Algebra 1 Curriculum Map
Algebra 1

Unit & Timeline	Objectives	Activities/ACT Connection	Standard	Clarification
Unit 1 Algebra Basics	-The Real Number System -Properties (includes a performance task!) -Order of Operations -Evaluating Expressions -Translating Expressions -Combining Like Terms -Distributing -Simplifying Expressions -Decimal/Fraction Conversions -Fractions -Absolute Value	Independent Practice Word Problems Multiple Choice Practice Collaboration Lecture/Guided Notes & Practice Weekly Quiz Unit Test Binder		
Unit 2 Multi-Step Equations & Inequalities	• Multi-Step Equations • Variables on Both Sides • Special Cases: Infinite Solution & No Solution • Proportions • Properties of Equality • Multi-Variable (Literal) Equations • Absolute Value Equations • Word Problems • Multi-Step Inequalities (including interval notation) • Compound Inequalities (including interval notation)	Independent Practice Word Problems Multiple Choice Practice Collaboration Lecture/Guided Notes & Practice Weekly Quiz Unit Test Binder Possible Writing Piece	**(2) KY.HS.A.1** interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors and coefficients. b. Interpret complicated expressions, given a context, by viewing one or more of their parts as a single entity. **(9) KY.HS.A.15** Rearrange formulas to solve a literal equation, highlighting a quantity of interest, using the same reasoning as in solving equations. **(10) KY.HS.A.16** Understand each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.	Students encounter simpler scenarios where they interpret r · t as the product of a given rate and time or interpret the perimeter expression (2l+2w) contextually as the sum of twice the length and twice the width of a rectangle. Students encounter more complicated scenarios where they interpret P(1+r)n contextually as the product of a principal investment, P and (1+r)n which represents an investment rate, compounding factor and time. Students encounter scenarios where they rewrite formulas/equations for variables different from the commonly used formulas. An example may include, but not being limited to, students rearranging Ohm's law (V = IR) to highlight resistance R, rather than the variable for voltage V. Students reason with and about collections of equivalent expressions to see how all the expressions in the collection are linked together through the properties of operations. They

			(10) KY.HS.A.18 Solve linear equations and inequalities in one variable, including literal equations with coefficients represented by letters.	discern patterns in sequences of solving equation problems that reveal structures in the equations themselves: 2x+ 4 = 10, 2(x− 3) + 4 = 10, 2(3x − 4) + 4 = 10, etc. After solving many linear equations in one variable, students look for general methods for solving a generic linear equation in one variable by replacing the numbers with letters: ax + b= cx + d. They have opportunities to pay close attention to calculations involving the properties of operations, properties of equality and properties of inequality as they find equivalent expressions and solve equations, noting common ways to solve different types of equations. Students use all properties of both equations and inequalities to solve for one variable.
Unit 3 Relations & Functions	• Coordinate Plane and Graphing Review • Relations • Representing Relations (Tables, Graphs, Ordered Pairs, Mappings) • Domain and Range of Ordered Pairs • Domain and Range of Continuous Graphs • Relations vs. Functions, Vertical Line Test • Equations as Functions • Graphing Functions by Table • Function Notation • Evaluating Functions • Zeros of Functions	Independent Practice Word Problems Multiple Choice Practice Collaboration Lecture/Guided Notes & Practice Weekly Quiz Unit Test Binder Possible Writing Piece	**(20) KY.HS.F.2** Recognize that arithmetic and geometric sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. **(19) KY.HS.F.6** Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations. **(20) KY.HS.F.7** Use arithmetic and geometric sequences to model situations and scenarios. a. Use formulas (explicit and recursive) to generate terms for	Sequences are functions with a domain consisting of whole numbers. b. Use real-world examples when appropriate. Examples include, but are not limited to: • calculating mortgages • drug dosages • simple interest

			arithmetic and geometric sequences. b. Write formulas to model arithmetic and geometric sequences and apply those formulas in realistic situations.	
Unit 4 Linear Equations	• Slope from a Graph • Slope from Ordered Pairs (The Slope Formula) • Linear Equations: Slope Intercept Form vs. Standard Form • Graphing by Slope Intercept Form • Writing Linear Equations Given a Graph • Graphing by Intercepts • Vertical vs. Horizontal Lines • Writing Linear Equations given Point and Slope • Writing Linear Equations given Two Points • Linear Equation Word Problems • Parallel vs. Perpendicular Lines • Scatter Plots & Line of Best Fit • Linear Regression	Independent Practice Word Problems Multiple Choice Practice Collaboration Lecture/Guided Notes & Practice Weekly Quiz Unit Test Binder	**(15) KY.HS.F.3** Understand average rate of change of a function over an interval. a. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. b. Estimate the rate of change from a graph. **(15) KY.HS.SP.6** Represent data on two quantitative variables on a scatter plot and describe how the explanatory and response variables are related. a. Calculate an appropriate mathematical model, or use a given mathematical model, for data to solve problems in context. b. Informally assess the fit of a model (through calculating correlation for linear data, plotting, calculating and/or analyzing residuals). **(15) KY.HS.SP.7** Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. **(15) KY.HS.SP.8** Understand the role and purpose of correlation in linear regression. a. Use technology to compute correlation coefficient of a linear fit. b. Interpret the meaning of the correlation within the context of the data.	The rate of change over an interval is equivalent to the slope between the endpoints of the interval. For linear functions, the rate of change is constant, over all intervals. However, for nonlinear functions, the average rate of change may vary depending on the interval. Students demonstrate interpreting slope in the context of a given situation when examining two variable statistics as being “for each additional known unit increase in an explanatory variable, we expect or predict a known unit increase (or decrease) in the response variable.” Students demonstrate interpreting intercept in the context of a given situation when examining two variable statistics as being “the predicted known unit of a response variable when the explanatory variable is zero known units.” a. Students use technology to perform the calculation of: b. Students understand correlation measures linear associations between two quantitative variables addressing the direction (positive or negative) and the relative strength of the given association. c. Students understand one of the most common misinterpretations of correlation is to think of it as a synonym for causation. A high correlation between two variables (suggesting a statistical association

			c. Describe the limitations of correlation when establishing causation.	between the two) does not imply one causes the other.
(Mini-Unit) Direct & Inverse Variation	• Recognizing a direct variation given ordered pairs, equations, and graphs. • Identifying the constant in a direct variation. • Solving for missing values given a direct variation relationship. • Recognizing an inverse variation given ordered pairs, equations, and graphs. • Identifying the constant in an inverse variation. • Solving for missing values given an inverse variation relationship. • Direct and Inverse Variation Application Problems - solving for missing values, and identifying the constant of variation.	Independent Practice Word Problems Multiple Choice Practice Collaboration Lecture/Guided Notes & Practice Weekly Quiz Unit Test Binder		
Unit 5 Systems of Equations & Inequalities	• Solving Systems of Equations by Graphing • Solving Systems of Equations by Substitution • Solving Systems of Equations by Elimination • Comparing Methods to Solving Systems/Review of All Methods • Systems of Equations Word Problems • Solving Systems of Equations by Matrices • Linear Inequalities • Systems of Linear Inequalities • Systems of Linear Inequalities Word Problems	Independent Practice Word Problems Multiple Choice Practice Collaboration Lecture/Guided Notes & Practice Weekly Quiz Unit Test Binder Possible Writing Piece	**(8) KY.HS.A.13** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. **(8) KY.HS.A.14** Create a system of equations or inequalities to represent constraints within a modeling context. Interpret the solution(s) to the corresponding system as viable or nonviable options within the context. **(12) KY.HS.A.20** Solve systems of linear equations in two variables. a. Understand a system of two equations in two variables has the same solution as a new system formed by replacing one of the original equations with an equivalent equation. b. Solve systems of linear equations with graphs, substitution and elimination, focusing on pairs of linear equations in two variables.	Students solve systems of equations with two or more variables to solve problems in the real world setting. Students may be asked to find an optimal solution and the conditions under which the optimal solution would occur for a given real world situation. a. This part of the standard is not focused on the actual process of solving a system of equations, but rather the proof of the method (specifically the elimination method). b. Students utilize a variety of methods to solve system of equations including graphing the system, solving using the substitution method, solving the system with elimination both with and without involving multiplication. Students recognize the conclusion of these processes may result in obtaining one solution (expressed as an ordered pair), no solution or infinitely many solutions. Students make connections between algebra and geometry within this

			(8) KY.HS.A.23 Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane. **(8) KY.HS.A.25** Graph linear inequalities in two variables. a. Graph the solutions to a linear inequality as a half-plane (excluding the boundary in the case of a strict inequality). b. Graph the solution set to a system of linear inequalities as the intersection of the corresponding half-planes.	standard. Students acquire the basic understanding that the coordinates of the points of intersection of the graphs are the pairs of values of the variables that solve the system. Students recall skills regarding graphing the solutions of a linear inequality in the coordinate plane in order to graph the solution set for a system of linear inequalities. Students utilize these skills in other standards via linear programming.
Unit 6 Exponents & Exponential Functions	• Adding and Subtracting Monomials (Review of Combine Like Terms) • Multiplying Monomials (Product Rule) • Multiplying Monomials (Power Rule) • Dividing Monomials (Quotient Rule) • Negative Exponents • Review of all Exponent Rules • Scientific Notation • Graphing Exponential Functions • Exponential Growth and Decay • Geometric Sequences • Simplifying Radicals: Square Roots and Cube Roots • Simplifying Square Roots with Variables	Independent Practice Word Problems Multiple Choice Practice Collaboration Lecture/Guided Notes & Practice Weekly Quiz Unit Test Binder	**(1) KY.HS.N.1** Extend the properties of integer exponents to rational exponents, allowing for the expression of radicals in terms of rational exponents. **(1) KY.HS.N.2** Rewrite expressions involving radicals and rational exponents using the properties of exponents. **KY.HS.N.5** Define appropriate units in context for the purpose of descriptive modeling. **(13) KY.HS.A.24** Justify that the solutions of the equations f(x) = g(x) are the x-coordinates of the points where the graphs of y = f(x) and y = g(x) intersect. Find the approximate solutions graphically, using technology or tables. **(17) KY.HS.F.11** Distinguish between situations that can be	Students understand that a single root can be expressed as a rational exponent with a numerator of one and a base that is equal to the root index. Students understand that powers and roots can be concisely expressed as a single rational exponent where the numerator is the power and the denominator is the root index. For example, students understand that defining 4 1/3 is the same as the cube root of 4 because 4(1⁄3) 3 = (41⁄3)3 so 4(1⁄3) 3 must equal 4. Standards KY.HS.N.2 builds on standard KY.HS.N.1 by extending student understanding to situations where the numerator is not one. For example, students understand that defining 4m/n is the same as √4 *nn* m and (√4 *nn*) m . Include contextual examples, such as rewriting the volume of a sphere to identify the radius as a function of volume. In real-world situations, answers are usually represented by numbers with

			modeled with linear functions and with exponential functions. a. Recognize and justify that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over equal intervals. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another. **(20) KY.HS.F.12** Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). **(18) KY.HS.F.13** Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function. **(18) KY.HS.F.14** Interpret the parameters in a linear or exponential function in terms of a context.	units. Units involve measurement, which requires precision and accuracy. For example, students should recognize that units measuring speed would not be appropriate for situations involving volume. Additionally students should understand when one dimensional, two dimensional, or three dimensional units are most applicable. Students justify solutions for equations which Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential and logarithmic functions. ★ Linear functions have the same average rate of change over same-sized intervals; the same value is added to the output over each interval. In contrast, the outputs of exponential functions grow or decay by the same percent over same-sized intervals; the same value is multiplied by the output over each interval. Students construct functions with and without technology. Students compare functions by focusing on how the output values change over intervals of equal length. Even though a linear function may initially be increasing faster than an exponential function, an increasing exponential function always eventually exceeds an increasing linear function. More than just substituting values into a given formula, this requires students to understand how changing specific parameters will change the function output. An example of this with an exponential function (f(x) = a • bx) might be changing the “b” from a number greater than 1 to a number

				between 0 and 1. Students should recognize this creates a decay problem instead of a growth problem. Similarly, changing the “a” parameter creates corresponding changes to the graph and has different implications within the realistic context.
Unit 7 Polynomials & Factoring	• Classifying Polynomials • Adding and Subtracting Polynomials • Multiplying Monomial x Polynomial • Multiplying Binomials (FOIL) and Binomial x Trinomial • Dividing Polynomials by a Monomial • Factoring by finding Greatest Common Factor (GCF) • Factoring Difference of Squares • Factoring Trinomials (x2 + bx + c) • Factoring Trinomials (ax2 + bx + c) *By Slip & Slide • Factoring By Grouping (4 Terms) • Factoring Review (organized by type, then practice with it mixed) • Dividing Polynomials by a Binomial (by Factoring)	Independent Practice Word Problems Multiple Choice Practice Collaboration Lecture/Guided Notes & Practice Weekly Quiz Unit Test Binder Possible Writing Piece	**(5) KY.HS.A.5** Add, subtract and multiply polynomials. **(6) KY.HS.A.7** Identify roots of polynomials when suitable factorizations are available. Know these roots become the zeros (x-intercepts) for the corresponding polynomial function.	Students combine like terms and make use of the distributive property when adding, subtracting and multiplying polynomials. Methods of finding roots could include, but are not limited to: • factoring • synthetic division • long division • an analysis of the graph (created by hand or through use of technology).
Unit 8 Quadratic Equations	• Introduction to Quadratic Equations (Standard Form, Vertex, Axis of Symmetry, Maximum, Minimum) • Graphing Quadratic Equations by Table (Review of Domain/Range included) • Vertex Form and Transformations • Quadratic Roots (Identifying by Graphing) • The Discriminant • Solving Quadratic Equations by Factoring • Solving Quadratic Equations by Square Roots • Solving Quadratic Equations by Completing the Square • Solving Quadratic Equations by the Quadratic Formula • Review of all Methods • Applications: Area and Consecutive Integers • Projectile Motion • Linear vs. Quadratic Models	Independent Practice Word Problems Multiple Choice Practice Collaboration Lecture/Guided Notes & Practice Weekly Quiz Unit Test Binder Possible Writing Piece	**KY.HS.N.6** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. **(3) KY.HS.A.2** Use the structure of an expression to identify ways to rewrite it and consistently look for opportunities to rewrite expressions in equivalent forms. **(4) KY.HS.A.3** Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. a. Write the standard form of a given polynomial and identify the terms, coefficients, degree, leading coefficient and constant term.	While KY.HS.N.6 does not require a formal discussion or use of significant digits in the scientific sense, students understand a level of precision. For example, when using the Pythagorean Theorem with measurements given in tenths of an inch, it is appropriate for students to express answers to the nearest tenth, but not to the nearest hundredth because that level of precision was not used in the original measures. Students see x4 – y4 as (x2) 2 – (y2) 2, thus recognizing it as a difference of squares factored as (x2 – y2)(x2 + y2). Additionally, students see there are three commonly used forms for a quadratic expression: • Standard form • Factored form • Vertex form and can

			b. Factor a quadratic expression to reveal the zeros of the function it defines. c. Use the properties of exponents to rewrite exponential expressions. **(7) KY.HS.A.12** Create equations and inequalities in one variable and use them to solve problems. **(11) KY.HS.A.19** Solve quadratic equations in one variable. a. Solve quadratic equations by taking square roots, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a ± bi for real numbers a and b. **(14) KY.HS.F.1** Understand properties and key features of functions and the different ways functions can be represented. a. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. b. Using appropriate function notation, evaluate functions for inputs in their domains and interpret statements that use function notation in terms of a context. c. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities and sketch graphs showing key features given a	identify when one form might be more useful than another. KY.HS.A.3b Students recognize the connection between the zero product property and solving a quadratic in one variable by setting factored expressions equal to zero. KY.HS.A.3c KY.HS.A.3d (+) Students recognize being able to complete the square allows them to identify the coordinates of the maximum or minimum value more easily than when the quadratic is in standard form and there are pros and cons of each equivalent form. Students use the addition, subtraction, multiplication and division properties for both equations and inequalities to solve problems. These equations may arise from linear and quadratic functions and simple rational and exponential functions. Students observe that methods for solving quadratic equations are interrelated and certain situations may more appropriately call upon one method as opposed to the other methods. b & c. (+) Students understand completing the square involves factoring and the quadratic formula is nothing more than an encapsulation of the method of completing the square. While all students are not required to be able to use completing the square as a method for solving quadratic equations, exposure to this method is needed to explain how the quadratic formula is derived.Students observe that methods for solving quadratic equations are interrelated and certain situations may more appropriately call upon one method as opposed to the

			verbal description of the relationship. d. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. e. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). **(16) KY.HS.F.4** Graph functions expressed symbolically and show key features of the graph, with and without using technology (computer, graphing calculator). a. Graph linear and quadratic functions and show intercepts, maxima and minima. **(16) KY.HS.F.5** Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Identify zeros, extreme values and symmetry of the graph within the context of a quadratic function. b. Use the properties of exponents to interpret expressions for exponential functions and classify the exponential function as representing growth or decay.	other methods. b & c. (+) Students understand completing the square involves factoring and the quadratic formula is nothing more than an encapsulation of the method of completing the square. While all students are not required to be able to use completing the square as a method for solving quadratic equations, exposure to this method is needed to explain how the quadratic formula is derived. a. When describing relationships between quantities, the defining characteristic of a function is the input value determines the output value or, equivalently, the output value depends upon the input value. In some situations where two quantities are related, each can be viewed as a function of the other. c. A function is often described and understood in terms of the output behavior, or over what input values is it increasing, decreasing, or constant. Important questions include, “For what input values is the output value positive, negative, or 0? What happens to the output when the input value gets very large in magnitude?” Graphs become useful representations for understanding and comparing functions because these behaviors are often easy to see in the graphs of functions. Key features include, but are not limited to: intercepts; intervals where the function is increasing, decreasing, or remaining constant; relative maxima and minima; symmetries; end behavior; periodicity. e. Students compare characteristics from various representations for one type of family of function at a time. For quadratics, students might determine which function has the larger

				maximum when given two different representations of quadratic functions. Within a family, the functions often have commonalities in the shapes of their graphs and in the kinds of features important for identifying and describing functions. This standard indicates the function families in students' repertoires, detailing which features are required for several key families. Students demonstrate fluency with linear, quadratic and exponential functions, including the ability to graph without using technology. In other function families, students graph simple cases without technology and more complex ones with technology. a. Quadratic functions provide a rich playground for developing this ability, since the three principal forms for a quadratic expression (expanded, factored and completed square) each give insight into different aspects of the function. b. Students examine real-world situations with constant multiplicative change, represented as expressions, such as growth or decay.
Unit 9 Statistics	• Mean, median, mode, range • lower extreme, lower quartile, upper quartile, upper extreme, interquartile range • box-and-whisker plots • stem-and-leaf plots • Histograms • mean absolute deviation • standard deviation • variance • normal distribution • z-scores	Independent Practice Word Problems Multiple Choice Practice Collaboration Lecture/Guided Notes & Practice Weekly Quiz Unit Test Binder Possible Writing Piece	**KY.HS.N.4** Use units in context as a way to understand problems and to guide the solution of multi-step problems; a. Choose and interpret units consistently in formulas; b. Choose and interpret the scale and the origin in graphs and data displays.	Graphical representations and data displays include but are not limited to: line graphs, circle graphs, histograms, multi-line graphs, scatterplots and multi-bar graphs.

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Unit 10 Rational Expressions & Equations	• Simplifying Rational Expressions • Multiplying Rational Expressions • Dividing Rational Expressions • Adding and Subtracting Rational Expressions (Like Bases) • Adding and Subtracting Rational Expressions (Unlike Bases) • Rational Expression Applications • Rational Equations (those that result in linear or quadratic equations)	Independent Practice Word Problems Multiple Choice Practice Collaboration Lecture/Guided Notes & Practice Weekly Quiz Unit Test Binder		
Unit 11 Radical Expressions & Equations	• Simplifying Radicals (square and cube roots) • Simplifying Radicals with Variables • Adding and Subtracting Radicals • Multiplying Radicals • Dividing Radicals • Rationalizing the Denominator • Dividing Radicals with Binomials (conjugates) • Solving Radical Equations (includes extraneous solutions) • Solving Radical Equations Resulting in a Quadratic Equation	Independent Practice Word Problems Multiple Choice Practice Collaboration Lecture/Guided Notes & Practice Weekly Quiz Unit Test Binder		