

# Limits and Clarifications for Multi-Course Standards

This document lists the 2023 New Jersey Student Learning Standards included in both the Algebra 1 and Algebra 2 courses. The document also provides the limits and clarifications for each of these standards. The standards are organized by conceptual category, domain, and cluster.

**Note**: A star () indicates a modeling standard.

| **Cluster Heading** | **Indicator** | **2023 New Jersey Student Learning Standard** | **Algebra 1 Limits and Clarifications** | **Algebra 2 Limits and Clarifications** |
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| Reason quantitatively and use units to solve problems | N.Q.A.2 | Define appropriate quantities for the purpose of descriptive modeling. | This standard is integrated with S.ID.A in Algebra 1 and requires the student to create a quantity of interest in the situation being described. For example, in a situation involving a single data set, the student might decide that the mean, as a measure of center, is the key variable in a situation, and then choose to work with the mean.  | This standard is integrated with S.ID.A in Algebra 2 and requires the student to create a quantity of interest in the situation being described. For example, in a situation involving more than two different data sets, the student might decide that the interquartile range (IQR), as a measure of spread, is the key variable in a situation and work with the IQR.  |
| Write expressions in equivalent forms to solve problems | A.SSE.B.3c | Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.1. Use the properties of exponents to transform expressions for exponential functions. For example, the expression can be rewritten as  to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.
 | Limited to exponential expressions with integer exponents and have a real-world context. | Limited to exponential expressions with rational or real exponents and have a real-world context. |
| Create equations that describe numbers or relationships | A.CED.A.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. | Limited to linear, quadratic and exponential equations with integer exponents | Limited to exponential equations with rational or real exponents and rational equations. |
| Understand solving equations as a process of reasoning and explain the reasoning | A.REI.A.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 | Limited to quadratic equations | Limited to simple rational or radical equations. |
| Solve equations and inequalities in one variable | A.REI.B.4b | Solve quadratic equations in one variable.1. Solve quadratic equations by inspection (e.g., for ), 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 for real numbers *a* and *b*.
 | Writing solutions for quadratic equations that have roots with nonzero imaginary parts is not required. | In the case of equations that have roots with nonzero imaginary parts, solutions are to be written asfor real numbers  and . |
| Solve systems of equations | A.REI.C.6 | Solve systems of linear equations algebraically (include using the elimination method) and graphically, focusing on pairs of linear equations in two variables. | Limited to 2 x 2 systems and have a real-world context. | Limited to 3 x 3 systems. |
| Represent and solve equations and inequalities graphically | A.REI.D.11 | Explain why the *x*-coordinates of the points where the graphs of the equations  and  intersect are the solutions of the equation ; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases whereand/or  are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. modeling standard. | Limited to linear, 2nd degree polynomial (i.e., quadratic) and absolute value functions.Finding solutions approximately is limited to cases where and are 2nd degree polynomial functions. | Includes any of the function types mentioned in the standard. |
| Understand the concept of a function and use function notation | F.IF.A.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 ,  for . | This standard is the Major work in Algebra 1 | This standard is Supporting work in Algebra 2 and should support the Major work in F.BF.A.2 |
| Interpret functions that arise in applications in terms of a context | F.IF.B.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. | Limited to linear functions, quadratic functions, and exponential functions with domains in the integers.Tasks should have a real-world context. | Limited to polynomial, exponential, and logarithmic functions. Tasks should have a real-world context. |
| Interpret functions that arise in applications in terms of a context | F.IF.B.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. | Limited to linear functions, quadratic functions, and exponential functions with domains in the integers.Tasks have a real-world context. | Limited to polynomial, exponential, and logarithmic functionsTasks should have a real-world context. |
| Build a function that models a relationship between two quantities | F.IF.C.7b | Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. modeling standard. 1. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
 | Limited to piecewise-defined functions, including step functions and absolute value functions. | Limited to square root and cube root functions. |
| Build a function that models a relationship between two quantities | F.IF.C.7e | Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. modeling standard.1. Graph exponential and logarithmic functions, showing intercepts and end behavior.
 | Limited to exponential functions with integer exponents. | Limited to exponential functions with rational or real exponents and logarithmic functions. |
| Analyze functions using different representations | F.IF.C.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. | Limited to linear functions, quadratic functions, and exponential functions with domains in the integers. | Limited to polynomial, exponential, and logarithmic functions. |
| Build a function that models a relationship between two quantities | F.BF.A.1a | Write a function that describes a relationship between two quantities. modeling standard.1. Determine an explicit expression, a recursive process, or steps for calculation from a context.
 | Limited to linear functions.Limited to function notation. Tasks do not use subscript notation.Tasks have a real-world context | Limited to polynomial, exponential, and logarithmic functions.Tasks may involve function or subscript notation.Tasks have a real-world context. |
| Build new functions from existing functions | F.BF.B.3 | Identify the effect on the graph of replacing  by , , , and  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. | Identifying the effect on the graph of replacing  by , , , and  for specific values of *k* (both positive and negative) is limited to linear and quadratic functions.Experimenting with cases and illustrating an explanation of the effects on the graph using technology is limited to linear functions, quadratic functions, and exponential functions with domains in the integers.Tasks do not involve recognizing even and odd functions. | Tasks may involve polynomial, exponential, and logarithmic functions.Tasks may involve recognizing even and odd functions. |
| Construct and compare linear and exponential models and solve problems | F.LE.A.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).  | Limited to constructing linear functions, including arithmetic sequences, and exponential functions.Exponential functions are limited to those with domains in the integers.Tasks do not use subscript notation. | Constructing linear and exponential functions includes constructing geometric sequences and arithmetic sequences.Tasks may involve function or subscript notation. |
| Interpret expressions for functions in terms of the situation they model | F.LE.B.5 | Interpret the parameters in a linear or exponential function in terms of a context. | Exponential functions are limited to those with domains in the integers.Tasks have a real-world context. | Tasks are limited to exponential functions with domains not in the integers.Tasks have a real-world context. |
| Summarize, represent, and interpret data on a single count or measurement variable | S.ID.A.1 | Represent data with plots on the real number line (dot plots, histograms, and box plots). | Limited to not more than two different data sets.Tasks have a real-world context. | Includes more than two data sets.Tasks have a real-world context. |
| Summarize, represent, and interpret data on a single count or measurement variable | S.ID.A.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 | Limited to not more than two different data sets.Tasks have a real-world context. | Includes more than two data sets.Tasks have a real-world context. |
| Summarize, represent, and interpret data on a single count or measurement variable | S.ID.A.3 | Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). | Limited to not more than two different data sets.Tasks have a real-world context. | Includes more than two data sets.Tasks have a real-world context. |
| Summarize, represent, and interpret data on a single count or measurement variable | S.ID.B.6a | Represent data on two quantitative variables on a scatter plot and describe how the variables are related. 1. 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.
 | Exponential functions are limited to those with domains in the integers.Quadratic functions are not included.Tasks have a real-world context. | Exponential functions include those with domains not in the integers.Tasks have a real-world context. |
| Summarize, represent, and interpret data on two categorical and quantitative variables | S.ID.B.6b | Represent data on two quantitative variables on a scatter plot and describe how the variables are related. 1. Informally assess the fit of a function by plotting and analyzing residuals, including with the use of technology.
 | Exponential functions are limited to those with domains in the integers.Quadratic functions are not included.Tasks have a real-world context. | Exponential functions include those with domains not in the integers.Tasks have a real-world context. |