Algebra 1 Course Syllabus

Course Description:

In Algebra 1, students will study the foundations of algebra, including the understanding of variables, expressions, and working with real numbers to simplify expressions. They will also learn solve equations, from one-step to complex equations, including proportions and absolute value equations. Students will learn to solve and graph inequalities, and will be introduced to linear functions, scatter plots, and will solve for systems of equations and inequalities. Students will also learn to work with polynomials, including factoring, and will solve for and graph quadratic functions. They will also learn to identify and solve rational functions and equations, as well as radical and exponential functions.

Part 1: 5 credit hours

Part 2: 5 credit hours

Course Outline	Common Core Standards (CA)

Algebra 1, Part 1

Unit 1: Foundations of Algebra

1.1 Variables & Expressions
1.2 Adding and Subtracting Real Numbers
1.3 Multiplying and Dividing Real Numbers
1.4 Powers and Exponents
1.5 Roots and Irrational Numbers
1.6 Properties of Real Numbers
1.7 Simplifying Expressions

In Unit 1 students will learn:
How to solve simple equations, and will work with more complex variables and expressions.
How to write and simplify Algebraic expressions, involving basic functions with Real Numbers.
How to analyze and combine like terms, and a mastery of powers and exponents, as well as roots and irrational numbers.
[N-RN,N-Q]

Unit 2: Equations

2.1 Solving One Step Equations
2.2 Solving Two Step Equations
2.3 Solving Multi- Step Equations
2.4 Solving Equations with Variables on Both Sides
2.5 Solving Proportions
2.6 Solving Literal Equations for a variable
2.7 Solving Absolute-Value Equations

In Unit 2 students will learn:
To move on from solving one step to two step equations, including equations in which the variable is on both sides.
How to identify real life scenarios and express them as proportions, and from there, how to solve those proportions for the given variable using cross multiplication.
How to use algebraic techniques to solve literal equations for a particular variable.

How to solve and comprehend absolute value equations, showing that two solutions are likely in those scenarios.
[N-Q, A-CED, A-REI]

Unit 3: Inequalities

3.1 Graphing and Writing Inequalities
3.2 Solving Inequalities by Adding or Subtracting
3.3 Solving Inequalities by Multiplying or Dividing
3.4 Solving Two Step and Multi-Step Inequalities
3.5 Solving Inequalities with Variables on Both Sides
3.6 Solving Compound Inequalities
3.7 Solving Absolute-Values Inequalities

In Unit 3 students will learn:
How to take what was learned from solving, and graphing linear equations and progress to graphing and writing inequalities.
How to solve complex inequalities and to gain the understanding that there is no single solution, but rather a range of possible answers with inequalities.
How to compare and contrast what is known about absolute value equations with absolute value inequalities, and how to graph the outcomes.
[N-Q, A-SSE, A-CED, A-REI, S-ID]

Unit 4: Functions

4.1 Relations and Functions
4.2 Writing Functions
4.3 Scatter Plots and Trend Lines
4.4 Arithmetic Sequence

In Unit 4 students will learn
How to spot and analyze relations and functions, understanding that not all relations are functions.
How to write functions from real life scenarios and how to develop a deep understanding of graphing a “best line of fit” for scatter plots.
How to calculate trend lines and to understand that they are an estimation in most cases.
To take this understanding of functions and learn arithmetic sequences and their patterns.
[N-Q, A-CED, A-REI, F-IF, F-BF, F-LE, S-ID]

Unit 5: Linear Functions

5.1 Linear Equations and Functions
5.2 Using Intercepts
5.3 Slope
5.4 Direct Variation
5.5 Slope- Intercept Form
5.6 Point- Slope Form
5.7 Slopes of Parallel and Perpendicular Lines

In Unit 5 students will learn:
How to identify and manipulate linear equations and functions, as well as match graphs to equations using key characteristics like intercepts, the slope, and positive or negative correlation.
To able to switch between the intercept form and the point-slope form of algebraic equations and will understand when one

	form is more convenient than another, with regards to graphing. How to understand and be able to identify when two lines are parallel, perpendicular, or of no particular relationship, using the slopes of the two lines. [N-Q, A-SSE, A-CED, F-IF, S-ID]
Unit 6: Systems of Equations and Inequalities 6.1 Solving Systems by Graphing 6.2 Solving Systems by Substitution 6.3 Solving Systems by Elimination 6.4 Solving Special Systems 6.5 Applying Systems 6.6 Solving Linear Inequalities 6.7 Solving Systems of Linear Inequalities	**In Unit 6 students will learn**: How to develop an understanding that two lines cross at a single point and how to incorporate prior knowledge of linear equations and inequalities to solve systems. How to solve systems of equations and inequalities using the graphing, substitution, and elimination methods, and how to identify which technique is more suitable for which scenario. How to solve special systems, including both consistent and inconsistent systems, and how to apply systems to real life scenarios. How to solve systems of inequalities and how to identify ranges of solutions that satisfy both linear inequalities in a system, and how to do the same for more than two inequalities at a time. [N-Q, A-SSE, A-CED, A-REI]

Algebra 1, Part 2

Unit 1: Exponents and Polynomials

1.1 Integer Exponents
1.2 Powers of 10 and Scientific Notation
1.3 Multiplication Properties of Exponents
1.4 Division Properties of Exponents
1.5 Fractional Exponents
1.6 Polynomials
1.7 Adding and Subtracting Polynomials
1.8 Multiplying Polynomials
1.9 Special Products of Binomials

In Unit 1 students will learn:
To explore and study integer exponents, including both positive and negative exponents, and how to recognize growth and decay patterns for each.
How to recognize the power of a negative exponent to result in the inverse of its base and the implications of a graph of both positive and negative exponents.
How to understand powers of 10 and how to use and understand scientific notation, applying scientific notation to figures from real life scenarios.
How to understand and exercise multiplication and division properties of exponents, and how to readily exchange fractional exponents into root form and simplify them.
How to simplify like terms, and how to add and subtract polynomials as well as how to multiply polynomials.
How to find special products of binomials.
[N-RN, A-SSE, A-APR, A-CED, F-LE]

Unit 2: Factoring Polynomials

2.1 Factors and Greatest Common Factors
2.2 Factoring ax^2+bx+c
2.3 Factoring Special Products
2.4 Choosing a Factoring Method

In Unit 2 students will learn:
How to incorporate the understanding of multiplying and dividing polynomials into factoring polynomials, and how to master the reverse process of "undoing" the FOIL method, as well as other factoring techniques.
How to identify the greatest common factors and factor using the GCF.
To become fluent in identifying and factoring trinomials as well as special products, including the difference of square, difference and sum of cubes.
How to quickly and efficiently determine the appropriate factoring method for the various factoring problems.

[A-SSE A-APR]

Unit 3: Quadratic Functions and Equations

3.1 Quadratic Equations and Functions
3.2 Characteristics of Quadratic Equations
3.3 Graphing Quadratic Functions
3.4 Solving Quadratic Equations by Graphing
3.5 Solving Quadratic Equations by Factoring
3.6 Solving Quadratic Equations by Using Square Roots
3.7 Completing the Square
3.8 The Quadratic Formula
3.9 The Discriminant

In Unit 3 students will learn:
To recognize the symmetric trends of quadratic functions and how to solve quadratic equations.
How to analyze and comprehend the characteristics of quadratic functions, including the identification of the vertex, the axis of symmetry, and the x and y intercepts.
How to identify graphs of quadratic functions from their key characteristics and how to graph them using only the equation.
How to solve quadratic equations using the graphing, factoring, square roots, and completing the square methods.
To understand that there are three alternatives to quadratic equations; one solution, two solutions, and no solutions.
How to master the quadratic formula to solve quadratics, as well as be able to use to use the discriminant to identify the nature of the roots.
[N-Q, A-SSE, A-CED, A-REI , F-IF, F-BF, F-LE]

Unit 4: Rational Functions and Equations

4.1 Inverse Variation
4.2 Rational Functions
4.3 Simplifying Rational Expressions
4.4 Multiplying and Dividing Rational Expressions
4.5 Adding and Subtracting Rational Expressions
4.6 Dividing Rational Polynomials
4.7 Solving Rational Expressions

In Unit 4 students will learn:
To identify the types of variation from real life scenarios, including both direct and inverse variation, and how to master writing variation equations to use for modeling outcomes.
To solve rational functions and how to become fluent at simplifying rational expressions.
How to multiply and divide rational expressions and use these skills, as well how to add and subtract rational expressions to solve for solutions.
How to divide rational polynomials and how to solve rational expressions involving complex polynomials.
[N-Q, A-SSE, A-APR, A-REI , F-IF, S-ID]

Unit 5: Radical and Exponential Functions

5.1 Square- Root Functions
5.2 Radical Expressions
5.3 Adding and Subtracting Radical Expressions
5.4 Solving Radical Equations
5.5 Geometric Sequence
5.6 Exponential Functions
5.7 Linear, Quadratic, and Exponential Models

In Unit 5 students will learn:
The fundamental characteristics of square root functions, including domain and range restrictions.
To recognize basic functions of radical expressions, including how to simplify, add, and subtract them.
How to solve radical equations by performing reverse operations to isolate the variable.
To recognize geometric sequences, including their growth or decay patterns, and their graphs.
To understand exponential functions and how to differentiate between linear, quadratic, and exponential models.
[N-Q, A-CED, A-REI, F-IF, F-LE, S-ID]