COMMON CORE ALGEBRA I BY eMATH INSTRUCTION
COMMON CORE PARCC EOY STANDARDS ALIGNMENT

NUMBER AND QUANTITY

NUMBER AND QUANTITY DOMAIN KEYS	
RN = REAL NUMBER SYSTEM	**Q = QUANTITIES**

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 #9 – Lessons #2 and #5, also various problems thereafter

N-Q.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.

Unit #1 – Lesson #1, Unit #3 – Lesson #6, Unit #4 – Lesson #2, Unit #10 – Lessons #1 and #2

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

Unit #4 – Lessons #6 and #7, Unit #6 – Lesson #7, Unit #10 – Lessons #3 and #4, Unit #11 – Lesson #7

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

Unit #11 – Lesson #8

ALGEBRA

ALGEBRA DOMAIN KEYS	
SSE = SEEING STRUCTURE IN EXPRESSIONS	**APR = ARITHMETIC WITH POLYNOMIAL AND RATIONAL EXPRESSIONS**
CED = CREATING EQUATIONS	**REI = REASONING WITH EQUATIONS AND INEQUALITIES**

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.

Unit #4 – Lesson #7, Unit #6 – Lesson #7, Unit #7 – Lesson #3

b. Interpret complicated expressions by viewing one or more of their parts as a single entity.

Unit #1 – Lessons #6 and #9, Unit #2 – Lesson #2, Unit #7 - Lesson #3, Unit #9 – Lessons #4 and #5

SSE.2 Use the structure of an expression to identify ways to rewrite it. Tasks are limited to numerical expressions and polynomial expressions in one variable. Examples include seeing that $53^2 - 47^2 = (53+47)(53-47)$.

Unit #1 – Lessons #6 and #9, Unit #7 – Lessons #3 through #6

A-SSE.3 Choose and produce an equivalent form of an 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.

Unit #8 – Lessons #6 through #8 and Unit #9 – Lesson #7

b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.

Unit #8 – Lessons #4 and #5

c. Use the properties of exponents to transform expressions for exponential functions. Tasks are limited to exponential expressions with integer coefficients. For example, seeing that $2^{-x} = \left(2^{-1}\right)^x = \left(\frac{1}{2}\right)^x$.

Unit #6 – Lessons #1 and #2

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 #7 – Lessons #1 and #2

A-APR.3 Identify zeroes of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial. Tasks are limited to quadratic and cubic polynomials in which linear and quadratic factors are available. For example, find the zeroes of $(x-2)(x^2-9)$.

Unit #8 – Lessons #6 and #7

A-CED.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.* Tasks are limited to linear, quadratic, or exponential equations with integer exponents.

Unit #2 – Lesson #5, Unit #2 – Lesson #6, Unit #2 – Lesson #13, Unit #6 – Lesson #7, Unit #8 – Lesson #8

No exponential or quadratic inequality work.

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

Unit #1 – Lesson #1, Unit #4 – Lesson #1 and Lessons #3 through #7, Unit #5 – Lesson #1

Unit #6 – Lessons #3, #7, and #8

A-CED.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.

Unit #2 – Lesson #3, Unit #5 – Lessons #5 and #8, Unit #6 – Lesson #9, Unit #8 – Lesson #1

Unit #11 – Lessons #3 and #6

A-CED.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

Unit #2 – Lesson #7

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. Tasks are limited to quadratic equations.

Unit #2 – Lesson #4 **Only done for linear equations. Not done for quadratics.**

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

Unit #2 – Lessons #1 through #7, Unit #2 – Lessons #9 through #13

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.

Unit #9 – Lessons #5 through #7

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. Tasks do not require students to solve quadratics for non-zero imaginary solutions, but students should recognize cases in which no real solutions exist.

Unit #8 – Lessons #6 through #8, Units #9 – Lesson #4, Lesson #5, and Lesson #7

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.

Unit #5 – Lesson #3

A-REI.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.

Unit #5 – Lessons #1 though #5

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).

Unit #4 – Lesson #10, Unit #5 – Lesson #1

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. Algebra I will include all function types **except** exponential and logarithmic.

Unit #5 – Lesson #6

A-REI.12 Graph the solutions to a linear inequality in two variables as a halfplane (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 #4 – Lesson #11, Unit #5 – Lessons #7 and #8

FUNCTIONS

FUNCTIONS DOMAIN KEYS

IF = INTERPRETING FUNCTIONS **BF = BUILDING FUNCTIONS**

LE = LINEAR, QUADRATIC, AND EXPONENTIAL MODELS

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 $y = f(x)$.

Unit #3 – Lessons #1 through #7

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.

Unit #3 – Lessons #2 through #7 and various other lessons throughout the text

F-IF.3 Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) +f(n-1) for* $n > 1$. **This is considered a major standard in the PARCC system.**

Unit #4 – Lesson #12 and Lesson #13, Unit #6 – Lesson #9

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.* Functions can include: linear, quadratic, square root, cube root, piecewise-defined (including step and absolute value) and exponential functions. No logarithmic, higher-order polynomial, or trigonometric functions.

Unit #3 – Lessons #4 and #5, Unit #4 – Lesson #9, Unit #8 – Lesson #1

F-IF.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.*

Unit #3 – Lesson #7, Unit #4 – Lesson #6, Unit #6 – Lesson #3, Unit #11 – Lesson 33

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. The same limitation on function types applies to this standard as that for F-IF.4.

Unit #3 – Lessons #6 and #7, Unit #4 – Lessons #3 and #7, Unit #6 – Lessons #4, #6, and #8, Unit #9 – Lesson #8, and Unit #11 – Lesson #6

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.

Unit #3 – Lesson #3, Unit #4 – Lessons #1, #3, #4, #6, and #8, Unit #8 – Lessons #1 through #3

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

Unit #3 – Lesson #4, Unit #4 – Lesson #9, Unit #9 – Lessons #3 and #8, Unit #11 – Lessons #5 and #6

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 zeroes, extreme values, and symmetry of the graph, and interpret these in terms of a context.

Unit #8 – Lessons #4 through #6

F-IF.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.* Limitations on function types are the same as those laid out in F-IF.4.

Unit #8 – Lesson #4

F-BF.1 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. Tasks are limited to linear functions, quadratic functions, and exponential functions with domains in the integers.

Unit #4 – Lessons #4, #5, #12, and #13, Unit #6 – Lessons #3, #7, #8, and #9

F-BF.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. Identifying these transformations will be limited to linear and quadratic functions. Students should experiment, though, with functions listed in F-IF.4.

Unit #8 – Lessons #3 through #5, Unit #9 – Lessons #3 and #8, Unit #11 – Lessons #1 and #2

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.

Unit #4 – Lessons #3 and #4, Unit #11 – Lesson #4

b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.

Unit #4 – Lessons #6 and #7, Unit #6 – Lesson #7, Unit #11 – Lesson #4

c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.

Unit #6 – Lessons #3 and #4, Unit #11 – Lesson #4

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). Tasks are limited to constructing linear and exponential functions in simple context (not multi-step).

Unit #4 – Lessons #5 and #13, Unit #6 – Lessons #3, #7, #8 and #9

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.

Unit #6 – Lesson #8 **No comparison made to quadratic and polynomial, only to linear.**

F-LE.5 Interpret the parameters in a linear or exponential function in terms of a context. Exponential functions will be limited to those with domains in the integers.

Unit #4 – Lessons #6 and #7, Unit #6 – Lessons #7 and #8, Unit #11 – Lesson #4

STATISTICS

STATISTICS DOMAIN KEY

ID = INTERPRETING CATEGORICAL AND QUANTITATIVE DATA

S-ID.1 Represent data with plots on the real number line (dot plots, histograms, and box plots).

Unit #10 – Lessons #1 and #2

S-ID.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.

Unit #10 – Lessons #2 through #4

S-ID.3 Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

Unit #10 – Lessons #1 through #4

S-ID.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.

Unit #10 – Lesson #5

S-ID.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related

a. Fit a function to the data; 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, quadratic, and exponential models.* Exponential functions are limited to those with domains in the integers.

Unit #10 – Lessons #6 through #10, Unit #11 – Lesson #4

b. Informally assess the fit of a function by plotting and analyzing residuals.

Unit #10 – Lesson #10, Unit #11 – Lesson #4

c. Fit a linear function for a scatter plot that suggests a linear association.

Unit #10 – Lessons #6, #7, #9, and #10

S-ID.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

Unit #10 – Lesson #7 (Slope and *y*-intercept are interpreted as well in Unit #4)

S-ID.8 Compute (using technology) and interpret the correlation coefficient of a linear fit.

Unit #10 – Lessons #9 and #10, Unit #11 – Lesson #4

S-ID.9 Distinguish between correlation and causation.

Unit #10 – Lessons #6 and #7