Algebra I

Course #'s 0064, 0068

Credits 5

2017

Algebra 1 Curriculum Overview

This curriculum has been designed to give students a comprehensive education in Algebra 1. This course will relate simple mathematical relationships in everyday concepts while also preparing them for higher levels of math.   Additionally, the curriculum is aligned to the PARCC framework and the New Jersey math learning standards. Throughout the year, students are exposed to PARCC type questions.

Unit 1 reviews pre-algebra and introduces students to algebraic expressions and linear equations. These skills easily transfer to solving and graphing one-variable linear inequalities. Next, polynomials are introduced through classification and operations (adding, subtracting and multiplying)

Unit 2 begins with factoring and solving polynomials. This is then related to the graph of a parabola and the quadratic formula. Students then explore other methods of solving polynomial equations (square roots, completing the square, grouping method) the unit concludes with exponential growth and decay functions.

Unit 3 covers all aspects of two-variable linear equations and inequalities (slope, intercepts, etc.) Then, linear systems are introduced and the various methods of solving them. Having been exposed to the main types of Algebra 1 functions (linear, quadratic, exponential), students begin to compare and contrast the properties of the relationships.

Unit 4 covers statistical aspects of Algebra 1 and the various ways to report them. At this point students take the PARCC examination. For the remaining weeks in Algebra 1, students use their cumulative knowledge of algebra to model, compare and summarize various real-world scenarios

PCTI Algebra 1 Curriculum (Aligned to PARCC and the NJ student learning standards for mathematics)

					Textbook Reference			
Unit 1	**Topic**	**STUDENT LEARNING OBJECTIVES**	**Suggested Days**	**NJ Math Standard**	**Larson (H and CP)**	**Holt (C and Apps 1)**	**Key Vocabulary (from textbooks)**	**Khan Academy Links**
Start		Review summer packet (H and CP only)	5					
1.01	I.) Expressions, Equations & Inequalities	1.) Apply order of operations	2	A.SSE.A.01.b	1.2	n/a	order of operations	https://www.khanacademy.org/math/pre-algebra/pre-algebra-arith-prop/pre-algebra-order-of-operations/v/introduction-to-order-of-operations
1.02	I.) Expressions, Equations & Inequalities	2.) Evaluate expressions (define/compare/contrast rational and irrational numbers)	2	F.IF.A.02 N.RN.B.03	1.1	1.1	variable, constant, numerical expression, algebraic expression, evaluate, power, base, exponent	https://www.khanacademy.org/math/algebra-home/alg-intro-to-algebra/alg-substitution/v/evaluating-expressions-in-two-variables
1.03	I.) Expressions, Equations & Inequalities	3.) Solve 2 step equations and verify the solution(s) with substitution. (Include decimal and fraction solving without a calculator)	2	A.REI.B.03 A.CED.A.01	2.3	1.4	like terms, input, output,	https://www.khanacademy.org/math/algebra/one-variable-linear-equations/alg1-two-steps-equations-intro/v/why-we-do-the-same-thing-to-both-sides-two-step-equations

1.04	I.) Expressions, Equations & Inequalities	4.) Solve multi-step equations and justify each step with properties of equality (Review distributive property in do now)	3	A.REI.B.03 A.REI.A.01 A.CED.A.01	2.4	1.4	distributive property, reciprocal	https://www.khanacademy.org/math/pre-algebra/pre-algebra-arith-prop/pre-algebra-ditributive-property/v/the-distributive-property
1.05	I.) Expressions, Equations & Inequalities	5.) Create and solve equations with variables on both sides	2	A.CED.A.01	2.5	1.5	identity	https://www.khanacademy.org/math/algebra/one-variable-linear-equations/alg1-variables-on-both-sides/v/why-we-do-the-same-thing-to-both-sides-multi-step-equations
1.06	I.) Expressions, Equations & Inequalities	6.) Write and solve proportions. Write and simplify ratios.	2	N.Q.A.01 F.LE.A.01.b	2.6	1.8, 1.9	ratio, proportion, simplest form	https://www.khanacademy.org/math/pre-algebra/pre-algebra-ratios-rates/pre-algebra-write-and-solve-proportions/v/find-an-unknown-in-a-proportion https://www.khanacademy.org/math/pre-algebra/pre-algebra-ratios-rates/pre-algebra-ratios-intro/v/ratios-intro https://www.khanacademy.org/math/pre-algebra/pre-algebra-ratios-rates/pre-algebra-rates/v/practice-computing-and-comparing-rates
1.07	I.) Expressions, Equations & Inequalities	7.) Create, solve and graph inequalities in one variable	3	A.REI.B.03 A.CED.A.01	5.1, 5.2, 5.3	2.4, 2.5	graph of an inequality, equivalent inequality, solution of an inequality	https://www.khanacademy.org/math/algebra/one-variable-linear-inequalities
1.08	II.) Polynomial Operations	1.) Add & subtract polynomials and classify by degree & number of terms (Include perimeter problems)	3	A.APR.A.01	8.1	6.4	monomial, degree, polynomial, leading coefficient, binomial, trinomial	https://www.khanacademy.org/math/algebra/introduction-to-polynomial-expressions/adding-and-subtracting-polynomials/v/adding-and-subtracting-polynomials-1 https://www.khanacademy.org/math/algebra/introduction-to-polynomial-expressions/introduction-to-polynomials/v/terms-coefficients-and-exponents-in-a-polynomial
1.09	II.) Polynomial Operations	2.) Multiply powers by applying the product rule for exponents	2	A.SSE.B.03.c	7.1	n/a	order of magnitude, power, exponent, base	https://www.khanacademy.org/math/algebra-basics/alg-basics-expressions-with-exponents/alg-basics-exponent-properties/v/exponent-properties-involving-products

1.10	II.) Polynomial Operations	3.) Multiply polynomials [Include area, volume, and products with more than one variable (x+y)(2x-3y)]	3	A.APR.A.01	8.2	6.5	polynomial, binomial	https://www.khanacademy.org/math/algebra/introduction-to-polynomial-expressions/multiplying-polynomials-by-monomials/v/multiplying-monomials-by-polynomials https://www.khanacademy.org/math/algebra/introduction-to-polynomial-expressions/multiplying-binomials-2/v/area-model-for-multiplying-binomials https://www.khanacademy.org/math/algebra/introduction-to-polynomial-expressions/modeling-with-polynomials/v/multiplying-polynomials-3
1.11	II.) Polynomial Operations	4.) Determine special products of polynomials (The square of a binomial and difference of squares)	3	A.APR.A.01	8.3	6.6	trinomial	https://www.khanacademy.org/math/algebra/introduction-to-polynomial-expressions/special-products-of-polynomials/v/difference-of-squares-pattern-for-simple-binomials
1.12	II.) Polynomial Operations	5.) Determine the greatest common factor of a polynomial and use it to factor the expression	3	A.SSE.A.02	N/A	7.1, 7.2		https://www.khanacademy.org/math/algebra/polynomial-factorization/factoring-polynomials-1-common-factors/v/factoring-linear-binomials
		Total days	*35*					

PCTI Algebra 1 Curriculum (Aligned to PARCC and the NJ student learning standards for mathematics)

Unit 2	Topic	STUDENT LEARNING OBJECTIVES	Suggested Days	NJ Math Standard	Larson (H and CP)	Holt (C and Apps 1)	Key Vocabulary (from textbooks)	Khan Academy Links
					Textbook Reference			
2.01	III.) Factoring, Solving & Graphing Quadratics	1.) Factor and solve x^2+bx+c	3	A.SSE.B.03.a	8.5	7.3	zero of a function	https://www.khanacademy.org/math/algebra/polynomial-factorization/factoring-quadratics-1/v/factoring-simple-quadratic-expression
2.02	III.) Factoring, Solving & Graphing Quadratics	2.) Factor and solve ax^2+bx+c	3	A.SSE.B.03.a	8.6	7.4	roots, vertical motion model	https://www.khanacademy.org/math/algebra/polynomial-factorization/factoring-quadratics-2/v/factor-by-grouping-and-factoring-completely
2.03	III.) Factoring, Solving & Graphing Quadratics	3.) Factor and solve special products of polynomials	1	A.SSE.A.02	8.7	7.5	perfect square trinomial	https://www.khanacademy.org/math/algebra-home/alg-polynomials/alg-factoring-polynomials-3-special-product-forms/v/factoring-difference-of-squares https://www.khanacademy.org/math/algebra/polynomial-factorization/factoring-quadratics-perfect-squares/v/factoring-perfect-square-trinomials
2.04	III.) Factoring, Solving & Graphing Quadratics	4.) Solve quadratic equations by using the quadratic formula (Include the relationship of the discriminant value to the number/types of solutions)	3	A.CED.A.01 A.REI.B.04.b	9.6	8.9	quadratic formula	https://www.khanacademy.org/math/algebra/quadratics/solving-quadratics-using-the-quadratic-formula/v/using-the-quadratic-formula https://www.khanacademy.org/math/algebra/quadratics/solving-quadratics-using-the-quadratic-formula/v/quadratic-formula-3

2.05	III.) Factoring, Solving & Graphing Quadratics	5.) Graph quadratic functions and show symmetry, intercepts, maxima, minima, end behavior, increasing/decreasing intervals	2	A.APR.B.03 A.REI.D.10 A.CED.A.02 F.IF.C.07 F.IF.C.07.c	9.1, 9.2	8.2, 8.3, 8.4	quadratic function, parabola, parent quadratic function, vertex, axis of symmetry, minimum value, maximum value	https://www.khanacademy.org/math/algebra-home/alg-quadratics/alg-graphing-quadratic-functions/v/graphing-a-quadratic-function
2.06	III.) Factoring, Solving & Graphing Quadratics	6.) Relate the graph of a quadratic function to the solutions attained by factoring and by using the quadratic formula. Continue to do this for future objectives (**Greatest Worksheet Ever)	4	F.IF.C.09 F.IF.C.08.a F.IF.C.07.a	N/A	N/A		
2.07	III.) Factoring, Solving & Graphing Quadratics	7.) Use square roots to solve quadratic equations (Approximate the value for 7+sqrt(3) and explain why it is irrational)	2	A.REI.B.04.b N.RN.B.03 N.Q.A.03	9.4, 2.1	8.7	square root, perfect square	https://www.khanacademy.org/math/algebra/quadratics/quadratics-square-root/v/simple-quadratic-equation
2.08	III.) Factoring, Solving & Graphing Quadratics	8.) Change quadratic functions from standard form to vertex form by completing the square and vice versa. Solve and graph functions in vertex form.	4	A.SSE.B.03.b A.REI.B.04.a	9.5, 9.5 ext.	8.8	completing the square	https://www.khanacademy.org/math/algebra/quadratics/solving-quadratics-by-completing-the-square/v/solving-quadratic-equations-by-completing-the-square https://www.khanacademy.org/math/algebra/quadratics/solving-quadratics-by-completing-the-square/v/solving-quadratic-equations-by-completing-the-square
2.09	III.) Factoring, Solving & Graphing Quadratics	9.) Factor polynomials completely to understand the relationship between zeros and factors. (Include factoring four terms by grouping) Solve polynomial equations by choosing the most efficient method(s).	3	A.APR.B.03 A.SSE.B.03.a A.REI.B.04.b	8.8	7.6	factor by grouping, factor completely	https://www.khanacademy.org/math/algebra-basics/alg-basics-quadratics-and-polynomials/alg-basics-factoring-quadratics-2/v/factor-by-grouping-and-factoring-completely https://www.khanacademy.org/math/algebra/quadratics/solving-quadratic-equations-by-factoring/v/using-structure-to-solve-quadratics

2.10	IV.) Exponential Functions and Graphs	1.) Use and apply the zero and negative rules for exponents	2	A.SSE.B.03.c	7.3	6.1	reciprocal	https://www.khanacademy.org/math/algebra-basics/alg-basics-expressions-with-exponents/alg-basics-pos-neg-exponents/v/negative-exponents
2.11	IV.) Exponential Functions and Graphs	2.) Graph and analyze exponential growth & decay functions. Analyze intercepts, end behavior, increasing/decreasing intervals, and asymptote. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.	4	F.IF.C.07.d F.IF.C.07.e F.IF.C.08.b F.LE.A.01.c A.SSE.B.03.c A.REI.D.10	7.4, 7.5	9.3	exponential function, exponential graph, compound interest	https://www.khanacademy.org/math/algebra/introduction-to-exponential-functions/exponential-growth-and-decay/v/exponential-growth-functions https://www.khanacademy.org/math/algebra/introduction-to-exponential-functions
2.12	V.) Functions	1.) Determine whether a relation is a function. Choose an appropriate domain and range to represent a function.	2	F.IF.A.01 F.IF.B.05	1.7, 1.8, 1.8 ext.	3.2	function, domain, range, independent variable, dependent variable	https://www.khanacademy.org/math/algebra/algebra-functions/evaluating-functions/v/what-is-a-function https://www.khanacademy.org/math/algebra/algebra-functions/domain-and-range/v/domain-of-a-function-intro https://www.khanacademy.org/math/algebra-home/alg-functions/alg-determining-the-domain-of-a-function/v/domain-of-a-modeling-function-example-1
2.13	V.) Functions	2.) Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. (Start using function notation in more and more problems)	3	F.IF.A.02 F.IF.B.05 F.BF.A.01.a	3.7	3.3	function notation, family of functions, parent linear function	https://www.khanacademy.org/math/algebra/algebra-functions/evaluating-functions/v/understanding-function-notation-example-1
		Total days	36					

PCTI Algebra 1 Curriculum (Aligned to PARCC and the NJ student learning standards for mathematics)

Unit 3	Topic	STUDENT LEARNING OBJECTIVES	Suggested Days	NJ Math Standard	Textbook Reference		Key Vocabulary (from textbooks)	Khan Academy Links
					Larson (H and CP)	Holt (C and Apps 1)		
3.01	VI.) Graphing Linear Equations and Functions	1.) Graph linear equations by making a table and using substitution (Discuss the effect the domain has in producing discrete and continuous functions)	2	A.CED.A.02 A.REI.D.10	3.2, 3.2 ext.	4.1	standard form of a linear function, discrete function, continuous function	https://www.khanacademy.org/math/algebra-basics/alg-basics-graphing-lines-and-slope/alg-basics-solutions-to-two-var-equations/v/2-variable-linear-equations-graphs https://www.khanacademy.org/math/cc-eighth-grade-math/cc-8th-linear-equations-functions/8th-solutions-to-two-var-linear-equations/v/descartes-and-cartesian-coordinates
3.02	VI.) Graphing Linear Equations and Functions	2.) Graph using linear equations by using intercepts	2	A.CED.A.02 F.IF.C.07.a	3.3	4.2	x-intercept, y-intercept	https://www.khanacademy.org/math/algebra/two-var-linear-equations/x-and-y-intercepts/v/introduction-to-intercepts
3.03	VI.) Graphing Linear Equations and Functions	3.) 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 **any type** of graph. (linear, polynomial, exponential, root, absolute value...) Use appropriate units and rounding.	2	F.LE.A.01.b F.IF.B.06 N.Q.A.01 N.Q.A.02	3.4	4.3, 4.4	slope, rate of change	https://www.khanacademy.org/math/algebra-basics/alg-basics-graphing-lines-and-slope/alg-basics-slope/v/introduction-to-slope https://www.khanacademy.org/math/algebra/algebra-functions/functions-average-rate-of-change/v/introduction-to-average-rate-of-change https://www.khanacademy.org/math/algebra-home/alg-functions/alg-average-rate-of-change-word-problems/v/average-rate-of-change-from-table-word-problem

3.04	VI.) Graphing Linear Equations and Functions	4.) Graph and model with slope-intercept form. Write and graph functions that are based on two or more other equations.	5	A.CED.A.02 A.CED.A.04 N.Q.A.01 F.BF.A.01.b	3.5, 4.2	4.6	slope intercept form, parallel	https://www.khanacademy.org/math/algebra-home/alg-linear-eq-func/alg-graphing-slope-intercept-equations/v/graphing-a-line-in-slope-intercept-form https://www.khanacademy.org/math/algebra-home/alg-linear-eq-func/alg-writing-slope-intercept-equations/v/graphs-using-slope-intercept-form
3.05	VI.) Graphing Linear Equations and Functions	5.) Fit a linear function to a scatterplot and determine its equation. Relate the meaning of the slope and intercept to the data. Distinguish between correlation and causation.	3	S.ID.B.05 S.ID.B.06.a S.ID.B.06.b S.ID.B.06.c S.ID.C.07 S.ID.C.08 S.ID.C.09	4.7, 4.7 ext.	4.8	best fitting line, linear regression, interpolation, extrapolation, zero of a function	https://www.khanacademy.org/math/probability/scatterplots-a1/creating-interpreting-scatterplots/v/scatter-plot-interpreting https://www.khanacademy.org/math/probability/scatterplots-a1/estimating-trend-lines/v/estimating-the-line-of-best-fit-exercise
3.06	VII.) Systems of Equations and Inequalities	1.) Graph linear systems [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)]	2	A.CED.A.03 A.CED.A.04 A.REI.D.11	6.1	5.1	system of linear equations, solution of a system of linear equations,	https://www.khanacademy.org/math/cc-eighth-grade-math/cc-8th-systems-topic/cc-8th-systems-graphically/v/solving-linear-systems-by-graphing https://www.khanacademy.org/math/algebra/systems-of-linear-equations/introduction-to-systems-of-linear-equations/v/testing-a-solution-for-a-system-of-equations
3.07	VII.) Systems of Equations and Inequalities	2.) Solve linear systems by elimination (linear combination)	3	A.CED.A.03 A.REI.C.05 A.REI.C.06	6.3, 6.4	5.3, 5.6	least common multiple	https://www.khanacademy.org/math/algebra-basics/alg-basics-systems-of-equations/alg-basics-elimination-method-systems/v/simple-elimination-practice
3.08	VII.) Systems of Equations and Inequalities	3.) Solve linear systems by substitution (when one variable is already isolated)	2	A.REI.C.06	6.2	5.2		https://www.khanacademy.org/math/algebra-basics/alg-basics-systems-of-equations/alg-basics-solving-systems-with-substitution/v/practice-using-substitution-for-systems
3.09	VII.) Systems of Equations and Inequalities	4.) Graph linear inequalities in two variables	2	A.CED.A.03 A.REI.D.12	5.7	5.6	linear inequality of two variables, graph of an inequality with two variables	https://www.khanacademy.org/math/high-school-math/algebra/two-variable-linear-inequalities/graphing-inequalities/v/graphing-inequalities

3.10	VII.) Systems of Equations and Inequalities	5.) Graph systems of linear inequalities in two variables	2	A.CED.A.03 A.REI.D.12	6.6	5.6		https://www.khanacademy.org/math/algebra/two-variable-linear-inequalities/graphing-inequalities/v/graphical-system-of-inequalities https://www.khanacademy.org/math/algebra/two-variable-linear-inequalities#modeling-with-linear-inequalities
3.11	VIII.) Compare Linear, Quadratic and Exponential Functions	1.) Compare linear, quadratic, and exponential functions. Contrast their graphs and discuss what situations they model. Generate and identify functions based on situations or graphs.	4	A.REI.D.10 A.REI.D.11 F.LE.B.05 F.BF.A.01.c	9.8	9.4	linear function, exponential function, quadratic function	https://www.khanacademy.org/math/algebra/introduction-to-exponential-functions/comparing-exponential-and-polynomial-functions/v/linear-exponential-models
3.12	VIII.) Compare Linear, Quadratic and Exponential Functions	2.) Compare contrast the outputs for the functions below - linear functions have equal 1st degree difference/constant rate - quadratic functions have equal 2nd degree differences - exponential functions have a common ratio/percent	1	F.LE.A.01.a F.LE.A.02 F.LE.A.03	N/A	8.1		
3.13	VIII.) Compare Linear, Quadratic and Exponential Functions	3.) Identify the effect on the graph of replacing $f(x)$ by $f(x) +k$, k $f(x)$, f(ox), 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.	2	F.BF.B.03	N/A	9.5		https://www.khanacademy.org/math/algebra2/manipulating-functions/stretching-functions/v/shifting-and-reflecting-functions

3.14	VIII.) Compare Linear, Quadratic and Exponential Functions	4.) Graph other types of functions by substitution (<u>absolute value</u>, <u>square root</u>, cube root, piecewise...)	2	F.IF.C.07.b	N/A	N/A		https://www.khanacademy.org/math/algebra/absolute-value-equations-functions/graphs-of-absolute-value-functions/v/graphs-of-absolute-value-functions https://www.khanacademy.org/math/algebra2/radical-equations-and-functions/graphs-of-radical-functions/v/flipping-shifting-radical-functions https://www.khanacademy.org/math/algebra/algebra-functions/piecewise-functions/v/piecewise-function-example
		Total days	34					

PCTI Algebra 1 Curriculum (Aligned to PARCC and the NJ student learning standards for mathematics)

Unit 4	Topic	STUDENT LEARNING OBJECTIVES	Suggested Days	NJ Math Standard	Textbook Reference Larson (H and CP)	Textbook Reference Holt (C and Apps 1)	Key Vocabulary (from textbooks)	Khan Academy Links
4.01	IX.) Summarize, Represent and Interpret Data	1.) Represent data with plots on the real number line (dot plots, histograms, and box plots).	2	S.ID.A.01	10.4, 10.5	10.2	stem and leaf plot, frequency, frequency table, histograms, box and whisker plot, quartile, interquartile range, outlier	https://www.khanacademy.org/math/probability/data-distributions-a1/displays-of-distributions/v/histograms-intro https://www.khanacademy.org/math/pre-algebra/pre-algebra-math-reasoning/pre-algebra-stem-leaf/v/u08-l1-t2-we3-stem-and-leaf-plots https://www.khanacademy.org/math/probability/data-distributions-a1/box--whisker-plots-a1/v/constructing-a-box-and-whisker-plot
4.02	IX.) Summarize, Represent and Interpret Data	2.) Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.	2	S.ID.A.02	10.2	10.3	measures of dispersion, range, mean absolute deviation	https://www.khanacademy.org/math/6th-engage-ny/engage-6th-module-6/6th-module-6-topic-b/v/mean-absolute-deviation
4.03	IX.) Summarize, Represent and Interpret Data	3.) Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).	2	S.ID.A.03	10.3	10.1	marginal frequency, joint frequency	https://www.khanacademy.org/math/probability/data-distributions-a1/displays-of-distributions/v/shapes-of-distributions

4.04	IX.) Summarize, Represent and Interpret Data	4.) Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.	2	S.ID.B.05	10.3	10.4		
		PARCC exam	3					
4.05	X.) Application of Algebra Topics	1.) Solve absolute value equations & inequalities and model real-life situations. Graph solutions in 1-dimension (number line). Then graph functions in 2-dimensions (coordinate plane)	6	A.REI.D.11 F.IF.C.07.a	5.5, 5.5 ext., 5.6	1.7, 2.7, 4.10 ext.		https://www.khanacademy.org/math/algebra-home/alg-absolute-value/alg-absolute-value-equations/v/absolute-value-equations
4.06	X.) Application of Algebra Topics	2.) Investigate the time it takes various objects to hit the ground after they are dropped from increasing heights. Model the data with a spreadsheet program. Compare the results to projectile motion models.	7	N.Q.A S.ID.B A.REI.B F.IF.C	N/A	N/A		
4.07	X.) Application of Algebra Topics	3.) Research data that can be modeled with a scatter plot. Then compare linear, quadratic, and exponential trendlines. Analyze the findings and use them to make predictions. Present a summary of the information.	12	A.REI.D F.LE.B S.ID.C	N/A	N/A		
		Total days	36					

Standard Explanation	A.SSE.A.01.a	■	Major Content
	DOMAIN.CLUSTER.STANDARD.component	☐	Supporting Content
		○	Additional Content

	Content Standards CCCSM Number	Content Standards Description	Type of Content	Illustrative Mathematics Open-Ended Problems https://www.illustrativemathematics.org/
Unit 1	A.SSE.A.01.b	b. Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret P(1+r)n as the product of P and a factor not depending on P	■	https://www.illustrativemathematics.org/HSA-SSE.A
	A.APR.A.01	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.	■	https://www.illustrativemathematics.org/HSA-APR.A
	A.CED.A.01	1. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.	■	https://www.illustrativemathematics.org/HSA-CED.A
	A.REI.A.01	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.	■	https://www.illustrativemathematics.org/HSA-REI.A
	A.REI.B.03	3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	■	https://www.illustrativemathematics.org/HSA-REI.B
	A.SSE.A.02	2. Use the structure of an expression to identify ways to rewrite it. For example, see $x4 - y4$ as $(x2)2 - (y2)2$, thus recognizing it as a difference of squares that can be factored as $(x2 - y2)(x2 + y2)$.	■	https://www.illustrativemathematics.org/HSA-SSE.A
	A.SSE.B.03.c	c. Use the properties of exponents to transform expressions for exponential functions. For example the expression 1.15t can be rewritten as $(1.151/12)12t \approx 1.01212t$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.	□	https://www.illustrativemathematics.org/HSA-SSE.B
	F.IF.A.02	2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	■	https://www.illustrativemathematics.org/HSF-IF.A
	F.LE.A.01.b	b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.	□	https://www.illustrativemathematics.org/HSF-BF.A
	N.Q.A.01	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.	□	https://www.illustrativemathematics.org/HSN-Q.A
	N.RN.B.03	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.	○	https://www.illustrativemathematics.org/HSN-RN.B

Unit 2	A.APR.B.03	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.	☐	https://www.illustrativemathematics.org/HSA-APR.B
	A.CED.A.01	1. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.	■	https://www.illustrativemathematics.org/HSA-CED.A
	A.CED.A.02	2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	■	https://www.illustrativemathematics.org/HSA-CED.A
	A.REI.B.04.a	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.	■	https://www.illustrativemathematics.org/HSA-REI.B
	A.REI.B.04.b	b. Solve quadratic equations by inspection (e.g., for $x2 = 49$), 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.	■	https://www.illustrativemathematics.org/HSA-REI.B
	A.REI.D.10	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).	■	https://www.illustrativemathematics.org/HSA-REI.D
	A.SSE.A.02	2. Use the structure of an expression to identify ways to rewrite it. For example, see $x4 - y4$ as $(x2)2 - (y2)2$, thus recognizing it as a difference of squares that can be factored as $(x2 - y2)(x2 + y2)$.	■	https://www.illustrativemathematics.org/HSA-SSE.A
	A.SSE.B.03.a	a. Factor a quadratic expression to reveal the zeros of the function it defines.	☐	https://www.illustrativemathematics.org/HSA-SSE.B
	A.SSE.B.03.b	b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.	☐	https://www.illustrativemathematics.org/HSA-SSE.B
	A.SSE.B.03.c	c. Use the properties of exponents to transform expressions for exponential functions. For example the expression $1.15t$ can be rewritten as $(1.151/12)12t \approx 1.01212t$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.	☐	https://www.illustrativemathematics.org/HSA-SSE.B
	F.BF.A.01.a	a. Determine an explicit expression, a recursive process, or steps for calculation from a context.	☐	https://www.illustrativemathematics.org/HSF-BF.A
	F.IF.A.01	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 $y = f(x)$.	■	https://www.illustrativemathematics.org/HSF-IF.A

F.IF.A.02	2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	■		https://www.illustrativemathematics.org/HSF-IF.A
F.IF.B.05	5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.★	■		https://www.illustrativemathematics.org/HSF-IF.B
F.IF.C.07	7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★	☐		https://www.illustrativemathematics.org/HSF-IF.C
F.IF.C.07.a	a. Graph linear and quadratic functions and show intercepts, maxima, and minima.	☐		https://www.illustrativemathematics.org/HSF-IF.C
F.IF.C.07.c	c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.	☐		https://www.illustrativemathematics.org/HSF-IF.C
F.IF.C.07.d	d. (+) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.	☐		https://www.illustrativemathematics.org/HSF-IF.C
F.IF.C.07.e	e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.	☐		https://www.illustrativemathematics.org/HSF-IF.C
F.IF.C.08.a	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.	☐		https://www.illustrativemathematics.org/HSF-IF.C
F.IF.C.08.b	b. Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as y = (1.02)t, y = (0.97)t, y = (1.01)12t, y = (1.2)t/10, and classify them as representing exponential growth or decay.	☐		https://www.illustrativemathematics.org/HSF-IF.C
F.IF.C.09	9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.	☐		https://www.illustrativemathematics.org/HSF-IF.C
F.LE.A.01.c	c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.	☐		https://www.illustrativemathematics.org/HSF-BF.A
N.Q.A.03	3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	☐		https://www.illustrativemathematics.org/HSN-Q.A
N.RN.B.03	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.	○		https://www.illustrativemathematics.org/HSN-RN.B

Unit 3	A.CED.A.02	2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	■	https://www.illustrativemathematics.org/HSA-CED.A
	A.CED.A.03	3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.	■	https://www.illustrativemathematics.org/HSA-CED.A
	A.CED.A.04	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.	■	https://www.illustrativemathematics.org/HSA-CED.A
	A.REI.C.05	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.	○	https://www.illustrativemathematics.org/HSA-REI.C
	A.REI.C.06	6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	○	https://www.illustrativemathematics.org/HSA-REI.C
	A.REI.D.10	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).	■	https://www.illustrativemathematics.org/HSA-REI.D
	A.REI.D.11	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.★	■	https://www.illustrativemathematics.org/HSA-REI.D
	A.REI.D.12	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.	■	https://www.illustrativemathematics.org/HSA-REI.D
	F.BF.A.01.b	b. Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.	□	https://www.illustrativemathematics.org/HSF-BF.A
	F.BF.A.01.c	c. (+) Compose functions. For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.	□	https://www.illustrativemathematics.org/HSF-BF.A
	F.BF.B.03	3. Identify the effect on the graph of replacing f(x) by f(x) + k, k f(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. Include recognizing even and odd functions from their graphs and algebraic expressions for them.	○	https://www.illustrativemathematics.org/HSF-BF.B

F.IF.B.06	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.★	■		https://www.illustrativemathematics.org/HSF-IF.B
F.IF.C.07.a	a. Graph linear and quadratic functions and show intercepts, maxima, and minima.	☐		https://www.illustrativemathematics.org/HSF-IF.C
F.IF.C.07.b	b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.	☐		https://www.illustrativemathematics.org/HSF-IF.C
F.LE.A.01.a	a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.	☐		https://www.illustrativemathematics.org/HSF-BF.A
F.LE.A.01.b	b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.	☐		https://www.illustrativemathematics.org/HSF-BF.A
F.LE.A.02	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).	☐		https://www.illustrativemathematics.org/HSF-BF.A
F.LE.A.03	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.	☐		https://www.illustrativemathematics.org/HSF-BF.A
F.LE.B.05	5. Interpret the parameters in a linear or exponential function in terms of a context.	☐		0
N.Q.A.01	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.	☐		https://www.illustrativemathematics.org/HSN-Q.A
N.Q.A.02	2. Define appropriate quantities for the purpose of descriptive modeling.	☐		https://www.illustrativemathematics.org/HSN-Q.A
S.ID.B.05	5. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.	☐		https://www.illustrativemathematics.org/HSS-ID.B
S.ID.B.06.a	a. Fit a function to the data (including with the use of technology); use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear and exponential models.	☐		https://www.illustrativemathematics.org/HSS-ID.B
S.ID.B.06.b	b. Informally assess the fit of a function by plotting and analyzing residuals, including with the use of technology.	☐		https://www.illustrativemathematics.org/HSS-ID.B
S.ID.B.06.c	c. Fit a linear function for a scatter plot that suggests a linear association.	☐		https://www.illustrativemathematics.org/HSS-ID.B
S.ID.C.07	7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.	■		https://www.illustrativemathematics.org/HSS-ID.C

| | S.ID.C.08 | 8. Compute (using technology) and interpret the correlation coefficient of a linear fit. | ■ | https://www.illustrativemathematics.org/HSS-ID.C |
| | S.ID.C.09 | 9. Distinguish between correlation and causation. | ■ | https://www.illustrativemathematics.org/HSS-ID.C |

Unit 4	A.REI.B	B. Solve equations and inequalities in one variable	Cluster	https://www.illustrativemathematics.org/HSA-REI.B
	A.REI.D	D. Represent and solve equations and inequalities graphically	Cluster	https://www.illustrativemathematics.org/HSA-REI.D
	A.REI.D.11	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.★	■	https://www.illustrativemathematics.org/HSA-REI.D
	F.IF.C	C. Analyze functions using different representations	Cluster	https://www.illustrativemathematics.org/HSF-IF.C
	F.IF.C.07.a	a. Graph linear and quadratic functions and show intercepts, maxima, and minima.	□	https://www.illustrativemathematics.org/HSF-IF.C
	F.LE.B	B. Interpret expressions for functions in terms of the situation they model	Cluster	https://www.illustrativemathematics.org/HSF-BF.B
	N.Q.A	A. Reason quantitatively and use units to solve problems.	Cluster	https://www.illustrativemathematics.org/HSN-Q.A
	S.ID.A.01	1. Represent data with plots on the real number line (dot plots, histograms, and box plots).	○	https://www.illustrativemathematics.org/HSS-ID.A
	S.ID.A.02	2. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.	○	https://www.illustrativemathematics.org/HSS-ID.A
	S.ID.A.03	3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).	○	https://www.illustrativemathematics.org/HSS-ID.A
	S.ID.B	B. Summarize, represent, and interpret data on two categorical and quantitative variables	Cluster	https://www.illustrativemathematics.org/HSS-ID.B
	S.ID.B.05	5. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.	□	https://www.illustrativemathematics.org/HSS-ID.B
	S.ID.C	C. Interpret linear models	Cluster	https://www.illustrativemathematics.org/HSS-ID.C

Page from the PARCC framework (page 43)
http://parcconline.org/resources/educator-resources/model-content-frameworks/mathematics-model-content-framework

PARCC

PARCC MODEL CONTENT FRAMEWORK FOR MATHEMATICS
FOR ALGEBRA I

Algebra I Overview

Numerals in parentheses designate individual content standards that are eligible for assessment in whole or in part. Underlined numerals (e.g., 1) indicate standards eligible for assessment on two or more end-of-course assessments. For more information, see Tables 1 and 2. Course emphases are indicated by: ■ Major Content; □ Supporting Content; ○ Additional Content. Not all CCSSM content standards in a listed domain or cluster are assessed.

The Real Number System (N-RN)
○ B. Use properties of rational and irrational numbers (3)

Quantities★ (N-Q)
□ A. Reason quantitatively and use units to solve problems (1, 2, 3)

Seeing Structure in Expressions (A-SSE)
■ A. Interpret the structure of expressions (1, 2)
□ B. Write expressions in equivalent forms to solve problems (3)

Arithmetic with Polynomials and Rational Expressions (A-APR)
■ A. Perform arithmetic operations on polynomials (1)
□ B. Understand the relationship between zeros and factors of polynomials (3)

Creating Equations★ (A-CED)
■ A. Create equations that describe numbers or relationships (1, 2, 3, 4)

Reasoning with Equations and Inequalities (A-REI)
■ A. Understand solving equations as a process of reasoning and explain the reasoning (1)
■ B. Solve equations and inequalities in one variable (3, 4)
○ C. Solve systems of equations (5, 6)
■ D. Represent and solve equations and inequalities graphically (10, 11, 12)

Interpreting Functions (F-IF)
■ A. Understand the concept of a function and use function notation (1, 2, 3)
■ B. Interpret functions that arise in applications in terms of the context (4, 5, 6)
□ C. Analyze functions using different representations (7, 8, 9)

Building Functions (F-BF)
□ A. Build a function that models a relationship between two quantities (1)
○ B. Build new functions from existing functions (3)

Linear, Quadratic, and Exponential Models★ (F-LE)
□ A. Construct and compare linear, quadratic, and exponential models and solve problems (1, 2, 3)
□ B. Interpret expressions for functions in terms of the situation they model (5)

Interpreting categorical and quantitative data (S-ID)
○ A. Summarize, represent, and interpret data on a single count or measurement variable (1, 2, 3)
□ B. Summarize, represent, and interpret data on two categorical and quantitative variables (5, 6)
■ C. Interpret linear models (7, 8, 9)

Mathematical Practices

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

Mathematics Standards for High School

The high school standards specify the mathematics that all students should study in order to be college and career ready. Additional mathematics that students should learn in order to take advanced courses such as calculus, advanced statistics, or discrete mathematics is indicated by (+), as in this example:

(+) Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers).

All standards without a (+) symbol should be in the common mathematics curriculum for all college and career ready students. Standards without a (+) symbol may also appear in courses intended for all students.

The high school standards are listed in conceptual categories:

• Number and Quantity

• Algebra

• Functions

• Modeling

• Geometry

• Statistics and Probability

Conceptual categories portray a coherent view of high school mathematics; a student's work with functions, for example, crosses a number of traditional course boundaries, potentially up through and including calculus.

Modeling is best interpreted not as a collection of isolated topics but in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol (★). The star symbol sometimes appears on the heading for a group of standards; in that case, it should be understood to apply to all standards in that group.