

Algebra I Mathematics Considerations from Achieve the Core/CCSSO

Algebra I Important Prerequisites		
Prerequisite Standard	Grade-Level Standard	Standard Language
Address before or within grade-level instruction	■ Major ■ Supporting ■ Additional	
8.EE.A.1	N.RN.A.1 Conceptual	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. For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5.
	N.RN.A.2 Procedural	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
8.NS.A.1, 8.NS.A.2	N.RN.B.3 Conceptual	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.
	N.Q.A.1 Conceptual, Application	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.
	N.Q.A.2 Conceptual, Application	Define appropriate quantities for the purpose of descriptive modeling.
	N.Q.A.3 Conceptual, Application	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
	A.SSE.A.1 Conceptual, Application	Interpret expressions that represent a quantity in terms of its context.
	A.SSE.A.1a Conceptual	Interpret parts of an expression, such as terms, factors, and coefficients.
	A.SSE.A.1b Conceptual	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 .
8.EE.A.2	A.SSE.A.2 Conceptual, Procedural	Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.
	A.SSE.B.3 Conceptual	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.



	Procedural	
8.EE.A.2	A.SSE.B.3a Conceptual, Procedural	Factor a quadratic expression to reveal the zeros of the function it defines.
	A.SSE.B.3b Conceptual, Procedural	Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.
	A.SSE.B.3c Procedural	Use the properties of exponents to transform expressions for exponential functions. <i>For example the expression 1.15^t can be rewritten as $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.</i>
8.EE.A.1	A.APR.A.1 Conceptual, Procedural	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.
8.EE.A.2, 8.EE.B.5, 8.EE.B.6, 8.F.B.4	A.CED.A.1 Conceptual, Procedural Application	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.
	A.CED.A.2 Conceptual, Procedural	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
	A.CED.A.3 Conceptual, Application	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. <i>For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.</i>
8.EE.C.7a-b	A.CED.A.4 Conceptual, Procedural	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. <i>For example, rearrange Ohm's law $V = IR$ to highlight resistance R.</i>
8.EE.C.7a-b	A.REI.A.1 Conceptual	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.
8.EE.C.7a-b	A.REI.B.3 Procedural	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
8.EE.A.2	A.REI.B.4 Procedural	Solve quadratic equations in one variable.
	A.REI.B.4a Conceptual, Procedural	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.
	A.REI.B.4b Conceptual, Procedural	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 .
8.EE.C.8a-c	A.REI.C.5 <i>Conceptual</i>	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.C.6 <i>Procedural</i>	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
	A.REI.C.7 <i>Procedural</i>	Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. <i>For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.</i>
	A.REI.D.10 <i>Conceptual</i>	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.D.11 <i>Conceptual, Procedural</i>	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.D.12 <i>Procedural</i>	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.
8.F.A.1	F.IF.A.1 <i>Conceptual</i>	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.A.2 <i>Conceptual, Procedural</i>	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
	F.IF.A.3 <i>Conceptual</i>	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. <i>For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$ for $n \geq 1$.</i>
8.F.B.5	F.IF.B.4 <i>Conceptual, Application</i>	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.B.5 <i>Conceptual, Application</i>	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. <i>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.*</i>



8.F.B.4	F.IF.B.6 Conceptual, Procedural, Application	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.C.7 Conceptual, Procedural	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
	F.IF.C.7a Conceptual, Procedural	Graph linear and quadratic functions and show intercepts, maxima, and minima.
	F.IF.C.7b Conceptual, Procedural	Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
	F.IF.C.7e Conceptual, Procedural	Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.
	F.IF.C.8 Conceptual, Procedural	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
	F.IF.C.8a Conceptual, Procedural, Application	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.
	F.IF.C.8b Conceptual	Use the properties of exponents to interpret expressions for exponential functions. <i>For example, identify percent rate of change in functions such as $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)12^t$, $y = (1.2)^t/10$, and classify them as representing exponential growth or decay.</i>
8.F.A.2	F.IF.C.9 Conceptual	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). <i>For example, given a graph of one quadratic function and an algebraic expression for another, say <u>which</u> has the larger maximum.</i>
	F.BF.A.1 Conceptual, Procedural, Application	Write a function that describes a relationship between two quantities.
	F.BF.A.1a Conceptual, Procedural, Application	Determine an explicit expression, a recursive process, or steps for calculation from a context.



	F.BF.A.1b Conceptual, Procedural, Application	Combine standard function types using arithmetic operations. <i>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.</i>
	F.BF.A.2 Conceptual, Procedural, Application	Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.*
	F.BF.B.3 Conceptual, Procedural	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.
	F.BF.B.4 Procedural	Find inverse functions.
	F.BF.B.4a Procedural	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. <i>For example, $f(x) = 2x^2$ or $f(x) = (x+1)/(x-1)$ for $x \neq 1$.</i>
8.EE.B.5, 8.EE.B.6, 8.F.A.3, 8.F.B.4	F.LE.A.1 Conceptual	Distinguish between situations that <u>can be modeled</u> with linear functions and with exponential functions.
	F.LE.A.1a Conceptual	Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.
8.F.A.3	F.LE.A.1b Conceptual	Recognize situations in which <u>one quantity</u> changes at a constant rate per unit interval relative to another.
	F.LE.A.1c Conceptual	Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
8.EE.B.5, 8.EE.B.6, 8.F.B.4	F.LE.A.2 Conceptual, Procedural, Application	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.A.3 Conceptual	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, <u>quadratically</u> , or (more generally) as a polynomial function.
	F.LE.B.5 Conceptual Application	Interpret the parameters in a linear or exponential function in terms of a context.
	S.ID.A.1 Procedural	Represent data with plots on the real number line (dot plots, histograms, and box plots).
	S.ID.A.2 Conceptual, Procedural	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.



	S.ID.A.3 <i>Conceptual, Application</i>	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
8.SP.A.4	S.ID.B.5 <i>Conceptual, Procedural, Application</i>	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.
8.SP.A.1, 8.SP.A.2	S.ID.B.6 <i>Conceptual, Procedural, Application</i>	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
8.SP.A.1, 8.SP.A.2	S.ID.B.6a <i>Conceptual, Procedural, Application</i>	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.
	S.ID.B.6b <i>Conceptual, Procedural</i>	Informally assess the fit of a function by plotting and analyzing residuals.
	S.ID.B.6c <i>Procedural</i>	Fit a linear function for a scatter plot that suggests a linear association.
8.SP.A.3	S.ID.C.7 <i>Conceptual, Application</i>	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
	S.ID.C.8 <i>Conceptual, Procedural</i>	Compute (using technology) and interpret the correlation coefficient of a linear fit
	S.ID.C.9 <i>Conceptual</i>	Distinguish between correlation and causation.

- What should we make of standards that have an important prerequisite that needs to be addressed, but a reduction in instructional time is also recommended?** These considerations should be weighed together, along with the needs of your group of students. For example, the time spent on a standard might be reduced from five days to three days by de-emphasizing one part of the standard, but prior-grade needs might be addressed within the first lesson through strategic choice of tasks.

Category	Meaning	Example	Actions to take
Address before grade-level instruction	Without this prior knowledge, students most likely do not have a way to access the grade-level standard.	A 7th-grader who has not learned how to divide positive fractions (6.NS.A.1) needs to build that understanding before beginning to divide negative fractions (7.NS.A.2c).	Students may require dedicated instruction on prerequisite standards before the grade level instruction is taught. (Not every standard needs its own full lesson; multiple standards may be addressed at once, or a standard might be taught as a short mini-lesson.)
Address within grade-level instruction	Students will have an entry point into grade-level content, but will benefit from instruction that weaves in this prior-grade content.	A 4th-grader who struggles with recalling multiplication facts (3.OA.C.7) can still access grade-level, multi-step application problems (4.OA.A.3) when given a multiplication table, but will need small doses of continued support to attain fluency.	Individual tasks or strategies from these standards can be incorporated into grade-level lessons to address important content that was missed in the prior grade.

See Complete K-8 Documents here:

2020–21 Priority Instructional Content from Achieve the Core

https://achievethecore.org/content/upload/2020%E2%80%9321%20Priority%20Instructional%20Content%20in%20ELA%20Literacy%20and%20Mathematics_June%202020.pdf

Math Important prerequisite skills list from CCSSO:

https://docs.google.com/document/d/1mcApF1n7sPI7Xsrlx29Ab_tmAAvne4A-VuJKSWb_qSg/edit