections between algebra and statistics. Students will use the language and symbols of mathematics in representations and communication throughout the course.

These standards include a transformational approach to graphing functions and writing equations when given the graph of the equation. Transformational graphing builds a strong connection between algebraic and graphic representations of functions.

The infusion of technology (graphing calculator and/or computer software) in this course will assist in modeling and investigating functions and data analysis.

Essential Skills/Processes:

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 a 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.

Essential Knowledge:

Algebra and Function

- Investigate and analyze function (linear, quadratic, exponential, and logarithmic) families and their characteristics. Key concepts include: continuity, local and absolute maxima and minima, domain and range, zeros, intercepts, intervals in which the function is increasing/decreasing, end behaviors, and asymptotes.
- Use knowledge of transformations to write an equation, given the graph of a function (linear, quadratic, exponential, and logarithmic).
- Collect data and generate an equation for the curve (linear, quadratic, exponential, and logarithmic) of best fit to model real-world problems or applications. Students will use the best fit equation to interpolate function values, make decisions, and justify conclusions with algebraic and/or graphical models.
- Transfer between and analyze multiple representations of functions including algebraic formulas, graphs, tables, and words. Students will select and use appropriate representations for analysis, interpretation, and prediction.
- Determine optimal values in problem situations by identifying constraints and using linear programming techniques.

Data Analysis

- Calculate probabilities. Key concepts include: conditional probability, dependent and independent events, addition and multiplication rules, counting techniques (permutations and combinations), and Law of Large Numbers.
- Analyze the normal distribution. Key concepts include: characteristics of normally distributed data, percentiles, normalizing data using z-scores, and area under the standard normal curve and probability.
- Design and conduct an experiment/survey. Key concepts include: sample size, sampling technique, controlling sources of bias and experimental error, data collection, and data analysis and reporting.

Resources:

- Stafford County Public Schools: <http://stafford.schoolfusion.us/> .
- High School Course Catalog: <http://stafford.schoolfusion.us/> . Click on For Parents/Students tab.
- VA Standards of Learning: http://www.doe.virginia.gov/testing/sol/standards_docs/mathematics/review.shtml
- School Report Card (VA Department of Education):
http://www.doe.virginia.gov/statistics_reports/school_report_card/index.shtml
- Textbook: W. H. Freeman Virginia's Algebra, Functions and Data Analysis <http://www.whfreeman.com/mma/>