

# New York State Next Generation Mathematics Learning Standards

This document is intended to help educators identify the key changes that have occurred to the content standards for this grade level/course and to assist with designing curriculum and lessons aligned to the NYS Next Generation Mathematics Learning Standards. This document does not contain the comprehensive list of learning standards for the grade level/course. The complete list of standards for the grade level/course can be found at [NYS Next Generation Mathematics Learning Standards](#).

## Algebra I Snapshot



### Standards New to Algebra I

**AI-N.RN.3** Use properties and operations to understand the different forms of rational and irrational numbers.

**AI-N.RN.3a** Perform all four arithmetic operations and apply properties to generate equivalent forms of rational numbers and square roots. Tasks include rationalizing denominators.

**AI-A.REI.7a** Solve a system, with rational solutions, consisting of a linear equation and a quadratic equation (parabolas only) in two variables both algebraically and graphically.

### Standards Moved from Algebra I

**N-Q.2** Define appropriate quantities for the purpose of descriptive modeling. Standard removed from Algebra I and Algebra II.

**A-SSE.3a** Factor quadratic expression to reveal the zeros of the function it defines. Standard removed, however, same content still covered in AI-A.APR.3, AI-A.SSE.2 and AI-A.REI.4b.

**A-SSE.3b** Complete the square in a quadratic expression to reveal the max and min value of the function it defines. Standard removed, however, completing the square is still an expectation when working with quadratic equations (functions), see AI-A.REI.4a and 4b, and AI-F.IF.7a and 8a.

**A-REL.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. Standard has been removed.

**S-ID.6b** Informally assess the fit of a function by plotting and analyzing residuals. Standard has been moved to the plus standards, (+)(-)S.ID.6b.

**S-ID.6c** Fit a linear function for a scatter plot that suggest a linear association. Standard removed, however, same content still covered in AI-S.ID.6 and 6a.

### Highlights/Instructional Considerations for Algebra I

**AI-N.RN.3b** Language has changed from explaining to categorizing the sum or product of rational or irrational numbers. Students will have to additionally distinguish when the sum and product of two irrational numbers is either rational or irrational, in addition to the original cases stated in standard N-RN.3.

**AI-N.Q.3** Removed clarification about greatest precision (significant figures).

**AI-A.SSE.1a.** Students need to be able to write the standard form of a given polynomial as well as identify the parts (terms, coefficients, degree, leading coefficient and constant term). Interpretation of the parts of an expression is standard NY-A.SSE.1b, which is a fluency expectation for Algebra I.

**AI-A.SSE.2** New factoring limitation for trinomials of the form  $ax^2+bx+c$ , lead coefficient will be a 1. A combination of methods could be used to factor an expression completely.

**AI-A.SSE.3c** Exponential expressions will include those with integer exponents, as well as those whose exponents are linear expressions. Any linear term in those expressions will have an integer coefficient. Rational exponents are an expectation for Algebra II. Producing equivalent forms of expressions to reveal something about the quantity/situation is an expectation as stated in standard AI-A.SSE.3.

**AI-A.APR.1** Adding, subtracting and multiplying polynomials is a fluency recommendation for Algebra I.

**AI-A.APR.3** Took out construct a rough graph, however students are still connecting the zeros of a function to its graph in standards AI-A.REI.4b, AI-F.IF.4, AI-F.IF.7a and AI-F.IF.8a.

**AI-A.CED.1** Standard addresses the development of the model (equation/inequality in one variable, real world context). Equations limited to linear, quadratic and exponential. Inequalities are limited to linear and tasks do not involve compound inequalities.

**AI-A.CED.2** Standard addresses the development of the model (equation/inequality in two variables, real world context). Equations limited to linear, quadratic and exponential.

**AI-A.REI.1a** Students need to be able to explain steps taken when solving linear and quadratic equations.

**AI-A.REI.3** Tasks do not involve solving compound inequalities.

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**AI-A.REI.4a** Students do not need to derive the quadratic formula, but should be exposed to the derivation by completing the square to  $ax^2+bx+c=0$  and know how to apply it (connect to standard AI-A.REI.4b). New limit for CTS, quadratic's lead coefficient will be 1 and the linear term will be even. When the quadratic equation in  $x$  is written in the form  $(x-p)^2=q$ ,  $q$  will be an integer.

## Highlights/Instructional Considerations (Cont.) for Algebra I

**AI-A.REI.4b** Graphing has been added as a method of solving quadratic equations. Algebraic tasks could involve simplifying radicals. There are no coefficient limits for use of the quadratic formula when solving a quadratic equation and the discriminant is a sufficient means of determining when a quadratic equation yields no real solutions/roots.

**AI-A.REI.10** Solving problems using the analytic geometry of lines (graphing of linear equations) is a fluency recommendation for Algebra I. See note in standards document.

**AI-A.REI.11** Students are recognizing the graphical solution to  $f(x)=g(x)$  and interpreting the solution in context. Functions to include are linear, polynomial, absolute value and exponential. Successive approximations as a method of finding solutions approximately has been removed.

**AI-A.REI.12** Solving problems using the analytic geometry of lines (graphing of linear equations) is a fluency recommendation for Algebra I. See note in standards document.

**AI-F.IF.1** Domain and range can be expressed using inequalities, set builder notation, verbal description and interval notations for functions of subsets of real numbers to the real numbers.

**AI-F.IF.3** Sequences (arithmetic and geometric) will be written explicitly and only in subscript notation. Recursive sequences are an expectation for Algebra II (AII-F.IF.3).

**AI-F.IF.4** Zeros are an added key feature. End behavior of polynomial functions is an expectation of Algebra II, it can, however, be introduced regarding the graphs of functions studied in Algebra I and work with AI-F.IF.7a and 7b.

**AI-F.IF.4, AI-F.IF.6, AI-F.IF.7b, AI-F.IF.9 and AI-F.BF.3a** Cube root functions have been removed in Algebra I, and are an expectation in Algebra II.

**AI-F.IF.5** Students will need to determine the domain of a function from its graph and, where applicable identify the appropriate domain for a function in context.

**AI-F.IF.7a** Graphing exponential functions has been added, in addition to linear and quadratic functions. Solving problems using the analytic geometry of lines (graphing of linear equations) is a fluency recommendation for Algebra I. See note in standards document.

**AI-F.IF.7b** Algebra I key features to be shown in graphs include: intercepts, zeros; intervals where the function is increasing, decreasing, positive or negative; maxima, minima; and symmetries.

**AI-F.IF.8a** Any algebraic process can be used, not just factoring and completing the square, on a quadratic function to show zeros, extreme values, and symmetry of the graph. Students will need to be able to interpret these in terms of a context.

**AI-F.BF.1a** Sequences will be written explicitly and only in subscript notation.

**AI-F.BF.3a** Additional expectation of writing a new function using the value of  $k$ . Horizontal stretch  $f(kx)$  is an expectation of Geometry, standard GEO-G.CO.2. Tasks are limited to linear, quadratic, square root, absolute value and exponential functions. Odd and even functions are officially introduced in AII.

**AI-F.LE.2** Constructing arithmetic and geometric sequences has been removed from this standard, but still an expectation in AI-F.IF.3 and AI-F.BF.1a.

**AI-S.ID.2** Values in the given data sets will represent samples of larger populations. Sample standard deviation will be used to make a statement about the population standard deviation from which the sample was drawn.

**AI-S.ID.6a** Emphasis is on linear models, with quadratic and exponential models being an expectation for Algebra II (AII-S.ID.6a).