



Nancy S. Grasmick
State Superintendent of Schools

200 West Baltimore Street, Baltimore, MD 21201 410-767-0100 410-333-6442 TTY/TDD

Maryland's State Curriculum - High School Mathematics

All high school students in the 21st century need to be mathematically competent and confident problem solvers if they are going to be able to be successful after graduation. The goal of the Maryland State Curriculum for High School Mathematics for College and Workplace Readiness is to provide high school students access to a curriculum that will achieve this goal by preparing graduating seniors for the first credit-bearing mathematics course in college and/or preparing them for employment in high-performance, high-growth jobs.

The Algebra/Data Analysis and Geometry State Curricula are divided into three columns:

- Identified prerequisites from the State Curriculum for Mathematics 3-8
- Algebra/Data Analysis or Geometry Core Learning Goals (CLG)
- Additional Topics

The first column, devoted to the State Curriculum 3-8 curriculum, includes the prerequisite knowledge for students prior to their studying the Algebra/Data Analysis or Geometry curriculum. The second column contains the Core Learning Goals (CLG). All students must successfully complete an Algebra/Data Analysis course and a Geometry course in which the CLG are a part of the curriculum. The Algebra/Data Analysis CLG are assessed on the High School Assessment, a requirement for a high school diploma. The Algebra/Data Analysis High School Assessment also provides the data used to produce a school's Adequate Yearly Progress required by the No Child Left Behind Act. The third column includes additional topics for this course. The format of three columns is designed to assist teachers in seeing the connections between the State Curriculum 3-8, CLG, and additional topics. Information concerning instruction and assessment of the curriculum in the Algebra/Data Analysis and Geometry Core Learning Goals can be found at <http://www.mdk12.org/instruction/curriculum/mathematics>

The Algebra II State Curriculum (State Curriculum AII) is divided into two columns:

- Algebra II Core Content
- Additional topics

The first column is comprised of an edited version of the Bridge Goals that was prepared during 1996-2000 by a group of Maryland's high school and college mathematics teachers. The edited version also includes content contained in the American Diploma Project Algebra II curriculum. The goal of the State Curriculum AII is for students to be prepared to enter successfully into a credit-bearing college mathematics course.

As an integral part of the learning and assessment of mathematics in Maryland, students are expected to be able to communicate mathematically by explaining how they arrive at a solution to a given problem, and to justify the correctness of their solution. Where appropriate, justifications may be given in the form of an algebraic or geometric proof. In addition, the processes of problem solving and reasoning should be integral to the mathematics curriculum. Formative and summative assessments should reflect the instruction while addressing the various levels of cognitive demand in mathematics. Real-world applications and connections to other disciplines are critical to all mathematics, and should be included throughout the mathematics curriculum. Note that specific applications are not included in these documents. This is a deliberate decision to avoid an unintentional narrowing of the instruction. Examples of applications may be found in public release items at http://www.mdk12.org/instruction/curriculum/mathematics/clg_toolkit.html

Technology – in the form of graphing calculators, computers and appropriate software-- is vital to the study of mathematics, and should be used to enhance students' understanding of various mathematics subject matter. Technology should be employed when it can enhance students' understanding without diminishing mental mathematics and estimation skills.

Maryland's State Curriculum for High School Mathematics will help teachers provide instruction in mathematics that enables students to view mathematics as an understandable, useful, and enjoyable subject.

State Curriculum - Algebra/Data Analysis

Pre-requisites Summarized from State Curriculum Mathematics Grades 3 – 8	Algebra/Data Analysis State Curriculum	
	CLG 1 The student will demonstrate the ability to investigate, interpret, and communicate solutions to mathematical and real-world problems using patterns, functions and algebra.	Additional Topics Would Include
<p>Standard 1.0 Knowledge of Algebra, Patterns, or Functions</p> <p>A1 Identify, describe, extend and create patterns, functions and sequences. Grades 3 – 8</p> <ul style="list-style-type: none"> • Complete, create, extend and interpret function tables • Write a rule for a function table <p>Grades 6 – 8</p> <ul style="list-style-type: none"> • Identify, describe, extend and determine recursive arithmetic and geometric sequences <p>A2 Identify, describe, extend, analyze or create non-numeric growing or repeating patterns Grades 3 & 4</p> <ul style="list-style-type: none"> • Represent, analyze and create patterns • Generate a rule for a pattern <p>C2 Generalize linear relationships Grades 6 – 8</p> <ul style="list-style-type: none"> • Identify and describe the change represented in a graph or table • Determine the slope of a linear relationship in a graph, table or equation <p>Standard 6.0 Knowledge of Number Relationships or Computations</p> <p>A1 Apply knowledge of rational numbers and place value Grade 8</p> <ul style="list-style-type: none"> • Compare, order and describe positive rational numbers <p>C1 Analyze number relations and compute Grades 7 & 8</p> <ul style="list-style-type: none"> • Add, subtract, multiply and divide integers • Add, subtract, multiply and divide fractions and mixed numbers 	<p>1.1 The student will analyze a wide variety of patterns and functional relationships using the language of mathematics and appropriate technology.</p> <p>1.1.1 The student will recognize, describe and/or extend patterns and functional relationships that are expressed numerically, algebraically, and/or geometrically.</p> <p style="text-align: center;"><u>Assessment Limits</u></p> <ul style="list-style-type: none"> ➤ The given pattern must represent a relationship of the form $y = mx + b$ (linear), $y = x^2 + c$ (simple quadratic), $y = x^3 + c$ (simple cubic), simple arithmetic progression, or simple geometric progression with all exponents being positive. ➤ The student will not be asked to draw three-dimensional figures. ➤ Algebraic description of patterns is in indicator 1.1.2 <p style="text-align: center;"><u>Skill Statement</u></p> <ul style="list-style-type: none"> ➤ Given a narrative, numeric, algebraic, or geometric representation description of a pattern or functional relationship, the student will give a verbal description, or predict the next term or a specific term in a pattern or functional relationship. ➤ Given a numerical or graphical representation of a relation, the student will identify if the relation is a function and/or describe it. 	<p>Functions and relations</p> <p>1.1.1.1 The student will define and interpret relations and functions numerically, graphically, and algebraically.</p> <p>1.1.1.2 The student will use patterns of change in function tables to develop the concept of rate of change.</p> <p>Scientific Notation</p> <p>1.1.1.3 The student will multiply and divide numbers expressed in scientific notation.</p> <p>Rational numbers</p> <p>1.1.1.4 The student will read, write and represent rational numbers.</p> <p>1.1.1.5 The student will compare, order and describe rational numbers.</p> <p>1.1.1.6 The student will add, subtract, multiply and divide rational numbers.</p> <p>Exponential patterns</p> <p>1.1.1.7 The student will identify and extend an exponential pattern in a table of values.</p>

State Curriculum - Algebra/Data Analysis

Pre-requisites Summarized from State Curriculum Mathematics Grades 3 – 8	Algebra/Data Analysis State Curriculum	
	CLG 1 The student will demonstrate the ability to investigate, interpret, and communicate solutions to mathematical and real-world problems using patterns, functions and algebra.	Additional Topics Would Include
<p>Standard 1.0 Knowledge of Algebra, Patterns, or Functions</p> <p>A1 Identify, describe, extend and create patterns, functions and sequences Grades 3 – 8</p> <ul style="list-style-type: none"> • Complete, create, extend and interpret function tables • Write a rule for a function table <p>Grades 6 – 8</p> <ul style="list-style-type: none"> • Identify, describe, extend and determine recursive arithmetic and geometric sequences <p>A2 Identify, describe, extend, analyze or create non-numeric growing or repeating patterns Grades 3 & 4</p> <ul style="list-style-type: none"> • Represent, analyze and create patterns • Generate a rule for a pattern <p>B1 Write, simplify and evaluate expressions Grades 3 – 8</p> <ul style="list-style-type: none"> • Write, identify, and evaluate algebraic expressions <p>Grade 8</p> <ul style="list-style-type: none"> • Describe a real-world situation represented by an algebraic expressions <p>B2 Identify, write, solve and apply equations and inequalities Grades 6 – 8</p> <ul style="list-style-type: none"> • Write equations to represent relationship that may describe real-world problems <p>C1 Locate points on a number line and a coordinate graph Grades 4 – 8</p> <ul style="list-style-type: none"> • Graph order pairs in a coordinate plane <p>Grades 6 – 8</p> <ul style="list-style-type: none"> • Graph linear equations in a coordinate plane <p>C2 Analyze linear relationships Grade 6</p> <ul style="list-style-type: none"> • Translate the graph of a linear relationship onto a table of values 	<p>1.1 The student will analyze a wide variety of patterns and functional relationships using the language of mathematics and appropriate technology.</p> <p>1.1.2 The student will represent patterns and/or functional relationships in a table, as a graph, and/or by mathematical expression.</p> <p style="text-align: center;"><u>Assessment Limits</u></p> <p>➤ The given pattern must represent a relationship of the form $mx + b$ (linear), x^2 (simple quadratic), simple arithmetic progression, or simple geometric progression with all exponents being positive.</p> <p style="text-align: center;"><u>Skill Statement</u></p> <p>Given a narrative description, algebraic expression, graph or table, the student will produce a graph, table, algebraic expression of the form $mx + b$ (linear) or x^2 (simple quadratic), or equation.</p>	<p>Exponential Function</p> <p>1.1.2.1 The student will be able to graph an exponential function given as a table of values or as an equation of the form $y = a(b^x)$, where a is a positive integer, $b > 0$ and $b \neq 1$.</p>

State Curriculum - Algebra/Data Analysis

Pre-requisites Summarized from State Curriculum Mathematics Grades 3 – 8	Algebra/Data Analysis State Curriculum	
	CLG 1 The student will demonstrate the ability to investigate, interpret, and communicate solutions to mathematical and real-world problems using patterns, functions and algebra.	Additional Topics Would Include
<p>Standard 6.0 Knowledge of Number Relationships or Computations</p> <p>C1 Analyze number relations and compute Grades 7 & 8</p> <ul style="list-style-type: none"> • Add, subtract, multiply and divide integers • Add, subtract, multiply and divide fractions and mixed numbers 	<p>1.1 The student will analyze a wide variety of patterns and functional relationships using the language of mathematics and appropriate technology.</p> <p>1.1.2 The student will represent patterns and/or functional relationships in a table, as a graph, and/or by mathematical expression.</p> <p style="text-align: center;"><u>Assessment Limits</u></p> <p>➤ The given pattern must represent a relationship of the form $mx + b$ (linear), x^2 (simple quadratic), simple arithmetic progression, or simple geometric progression with all exponents being positive.</p> <p style="text-align: center;"><u>Skill Statement</u></p> <p>Given a narrative description, algebraic expression, graph or table, the student will produce a graph, table, algebraic expression of the form $mx + b$ (linear) or x^2 (simple quadratic), or equation.</p>	

State Curriculum - Algebra/Data Analysis

Pre-requisites Summarized from State Curriculum Mathematics Grades 3 – 8	Algebra/Data Analysis State Curriculum	
	CLG 1 The student will demonstrate the ability to investigate, interpret, and communicate solutions to mathematical and real-world problems using patterns, functions and algebra.	Additional Topics Would Include
<p>Standard 1.0 Knowledge of Algebra, Patterns, or Functions</p> <p>B1 Write, simplify and evaluate expressions Grades 6 – 8</p> <ul style="list-style-type: none"> • Write, evaluate and simplify algebraic expressions • Evaluate numeric expressions using the order of operations <p>Grade 8</p> <ul style="list-style-type: none"> • Describe a real-world situation represented by an algebraic expressions <p>Standard 6.0 Knowledge of Number Relationships or Computations</p> <p>C1 Analyze number relations or compute Grades 7 & 8</p> <ul style="list-style-type: none"> • Add, subtract, multiply and divide integers • Add, subtract, multiply and divide fractions and mixed numbers • Calculate powers of integers and square roots of perfect square whole numbers • Identify and use the laws of exponents to simplify expressions • Use properties of addition and multiplication to simplify expressions 	<p>1.1 The student will analyze a wide variety of patterns and functional relationships using the language of mathematics and appropriate technology.</p> <p>1.1.3 The student will apply addition, subtraction, multiplication, and/or division of algebraic expressions to mathematical and real-world problems.</p> <p style="text-align: center;"><u>Assessment Limit</u></p> <ul style="list-style-type: none"> ➤ The algebraic expression is a polynomial in one variable. ➤ The polynomial is not simplified. <p style="text-align: center;"><u>Skill Statement</u></p> <p>The student will represent a situation as a sum, difference, product, and/or quotient in one variable.</p>	<p>Absolute Value</p> <p>1.1.3.1 The student will locate the position of a number on the number line, know its distance from the origin is its absolute value and know that the distance between two numbers on the number line is the absolute value of their difference.</p> <p>1.1.3.2 The student will evaluate expressions containing absolute value.</p> <p>Polynomial expressions in one or two variables</p> <p>1.1.3.3 The student will add, subtract, and multiply polynomials.</p> <p>1.1.3.4 The student will divide a polynomial by a monomial.</p> <p>1.1.3.5 The student will factor polynomials:</p> <ul style="list-style-type: none"> ➤ Using greatest common factor ➤ Using the form $ax^2 + bx + c$ ➤ Using special product patterns <ol style="list-style-type: none"> 1. Difference of squares $a^2 - b^2 = (a - b)(a + b)$ 2. Perfect square trinomial $a^2 + 2ab + b^2 = (a + b)^2$ $a^2 - 2ab + b^2 = (a - b)^2$ <p>1.1.3.6 The student will use the laws of exponents, including negative exponents, to simplify expressions.</p> <p>Radicals</p> <p>1.1.3.7 The student will simplify radical expressions with or without variables.</p>

State Curriculum - Algebra/Data Analysis

Pre-requisites Summarized from State Curriculum Mathematics Grades 3 – 8	Algebra/Data Analysis State Curriculum	
	CLG 1 The student will demonstrate the ability to investigate, interpret, and communicate solutions to mathematical and real-world problems using patterns, functions and algebra.	Additional Topics Would Include
<p>Standard 1.0 Knowledge of Algebra, Patterns, or Functions</p> <p>A1 Identify, describe, extend, and create patterns, functions, and sequences Grade 8</p> <ul style="list-style-type: none"> • Determine whether functions are linear or nonlinear when represented in words, in a table, symbolically, or in a graph <p>C1 Locate points on a number line and in a coordinate graph Grades 3 – 8</p> <ul style="list-style-type: none"> • Represent rational numbers on the number line and on the coordinate plane <p>C2 Analyze linear relationships Grade 6</p> <ul style="list-style-type: none"> • Identify and describe the change represented in a graph <p>Grade 8</p> <ul style="list-style-type: none"> • Determine the slope of a graph in a linear relationship 	<p>1.1 The student will analyze a wide variety of patterns and functional relationships using the language of mathematics and appropriate technology.</p> <p>1.1.4 The student will describe the graph of a non-linear function and discuss its appearance in terms of the basic concepts of maxima and minima, zeros (roots), rate of change, domain and range, and continuity.</p> <p style="text-align: center;"><u>Assessment Limits</u></p> <ul style="list-style-type: none"> ➤ A coordinate graph will be given with easily read coordinates. ➤ “Zeros” refers to the x-intercepts of a graph, “roots” refers to the solution of an equation in the form $p(x) = 0$. ➤ Problems will not involve a real-world context. <p style="text-align: center;"><u>Skill Statement</u></p> <p>Given the graph of a non-linear function, the student will identify maxima/minima, zeros, rate of change over a given interval (increasing/decreasing), domain and range, or continuity.</p>	<p>Non-Linear Functions</p> <p>1.1.4.1 The student will describe the graph of the quadratic, exponential, absolute value, piece-wise, and step functions.</p> <p>1.1.4.2 The student will solve quadratic equations by factoring and graphing.</p>

State Curriculum - Algebra/Data Analysis

Pre-requisites Summarized from State Curriculum Mathematics Grades 3 – 8	Algebra/Data Analysis State Curriculum	
	CLG 1 The student will demonstrate the ability to investigate, interpret, and communicate solutions to mathematical and real-world problems using patterns, functions and algebra.	Additional Topics Would Include
<p>Standard 1.0 Knowledge of Algebra, Patterns, or Functions</p> <p>A1 Identify, describe, extend, and create numeric patterns and functions Grades 3 – 5</p> <ul style="list-style-type: none"> • Create and complete function tables <p>Grades 6 – 8</p> <ul style="list-style-type: none"> • Interpret and write a rule for function tables <p>Grade 8</p> <ul style="list-style-type: none"> • Determine whether functions are linear or nonlinear when represented in words, in a table, symbolically, or in a graph <p>B2 Identify, write, solve, and apply equations and inequalities Grades 3 – 8</p> <ul style="list-style-type: none"> • Solve linear equations <p>C1 Locate points on a number line and in a coordinate graph Grades 4 – 8</p> <ul style="list-style-type: none"> • Graph using a coordinate plane <p>Grades 7 & 8</p> <ul style="list-style-type: none"> • Graph linear equations in a coordinate plane <p>C2 Analyze linear relationships Grades 6 – 8</p> <ul style="list-style-type: none"> • Determine the slope of a linear relationship in a graph, table or equation 	<p>1.2 The student will model and interpret real-world situations using the language of mathematics and appropriate technology.</p> <p>1.2.1 The student will determine the equation for a line, solve linear equations, and/or describe the solutions using numbers, symbols, and/or graphs.</p> <p style="text-align: center;"><u>Assessment Limits</u></p> <ul style="list-style-type: none"> ➤ Functions are to have no more than two variables with rational coefficients. ➤ Linear equations will be given in the form: $Ax + By = C$, $Ax + By + C = 0$, or $y = mx + b$. ➤ Vertical lines are included. ➤ The majority of these items should be in real-world context. <p style="text-align: center;"><u>Skill Statement</u></p> <p>Given one or more of the following:</p> <ul style="list-style-type: none"> ➤ the graph of a line ➤ written description of a situation that can be modeled by a linear function ➤ two or more collinear points ➤ a point and slope <p>the student will do one or more of the following:</p> <ul style="list-style-type: none"> ➤ write the equation ➤ solve a one-variable equation for the unknown ➤ solve a two-variable equation for one of the variables ➤ graph the resulting equation ➤ interpret the solution in light of the context ➤ evaluate the equation for a given value ➤ create a table of values ➤ find and/or interpret the slope (rate of change) and/or intercepts in relation to the context. <p>Any correct form of a linear equation will be acceptable as a response.</p>	

State Curriculum - Algebra/Data Analysis

Pre-requisites Summarized from State Curriculum Mathematics Grades 3 – 8	Algebra/Data Analysis State Curriculum	
	CLG 1 The student will demonstrate the ability to investigate, interpret, and communicate solutions to mathematical and real-world problems using patterns, functions and algebra.	Additional Topics Would Include
<p>Standard 1.0 Knowledge of Algebra, Patterns, or Functions</p> <p>B2 Identify, write, solve, and apply equations and inequalities Grades 3 – 8</p> <ul style="list-style-type: none"> • Solve linear equations <p>Grades 3 – 5</p> <ul style="list-style-type: none"> • Represent numerical inequalities <p>Grades 6 – 8</p> <ul style="list-style-type: none"> • Write inequalities to represent relationships and solve <p>C1 Locate points on a number line and in a coordinate graph Grades 4 – 8</p> <ul style="list-style-type: none"> • Graph using a coordinate plane <p>Grades 7 & 8</p> <ul style="list-style-type: none"> • Graph linear equations in a coordinate plane 	<p>1.2 The student will model and interpret real-world situations using the language of mathematics and appropriate technology.</p> <p>1.2.2 The student will solve linear inequalities and describe the solutions using numbers, symbols, and/or graphs.</p> <p style="text-align: center;"><u>Assessment Limits</u></p> <ul style="list-style-type: none"> ➤ Inequalities will have no more than two variables with rational coefficients. ➤ Acceptable forms of the problem or solution are the following: $Ax + By < C$, $Ax + By \leq C$, $Ax + By > C$, $Ax + By \geq C$, $Ax + By + C < 0$, $Ax + By + C \leq 0$, $Ax + By + C > 0$, $Ax + By + C \geq 0$, $y < mx + b$, $y \leq mx + b$, $y \geq mx + b$, $y > mx + b$, $y < b$, $y \leq b$, $y > b$, $y \geq b$, $x < b$, $x \leq b$, $x > b$, $x \geq b$, $a \leq x \leq b$, $a < x < b$, $a \leq x < b$, $a < x \leq b$, $a \leq x + c \leq b$, $a < x + c < b$, $a \leq x + c < b$, $a < x + c \leq b$. ➤ The majority of these items should be in real-world context. ➤ Systems of linear inequalities will not be included. ➤ Compound inequalities will be included. ➤ Disjoint inequalities will not be included. ➤ Absolute value inequalities will not be included. <p style="text-align: center;"><u>Skill Statement</u></p> <ul style="list-style-type: none"> ➤ Given a linear inequality in narrative, algebraic, or graphical form, the student will graph the inequality, write an inequality and/or solve it, or interpret an inequality in the context of the problem. <p>Any correct form of a linear inequality will be an acceptable response.</p>	<p>Systems of Linear Inequalities</p> <p>1.2.2.1 The student will graph systems of linear inequalities and apply their solution to real-world applications.</p>

State Curriculum - Algebra/Data Analysis

Pre-requisites Summarized from State Curriculum Mathematics Grades 3 – 8	Algebra/Data Analysis State Curriculum	
	CLG 1 The student will demonstrate the ability to investigate, interpret, and communicate solutions to mathematical and real-world problems using patterns, functions and algebra.	Additional Topics Would Include
<p>Standard 1.0 Knowledge of Algebra, Patterns, or Functions</p> <p>A1 Identify, describe, extend, and create numeric patterns and functions Grades 3 – 5</p> <ul style="list-style-type: none"> • Create and complete function tables <p>Grades 6 – 8</p> <ul style="list-style-type: none"> • Interpret and write a rule for function tables <p>Grade 8</p> <ul style="list-style-type: none"> • Determine whether functions are linear or nonlinear when represented in words, in a table, symbolically, or in a graph <p>B2 Identify, write, solve, and apply equations and inequalities Grades 3 – 8</p> <ul style="list-style-type: none"> • Solve linear equations <p>C1 Locate points on a number line and in a coordinate graph Grades 4 – 8</p> <ul style="list-style-type: none"> • Graph using a coordinate plane <p>Grades 7 & 8</p> <ul style="list-style-type: none"> • Graph linear equations in a coordinate plane 	<p>1.2 The student will model and interpret real-world situations using the language of mathematics and appropriate technology.</p> <p>1.2.3 The student will solve and describe using numbers, symbols, and/or graphs if and where two straight lines intersect.</p> <p style="text-align: center;"><u>Assessment Limits</u></p> <ul style="list-style-type: none"> ➤ Functions will be of the form: $Ax + By = C$, $Ax + By + C = 0$, or $y = mx + b$. ➤ All coefficients will be rational. ➤ Vertical lines will be included. ➤ Systems of linear functions will include coincident, parallel, or intersecting lines. ➤ The majority of these items should be in real-world context. <p style="text-align: center;"><u>Skill Statement</u></p> <p>Given one or more of the following:</p> <ul style="list-style-type: none"> ➤ a narrative description ➤ the graph of two lines ➤ equations for two lines <p>the student will do one or more of the following:</p> <ul style="list-style-type: none"> ➤ determine the system of equations and/or its solution ➤ describe the relationship of the points on one line with points on the other line ➤ give the meaning of the point of intersection in the context of the problem ➤ graph the system, determine the solution and interpret the solution in the context of the problem ➤ use slope to recognize the relationship between parallel lines. <p>Any correct form of a linear equation will be an acceptable response.</p>	<p>Parallel and Perpendicular Lines</p> <p>1.2.3.1 The student will determine if two lines in a plane are parallel, perpendicular, or neither.</p>

State Curriculum - Algebra/Data Analysis

Pre-requisites Summarized from State Curriculum Mathematics Grades 3 – 8	Algebra/Data Analysis State Curriculum	
	CLG 1 The student will demonstrate the ability to investigate, interpret, and communicate solutions to mathematical and real-world problems using patterns, functions and algebra.	Additional Topics Would Include
<p>Standard 1.0 Knowledge of Algebra, Patterns, or Functions</p> <p>A1 Identify, describe, extend, and create patterns, functions, and sequences Grade 8</p> <ul style="list-style-type: none"> • Determine whether functions are linear or nonlinear when represented in words, in a table, symbolically, or in a graph <p>C1 Locate points on a number line and in a coordinate graph Grades 3 – 8</p> <ul style="list-style-type: none"> • Represent rational numbers on a number line and on a coordinate plane <p>C2 Analyze linear relationships Grade 6</p> <ul style="list-style-type: none"> • Identify and describe the change represented in a graph <p>Grade 8</p> <ul style="list-style-type: none"> • Determine the slope of a graph in a linear relationship 	<p>1.2 The student will model and interpret real-world situations using the language of mathematics and appropriate technology.</p> <p>1.2.4 The student will describe how the graphical model of a non-linear function represents a given problem and will estimate the solution.</p> <p style="text-align: center;"><u>Assessment Limits</u></p> <ul style="list-style-type: none"> ➤ The problem is to be in a real-world context. ➤ The function will be represented by a graph. ➤ The equation of the function may be given. ➤ The features of the graph may include maxima/minima, zeros (roots), rate of change over a given interval (increasing/decreasing), continuity, or domain and range. ➤ “Zeros” refers to the x-intercepts of a graph, “roots” refers to the solution of an equation in the form $p(x) = 0$. ➤ Functions may include step, absolute value, or piece-wise functions. <p style="text-align: center;"><u>Skill Statement</u></p> <p>Given a graph which represents a real-world situation, the student will describe the graph and/or explain how the graph represents the problem or solution and/or estimate a solution.</p>	<p>Quadratic and Exponential Functions</p> <p>1.2.4.1 The student will describe the graph of the quadratic and exponential functions.</p> <p>1.2.4.2 The student will identify horizontal and vertical asymptotes given the graph of a non-linear function.</p> <p>1.2.4.3 The student will solve, by factoring or graphing, real-world problems that can be modeled using a quadratic equation.</p>

State Curriculum - Algebra/Data Analysis

Pre-requisites Summarized from State Curriculum Mathematics Grades 3 – 8	Algebra/Data Analysis State Curriculum	
	CLG 1 The student will demonstrate the ability to investigate, interpret, and communicate solutions to mathematical and real-world problems using patterns, functions and algebra.	Additional Topics Would Include
<p>Standard 1.0 Knowledge of Algebra, Patterns, or Functions</p> <p>B2 Identify, write, solve, and apply equations and inequalities Grades 6 – 8</p> <ul style="list-style-type: none"> • Apply formulas to problem solving 	<p>1.2 The student will model and interpret real-world situations using the language of mathematics and appropriate technology.</p> <p>1.2.5 The student will apply formulas and/or use matrices (arrays of numbers) to solve real-world problems.</p> <p style="text-align: center;"><u>Assessment Limits</u></p> <ul style="list-style-type: none"> ➤ Formulas will be provided in the problem or on the reference sheet. ➤ Formulas may express linear or non-linear relationships. ➤ The students will be expected to solve for first degree variables only. ➤ Matrices will represent data in tables. ➤ Matrix addition, subtraction, and/or scalar multiplication may be necessary. ➤ Inverse and determinants of matrices will not be required. <p style="text-align: center;"><u>Skill Statement</u></p> <ul style="list-style-type: none"> ➤ Given a formula, students will substitute values, solve, and interpret solutions in the context of a problem. ➤ Given matrices, the students will perform operations and interpret solutions in real-world contexts. 	<p>Literal Equations</p> <p>1.2.5.1 The student will solve literal equations for a specified variable.</p>

State Curriculum - Algebra/Data Analysis

Pre-requisites Summarized from State Curriculum Mathematics Grades 3 – 8	Algebra/Data Analysis State Curriculum	
	CLG 3 The student will demonstrate the ability to apply probability and statistical methods for representing and interpreting data and communicating results, using technology when needed.	Additional Topics Would Include
<p>Standard 4.0 Knowledge of Statistics</p> <p>A1 Collect, organize, and display data Grades 3 – 5</p> <ul style="list-style-type: none"> • Collect data by conducting surveys to answer a question <p>Grades 3 – 8</p> <ul style="list-style-type: none"> • Organize and display data using frequency tables, line plot, back-to-back stem-and-leaf plots, and circle graphs <p>Grade 5</p> <ul style="list-style-type: none"> • Determine the appropriate type of graph to display data <p>Standard 5.0 Knowledge of Probability</p> <p>A1 Identify a sample space Grades 3, 5, & 7</p> <ul style="list-style-type: none"> • Determine the number of outcomes in a sample space for independent events <p>Grade 8</p> <ul style="list-style-type: none"> • Describe the difference between independent and dependent events <p>B1 Determine the probability of one or two events comprised of equally likely outcomes Grades 3 – 8</p> <ul style="list-style-type: none"> • Express the probability of an event as a fraction, decimal, or percent <p>C1 Analyze the results of a survey or simulation Grades 6 – 8</p> <ul style="list-style-type: none"> • Make predictions and express the probability of the results as a fraction, decimal, or percent • Conduct a probability experiment 	<p>3.1 The student will collect, organize, analyze, and present data.</p> <p>3.1.1 The student will design and/or conduct an investigation that uses statistical methods to analyze data and communicate results.</p> <p style="text-align: center;"><u>Assessment Limits</u></p> <ul style="list-style-type: none"> ➤ The student will design investigations stating how data will be collected and justify the method. ➤ Types of investigations may include: simple random sampling, representative sampling, and probability simulations. ➤ Probability simulations may include the use of spinners, number cubes, or random number generators. ➤ In simple random sampling each member of the population is equally likely to be chosen and the members of the sample are chosen independently of each other. Sample size will be given for these investigations. <p style="text-align: center;"><u>Skill Statement</u></p> <ul style="list-style-type: none"> ➤ The student will design an investigation and justify their design. ➤ The students will describe how they would do an investigation, select a sampling technique and justify their choice ➤ The student will demonstrate an understanding of the concepts of bias, sample size, randomness, representative samples, and simple random sampling techniques. 	<p>Data Display</p> <p>3.1.1.1 The student will organize and display data to detect patterns and departures from patterns. One example of an appropriate method for displaying data is a spreadsheet.</p> <p>Observational Studies</p> <p>3.1.1.2 The student will communicate the differences between randomized experiments and observational studies.</p>

State Curriculum - Algebra/Data Analysis

Pre-requisites Summarized from State Curriculum Mathematics Grades 3 – 8	Algebra/Data Analysis State Curriculum	
	CLG 3 The student will demonstrate the ability to apply probability and statistical methods for representing and interpreting data and communicating results, using technology when needed.	Additional Topics Would Include
<p>Standard 4.0 Knowledge of Statistics</p> <p>A1 Collect, organize, and display data Grades 4 – 8</p> <ul style="list-style-type: none"> • Organize and display data in a variety of statistical formats, which includes line plots, stem-and-leaf plots, frequency tables, circle graphs, box-and-whisker plots, multiple box-and-whisker plots, and scatter plots <p>B1 Analyze data Grades 5, 6, & 8</p> <ul style="list-style-type: none"> • Interpret data from a variety of statistical formats, which includes line plots, stem-and-leaf plots, back-to-back stem-and-leaf plots, frequency tables, circle graphs, box-and-whisker plots, multiple box-and-whisker plots, and scatter plots <p>B2 Describe a set of data Grades 4 – 6</p> <ul style="list-style-type: none"> • Apply the range and measures of central tendency to solve a problem or answer a question <p>Grade 7</p> <ul style="list-style-type: none"> • Analyze measures of central tendency to determine or apply mean, median, mode. 	<p>3.1 The student will collect, organize, analyze, and present data.</p> <p>3.1.2 The student will use the measures of central tendency and/or variability to make informed conclusions.</p> <p style="text-align: center;"><u>Assessment Limits</u></p> <ul style="list-style-type: none"> ➤ Measures of central tendency include mean, median, and mode. ➤ Measures of variability include range, interquartile range, and quartiles. ➤ Data may be displayed in a variety of representations, which may include: frequency tables, box and whisker plots, and other displays. <p style="text-align: center;"><u>Skill Statement</u></p> <ul style="list-style-type: none"> ➤ The student uses measures of central tendency and variability to solve problems, make informed conclusions and/or display data. ➤ The student will recognize and apply the effect of the distribution of the data on the measures of central tendency and variability. 	<p>Outliers</p> <p>3.1.2.1 The student will identify an outlier and describe its effect on a measure of central tendency.</p>

State Curriculum - Algebra/Data Analysis

Pre-requisites Summarized from State Curriculum Mathematics Grades 3 – 8	Algebra/Data Analysis State Curriculum	
<p>Standard 4.0 Knowledge of Statistics</p> <p>A1 Collect, organize, and display data Grades 4 – 6 & 8</p> <ul style="list-style-type: none"> • Organize and display data in a variety of statistical formats, which includes line plots, stem-and-leaf plots, frequency tables, circle graphs, box-and-whisker plots, and scatter plots <p>Grades 5, 6, & 8</p> <ul style="list-style-type: none"> • Interpret data from a variety of statistical formats, also including double bar graphs, double line graphs, and multiple box-and-whisker plots <p>Standard 5.0 Knowledge of Probability</p> <p>A1 Identify a sample space Grade 5</p> <ul style="list-style-type: none"> • Determine the possible outcomes of independent events <p>Grade 8</p> <ul style="list-style-type: none"> • Describe the difference between independent and dependent events <p>B1 Determine the probability of one or two events comprised of equally likely outcomes Grades 3 – 8</p> <ul style="list-style-type: none"> • Express the probability of an event as a fraction, decimal, or percent <p>B2 Theoretical probability Grade 8</p> <ul style="list-style-type: none"> • Determine the probability of a second event that is dependent on a first event of equally likely outcomes <p>C1 Analyze the results of a survey or simulation Grades 6 – 8</p> <ul style="list-style-type: none"> • Make predictions and express the probability of the results as a fraction, decimal, or percent <p>C2 Conduct a probability experiment Grades 6 – 8</p>	CLG 3 The student will demonstrate the ability to apply probability and statistical methods for representing and interpreting data and communicating results, using technology when needed.	Additional Topics Would Include
	<p>3.1 The student will collect, organize, analyze and present data.</p> <p>3.1.3 The student will calculate theoretical probability or use simulations or statistical inferences from data to estimate the probability of an event.</p> <p style="text-align: center;"><u>Assessment Limits</u></p> <ul style="list-style-type: none"> ➤ This indicator does not include finding probabilities of dependent events. <p style="text-align: center;"><u>Skill Statement</u></p> <ul style="list-style-type: none"> ➤ Using given data, the student determines the experimental probability of an event. ➤ Given a situation involving chance, the student will determine the theoretical probability of an event. 	<p>Probability</p> <p>3.1.3.1 The student will determine the probability of a dependent event (conditional probability).</p>

State Curriculum - Algebra/Data Analysis

<p style="text-align: center;">Pre-requisites Summarized from State Curriculum Mathematics Grades 3 – 8</p>	<p style="text-align: center;">Algebra/Data Analysis State Curriculum</p>	
	<p>CLG 3 The student will demonstrate the ability to apply probability and statistical methods for representing and interpreting data and communicating results, using technology when needed.</p>	<p style="text-align: center;">Additional Topics Would Include</p>
<p>C3 Compare theoretical and experimental probability Grades 6 – 8</p> <p>C4 Describe the difference between theoretical and experimental probability Grades 6 – 8</p>	<p>3.1 The student will collect, organize, analyze and present data.</p> <p>3.1.3 The student will calculate theoretical probability or use simulations or statistical inferences from data to estimate the probability of an event.</p> <p style="text-align: center;"><u>Assessment Limits</u></p> <ul style="list-style-type: none"> ➤ This indicator does not include finding probabilities of dependent events. <p style="text-align: center;"><u>Skill Statement</u></p> <ul style="list-style-type: none"> ➤ Using given data, the student determines the experimental probability of an event. ➤ Given a situation involving chance, the student will determine the theoretical probability of an event. 	

State Curriculum - Algebra/Data Analysis

Pre-requisites Summarized from State Curriculum Mathematics Grades 3 – 8	Algebra/Data Analysis State Curriculum	
	CLG 3 The student will demonstrate the ability to apply probability and statistical methods for representing and interpreting data and communicating results, using technology when needed.	Additional Topics Would Include
<p>Standard 4.0 Knowledge of Statistics</p> <p>B1 Analyze data Grades 3 – 6 & 8</p> <ul style="list-style-type: none"> • Interpret data from a variety of statistical formats which includes line plots, stem-and-leaf plots, back-to-back stem-and-leaf plots, frequency tables, circle graphs, box-and-whisker plots, scatter plots, double bar graphs, double line graphs, and multiple box-and-whisker plots <p>Standard 5.0 Knowledge of Probability</p> <p>A1 Identify a sample space Grades 5, 7, & 8</p> <ul style="list-style-type: none"> • Determine the possible outcomes of independent events 	<p>3.2 The student will apply the basic concepts of statistics and probability to predict possible outcomes of real-world situations</p> <p>3.2.1 The student will make informed decisions and predictions based upon the results of simulations and data from research.</p> <p style="text-align: center;"><u>Skill Statement</u></p> <p>Given data from a simulation or research, the student makes informed decisions and predictions.</p>	

State Curriculum - Algebra/Data Analysis

Pre-requisites Summarized from State Curriculum Mathematics Grades 3 – 8	Algebra/Data Analysis State Curriculum	
	CLG 3 The student will demonstrate the ability to apply probability and statistical methods for representing and interpreting data and communicating results, using technology when needed.	Additional Topics Would Include
<p>Standard 1.0 Knowledge of Algebra, patterns, or Functions</p> <p>C1 Locate points on a number line and in a coordinate graph Grades 4 – 7</p> <ul style="list-style-type: none"> • Identify and graph ordered pairs in a coordinate plane <p>Grades 7 & 8</p> <ul style="list-style-type: none"> • Graph linear equations in a coordinate plane <p>C2 Analyze linear relationships Grades 6 – 8</p> <ul style="list-style-type: none"> • Identify slope from a table of values, a graph, or a linear equation <p>Grades 7 & 8</p> <ul style="list-style-type: none"> • Determine slope (rate of change) from a table of values, graph, or linear equation <p>B2 Identify, write, solve, and apply equations and inequalities Grades 6 – 8</p> <ul style="list-style-type: none"> • Solve for the unknown in a linear equation <p>Standard 4.0 Knowledge of Statistics</p> <p>A1 Organize and display data Grade 8</p> <ul style="list-style-type: none"> • Organize and display data to make a scatter plot 	<p>3.2 The student will apply the basic concepts of statistics and probability to predict possible outcomes of real-world situations.</p> <p>3.2.2 The student will interpret data and/or make predictions by finding and using a line of best fit and by using a given curve of best fit.</p> <p style="text-align: center;"><u>Assessment Limits</u></p> <ul style="list-style-type: none"> ➤ Items should include a definition of the data and what it represents. ➤ Data will be given when a line of best fit is required. ➤ Equation or graph will be given when a curve of best fit is required. <p style="text-align: center;"><u>Skill Statement</u></p> <ul style="list-style-type: none"> ➤ The students will find a line of best fit, use it to interpolate and extrapolate, and/or interpret slope and intercepts. ➤ The student will use a curve of best fit to interpolate and extrapolate. ➤ The student’s response will be in the context of the problem. 	

State Curriculum - Algebra/Data Analysis

Pre-requisites Summarized from State Curriculum Mathematics Grades 3 – 8	Algebra/Data Analysis State Curriculum	
	CLG 3 The student will demonstrate the ability to apply probability and statistical methods for representing and interpreting data and communicating results, using technology when needed.	Additional Topics Would Include
<p>Standard 4.0 Knowledge of Statistics</p> <p>B1 Analyze data Grade 7</p> <ul style="list-style-type: none"> • Recognize misuses of data • Analyze misleading data representations <p>Standard 2.0 Knowledge of Geometry</p> <p>B1 Analyze the properties of solid geometric figures Grades 3 & 4</p> <ul style="list-style-type: none"> • Identify and describe prisms, pyramids, cylinders, and cones <p>Standard 3.0 Knowledge of Measurement</p> <p>C1 Estimate and apply measurement formulas Grades 3 & 6</p> <ul style="list-style-type: none"> • Estimate and determine the volume of rectangular prisms <p>Grade 7</p> <ul style="list-style-type: none"> • Estimate and determine the volume of a triangular prism <p>Grade 8</p> <ul style="list-style-type: none"> • Estimate and determine the volume of cylinders, cones, pyramids, and spheres 	<p>3.2 The student will apply the basic concepts of statistics and probability to predict possible outcomes of real-world situations.</p> <p>3.2.3 The student will communicate the use and misuse of statistics.</p> <p style="text-align: center;"><u>Assessment Limits</u></p> <p>Examples of “misuse of statistics” include the following:</p> <ul style="list-style-type: none"> ➤ misuse of scaling on a graph ➤ misuse of measures of central tendency and variability to represent data, ➤ using three-dimensional figures inappropriately ➤ using data to sway interpretation to a predetermined conclusion ➤ using incorrect sampling techniques ➤ using data from simulations incorrectly ➤ predicting well beyond the data set. <p style="text-align: center;"><u>Skill Statement</u></p> <p>The student will analyze and identify proper and improper use of statistical data and/or statistical methods.</p>	<p>Correlation and Causation</p> <p>3.2.3.1 The student will recognize when arguments based on data confuse correlation with causation.</p>