DELAWARE VALLEY SCHOOL DISTRICT

<u>PLANNED INSTRUCTION</u>

A PLANNED COURSE FOR:

SAT Prep Math

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Curriculum Writing Committee:

Elizabeth Katz

Grade Level: 11

Date of Board Approval: _____2024_____

Course Weighting: SAT Prep Math

Marking Period	Quiz	Homework	Total
Quarter (45 days)	250	25	250
Total Percent	91%	9%	100%

Curriculum Map

Overview:

This academic course provides a strong review for the four content areas on the math part of the College Board SAT: Heart of Algebra, Passport to Advanced Mathematics, Problem Solving with Data Analysis, and Additional Topics in Mathematics.

Time/Credit for the Course: 1 QUARTER / ¼ CREDIT; 45 days, meeting one period per day

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Goals:

Understanding of:

Unit 1: Heart of Algebra   Overview based on 12 days
Goals:
- Define one or more variables that represent quantities.
- Write one or more equations, expressions, inequalities, or functions that represent the relationships described in a given question.
- Solve a linear equation or linear inequality and interpret the solution in terms of what the question is asking.
- Understand and use the relationship between linear equations and inequalities and their graphs in order to solve problems.
- Analyze linear functions both graphically and algebraically.
- Solve a system of equations or inequalities.
- Evaluate and write expressions, inequalities, and equations using absolute value.

Unit 2: Problem Solving and Data Analysis   Overview based on 11 days
Goals:
- Utilize measures of central tendency and variability.
- Find and apply probabilities in context.
- Write relations and functions.
- Represent and analyze data distributions involving qualitative and quantitative data.
- Analyze standard deviation of a set of data.
- Create and analyze relationships using ratios, proportions, percentages and units.
- Interpret relationships presented in scatterplots, graphs, tables, and equations.

Unit 3: Passport to Advanced Mathematics   Overview based on 12 days
Goals:
- Understand function notation.
- Perform operations on polynomials (add, subtract, multiply, and divide).
- Factor polynomials including those with a GCF.
- Solve quadratic equations by factoring, graphing, completing the square, and/or quadratic formula.
- Simplify rational expressions.
- Solve rational equations.
- Evaluate composite functions.
- Simplify radical expressions.
- Solve equations involving radicals.
- Simplify exponents in expressions.
- Solve equations involving radicals and exponents.
- Create, analyze, and graph quadratic, exponential, and other non-linear functions.
- Identify transformations on graphs of linear, quadratic, and other non-linear functions.

- Analyze exponential functions and their graphs.
- Understand the relationships between algebraic and graphical representations of functions by finding the intercepts, domain, range, maximum and minimum values, intervals of increase and decrease, end behavior, asymptotes, symmetry, and transformations.
- Divide polynomials by a linear expression.

Unit 4: Additional Topics in Mathematics   **Overview based on 10 days**
  Goals:
- Use concepts and theorems about congruence and similarity to solve problems about lines, angles, and triangles.
- Solve problems using volume formulas.
- Use trigonometric ratios and the Pythagorean Theorem.
- Convert between degrees and radians and use radians to determine arc lengths o Use trigonometric functions of radian measure.
- Apply theorems about circles to find arc lengths, angle measures, chord lengths, and areas of sectors.
- Use the relationship between similarity, right triangles, and trigonometric ratios o Use the relationship between the sine and the cosine of complementary angles.
- Create or use an equation in two variables to solve a problem involving a circle in the coordinate plane.
- Add, subtract, multiply, divide, and simplify complex numbers.

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Big Ideas:

Big Idea # 1: Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms.

Big Idea #3:
There are some mathematical relationships that are always true. These relationships are used as the rules of arithmetic and algebra and are useful for writing equivalent forms of expressions and solving equations and inequalities.

Big Idea #4:
Bivariate data can be modeled with mathematical functions that approximate the data well and help us make predictions based on the data.

Big Idea #5:
Relations and functions are mathematical relationships that can be represented and analyzed using words, tables, graphs, and equations.

Big Idea #6: Families of functions exhibit properties and behaviors that can be recognized across representations. Functions can be transformed, combined, and composed to create new functions in mathematical and real-world situations.

Big Idea #7: Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions.

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Primary Textbook(s) and Supplemental Resources:

- No Primary Textbook is utilized in this course.
- Practice is structured through websites such as College Board and Khan Academy.

Supplemental Resources:
- SAT Prep Online Resources
- TI-84 Plus Graphing calculator
- TI-SmartView for the Smartboard
- Smart notebook gallery essentials
- Software: IXL, Kuta, Desmos etc.
- College Board Website (https://satsuite.collegeboard.org/sat/practice-preparation)
- Khan Academy Website (https://www.khanacademy.org/digital-sat)

Curriculum Plan

UNIT 1: Heart of Algebra   **based on 12 days**

Standard(s):   Common Core State Standards for Mathematics
http://static.pdesas.org/content/documents/PA%20Core%20Standards%20Mathematics%20PreK-12%20March%202014.pdf

Standards Addressed:

CC.2.1. HS.D.1,	CC.2.2.HS.F.4,	CC.2.2.HS.D.7,	CC.2.2.HS.D.9,
CC.2.1.HS.F.2,	CC.2.2.HS.D.2,	CC.2.2.HS.D.8	

Anchors Addressed: A1.2.1.1, A.1.1.2, A.1.1.3

Eligible Content:
- Solve linear equations in one or two variables.
- Solve linear inequalities in one or two variables.
- Solve systems of two linear equations in two variables.
- Create, graph, and use linear functions.
- Use algebraic properties and processes in mathematical situations and apply them to solve real world problems.
- Create and use functions in multiple representations**.**
- Use algebraic properties and processes in mathematical situations and apply them to solve real world problems.
- Write, solve, graph, and interpret linear equations and inequalities to model relationships between quantities.

Objectives: Students will be able to
- **Create, solve, or interpret a linear expression or equation in one variable** that represents a context. The expression or equation will have rational coefficients, and multiple steps may be required to simplify the expression, simplify the equation, or solve for the variable in the equation. (DOK Levels 2 and 3)
- **Create, solve, or interpret a linear inequality in one variable** that represents a context. The inequality will have rational coefficients, and multiple steps may be required to simplify or solve for the variable. (DOK Level 2)
- **Build a linear function that models a linear relationship between two quantities.** The student will describe a linear relationship that models a context using either an equation in two variables or function notation. The equation or function will have rational coefficients, and multiple steps may be required to build and simplify the equation or function. (DOK Level 3)
- **Create, solve, and interpret systems of linear inequalities in two variables.** The student will analyze one or more constraints that exist between two variables by creating, solving, or interpreting either an inequality in two variables or a system of inequalities in two variables to represent a context. Multiple steps may be required either to create

the inequality or system of inequalities or to determine whether a given point is in the solution set. (DOK Levels 2 and 3)

- **Create, solve, and interpret systems of two linear equations in two variables.** The student will analyze one or more constraints that exist between two variables by creating, solving, or analyzing a system of linear equations to represent a context. The equations will have rational coefficients, and multiple steps may be required to simplify or solve the system. (DOK Levels 2 and 3)
- **Algebraically solve linear equations (or inequalities) in one variable.** The equation (or inequality) will have rational coefficients and may require multiple steps to solve for the variable; the equation may yield no solution, one solution, or infinitely many solutions. The student may also be asked to determine the value of a constant or coefficient for an equation with no solution or with infinitely many solutions. (DOK Levels 2 and 3)
- **Algebraically solve systems of two linear equations in two variables.** The equations will have rational coefficients, and the system yields no solution, one solution, or infinitely many solutions. The student may also be asked to determine the value of a constant or coefficient of an equation in which the system has no solution, one solution, or infinitely many solutions. (DOK Level 2)
- **Interpret the variables and constants in expressions for linear functions within the context presented.** The student will make connections between a context and the linear equation that models the context. The students also will identify or describe the real-life meaning of a constant term, a variable, or a feature of the given equation. (DOK Level 4)
- **Understand connections between algebraic and graphical representations.** The student will select a graph described by a given linear equation, select a linear equation that describes a given graph, determine the equation of a line given a verbal description of its graph, determine key features of the graph of a linear function from its equation, or determine how a graph may be affected by a change in its equation. (DOK Levels 3 and 4)

Core Activities and Corresponding Instructional Methods:
1. Expose students' prior knowledge of the real number system, including operations with and properties of real numbers, as well as other pre-algebra skills (simplifying and/or evaluating algebraic expressions).
   - Suggested practice exercises: Khan Academy practice – Foundation level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:algebra-easier
   - Suggested practice exercises: Khan Academy practice – Medium level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:algebra-medium
   - Suggested practice exercises: Khan Academy practice – Advanced level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:algebra-harder
   - Diagnostic assessment, questioning
   - Direct instruction using Smart Technology and online resources such as College Board
   - Guided practice

- Cooperative learning groups
2. Expose students' prior knowledge of irrational numbers as well as perfect squares and the inverse relationship between squaring and taking the square root. Introduce simplifying radicals involving products and quotients. a. Diagnostic assessment, questioning
   - Suggested practice exercises: Khan Academy practice – Foundation level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:algebra-easier
   - Suggested practice exercises: Khan Academy practice – Medium level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:algebra-medium
   - Suggested practice exercises: Khan Academy practice – Advanced level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:algebra-harder
   - Direct instruction using Smart Technology and online resources such as College Board
     - Suggested activity: *Classifying Rational and Irrational Numbers* https://www.map.mathshell.org/lessons.php?collection=8&unit=9105
   - Guided practice
   - Cooperative learning groups
3. Build math language/vocabulary.
   - Teachers will use correct mathematical language to identify algebraic terms and processes.
   - Writing activities incorporating appropriate math language
4. Develop students' skills in solving equations, inequalities (including absolute value), and compound inequalities.
   - Suggested practice exercises: Khan Academy practice – Foundation level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:algebra-easier
   - Suggested practice exercises: Khan Academy practice – Medium level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:algebra-medium
   - Suggested practice exercises: Khan Academy practice – Advanced level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:algebra-harder
   - Direct instruction using Smart Technology and online resources such as College Board
     - Suggested activity: *Solving Linear Equations in Two Variables* https://www.map.mathshell.org/lessons.php?unit=9235&collection=8
   - Guided practice
   - Cooperative learning groups
5. Develop students' ability to solve problems by applying algebraic processes.
   - Suggested practice exercises: Khan Academy practice – Foundation level

- o https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:algebra-easier
- Suggested practice exercises: Khan Academy practice – Medium level
  - o https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:algebra-medium
- Suggested practice exercises: Khan Academy practice – Advanced level
  - o https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:algebra-harder
- Direct instruction using Smart Technology and online resources such as College Board
  - o Suggested activity: *Maximizing Profits – Selling Boomerangs* https://www.map.mathshell.org/lessons.php?unit=9205&collection=8
- Guided practice
- Cooperative learning groups

Extensions:
- Daily Warm-up
- SAT Practice Problems
- Enrichment Worksheets (Khan Academy Website, College Board Website, and Kuta Software)

Assessments:
  Diagnostic:
  - Teacher prepared diagnostic questions
  - Teacher observation
  Formative:
  - Teacher observations, questioning techniques
  - Group activities involving verbal and written justification showing all steps, drawing conclusions, estimating, citing evidence, and developing logical arguments
  - Homework – sets of SAT practice questions
  - Individual, independent quizzes from Unit 1 Topics
  Summative:
  - Common Assessment Quizzes

DELAWARE VALLEY SCHOOL DISTRICT

UNIT 2: Problem Solving and Data Analysis   **based on 11 days**

Standards: Common Core State Standards for Mathematics
    http://static.pdesas.org/content/documents/PA%20Core%20Standards%20Mathematics%20PreK12%20March%202014.pdf

Standards Addressed:

CC.2.2.HS.C.1,	CC.2.2.HS.D.7,	CC.2.4.HS.B.2,	CC.2.4.HS.B.7,
CC.2.2.HS.C.2,	CC.2.2.HS.D.9,	CC.2.4.HS.B.3,	CC.2.4.HS.F.3,
CC.2.2.HS.C.3,	CC.2.2.HS.D.10,	CC.2.4.HS.B.5,	CC.2.2.HS.F.4
CC.2.2.HS.C.6,	CC.2.4.HS.B.1,	CC.2.4.HS.B.6,	

Anchors Addressed: A.1.1.2.1 A.1,1.1.3, A1.2.1.1, A1.2.1.2, A1.2.2.1, A1.2.2.2, A1.2.3.1, A1.2.3.2, A1.2.3.3

Eligible Content
- Ratios, Rates, and Proportions
- Unit conversions
- Percentages
- Center, spread, and shape of distributions
- Data representations: scatter plots, histograms, line plots, pie charts, etc.
- Linear and Exponential Growth
- Probability
- Data inferences and evaluation

Objectives: Students will be able to
- **Use ratios, rates, proportional relationships, and scale drawings to solve single-step and multistep problems.** The students will use a proportional relationship between two variables to solve a multistep problem in order to determine a ratio or rate; calculate a ratio or rate and then solve a multistep problem; or take a given ratio or rate and solve a multistep problem. (DOK Level 2 and 3)
- **Solve single and multistep problems involving percentages.** The student will solve a multistep problem to determine a percentage; calculate a percentage and then solve a multistep problem; or take a given percentage and solve a multistep problem. (DOK Level 1 and 2)
- **Solve single and multistep problems involving measurement quantities, units, and unit conversion.** The student will solve a multistep problem to determine a unit rate; calculate a unit rate and then solve a multistep problem; solve a multistep problem to complete a unit conversion; solve a multistep problem to calculate density; or use the concept of density to solve a multistep problem. (DOK Level 2)
    - **Given a scatterplot, use linear, quadratic, or exponential models to describe how the variables are related.** Given a scatterplot, the student will select the equation of a line

or curve of best fit; interpret the line in the context of the situation; or use the line or curve of best fit to make a prediction. (DOK Level 3)

- **Use the relationship between two variables to investigate key features of the graph.** The student will make connections between the graphical representation of a relationship and the properties of the graph by selecting the graph that represents the properties described, or by using the graph to identify a value or set of values. (DOK Level 3 and 4)
- **Compare linear growth with exponential growth.** The student will infer the connection between two variables given a context in order to determine what type of model fits best. (DOK Level 3)
- **Use two-way tables to summarize categorical data and relative frequencies and calculate conditional probability.** The student will summarize categorical data or use categorical data to calculate conditional frequencies, conditional probabilities, association of variables, or independence of events. (DOK Level 2 and 3)
- **Make inferences about population parameters based on sample data.** The student will estimate a population parameter given the results from a random sample of the population. The sample statistics may mention confidence intervals and measurement error of which the student should understand and make use but need not calculate. (DOK Level 2 and 3)
- **Use statistics to investigate measures of center of data and analyze shape, center, and spread.** The student will calculate measures of central tendency and/or spread for a given set of data or use given statistics to compare two separate sets of data. The measures of central tendency that may be calculated include mean, median, and mode; the measures of spread that may be calculated include range. When comparing two data sets, the student may investigate mean, median, mode, range, and/or standard deviation. (DOK Level 2 and 3)
- **Evaluate reports to make inferences, justify conclusions, and determine appropriateness of data collection methods.** The reports may consist of tables, graphs, or text summaries. (DOK Level 4)

Core Activities and Corresponding Instructional Methods:
1. Expose students' prior knowledge of frequency tables, histograms, and measures of central tendency (mean, median and mode) as well as the range of a data set. a. Diagnostic assessment, questioning
   - Suggested practice exercises: Khan Academy practice – Foundation level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:problem-solving-and-data-analysis-easier
   - Suggested practice exercises: Khan Academy practice – Medium level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:problem-solving-and-data-analysis-medium
   - Suggested practice exercises: Khan Academy practice – Advanced level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:problem-solving-and-data-analysis-harder

- Direct instruction using Smart Technology and online resources such as College Board
  - Suggested activity: *Representing Data with Frequency Graphs*
    https://www.map.mathshell.org/lessons.php?unit=9415&collection=8
- Guided practice
- Cooperative learning groups
2. Build math language/vocabulary.
- Teachers will use appropriate language to discuss data displays and measures of central tendency and variability.
- Writing activities incorporating appropriate math language
3. Develop students' skills in creating and interpreting box-and-whisker plots.
- Suggested practice exercises: Khan Academy practice – Foundation level
  - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:problem-solving-and-data-analysis-easier
- Suggested practice exercises: Khan Academy practice – Medium level
  - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:problem-solving-and-data-analysis-medium
- Suggested practice exercises: Khan Academy practice – Advanced level
  - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:problem-solving-and-data-analysis-harder
- Direct instruction using Smart Technology and online resources such as College Board
  - Suggested activity: *Representing Data with Box Plots*
    https://www.map.mathshell.org/lessons.php?unit=9420&collection=8
- Guided practice
- Cooperative learning groups
4. Develop students' ability to determine theoretical and experimental probabilities including mutually exclusive and overlapping events as well as independent and dependent events.
- Suggested practice exercises: Khan Academy practice – Foundation level
  - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:problem-solving-and-data-analysis-easier
- Suggested practice exercises: Khan Academy practice – Medium level
  - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:problem-solving-and-data-analysis-medium
- Suggested practice exercises: Khan Academy practice – Advanced level
  - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:problem-solving-and-data-analysis-harder
- Direct instruction using Smart Technology and online resources such as College Board
  - Suggested activity: *Evaluating Statements about Probability*
    https://www.map.mathshell.org/lessons.php?unit=7415&collection=8
- Direct instruction using manipulatives such as dice, cards or marbles.

- Guided practice
- Cooperative learning groups

5. Expose students' prior knowledge of the coordinate plane and plotting points. Review   graphing a line using a table of values. Identify and represent patterns that form a line.
    - Suggested practice exercises: Khan Academy practice – foundation level
        - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:problem-solving-and-data-analysis-easier
    - Suggested practice exercises: Khan Academy practice – medium level
        - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:problem-solving-and-data-analysis-medium
    - Suggested practice exercises: Khan Academy practice – advanced level
        - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:problem-solving-and-data-analysis-harder
    - Direct instruction using Smart Technology and online resources such as College Board
        - Suggested activity: *Defining Lines by Points, Slopes, and Equations* https://www.map.mathshell.org/lessons.php?unit=8215&collection=8
    - Guided practice
    - Cooperative learning groups

Extensions:
- Organizing Data using Keystone resources
- Samples and Surveys
- Direct Variation
- Enrichment Worksheets (Khan Academy Website, College Board Website, and Kuta Software)
- Permutations and Combinations
- SAT Practice Problems

Assessments:
Diagnostic:
- Teacher prepared diagnostic questions
- Teacher observation

Formative:
- Teacher observations, questioning techniques
- Group activities involving verbal and written justification showing all steps, drawing conclusions, estimating, citing evidence, and developing logical arguments
- Homework – sets of SAT practice questions
- Individual, independent quizzes from Unit 2 Topics

Summative:
- Common Assessment Quizzes

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UNIT 3: Passport to Advanced Mathematics   **based on 12 days**

Standards: Common Core State Standards for Mathematics

http://static.pdesas.org/content/documents/PA%20Core%20Standards%20Mathematics%20PreK12%20March%202014.pdf

Standards Addressed:

CC.2.1.HS.F.1,	CC.2.1.HS.F.3,	CC.2.1.HS.F.5,	CC.2.2.HS.D.2,
CC.2.1.HS.F.2,	CC.2.1.HS.F.4,	CC.2.2.HS.D.1,	CC.2.2.HS.D.3

Anchors Addressed: A1.1.1.5, A1.1.2.2, A1.1.3.1, A1.1.3.2

Eligible Content
- Quadratic and Polynomial expressions and equations
- Radical and Rational exponents
- Operations with Polynomial and Rational expressions
- Non-linear functions
- Linear and Quadratic systems of equations
- Radical, Rational, and Absolute Value equations
- Quadratic, Polynomial, Exponential, and other non-linear graphs

Objectives: Students will be able to
- **Create a quadratic or exponential function** or equation that models a context. The equation will have rational coefficients and may require multiple steps to simplify or solve the equation. (DOK Level 2)
- **Determine the most suitable form of an expression** or equation to reveal a particular trait, given a context. (DOK Level 3)
- **Create equivalent expressions involving rational exponents** and radicals, including simplifying or rewriting in other forms. (DOK Level 1 and 2)
- **Create an equivalent form of an algebraic expression** by using structure and fluency with operations. (DOK Level 1 and 2)
- **Solve a quadratic equation** having rational coefficients. The equation can be presented in a wide range of forms to require attending to algebraic structure and can require manipulation in order to solve. (DOK Level 2)
- **Add, subtract, and multiply polynomial expressions** and simplify the result. The expressions will have rational coefficients. (DOK Level 2)
- **Solve an equation in one variable that contains radicals or contains the variable in the denominator of a fraction.** The equation will have rational coefficients, and the student may be required to identify when a resulting solution is extraneous. (DOK Level 2 and 3)
- **Solve a system of one linear equation and one quadratic equation.** The equations will have rational coefficients. (DOK Level 2)

- **Rewrite simple rational expressions.** Students will add, subtract, multiply, or divide two rational expressions or divide two polynomial expressions and simplify the result. The expressions will have rational coefficients. (DOK Level 2)
- **Interpret parts of nonlinear expressions in terms of their context.** Students will make connections between a context and the nonlinear equation that models the context to identify or describe the real-life meaning of a constant term, a variable, or a feature of the given equation. (DOK Level 4)
- **Understand the relationship between zeros and factors of polynomials** and use that knowledge to sketch graphs. Students will use properties of factorable polynomials to solve conceptual problems relating to zeros, such as determining whether an expression is a factor of a polynomial based on other information provided. (DOK Level 3)
- **Understand a nonlinear relationship between two variables** by making connections between their algebraic and graphical representations. The student will select a graph corresponding to a given nonlinear equation; interpret graphs in the context of solving systems of equations; select a nonlinear equation corresponding to a given graph; determine the equation of a curve given a verbal description of a graph; determine key features of the graph of a linear function from its equation; or determine the impact on a graph of a change in the defining equation. (DOK Level 4)
- **Use function notation and interpret statements using function notation.** The student will use function notation to solve conceptual problems related to transformations and compositions of functions. (DOK Level 2)
- **Use structure to isolate or identify a quantity of interest** in an expression or isolate a quantity of interest in an equation. The student will rearrange an equation or formula to isolate a single variable or a quantity of interest. (DOK Level 3 and 4)

Core Activities and Corresponding Instructional Methods:
1. Develop students' skills in solving quadratic and exponential equations both graphically and algebraically.
   - Suggested practice exercises: Khan Academy practice – Foundation level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:advanced-math-easier
   - Suggested practice exercises: Khan Academy practice – Medium level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:advanced-math-medium
   - Suggested practice exercises: Khan Academy practice – Advanced level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:advanced-math-harder
   - Direct instruction using Smart Technology and online resources such as College Board
     - Suggested activity: *Representing Quadratic Functions Graphically* https://www.map.mathshell.org/lessons.php?unit=9245&collection=8
- Guided practice
- Cooperative learning groups

2. Develop students' ability to solve real world problems by applying their understanding of functions, equations, and inequalities.
   - Suggested practice exercises: Khan Academy practice – Foundation level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:advanced-math-easier
   - Suggested practice exercises: Khan Academy practice – Medium level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:advanced-math-medium
   - Suggested practice exercises: Khan Academy practice – Advanced level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:advanced-math-harder
   - Direct instruction using Smart Technology and online resources such as College Board
     - Suggested activity: *Building and Solving Complex Equations* https://www.map.mathshell.org/lessons.php?unit=9215&collection=8
   - Guided practice
   - Cooperative learning groups
3. Expose students' prior knowledge of exponents. Guide students to develop the properties of exponents using the definition of an exponent.
   - Suggested practice exercises: Khan Academy practice – Foundation level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:advanced-math-easier
   - Suggested practice exercises: Khan Academy practice – Medium level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:advanced-math-medium
   - Suggested practice exercises: Khan Academy practice – Advanced level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:advanced-math-harder
     - Direct instruction using Smart Technology and online resources such as College Board
     - Suggested activity: *Applying Properties of Exponents* https://www.map.mathshell.org/lessons.php?unit=8110&collection=8
   - Guided practice
   - Cooperative learning groups
4. Build math language/vocabulary, specifically *monomial, binomial, trinomial,* and *polynomial.*
   - Teachers will use appropriate language to identify algebraic terms.
   - Writing activities incorporating appropriate math language
5. Develop students' skills in adding and subtracting polynomials followed by multiplying polynomials (two binomials or a binomial by a trinomial).
   - Suggested practice exercises: Khan Academy practice – Foundation level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:advanced-math-easier

- Suggested practice exercises: Khan Academy practice – Medium level
  - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:advanced-math-medium
- Suggested practice exercises: Khan Academy practice – Advanced level
  - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:advanced-math-harder
- Direct instruction using Smart Technology and online resources such as College Board
  - Suggested activity: *Generating Polynomials from Patterns*
    https://www.map.mathshell.org/lessons.php?unit=9230&collection=8
- Guided practice
- Cooperative learning groups

Extensions:
- Organizing Data using Keystone resources
- Samples and Surveys
- Direct Variation
- Enrichment Worksheets emphasizing word problems and applications (Khan Academy Website, College Board Website, and Kuta Software)
- Permutations and Combinations
- SAT Practice Problems

Assessments:
  Diagnostic:
- Teacher prepared diagnostic questions
- Teacher observation
  Formative:
- Teacher observations, questioning techniques
- Group activities involving verbal and written justification showing all steps, drawing conclusions, estimating, citing evidence, and developing logical arguments
- Homework – sets of SAT practice questions
- Individual, independent quizzes from Unit 3 Topics
  Summative:
- Common Assessment Quizzes

DELAWARE VALLEY SCHOOL DISTRICT

UNIT 4: Additional Topics   **based on 10 days**

Standards: Pennsylvania Core State Standards for Mathematics
   **http://static.pdesas.org/content/documents/PA%20Core%20Standards%20Mathemat
   ics%20PreK12%20March%202014.pdf**

Standards Addressed:

CC.2.1.HS.F.1,	CC.2.2.HS.D3,	CC.2.3.HS.A.3,	CC.2.3.HS.A.12,
CC.2.1.HS.F.2,	CC.2.2.HS.D4,	CC.2.3.HS.A.7,	CC.2.3.HS.A.14
CC.2.2.HS.D1,	CC.2.2.HS.D5,	CC.2.3.HS.A.8,	
CC.2.2.HS.D2,	CC.2.2.HS.D.6,	CC.2.3.HS.A.9,	

Anchors Addressed: A.1.1.1.5, A.1.1.1.3

Eligible Content
   • Area and volume
   • Congruence, similarity, and angle relationships
   • Right Triangle Trigonometry
   • Circle Theorems and Equations
   • Unit Circle Trigonometry

Objectives: Students will be able to
   • **Solve problems using volume formulas.** The student will use given information
     about figures - such as length of a side, area of a face, or volume of a solid - to
     calculate missing information. Any required volume formulas will be provided to
     students either on the formula sheet or within the question. (DOK Level 1 and 2)
   • **Use Trigonometric ratios and the Pythagorean Theorem** to solve applied problems
     involving right triangles. The student will use information about triangle side lengths
     or angles presented in a context to calculate missing information using the
     Pythagorean Theorem and/or Trigonometric ratios. (DOK Level 2)
   • **Add, subtract, multiply, divide, and simplify complex numbers**. (DOK Level 1 and 2)
   • **Convert between degrees and radians and use radians to determine arc lengths;
     use Trigonometric functions of radian measure.** The student will convert between
     angle measures in degrees and radians in order to calculate arc lengths by
     recognizing the relationship between an angle measured in radians and an arc
     length, evaluating trigonometric functions of angles in radians. (DOK Level 2)
   • **Apply theorems about circles to find arc lengths, angle measures, chord lengths,
     and areas of sectors.** The student will use given information about circles and lines
     to calculate missing values for radius, diameter, chord length, angle, arc, and sector
     area. (DOK Level 3)
   • **Use concepts and theorems about congruence and similarity to solve problems
     about lines, angles, and triangles.** The student will use theorems about triangles and

intersecting lines to determine missing lengths and angle measures of triangles. The student may also be asked to provide a missing length or angle to satisfy a given theorem. (DOK Level 3)

- **Use the relationship between similarity, right triangles, and trigonometric ratios; use the relationship between sine and cosine of complementary angles.** The student will use Trigonometry and theorems about triangles and intersecting lines to determine missing lengths and angle measures of right triangles. The student may also be asked to provide a missing length or angle that would satisfy a given theorem. (DOK Level 2)

- **Create or use an equation in two variables to solve a problem about a circle in the coordinate plane.** The student will create an equation or use properties of an equation of a circle to demonstrate or determine a property of the circle's graph. (DOK Level 2 and 3)

Core Activities and Corresponding Instructional Methods:
1. Develop students' ability to solve problems using formulas, such as volume, area and perimeter.
   - Suggested practice exercises: Khan Academy practice – Foundation level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:geometry-and-trigonometry-easier
   - Suggested practice exercises: Khan Academy practice – Medium level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:geometry-and-trigonometry-medium
   - Suggested practice exercises: Khan Academy practice – Advanced level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:geometry-and-trigonometry-harder
   - Direct instruction using Smart Technology and online resources such as College Board
     - Suggested activity: *Estimating Volume – The Money Munchers* https://www.map.mathshell.org/lessons.php?unit=7315&collection=8
   - Guided practice
   - Cooperative learning groups
2. Develop students' ability to solve applications by using Trigonometric ratios
   - Suggested practice exercises: Khan Academy practice – Foundation level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:geometry-and-trigonometry-easier
   - Suggested practice exercises: Khan Academy practice – Medium level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:geometry-and-trigonometry-medium
   - Suggested practice exercises: Khan Academy practice – Advanced level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:geometry-and-trigonometry-harder

- Direct instruction using Smart Technology and online resources such as College Board
  - Suggested activity: *Exact Value of Trig Functions Leap-frog Game* https://mathequalslove.net/trig-leap-frog-game/
- Guided practice
- Cooperative learning groups

3. Develop students' skills in adding, subtracting, multiplying and dividing complex numbers
   - Suggested practice exercises: Khan Academy practice – Foundation level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:geometry-and-trigonometry-easier
   - Suggested practice exercises: Khan Academy practice – Medium level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:geometry-and-trigonometry-medium
   - Suggested practice exercises: Khan Academy practice – Advanced level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:geometry-and-trigonometry-harder
   - Direct instruction using Smart Technology and online resources such as College Board
     - Suggested activity: *Complex Number Battleship* https://teaching.betterlesson.com/lesson/491418/complex-number-battleship
   - Guided practice
   - Cooperative learning groups

4. Build math language/vocabulary.
   - Teachers will use appropriate language to identify Algebraic terms and processes.
   - Writing activities incorporating appropriate math language

5. Develop students' ability to solve equations involving right triangles and trigonometric ratios
   - Suggested practice exercises: Khan Academy practice – Foundation level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:geometry-and-trigonometry-easier
   - Suggested practice exercises: Khan Academy practice – Medium level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:geometry-and-trigonometry-medium
   - Suggested practice exercises: Khan Academy practice – Advanced level
     - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:geometry-and-trigonometry-harder
   - Direct instruction using Smart Technology and online resources such as College Board
     - Suggested activity: *Trig Equations Punch-card Activity* https://mathequalslove.net/monday-must-reads-volume-2/#Punch_Cards_Review_Activity

- Guided practice
- Cooperative learning groups
6. Expose students' prior knowledge of circles to solve arc length and area problems.
    - Suggested practice exercises: Khan Academy practice – Foundation level
        - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:geometry-and-trigonometry-easier
    - Suggested practice exercises: Khan Academy practice – Medium level
        - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:geometry-and-trigonometry-medium
    - Suggested practice exercises: Khan Academy practice – Advanced level
    - Direct instruction using Smart Technology and online resources such as College Board
        - https://www.khanacademy.org/test-prep/v2-sat-math/x0fcc98a58ba3bea7:geometry-and-trigonometry-harder
        - Suggested activity: *Calculating Arcs and Areas of Sectors and Circles* https://www.map.mathshell.org/lessons.php?unit=9360&collection=8
    - Guided practice
    - Cooperative learning groups

Extensions:
- Organizing Data using Keystone resources
- Samples and Surveys
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- Enrichment Worksheets emphasizing word problems and applications (Khan Academy Website, College Board Website, and Kuta Software)
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Summative:
- Common Assessment Quizzes
- Khan Academy Summative Course Challenge:
    - https://www.khanacademy.org/test-prep/v2-sat-math/test/x0fcc98a58ba3bea7:course-challenge
- College Board SAT exam