

Course Name - Strategic Math - Algebra 1

Mon./Qtr.	Content	HSCE	Essential Skills	Assessment	Vocabulary
Sem. 1 Sept.	Unit 1 – Uses of Variables	<p>A1.1.1 Give a verbal description of an expression that is presented in symbolic form, write an algebraic expression from a verbal description, and evaluate expressions given values of the variables.</p> <p>A1.1.2 Know the definitions and properties of exponents and roots transition fluently between them, and apply them in algebraic expressions.</p> <p>A2.1.3 Represent functions in symbols, graphs, tables, diagrams, or words and translate among representations.</p> <p>L1.1.5 Justify numerical relationships</p> <p>L2.1.4 Know that the complex number i is one of two solutions to $x^2 = -1$.</p>	<ul style="list-style-type: none"> • Instances and counter examples • Solutions to sentences • Order of operations • Formulas • Pythagorean Theorem • Square Roots • Sets 	Homework, Quizzes, Tests	<p>Pythagorean Theorem</p> <p>roots</p> <p>complex number</p>
Sept./Oct.	Unit 2– Multiplication in Algebra	<p>L1.1.1 Know the different properties that hold in different number systems and recognize that the applicable properties change in the transition from the positive integers to all integers, to the rational numbers, and to the real numbers.</p> <p>L1.1.2 Explain why the multiplicative inverse of a number has the same sign as the number, while the additive inverse of a number has the opposite sign.</p> <p>L1.1.3 Explain how the properties of associativity, commutativity, and distributivity, as well as identity and inverse elements, are used in arithmetic and algebraic calculations.</p> <p>L1.1.4 Describe the reasons for the different effects of multiplication by, or exponentiation of, a positive number by a number less than 0, a number between 0 and 1, and a number greater than 1.</p> <p>L1.1.5 Justify numerical relationships</p>	<ul style="list-style-type: none"> • Areas and volumes • Multiplying fractions • Solving $ax=b$ and $ax<b$ • Special numbers in multiplication and equation • Probability 	Homework, Quizzes, Tests	<p>multiplicative inverse</p> <p>associativity</p> <p>commutativity</p> <p>distributivity</p> <p>probability</p>

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Sept./Oct.	Unit 2– Multiplication in Algebra	A1.2.1 Write equations and inequalities with one or two variables to represent mathematical or applied situations, and solve.	<ul style="list-style-type: none"> • The factorial symbol 		factorial
Oct.	Unit 3 - Addition in Algebra	<p>L1.1.1 Know the different properties that hold in different number systems and recognize that the applicable properties change in the transition from the positive integers to all integers, to the rational numbers, and to the real numbers.</p> <p>L1.1.2 Explain why the multiplicative inverse of a number has the same sign as the number, while the additive inverse of a number has the opposite sign.</p> <p>L1.1.3 Explain how the properties of associativity, commutativity, and distributivity, as well as identity and inverse elements, are used in arithmetic and algebraic calculations.</p> <p>L1.1.4 Describe the reasons for the different effects of multiplication by, or exponentiation of, a positive number by a number less than 0, a number between 0 and 1, and a number greater than 1.</p> <p>L1.1.5 Justify numerical relationships</p> <p>A1.2.1 Write equations and inequalities with one or two variables to represent mathematical or applied situations, and solve.</p> <p>A2.2.2 Apply given transformations to basic functions and represent symbolically.</p> <p>S2.1.1 Construct a scatterplot for a bivariate data set with appropriate labels and scales.</p> <p>S2.1.2 Given a scatterplot, identify patterns, clusters, and outliers. Recognize no correlation, weak correlation, and strong correlation.</p>	<ul style="list-style-type: none"> • Model for addition • Addition fractions • Distributive Property • The coordinate plane • Two-dimensional slide • Graphing • Scatterplots • Solving one-step equation • Solving one step inequalities 	Homework, Quizzes, Tests	distributive property two-dimensional slide scatterplots bivariate data correlation

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Oct./Nov.	Unit 4 – Subtraction in Algebra	<p>A1.2.1 Write equations and inequalities with one or two variables to represent mathematical or applied situations, and solve.</p> <p>A2.3.2 Describe the tabular pattern associated with functions having constant rate of change (linear); or variable rates of change.</p>	<ul style="list-style-type: none"> • Subtraction of real numbers • Models for subtraction • Solving $x-a = b$ and $x-a < b$ • Triangle Inequality 	Homework, Quizzes, Tests	
Nov.	Unit 5 – Linear Sentences	<p>A1.2.3 Solve linear and quadratic equations and inequalities including systems of up to three linear equations with three unknowns. Justify steps in the solution, and apply the quadratic formula appropriately.</p> <p>A1.2.8 Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. Justify steps in the solution.</p> <p>A2.4.2 Adapt the general symbolic form of a function to one that fits the specification of a given situation by using the information to replace arbitrary constants with numbers.</p> <p>L1.2.4 Organize and summarize a data set in a table, plot, chart, or spreadsheet; find patterns in a display of data; understand and critique data displays in the media.</p>	<ul style="list-style-type: none"> • Solving linear equalities and inequalities • Tables and charts for graphing • Horizontal and vertical lines • Graphing and problem solving • Equivalent Formulas 	Homework, Quizzes, Tests	<p>linear</p> <p>quadratic</p>
Dec.	Unit 6 – Division in Algebra	<p>A1.2.1 Write equations and inequalities with one or two variables to represent mathematical or applied situations, and solve.</p> <p>L1.1.5 Justify numerical relationships</p>	<ul style="list-style-type: none"> • Rates • Ratios • Solving percent problems using equations 	Homework, Quizzes, Tests	<p>probability</p> <p>similar figures</p>

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Dec.	Unit 6 – Division in Algebra		<ul style="list-style-type: none"> • Probability • Size change • Proportions • Similar figures 		
Jan.	Unit 7 – Slopes and Lines	<p>A2.4.1 Identify the family of function best suited for modeling a given real-world situation.</p> <p>A2.4.2 Adapt the general symbolic form of a function to one that fits the specification of a given situation by using the information to replace arbitrary constants with numbers.</p> <p>A2.4.3 Using the adapted general symbolic form, draw reasonable conclusions about the situation being modeled.</p> <p>*A2.4.4 Use methods of linear programming to represent and solve simple real-life problems.</p> <p>L1.2.4 Organize and summarize a data set in a table, plot, chart, or spreadsheet; find patterns in a display of data; understand and critique data displays in the media.</p> <p>A3.1.1 Write the symbolic forms of linear functions (standard, point-slope, and slope-intercept) given appropriate information, and convert between forms.</p> <p>A3.1.2 Graph lines (including those of the form $x = h$ and $y = k$) given appropriate information.</p> <p>A3.1.3 Relate the coefficients in a linear function to the slope and x- and y-intercepts of its graph.</p>	<ul style="list-style-type: none"> • Graphing lines • Slope • Equations of lines • Rate of change • Linear Inequalities • Best fit line 	Homework, Quizzes, Tests	<p>rate of change</p> <p>best fit line</p> <p>x- and y- intercepts</p>

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Jan.	Unit 7 – Slopes and Lines	<p>S2.2.1 For bivariate data that appear to form a linear pattern, find the least squares regression line by estimating visually and by calculating the equation of the regression line. Interpret the slope of the equation for a regression line.</p> <p>S2.2.2 Use the equation of the least squares regression line to make appropriate predictions.</p>			
Sem. 2 Feb.	Unit 8 – Exponent and Powers	<p>L2.1.2 Calculate fluently with numerical expressions involving exponents; use the rules of exponents; evaluate numerical expressions involving rational and negative exponents; transition easily between roots and exponents.</p> <p>A3.2.1 Write the symbolic form and sketch the graph of an exponential function given appropriate information.</p> <p>A3.2.2 Interpret the symbolic forms and recognize the graphs of exponential and logarithmic functions; recognize the logarithmic function as the inverse of the exponential function.</p> <p>A3.2.3 Apply properties of exponential and logarithmic functions.</p> <p>A3.2.4 Understand and use the fact that the base of an exponential function determines whether the function increases or decreases and understand how the base affects the rate of growth or decay.</p> <p>A.3.2.5 Relate exponential and logarithmic functions to real phenomena, including half-life and doubling time.</p>	<ul style="list-style-type: none"> • Compound interest • Exponential growth • Exponential decay • Graphing exponential growth and decay • Properties of exponents • Relate real life (doubling) to exponential growth 	Homework, Quizzes, Tests	<p>compound</p> <p>logarithmic function</p> <p>exponential function</p>
Feb.	Unit 9 – Quadratic Equations and Square Roots	<p>L1.2.2 Interpret representations that reflect absolute value relationships in such contexts as error tolerance.</p>	<ul style="list-style-type: none"> • Quadratic equations 	Homework, Quizzes, Tests	quadratic equations

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Feb.	Unit 9 – Quadratic Equations and Square Roots	<p>L2.1.4 Know that the complex number i is one of two solutions to $x^2 = -1$.</p> <p>A1.1.2 Know the definitions and properties of exponents and roots transition fluently between them, and apply them in algebraic expressions.</p> <p>A1.2.2 Associate a given equation with a function whose zeros are the solutions of the equation.</p> <p>A1.2.3 Solve linear and quadratic equations and inequalities including systems of up to three linear equations with three unknowns. Justify steps in the solution, and apply the quadratic formula appropriately.</p> <p>A1.2.4 Solve absolute value equations and inequalities, and justify steps in the solution.</p> <p>A1.2.6 Solve power equations and equations including radical expressions, justify steps in the solution, and explain how extraneous solutions may arise.</p> <p>A3.3.1 Write the symbolic form and sketch the graph of a quadratic function given appropriate information.</p> <p>A3.3.2 Identify the elements of a parabola (vertex, axis of symmetry, direction of opening) given its symbolic form or its graph, and relate these elements to the coefficient(s) of the symbolic form of the function.</p> <p>A3.3.4 Relate the number of real solutions of a quadratic equation to the graph of the associated quadratic function.</p>	<ul style="list-style-type: none"> • Square roots • Absolute values • Distance • Graphs of quadratic equations • Re-introduce complex number sets • Use the discriminant to determine the number of real solutions 		<p>complex number sets</p> <p>discriminant</p> <p>quadratic formula</p> <p>parabola</p>

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Feb.	Unit 9 – Quadratic Equations and Square Roots	A3.5.3 Determine the maximum possible number of zeros of a polynomial function, and understand the relationship between the x-intercepts of the graph and the factored form of the function.			
Mar.	Unit 10 - Polynomials	A1.1.4 Add, subtract, multiply, and simplify polynomials and rational expressions. A2.2.1 Combine functions by addition, subtraction, multiplication, and division. A3.5.2 Understand the effects of degree, leading coefficient, and number of real zeros on the graphs of polynomial functions of degree greater than 2. A3.5.1 Write the symbolic form and sketch the graph of simple polynomial functions.	<ul style="list-style-type: none"> • Polynomials • Degree of polynomials • Operations with polynomials 	Homework, Quizzes, Tests	degree polynomials leading coefficient zeros
April	Unit 11 - Linear Systems	A1.2.3 Solve linear and quadratic equations and inequalities including systems of up to three linear equations with three unknowns. Justify steps in the solution, and apply the quadratic formula appropriately. A1.2.8 Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable. Justify steps in the solution. L2.1.1 Explain the meaning and uses of weighted averages. A3.1.4 Find an equation of the line parallel or perpendicular to given line, through a given point; understand and use the facts that non-vertical parallel lines have equal slopes, and that non-vertical perpendicular lines have slopes that multiply to give -1.	<ul style="list-style-type: none"> • Linear systems and methods of solving • Number of solutions to a system • Graphs of systems • Problem solving with systems • Weighted average • Slopes of parallel lines 	Homework, Quizzes, Tests	systems weighted averages

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May	Unit 12 - Factoring	<p>A1.1.3 Factor algebraic expressions using, for example, greatest common factor, grouping, and the special product identities.</p> <p>A2.1.6 Identify the zeros of a function, the intervals where the values of a function are positive or negative, and describe the behavior of a function as x approaches positive or negative infinity, given the symbolic and graphical representations.</p>	<ul style="list-style-type: none"> • Factoring quadratic equations • Zero Product Property • Solving equations using factoring • Prime Factorization • Discriminant 	Homework, Quizzes, Tests	<p>zero product property</p> <p>prime factorization</p>
May/June	Unit 13 - Functions	<p>A2.1.1 Determine whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function and identify its domain and range.</p> <p>A2.1.2 Read, interpret, and use function notation and evaluate a function at a value in its domain.</p> <p>A2.1.3 Represent functions in symbols, graphs, tables, diagrams, or words and translate among representations.</p> <p>A2.1.4 Recognize that functions may be defined by different expressions over different intervals of their domains; such functions are piecewise-defined.</p> <p>A2.1.6 Identify the zeros of a function, the intervals where the values of a function are positive or negative, and describe the behavior of a function as x approaches positive or negative infinity, given the symbolic and graphical representations.</p> <p>A2.1.7 Identify and interpret the key features of a function from its graph or its formula(e).</p>	<ul style="list-style-type: none"> • Function notation • Function terminology • Domain and range • Determining functions • Graphs on functions and their inverses • Determine the family of functions a function belongs and write in symbolic form 	Homework, Quizzes, Tests	<p>domain and range</p> <p>function notation</p> <p>piecewise-defined</p> <p>asymptotic behavior</p>

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May/June	Unit 13 - Functions	<p>A2.2.3 Recognize whether a function (given in tabular or graphical form) has an inverse and recognize simple inverse pairs.</p> <p>A2.3.1 Identify a function as a member of a family of functions based on its symbolic or graphical representation; recognize that different families of functions have different asymptotic behavior.</p> <p>A2.3.3 Write the general symbolic forms that characterize each family of functions.</p> <p>A3.4.1 Write the symbolic form and sketch the graph of power functions.</p> <p>A3.5.1 Write the symbolic form and sketch the graph of simple polynomial functions.</p>			