

Definitions

CALPADS	California Longitudinal Pupil Achievement Data System
CTE Technical Prep	A course within a CTE technical career pathway or program that has been articulated with a postsecondary education or through an apprenticeship program of at least 2 years following secondary instruction.
Instructional Level Code	Represents a nonstandard instructional level at which the content of a specific course is either above or below a 'standard' course instructional level. These levels may be identified by the actual level of instruction or identified by equating the course content and level of instruction with a state or nationally recognized advanced course of study, such as IB or AP.
Instructional Level Honors, UC Certified	Includes all AP courses.
Instructional Level Honors, non UC Certified	Requires Board approval.
Instructional Level College	Includes ACE courses. Equivalent to college course and content, but not an AP course. Not related to section, but to course.

EDUCATIONAL SERVICES

Course Title: Algebra 1 - #0212

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EDUCATIONAL SERVICES

Department: **Mathematics**

Course Title: **Algebra 1**

Course Number: **#0212**

Unit Title: **1 The Real Number System**

Content Area Standards (Please identify the source): List content standards students will master in this unit.

N-RN 1. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.

N-RN 2. Rewrite expressions involving radicals and rational exponents using the properties of exponents.

N-RN 3. Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

Students will extend the properties of exponents to rational exponents. [N-RN 1]

Students will use properties of rational and irrational numbers. [N-RN 2], [N-RN 3]

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Assessments: Describe the Formative and Summative assessments that will be used to demonstrate learning and mastery of the standards.

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Unit Title: **2 Quantities**

Content Area Standards (Please identify the source): List content standards students will master in this unit.

N-Q 1. Use units as a way to understand problems and to guide solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

N-Q 2. Define appropriate quantities for the purpose of descriptive modeling.

N-Q 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

Students will reason quantitatively and use units to solve problems. [N-Q 1], [N-Q 2], [N-Q 3]

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Unit Title: **3 Seeing Structure in Expressions**

Content Area Standards (Please identify the source): List content standards students will master in this unit.

A-SSE 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 by viewing one or more of their parts as a single entity.

A-SSE 2. Use the structure of an expression to identify ways to rewrite it.

A-SSE 3. Choose and produce an equivalent form of expression to reveal and explain properties of the quantity represented by the expression.

- a. Factor a quadratic expression to reveal the zeroes of the function it defines.
- b. Complete the square in a quadratic expression to reveal the maximum and the minimum value of the function it defines.
- c. Use the properties of exponents to transform expressions for exponential functions.

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

Students will interpret the structure of linear, exponential and quadratic expressions. [A-SSE 1a,b], [A-SSE 2]

Students will write expressions in equivalent forms to solve quadratic and exponential problems. [A-SSE 3a,b,c]

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Unit Title: **4 Arithmetic With Polynomials and Rational Expressions**

Content Area Standards (Please identify the source): List content standards students will master in this unit.

A-APR 1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

Students will perform arithmetic operations on linear and quadratic polynomials. [A-APR 1]

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Unit Title: **5 Creating Equations**

Content Area Standards (Please identify the source): List content standards students will master in this unit.

A-CED 1. Create equations and inequalities in one variable including ones with absolute value and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

A-CED 2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

A-CED 3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context.

A-CED 4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law $V = IR$ to highlight resistance R .

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

Students will create linear, quadratic and exponential equations that describe numbers or relationships. [A-CED 1], [A-CED 2], [A-CED 3], [A-CED 4]

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A-REI 1. Explain 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.

A-REI 3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

A-REI 4. Solve quadratic equations in one variable.

a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.

b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, 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 $a \pm bi$ for real numbers a and b .

A-REI 5. Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.

A-REI 7. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.

A-REI 10. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).

A-REI 11. Explain why the x -coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

A-REI 12. Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

Students will understand solving equations as a process of reasoning and explain the reasoning. [A-REI 1]

Students will solve linear equations and inequalities in one variable. [A-REI 3], [A-REI 4a,b], [A-REI 5]

Students will solve systems of two linear equations and systems of one linear and one quadratic equation. [A-REI 7], [A-REI 10]

Students will represent and solve linear and exponential equations and inequalities graphically. [A-REI 11], [A-REI 12]

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Unit Title: **7 Interpreting Functions**

Content Area Standards (Please identify the source): List content standards students will master in this unit.

F-IF 1. 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 . The graph of f is the graph of the equation $y = f(x)$.

F-IF 2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

F-IF 3. Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. Interpret functions that arise in applications in terms of the context.

F-IF 4. 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 verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.

F-IF 5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.

F-IF 6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

F-IF 7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

a. Graph linear and quadratic functions and show intercepts, maxima, and minima.

b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.

c. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.

F-IF 8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.

a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.

b. Use the properties of exponents to interpret expressions for exponential functions.

F-IF 9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

Students will understand the concept of a function and use function notation. [F-IF 1], [F-IF 2],[F-IF 3], [F-IF 4], [F-IF 5]

Students will interpret linear, exponential and quadratic functions that arise in applications in terms of the context. [F-IF 6], [F-IF 7a,b,c], [F-IF 8a,b]

Students will analyze linear, exponential, quadratic, absolute value, step and piecewise functions using different representations. [F-IF 9]

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Unit Title: **8 Building Functions**

Content Area Standards (Please identify the source): List content standards students will master in this unit.

F-BF 1. Write a function that describes a relationship between two quantities. [Linear, exponential, and quadratic.]

- a. Determine an explicit expression, a recursive process, or steps for calculation from a context.
- b. Combine standard function types using arithmetic operations.

F-BF 2. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms. [Linear, exponential, and quadratic.]

F-BF 3. Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $kf(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology.

F-BF 4. Find inverse functions.

- a. Solve an equation of the form $f(x) = c$ for a simple function f that has an inverse and write an expression for the inverse. [Linear only.]

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

Students will build a function that models a relationship between two quantities. [F-BF 1a,b], [F-BF 2]

Students will build new linear, exponential, quadratic and absolute value functions from existing functions. [F-BF 3], [F-BF 4]

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Unit Title: **9 Linear, Quadratic, and Exponential Models**

Content Area Standards (Please identify the source): List content standards students will master in this unit.

F-LE 1. Distinguish between situations that can be modeled with linear functions and with exponential functions.

a. Prove 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.

F-LE 2. 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).

F-LE 3. Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.

F-LE 4. Interpret the parameters in a linear or exponential function in terms of a context.

F-LE 5. Apply quadratic functions to physical problems, such as the motion of an object under the force of gravity.

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

Students will construct and compare linear, quadratic, and exponential models and solve problems. [F-LE 1 a,b,c], [F-LE 2], [F-LE 3]

Students will interpret expressions for functions in terms of the situation they model. [F-LE 4], [F-LE 5]

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