**Algebra I Mathematics**

**Prince William County Schools Pacing Guide**

**2021-2022**

Teacher focus groups have assigned a given number of days to each unit based on their experiences and knowledge of the curriculum. Teacher teams will need to include time for assessment as they are planning each unit. It is recommended that teachers stay as close as possible to the pacing guidelines to ensure that all of the Standards of Learning have been taught prior to the SOL Test, and that, as students move within the Division, their math instruction remains consistent. Ongoing review should occur throughout the year.

Teachers may find the full wording of the objectives, along with the essential knowledge and skills to be learned, in the Unit Plans located on the Mathematics Staff Communities webpage. Unit plans created by the Teacher Focus Groups provide suggestions for learning experiences as well as resources to support instruction.

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| **\*\*\*Important Note\*\*\*** |
| **Objectives in RED font indicate 7th-grade standards that may not have been formally taught due to school closures during the 2019-20 school year or may require additional review.** **Objectives in ORANGE font indicate-8th grade standards that were taught to varying levels of mastery during the 2020-21 school year or may need to be reviewed. Refer to the unit guides, Canvas course, and Learning Recovery Plan document for more information.****Information in BLUE font provides guidance on priority standards.** |

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| **(6 blocks / 12 days)** **Unit 1 /Modules 1A and 1B: Expressions and Equations** |
| **Focus Topics** | **Standards of Learning** |
| **A.1 ab:** This is taught in middle school explicitly and using formulas. **Keep it simple for square and cube roots here.** Time permitting, return to **A.1 b** to evaluate algebraic expressions involving exponents and roots in Modules 9A and 9B. **A.4 a:** Lower priority is memorizing properties; show students how they are used as you teach solving equations in Module 1B.**A.4 c:** This needs to be taught to the extent of solving an equation for y. For the sake of time, complicated formulas could be skipped.**Translate and Evaluate Expressions (3 blocks / 6 days))*** Translate between verbal quantitative situations and algebraic expressions and equations. (a)
* Represent practical situations with algebraic expressions in a variety of representations (e.g., concrete, pictorial, symbolic, verbal). (a)
* Evaluate algebraic expressions, using the order of operations, **which include absolute value, square roots, and cube roots** for given replacement values **to include rational numbers**, without rationalizing the denominator. (b)

**Multi-Step Equations*** Determine whether a linear equation in one variable has one, an infinite number, or no solutions. (a)
* Apply the properties of real numbers and properties of equality to simplify expressions and solve equations. (a, b)
* Solve multistep linear equations in one variable algebraically. (a)
* Solve a literal equation for a specified variable. (c)
* Solve practical problems involving equations ~~and systems of equations~~. (e)
 | A.1A.4 ace |

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|  **(6 blocks / 12 days)** **Cluster: Linear Relationships****Unit 2 / Module 2: Characteristics of Linear Functions** |
| **Focus Topics** | **Standards of Learning** |
| **A.6 a:** In middle school, students were taught that the slope is the rate of change and that it is the change in y over the change in x. According to the standards, the slope formula should not have been formally introduced. Algebra I should be the FIRST time that students learn about the slope formula.**A.6 b:** Lower priority is parallel and perpendicular lines as they will see this again in geometry.**Slope and Graphing*** Determine the slope of the line, given the equation of a linear function. (a)
* Determine the slope of a line, given the coordinates of two points on the line. (a)
* Determine the slope of a line, given the graph of a line. (a)
* Recognize and describe a line with a slope or rate of change that is positive, negative, zero, or undefined. (a)
* Write the equation of a line when given the graph of a line ***(for horizontal and vertical lines only).*** (b)
* Graph a linear equation in two variables, including those that arise from a variety of practical situations. (c)
* Use the parent function *y* = *x* and describe transformations defined by changes in the slope or *y*-intercept. (c)

***Informally introduce function notation, f(x), before transformations and continue to use it in place of “y =” throughout the study of linear and quadratic functions****.* ***Function notation will be formally taught and used in Unit 11: Functions*****Mathematical Modeling*** Represent practical situations with algebraic expressions in a variety of representations (e.g., concrete, pictorial, symbolic, verbal). (a)

***X* and *Y*-Intercepts** * Identify the ~~domain, range, zeros, and~~ **intercepts** of a function presented algebraically or graphically. (b, c, d)
* Investigate and analyze characteristics and multiple representations of functions with a graphing utility. (a, b, c, d, e, f)

***Informally included in instruction but NOT assessed until Unit 7 Quadratic Functions.**** Identify the **domain and range** of a function presented algebraically or graphically. (b, c, d)
* For any value, *x,* in the domain of *f*, determine *f*(*x*). (e)
* Represent relations and functions using verbal descriptions, tables, equations, and graphs. Given one representation, represent the relation in another form. (f)
 | A.6 abcA.1aA.7 bd A.7 ef |

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| **(7 blocks / 14 days)** **Cluster: Linear Relationships****Unit 3 / Modules 3A and 3B: Linear Functions** |
| **Focus Topics** | **Standards of Learning** |
| **A.4 c:** This needs to be taught to the extent of solving an equation for y. For the sake of time, complicated formulas could be skipped in Module B.**A.6 a:** In middle school, students were taught that the slope is the rate of change and that it is the change in y over the change in x. According to the standards, the slope formula should not have been formally introduced. Algebra I should be the FIRST time that students learn about the slope formula in Modules 3A and 3B.**A.6 b:** Lower priority is parallel and perpendicular lines as they will see this again in geometry in Modules 3A and 3B.**Scatter Plots Various Levels of Mastery** * 8.16c The student will determine the independent and dependent variable, given a practical situation modeled by a linear function;
* 8.16e The student will make connections between and among representations of a linear function using verbal descriptions, tables, equations, and graphs.

**Writing the Equation of a Line*** Write the equation of a line when given two points on the line whose coordinates are integers. (b)
* Write the equation of a line when given the slope and a point on the line whose coordinates are integers. (b)
* Write the equation of a line parallel or perpendicular to a given line through a given point. (b)
* Graph a linear equation in two variables, including those that arise from a variety of practical situations. (c)
* Use the parent function *y* = *x* and describe transformations defined by changes in the slope or *y*-intercept. (c)

**Equations of Lines in Other Forms*** Write the equation of a vertical line as *x* = *a*. (b)
* Write the equation of a horizontal line as *y* = *c*. (b)

**Literal Equations (Standard** $\leftrightarrow $ **Slope-intercept forms)*** Solve a literal equation for a specified variable. (c)

**Direct Variation *(could be done here or with inverse variation in Unit 11)**** Given a data set or practical situation, determine whether a direct variation exists.
* Given a data set or practical situation, write an equation for a direct variation.
* Given a data set or practical situation, graph an equation representing a direct variation.

**Mathematical Modeling*** Represent practical situations with algebraic expressions in a variety of representations (e.g., concrete, pictorial, symbolic, verbal). (a)

***X* and *Y*-Intercepts** * Identify the **intercepts** of a function presented algebraically or graphically. (b, c, d)
* Investigate and analyze characteristics and multiple representations of functions with a graphing utility. (a, b, c, d, e, f)

***Informally included in instruction but NOT assessed until Unit 7 Quadratic Functions.*** * Identify the **domain and range** of a function presented algebraically or graphically. (b, c, d)
* For any value, *x,* in the domain of *f*, determine *f*(*x*). (e)
* Represent relations and functions using verbal descriptions, tables, equations, and graphs. Given one representation, represent the relation in another form. (f)
 | 8.16c 8.16e Unit 7A.6 bcA.6 b A.4 cA.8A.1aA.7 bd A.7 ef |

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|  **(4 blocks / 8 days)** **Cluster: Linear Relationships****Unit 4 / Module 4: Scatter Plots and Linear Regression** |
| **Focus Topics** | **Standards of Learning** |
| **Statistics- MISSED Standard*** Collect, organize, and represent data in a histogram. (a)
* Make observations and inferences about data represented in a histogram. (b)
* Compare data represented in histograms with the same data represented in line plots, circle graphs, and stem-and-leaf plots. (c)

**Scatter Plots Various Levels of Mastery** * 8.12b The student will make observations about data represented in scatterplots; and
* 8.12c The student will use a drawing to estimate the line of best fit for data represented in a scatterplot.
* 8.13a The student will represent data in scatterplots;
* 8.13b The student will make observations about data represented in scatterplots; and
* 8.13c The student will use a drawing to estimate the line of best fit for data represented in a scatterplot.

 **Linear Regression*** Determine an equation of a curve of best fit, using a graphing utility, given a set of no more than twenty data points in a table, a graph, or a practical situation.
* Make predictions, using data, scatterplots, or the equation of the curve of best fit.
* Solve practical problems involving an equation of the curve of best fit.
* Evaluate the reasonableness of a mathematical model of a practical situation.

**Domain, Range, and Function – *Informally included in instruction but not assessed until Unit 8: Solving Quadratic Equations**** Identify the domain and range of a relation/function presented algebraically or graphically. (b, c, d)
* For any value, *x*, in the domain of *f*, determine *f(x)*. (e)
* Represent relations and functions using verbal descriptions, tables, equations, and graph. Given one representation, represent the relation in another form. (f)
* Investigate and analyze characteristics and multiple representations of functions with a graphing utility. (a, b, c, d, e, f)
 | 7.9Unit 78.12bc 8.13 abcUnit 8A.9A.7 bef  |

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| **(5 blocks / 10 days)** **Cluster: Linear Relationships****Unit 5 / Module 5: Systems of Linear Equations** |
| **Focus Topics** | **Standards of Learning** |
| **A.4 d:** Lower priority is elimination. Substitution is used more often in solving systems of quadratic and linear equations in Algebra II.**Systems of Linear Equations*** Given a system of two linear equations in two variables that has a unique solution, solve the system by substitution or elimination to identify the ordered pair which satisfies both equations. (d)
* Given a system of two linear equations in two variables that has a unique solution, solve the system graphically by identifying the point of intersection. (d)
* Solve and confirm algebraic solutions to a system of two linear equations using a graphing utility. (d)
* Determine whether a system of two linear equations has one, an infinite number, or no solutions. (d)
* Write a system of two linear equations that models a practical situation. (e)
* Interpret and determine the reasonableness of the algebraic or graphical solution of a system of two linear equations that models a practical situation. (e)
* Solve practical problems involving equations and systems of equations. (e)
 | A.4 de |

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| **(4 blocks / 8 days)** **Cluster: Quadratic Relationships****Unit6 / Module 6: Introduction to Polynomials** |
| **Focus Topics** | **Standards of Learning** |
| **A.2 a:** Time permitting, return to A.1 ab to represent verbal situations and evaluate algebraic expressions involving exponents.**A.2 c:** Keep to the SOL requirements in terms of one variable and complexity (see bold text above). Dividing a polynomial by a binomial divisor is a lower priority.**Exponent Rules *(Multiplication and division rules only. Remaining exponent rules will be formally introduced in Unit 9 Simplify and Evaluate Expressions)**** Simplify monomial expressions and ratios of monomial expressions in which the exponents are integers, using the laws of exponents. (a)

**Polynomial Operations (Add, subtract, distribute monomial, divide monomials, multiply binomials, factor GCF)*** Model sums, differences, products, and quotients of polynomials with concrete objects and their related pictorial and symbolic representations. (b)
* Determine sums and differences of polynomials. (b)
* Determine products of polynomials. The factors should be limited to five or fewer terms (i.e., $(4x + 2)(3x + 5)$ represents four terms and $(x + 1)(2x^{2} + x + 3)$ represents five terms). (b)
* Determine the quotient of polynomials, using a monomial divisor. (b) ***Binomial divisors and completely factored divisors will be handled in the Quadratic Relationships cluster.***
* Factor out the greatest common factor (GCF). (c) ***Factoring completely first- and second-degree polynomials in one variable with integral coefficients will be handled in the Quadratic Relationships cluster.***
 | A.2 a A.2 bc |

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|  **(8 blocks / 16 days)** **Cluster: Quadratic Relationships****Unit 7 / Module 7: Quadratic Functions** |
| **Focus Topics** | **Standards of Learning** |
| **A.4 b:** Focus on solving based on zeros and factoring. Although quadratic formula can be used on all equations, if it is cut here, it will be picked up in Algebra 2. Choose the number of methods used based on time permitting.**Quadratic Curve of Best Fit (2 blocks / 4 days) *(Can be done here or at end of this unit )**** Determine an equation of a curve of best fit, using a graphing utility, given a set of no more than twenty data points in a table, a graph, or a practical situation.
* Make predictions, using data, scatterplots, or the equation of the curve of best fit.
* Solve practical problems involving an equation of the curve of best fit.
* Evaluate the reasonableness of a mathematical model of a practical situation.

**Graphs of Quadratic Functions *(Formal introduction of domain and range)* (6 blocks / 12 days)*** Identify the domain, range, zeros, and intercepts of a function presented algebraically or graphically. (b, c, d)
* Use the *x*-intercepts from the graphical representation of a quadratic function to determine and confirm its factors. (c, d)
* For any value, *x,* in the domain of *f*, determine *f*(*x*). (e)
* Represent relations and functions using verbal descriptions, tables, equations, and graph. Given one representation, represent the relation in another form. (f)
* Investigate and analyze characteristics and multiple representations of functions with a graphing utility. (a, b, c, d, e, f)
* Confirm intercepts and the vertex of a quadratic function using a graphing utility
 | A.9A.7 bcdefA.4b |

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|  **(10 blocks / 20 days)** **Cluster: Quadratic Relationships****Unit 8 / Modules 8A and 8B: Solving Quadratic Equations** |
| **Focus Topics** | **Standards of Learning** |
| **A.2 c:** Keep to the SOL requirements in terms of one variable and complexity (see bold text above). Dividing a polynomial by a binomial divisor is a lower priority in Module 8B.**A.3a**: Time permitting, return to A.1 ab to represent verbal situations and evaluate algebraic expressions involving square and cube roots Module 8A.**A.4 b:** Focus on solving based on zeros and factoring. Although quadratic formula can be used on all equations, if it is cut here, it will be picked up in Algebra 2. Choose the number of methods used based on time permitting in Module 8A.**Factor Trinomials Completely and Divide Binomials (6 blocks / 12 days)*** Factor completely first- and second-degree polynomials in one variable with integral coefficients. After factoring out the greatest common factor (GCF), leading coefficients should have no more than four factors. (c)
* Factor and verify algebraic factorizations of polynomials with a graphing utility. (c)
* Model ~~sums, differences, products, and~~ quotients of polynomials with concrete objects and their related pictorial and symbolic representations. (b)
* Determine the quotient of polynomials, using a monomial or binomial divisor, or a completely factored divisor. (b)

**Radicals *(Square Roots only)**** Express the square root of a whole number in simplest form. (a)
* Express the principal square root. (a)

**Solve Quadratic Equations (4 blocks / 8 days)*** Apply the properties of real numbers and properties of equality to simplify expressions and solve equations. (a, b)
* Solve quadratic equations in one variable algebraically. Solutions may be rational or irrational. (b)
* Solve practical problems involving equations and systems of equations. (e)

**Solving Quadratic Equations** * Identify the domain, range, zeros, and intercepts of a function presented algebraically or graphically. (b, c, d)
* Use the *x*-intercepts from the graphical representation of a quadratic function to determine and confirm its factors. (c, d)
 | A.2 bcA.3aA.4beA.7bcd |

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|  **(8 blocks / 16 days)** **Unit 9 / Modules 9A and 9B: Exponents and Radicals** |
| **Focus Topics** | **Standards of Learning** |
| **A.2 a:** Time permitting, return to A.1 ab to represent verbal situations and evaluate algebraic expressions involving exponents in Module 9A.**A.3abc**: Time permitting, return to A.1 ab to represent verbal situations and evaluate algebraic expressions involving square and cube roots Module 9B.**Exponents*** Simplify monomial expressions and ratios of monomial expressions in which the exponents are integers, using the laws of exponents. (a)
* Perform operations involving numbers written in scientific notation using the laws of exponents.

**Radicals*** Express the square root of a whole number in simplest form. (a)
* Express the principal square root of a monomial algebraic expression in simplest form where variables are assumed to have positive values. (a)
* Express the cube root of an integer in simplest form. (b)
* Simplify a numerical expression containing square or cube roots. (c)
* Add, subtract, and multiply two monomial radical expressions limited to a numerical radicand. (c)
 | A.2aA.3 |

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| **(5 blocks / 10 days)** **Unit 10 / Module 10: Inequalities** |
| **Focus Topics** | **Standards of Learning** |
| **A.5 d:** Lower priority is systems of linear inequalities.**Inequalities in One Variable, Two Variable, and Systems*** Solve multistep linear inequalities in one variable algebraically and represent the solution graphically. (a)
* Apply the properties of real numbers and properties of inequality to solve multistep linear inequalities in one variable algebraically. (a)

**Inequalities in Two Variables*** Represent the solution of a linear inequality in two variables graphically. (b)
* Solve practical problems involving linear inequalities. (c)

**Systems of Inequalities*** Determine whether a coordinate pair is a solution of a linear inequality or a system of linear inequalities. (c)
* Represent the solution of a system of two linear inequalities graphically. (d)

**All Inequalities*** Determine and verify algebraic solutions using a graphing utility. (a, b, c, d)
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| **(6 blocks / 12 days)****Unit 11 /Module 11: Functions** |
| **Focus Topics** | **Standards of Learning** |
| **Functions*** Determine whether a relation, represented by a set of ordered pairs, a table, a mapping, or a graph is a function. (a)
* Identify the domain, range, zeros, and intercepts of a function presented algebraically or graphically. (b, c, d)
* Use the *x*-intercepts from the graphical representation of a quadratic function to determine and confirm its factors. (c, d)
* For any value, *x,* in the domain of *f*, determine *f*(*x*). (e)
* Represent relations and functions using verbal descriptions, tables, equations, and graph. Given one representation, represent the relation in another form. (f)
* Investigate and analyze characteristics and multiple representations of functions with a graphing utility. (a, b, c, d, e, f)

**Variation *(Direct Variation may have been done in Unit 3)**** Given a data set or practical situation, determine whether a direct variation exists.
* Given a data set or practical situation, determine whether an inverse variation exists.
* Given a data set or practical situation, write an equation for a direct variation.
* Given a data set or practical situation, write an equation for an inverse variation.
* Given a data set or practical situation, graph an equation representing a direct variation.

**Scatter Plots Various Levels of Mastery** * 8.16c The student will determine the independent and dependent variable, given a practical situation modeled by a linear function;
* 8.16e The student will make connections between and among representations of a linear function using verbal descriptions, tables, equations, and graphs.
 | A.7  A.88.16c 8.16e Unit 7 |

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|  **(2 blocks / 4 days)** **Unit 12 / Module 12 Box Plots – POST SOL**  |
| **Focus Topics** | **Standards of Learning** |
| **Box Plots –Various Levels of Mastery** * Collect and display a numeric data set of no more than 20 items, using boxplots. (a)
* Make observations and inferences about data represented in a boxplot. (b)
* Given a data set represented in a boxplot, identify and describe the lower extreme (minimum), upper extreme (maximum), median, upper quartile, lower quartile, range, and interquartile range. (b)
* Compare and analyze two data sets represented in boxplots. (c)
 | 8.12 abcUnit 8  |

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| **POST SOL (4 blocks/ 8 days)** |
| **Focus Topics** | **Standards of Learning** |
| **Geometry –Various Levels of Mastery** * 8.5 The student will use the relationships among pairs of angles that are vertical angles, adjacent angles, supplementary angles, and complementary angles to determine the measure of unknown angles.
* 8.6a The student will solve problems, including practical problems, involving volume and surface area of cones and square-based pyramids; and
* 8.6b The student will describe how changing one measured attribute of a rectangular prism affects the volume and surface area.
* 8.7a The student will given a polygon, apply transformations, to include translations, reflections, and dilations, in the coordinate plane; and
* 8.7b The student will identify practical applications of transformations
* 8.8 The student will construct a three-dimensional model, given the top or bottom, side, and front views.

**Geometry Reasoning-MISSED Standard****Quadrilaterals** * Compare and contrast properties of the following quadrilaterals: parallelogram, rectangle, square, rhombus, and trapezoid. (a)
* Sort and classify quadrilaterals, as parallelograms, rectangles, trapezoids, rhombi, and/or squares based on their properties. (a)
* Given a diagram, determine an unknown angle measure in a quadrilateral, using properties of quadrilaterals. (b)
* Given a diagram determine an unknown side length in a quadrilateral using properties of quadrilaterals. (b)

**Transformations** * Given a preimage in the coordinate plane, identify the coordinates of the image of a right triangle or rectangle that has been translated either vertically, horizontally, or a combination of a vertical and horizontal translation.
* Given a preimage in the coordinate plane, identify the coordinates of the image of a right triangle or a rectangle that has been reflected over the *x*- or *y*-axis.
* Given a preimage in the coordinate plane, identify the coordinates of the image of a right triangle or rectangle that has been translated and reflected over the *x*- or *y*-axis or reflected over the *x*- or *y*-axis and then translated.
* Sketch the image of a right triangle or rectangle that has been translated vertically, horizontally, or a combination of both.
* Sketch the image of a right triangle or rectangle that has been reflected over the *x*- or *y*-axis.
* Sketch the image of a right triangle or rectangle that has been translated and reflected over the *x*- or *y*-axis or reflected over the *x*- or *y*-axis and then translated

**Statistical Reasoning-MISSED Standard****Probability** * Determine the theoretical probability of an event. (a)
* Determine the experimental probability of an event. (a)
* Describe changes in the experimental probability as the number of trials increases. (b)
* Investigate and describe the difference between the probability of an event found through experiment or simulation versus the theoretical probability of that same event. (b)
 | SOL 8.5 8.6abc, 8.7ab. 8.8Unit 4SOL 7.6 & 7.7 Unit 6SOL 7.8 Unit 7 |