**Secondary Mathematics Utah Core Changes**

# How to read the grade level standards

**Standards** define what students should understand and be able to do.

**Strands** (formerly known as Domains) are groups of related standards. The paragraph beneath each strand is a description of the standards (often references are made to specific standards within this paragraph).

**Format Changes:** Cluster Titles have been removed to be consistent with other subject area cores. They have been combined and are a **Description** of the Strand.

In high school, the instructional notes located within the cluster have been embedded into the standards to provide clarity and specify depth of a given standard.

# Core changes: Key

Bold: Addition to standards not previously in the core are **bold**.

Underline: Relocation of information from footnotes (or instructional notes) are underlined.

Strikethrough: Removals use ~~strikethrough~~.

Grade 6 Core changes: still in draft form

Grade 7 Core changes

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| **Standard** | **Modified/Added/Deleted** |
| **7.SP.1**  modified | Understand that statistics can be used to gain information about a population by examining a sample of the population, and that generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling ~~tends~~ **is more likely** to produce representative samples and support valid inferences. |
| **7.SP.3**  modified | Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, estimating the difference between the centers by expressing it as a multiple of a measure of variability. *For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, ~~about~~* ***approximately*** *twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.* |

Grade 8 Core changes

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| **Standard** | **Modified/Added/Deleted** |
| **8.NS.3**  Did not exist | **8.NS.3 - Understand how to perform operations and simplify radicals with emphasis on square roots.** |
| **8.EE.7**  modified | Solve linear equations **and inequalities** in one variable. |
| **8.EE.7b**  modified | Solve **single variable** linear equations **and inequalities** with rational number coefficients, including equations **and inequalities** whose solutions require expanding expressions using the distributive property and collecting like terms. |
| **8.EE.7c**  Did not exist | **8.EE.7c - Solve single variable absolute value equations.** |
| **8.EE.8b**  modified | Solve systems of two linear equations in two variables ~~algebraically, and estimate solutions by graphing the equations~~ **graphically, approximating when solutions are not integers.** Solve simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.* |
| **8.EE.8c**  modified | Solve real-world and mathematical problems leading to two linear equations in two variables **graphically.** *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.* |
| **8.G.3**  modified | **Observe that orientation of the plane is preserved in rotations and translations, but not with reflections.** Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. |
| **8.G.6**  modified | **Explore and** explain proofs of the Pythagorean Theorem and its converse. |
| **8.SP.3** | Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.* **(Calculating equations for a linear model is not expected in grade 8.)** |

Relocation of information: In grade 8, the only relocation was moving the footnote for standard 8.F.1 to be within the standard itself.

**8.F.1:** Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. (Function notation is not required in grade 8.)

Secondary I Core changes

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| **Standard** | **Modified/Added/Moved/Deleted** |
| **Throughout** | “Linear” and “exponential” added to several standards indicating the emphasis of these two functions in Secondary Mathematics I.  Examples of where this occurs: I.A.REI.1, I.F.IF.9, I.F.BF.3, I.S.ID.6 |
| **Throughout** | “Quadratic”, “rational” and other functions removed from several standards and placed in appropriate Secondary Mathematics courses.  Examples of where this occurs: I.A.CED.1, I.A.REI.11, I.F.IF.7a, e, I.F.IF.9, I.F.BF.3, I.F.LE.3 |
| **I.A.REI.3**  modified/  ”b” added | Solve equations and inequalities in one variable. a. Equations with coefficients represented by letters. b**. Compound inequalities in one variable, including absolute value inequalities.** c. Solve simple exponential equations that rely only on application of the laws of exponents, *such as 5ˣ = 125 or 2ˣ = 1/16* |
| **I.A.REI.6**  modified | Solve systems of linear equations exactly and approximately ~~(e.g., with graphs)~~ **(numerically, algebraically, graphically)**, focusing on pairs of linear equations in two variables. |
| **I.F.IF.4**  modified | 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; **and** end behavior~~; and periodicity~~. |
| **I.F.BF.3**  modified | 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. Relate the vertical translation of a linear function to its y-intercept. 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.~~* |
| **I.S.ID.3**  modified | Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). Calculate the weighted average of a distribution and interpret it as a measure of center. |
| **I.S.ID.5**  moved | Moved to Secondary II |

Secondary II Core changes

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| **Standard** | **Modified/Added/Moved/Deleted** |
| **Throughout** | “Quadratic” , “quadratic, exponential, and linear” and key concepts specific to this course (such as “Limit to multiplications that involve i2 as the highest power of *i”*) added to several standards to clarify limits and expectations in Secondary Mathematics II.  Examples of where this occurs: II.N.CN.1, II.N.CN.2, II.A.SSE.1, II.F.IF.5, II.F.IF.9, II.F.BF.3, II.F.LE.3, II.F.TF |
| **Throughout** | “Rational” functions and other concepts removed from several standards and placed in appropriate Secondary Mathematics courses. Example of where this occurs: II.A.SSE.1 |
| **II.A.SSE.1b**  modified | Interpret quadratic and exponential expressions that represent a quantity in terms of its context.  b. Interpret ~~complicated~~ **increasingly more complex** 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.~~* Exponents are extended from the integer exponents to rational exponents focusing on those that represent square or cube roots. |
| **II.A.CED.4**  modified | Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations; extend to formulas involving squared variables. ***For example, rearrange the formula for the volume of a cylinder V = πr2 h.*** |
| **II.F.IF.7b**  Modified/moved | Graph ~~square root, cube root, and~~ piecewise-defined functions~~, including step functions~~ and absolute value functions. Compare and contrast absolute value and piecewise-defined functions with linear, quadratic, and exponential functions. Highlight issues of domain, range, and usefulness when examining piecewise-defined functions.  (crossed out functions moved to Secondary Math III) |
| **II.F.BF.4b**  moved | Moved to Secondary Math III |
| **II.G.GPE.2**  moved | Moved to Secondary Math II Honors |
| **I.S.ID.5**  added | Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and condition relative frequencies). Recognize possible associations and trends in the date.  (Moved from Secondary Math I) |
| **II.S.CP.2**  moved | Moved to Secondary Math II Honors |
| **II.S.CP.3**  moved | Moved to Secondary Math II Honors |
| **II.S.CP.7**  moved | Moved to Secondary Math II Honors |
| **II.S.CP.8**  moved | Moved to Secondary Math II Honors |
| **II.S.CP.9**  moved | Moved to Secondary Math III Honors |
| **II.S.MD.1**  deleted | Removed from core |
| **II.S.MD.2**  deleted | Removed from core |

Secondary III Core changes

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| **Standard** | **Modified/Added/Removed** |
| **Throughout** | “Polynomial”, “rational” functions, key concepts specific to this course (such as “limit to polynomials with real coefficients*”*), and examples added to several standards to clarify limits and expectations in Secondary Mathematics III. Examples of where this occurs: II.N.CN.1, III.A.SSE.1b, III.A.CED.3, III.A.CED.4, III.F.BF.3 |
| **Throughout** | Examples and other concepts removed from several standards and placed in appropriate Secondary Mathematics courses. Examples of where this occurs: III.N.CN.9, III.A.SSE.1b, , III.A.CED.3, III.A.CED.4, III.A.APR.1 |
| **III.A.SSE.1b**  modified | Interpret polynomial and rational expressions that represent a quantity in terms of its context.  b. Interpret complex 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~~* ***examine the behavior of P(1+r/n)nt as n becomes large***. |
| **III. A.SSE.4**  modified | ~~Derive~~ **Understand** the formula for the sum of a series ~~(when the common ration is not 1),~~ and use the formula to solve problems.  a. **Derive the formula for the sum of an arithmetic series.**  b. Derive the formula for the sum of a geometric series, and use the formula to solve problems. Extend to infinite geometric series. *For example, calculate mortgage payments.* |
| **III.F.IF.7b, d**  modified | b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. **Compare and contrast square root, cubed root, and step functions with all other functions.**  d. (Moved from Secondary Math III Honors) **Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.** |
| **III.F.BF.4a**  modified | Find inverse functions.   1. 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. **Include linear, quadratic, exponential, logarithmic, rational, square root, and cube root functions.** *For example, f(x) = 2x3 or f(x) = (x+1)/(x-1) for x ≠ 1.* |
| **III.F.LE.3**  added | **Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.** (standard existed, but added to Secondary Math III) |
| **III.F.LE.5**  added | **Interpret the parameters in a linear, quadratic, or exponential function in terms of a context.** (standard existed, but added to Secondary Math III) |
| **III.F.TF.7**  moved | **Use inverse functions to solve trigonometric equations that arise in modeling context; evaluate the solutions using technology and interpret them in terms of context. Limit solutions to a given interval.** (Moved from Secondary Math III Honors) |
| **III.S.IC.2**  deleted | Removed from Core |
| **III.S.IC.5**  deleted | Removed from Core |