Mathematics Standards
Catalina Foothills School District
Math 8 Accelerated

In Math 8 Accelerated, the focus of instructional time is on three critical areas:

1. Develop understanding of rational and irrational numbers and rewriting rational and irrational numbers in different forms.
2. Develop understanding of expressions and equations, including solving linear equations, linear inequalities, and systems of linear equations. In addition, students will begin an analysis of quadratic equations.
3. Develop understanding of the concept of a function and use functions to describe quantitative relationships, including modeling an association in bivariate data with a linear equation.

    a. Students use their understanding of multiplication and apply properties to develop understanding of radicals and rational exponents. They use their knowledge of rational numbers to develop understanding of irrational numbers. Students will develop an understanding of rewriting numbers in multiple forms and performing operations on rational and irrational numbers.

    b. Students recognize equations for proportions (y/x =m or y = mx) as special linear equations (y = mx + b), understanding that the constant of proportionality (m) is the slope, and the graphs are lines through the origin. They understand that the slope (m) of a line is a constant rate of change, so that if the input or x-coordinate changes by an amount A, the output or y-coordinate changes by the amount (m)(A).

    Students fluently solve linear equations and linear inequalities in one variable. They solve systems of two linear equations in two variables to analyze situations and solve problems. Students understand when they use properties of equality and logical equivalence, they maintain the solutions of the original equation. Students can build models using equations and inequalities to solve problems in a real-world context.

    Students will solve quadratic equations by extracting the root and connect the equation to the key features of the graph of the quadratic function.

    c. Students grasp the concept of a function as a rule that assigns to each input exactly one output. They can translate among representations and partial representations of functions (noting that tabular and graphical representations may be partial representations), and they describe how aspects of the function are reflected in the different representations. Students will evaluate functions using multiple notations including tables and function notation.

    Students use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For scatter plots that suggest linear association, students informally fit a straight line and assess the model fit by judging the closeness of the data points to the line.

The Standards for Mathematical Practice complement the content standards so that students increasingly engage with the subject matter as they grow in mathematical maturity and expertise throughout the elementary, middle, and high school years.

Standards for Math 8 Accelerated

The Number System (NS)	
8.NS.A.1	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion. Know that numbers whose decimal expansions do not terminate in zeros or in a repeating sequence of fixed digits are called irrational.
8.NS.A.2	Use rational approximations of irrational numbers to compare the size of irrational numbers. Locate them approximately on a number line diagram, and estimate their values.
8.NS.A.3	Understand that given any two distinct **rational** numbers, $a < b$, there exist a rational number c and an irrational number d such that $a < c < b$ and $a < d < b$. Given any two distinct **irrational** numbers, $a < b$, there exist a rational number c and an irrational number d such that $a < c < b$ and $a < d < b$.
Expressions and Equations (EE)	
8.EE.A.1	Understand and apply the properties of integer exponents to generate equivalent numerical expressions.
8.EE.A.2	Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Know that $\sqrt{2}$ is irrational. a. Evaluate square roots of perfect squares less than or equal to 225. b. Evaluate cube roots of perfect cubes less than or equal to 1000.
8.EE.A.3	Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and express how many times larger or smaller one is than the other.
8.EE.A.4	Perform operations with numbers expressed in scientific notation including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities.
8.EE.B.5	Graph proportional relationships interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways (for example: compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed).
8.EE.B.6	Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane. Derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at (0, b).
8.EE.C.7	Fluently solve linear equations and inequalities in one variable. a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solution. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). b. Solve linear equations and inequalities with rational number coefficients, including solutions that require expanding expressions using the distributive property and collecting like terms.
8.EE.C.8	Analyze and solve pairs of simultaneous linear equations. a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations including cases of no solution and infinite number of solutions. Solve simple cases by inspection. c. Solve mathematical problems and problems in real-world context leading to two linear equations in two variables.
Functions (F)	
8.F.A.1	Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. (Function notation is not required in Grade 8.)

8.F.A.2	Compare properties of two functions each represented in a different way [algebraically, graphically, numerically in tables, or by verbal descriptions] (for example: given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change).
8.F.A.3	Interpret the equation $y = mx + b$ as defining a linear function whose graph is a straight line; give examples of functions that are not linear (for example: the function $A = s^2$ giving the area of a square as a function of its side length in not linear because its graph contains the points (1,1), (2,4), and (3,9) which are not on a straight line).
8.F.B.4	Given a description of a situation, generate a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or a graph. Track how the values of the two quantities change together. Interpret the rate of change and initial value of a linear function in terms of the situation it models, its graph, or its table of values.
8.F.B.5	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
Geometry (G)	
8.G.A.1	Verify experimentally the properties of rotations, reflections, and translations. Properties include: lines are taken to lines, line segments are taken to line segments of the same length, angles are taken to angles of the same measure, parallel lines are taken to parallel lines.
8.G.A.2	Understand that a two-dimensional figure is congruent to another if one can be obtained from the other by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that demonstrates congruence.
8.G.A.3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
8.G.A.4	Understand that a two-dimensional figure is similar to another if, and only if, one can be obtained from the other by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that demonstrates similarity.
8.G.A.5	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles (for example: arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so).
8.G.B.6	Understand the Pythagorean Theorem and its converse.
8.G.B.7	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world context and mathematical problems in two and three dimensions.
8.G.B.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
8.G.C.9	Understand and use formulas for volumes of cones, cylinders and spheres and use them to solve real-world context and mathematical problems.
Statistics and Probability (SP)	
8.SP.A.1	Construct and interpret scatter plots for bivariate measurement data to investigate and describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
8.SP.A.2	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.
8.SP.A.3	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.

8.SP.A.4	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables.
8.SP.B.5	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. a. Understand that the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. b. Represent sample spaces for compound events using organized lists, tables, tree diagrams and other methods. Identify the outcomes in the sample space which compose the event. c. Design and use a simulation to generate frequencies for compound events.
Number and Quantity: Quantities (N-Q) (Algebra 1)	
A1.N-Q.A.1	Use units as a way to understand problems and to guide the 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, include utilizing real-world context.
A1.N-Q.A.2	Define appropriate quantities for the purpose of descriptive modeling. Include problem-solving opportunities utilizing real-world context.
A1.N-Q.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities utilizing real-world context.
Algebra: Seeing Structure in Expressions (A-SSE) (Algebra 1)	
A1.A-SSE.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 expressions by viewing one or more of their parts as a single entity.
A1.A-SSE.A.2	Use structure to identify ways to rewrite numerical and polynomial expressions. Focus on polynomial multiplication and factoring patterns.
Algebra: Arithmetic with Polynomials and Rational Expressions (A-APR) (Algebra 1)	
A1.A-APR.B.3	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial. Focus on quadratic and cubic polynomials in which linear and quadratic factors are available.
Functions: Interpreting Functions (F-IF) (Algebra 1)	
A1.F-IF.A.2	Evaluate a function for inputs in the domain, and interpret statements that use function notation in terms of a context.
A1.F-IF.C.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. Functions include linear, exponential, quadratic, and piecewise- defined functions (limited to the aforementioned functions).
Algebra: Creating Equations (A-CED) (Algebra 1)	
A1.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems. Include problem-solving opportunities utilizing real-world context. Focus on equations and inequalities that are linear, quadratic, or exponential.
A1.A-CED.A.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.
A1.A-CED.A.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).
Algebra: Reasoning with Equations and Inequalities (A-REI) (Algebra 1)	
A1.A-REI.A.1	Explain each step in solving linear and quadratic equations 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.
A1.A-REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

Standards for Mathematical Practice	
8.MP.1	Make sense of problems and persevere in solving them.
8.MP.2	Reason abstractly and quantitatively.
8.MP.3	Construct viable arguments and critique the reasoning of others.
8.MP.4	Model with mathematics.
8.MP.5	Use appropriate tools strategically.
8.MP.6	Attend to precision.
8.MP.7	Look for and make use of structure.
8.MP.8	Look for an express regularity in repeated reasoning.