



# Algebra I Mathematics– Evidence Statements

## Overview of the Maryland Comprehensive Assessment Program (MCAP)

The MCAP includes a coherent set of summative mathematics assessments aligned to the Maryland College and Career Ready Standards for Mathematics (MCCRSM). Students are required to take an MCAP mathematics assessment at the end of grades 3 – 8 and at the end of Algebra I. Students may also take an MCAP mathematics assessment at the end of Geometry and Algebra II.

The MCAP mathematics assessment development process is based on Evidence-Centered Design. The ECD process begins by establishing the answer to “What skills and understandings should be assessed?”. The MCCRSM describes the skills and understandings that the MCAP mathematics assessments assess. Assessments are then designed to gather evidence that allows inferences to be made. Assessments can be designed to allow inferences of various grain sizes. The MCAP mathematics assessments are summative assessments and are therefore designed to provide evidence that allows only general inferences about a student’s mathematical skills and understandings. The MCAP Mathematics Claims Structure describes the grain size of the evidence that the MCAP mathematics assessments will yield. Assessment items are designed to elicit evidence of a student’s level of proficiency for each claim.

### MCAP MATHEMATICS CLAIMS STRUCTURE

#### Master Claim

The student is college and career ready or is on track to being college and career ready in mathematics.

#### Subclaims

**Content** - The student solves problems related to all content of the grade/course related to the Standards for Mathematical Practice.

**Reasoning** - The student expresses grade/course level appropriate mathematical reasoning.

**Modeling** - The student solves real-world problems with a degree of difficulty appropriate to the grade/course.

**OVERVIEW OF MCAP MATHEMATICS ASSESSMENT TASK TYPES**

Item Type	Description	Subclaim	Scoring Method	Number of Operational Items per Form
<b>Type I</b>	Type I items will assess conceptual understanding, procedural skills, reasoning, and the ability to use mathematics to solve real-world problems.	Content Reasoning Modeling	Machine scored	<b>32</b>
<b>Type II</b>	Type II items assess a student's ability to reason mathematically. Items may require students to provide arguments or justifications, critique the reasoning of others, and to use precision when explaining their thinking related to mathematics.	Reasoning	Human scored	<b>2</b>
<b>Type III</b>	Type III items assess a student's ability to apply their understanding of mathematics when solving real-world contextual problems.	Modeling	Human scored	<b>2</b>
			<b>Total</b>	<b>36</b>

## Overview of the MCAP Mathematics Evidence Statements

MCAP Mathematics Evidence Statements help teachers, curriculum developers, and administrators understand how the MCCRSM will be assessed. Assessment items are designed to elicit the evidence described in the Evidence Statements.

The MCAP Mathematics Evidence Statements for the Content Sub-Claim are organized using the same structure as the Maryland College and Career Ready Standards for Mathematics. The Algebra I, Geometry and Algebra II Content Evidence Statements are organized by Conceptual Category, Domains, Clusters, and then Standards.

### Evidence Statements

Evidence statements are provided for each standard to describe the type of evidence that a task addressing the standard should elicit. In some cases, the standard clearly describes the type of evidence that an aligned task should elicit. The Evidence Statement for such standards will read “As stated in the standard”. In cases where the wording of a standard does not adequately describe the type of evidence that should be elicited, the Evidence Statement will attempt to better describe the type of evidence items should elicit. In cases where a standard is taught in both Algebra I and Algebra II, the Evidence Statement and/or Item Specification will seek to describe how the items might differ between the two courses.

## Clarifications

Clarifications provide additional information to help the reader better understand how a standard might be assessed.

## Modeling Standards ★

Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol (★).

## Calculator Codes

The last column of each table found in the Content Sub-Claim Evidence Statement tables identifies whether items that assess a given standard will allow the use of a calculator. The codes are identified in the Calculator Key below.

### Calculator Key:

- Y – Yes. A calculator will be available on the tool bar when this standard is assessed.
- N – No. A calculator will NOT be available on the tool bar when this standard is assessed.
- X – The calculator designation will be dependent on the task and will be determined as a Yes or No during content review.

## Reasoning Sub-Claim

The MCAP Mathematics Evidence Statements for the Reasoning Sub-Claim have a different structure than the Content Evidence Statements. The codes for the Reasoning Evidence Statements begin with either A1, G or A2 that correspond to Algebra I, Geometry or Algebra II. The letter “R” appears after the course designation in the code to indicate that the statement is a Reasoning Evidence Statement. The Reasoning Evidence Statements may apply to both machine-scored and constructed response items, unless otherwise noted. Reasoning items may align to any of the content standards from a given course.

## Modeling Sub-Claim

The MCAP Mathematics Evidence Statements for the Modeling Sub-Claim have a different structure than the Content Evidence Statements. The codes for the Modeling Evidence Statements begin with either A1, G or A2 that correspond to Algebra I, Geometry or Algebra II. The letter “M” appears after the course designation in the code to indicate that the statement is a Modeling Evidence Statement. The Modeling Evidence Statements may apply to both machine-scored and constructed response items, unless otherwise noted. Modeling items may align to any of the content standards from a given course.

## Standards for Mathematical Practice

The Standards for Mathematical Practice describe the varieties of expertise that mathematics educators at all levels should seek to develop in their students.

These practice rest on important “processes and proficiencies” with longstanding importance in mathematics education.

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

## Content Subclaim

### Number and Quantity

#### N.RN The Real Number System

#### N.RN.B Use properties of rational and irrational numbers.

**N.RN.B.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.

**Evidence Statement:**

- Apply properties of rational and irrational numbers to identify rational and irrational numbers.

**Clarification:**

- Assess at the cluster level (for example, items may include addition, subtraction, and multiplication of irrational numbers).
- Simplification of radicals not required.
- Division of radicals not assessed.
- Items do not have context.
- Items should go beyond asking students to only identify rational and irrational numbers.

**Calculator Code:** N

**N.Q Quantities****N.Q.A Reason quantitatively and use units to solve problems.**

**N.Q.A.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.

**Evidence Statement:**

- Determine an appropriate scale for a graph.
- Use dimensional analysis to convert units.

**Clarifications:**

- Items must have real-world context.

**Calculator Code: Y**

**N.Q.A.2 ★** Define appropriate quantities for the purpose of descriptive modeling.

*\*This standard is also taught in Algebra II\**

**Evidence Statement:**

- Select an appropriate quantity for a real-world context.

**Clarifications:**

- Items must have real-world context.
- Items should include units with every numerical entry.
- Items should focus on students choosing appropriate units based on the real-world context.

**Calculator Code: Y**

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

**Not assessed. This is an instructional standard only.**

## Algebra

### A.SSE SEEING STRUCTURE IN EXPRESSIONS

#### A.SSE.A Interpret the structure of expressions.

**A.SSE.A.1** ★ Interpret expressions that represent a quantity in terms of its real-world context.

**1a.** Interpret parts of an expression, such as terms, factors, and coefficients.

Note: (A.SSE.A.1a-1 focuses on linear, A.SSE.A.1a-2 focuses on quadratic, A.SSE.A.1a-3 focuses on exponential)

**Evidence Statement:**

- Interpret parts of linear, quadratic, or exponential expressions that represent a quantity in terms of real-world context.

**Clarifications:**

- Items must have real-world context.
- Items that contain exponential expressions should be limited to single variable exponents (i.e.,  $y = 3(2)^x$ ).
- Item prompt may contain either an equation or expression.

**Calculator Code:** X

**1b.** Interpret complicated expressions by viewing one or more of their parts as a single entity.

Note: (A.SSE.A.1b-1 focuses on linear, A.SSE.A.1b-2 focuses on quadratic, A.SSE.A.1b-3 focuses on exponential)

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- Items must have real-world context.
- Items use linear, quadratic, or exponential expressions.

**Calculator Code:** X



**A.SSE.A.2** ★ Use the structure of expressions to identify ways to rewrite it.

*\*This standard is also taught in Algebra II\**

**Evidence Statement:**

- Rewrite linear, quadratic, and exponential expressions.

**Clarifications:**

- Unlike standard A.SSE.1, items that address A.SSE.2 do not need to have real-world context.
- In Algebra I, expressions are limited to one variable expressions.
- Items may ask students to identify expressions equivalent to a given expression.
- Items may ask students to rewrite an expression in one variable.

**Calculator Code:** X

**A.SSE.B** Write expressions in equivalent forms to solve problems.

**A.SSE.B.3** ★ Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.

**3a.** Factor a quadratic expression to reveal the zeros of the function it defines.

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- Items must have real-world context.
- The equivalent form must reveal something about the real-world context.

**Calculator Code:** X

**3b.** Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- Items may have real-world context.
- The equivalent form must reveal something about the real-world context or the graph of the associated function.
- Limit completing the square in a quadratic expression to quadratics that have a leading coefficient of one and an even number as the coefficient of the linear term.
- Items with real world context may give the completed vertex form and ask analysis based questions.

**Calculator Code:** X

**3c.** Use the properties of exponents to transform expressions for exponential functions.

*\*This standard is also taught in Algebra II\**

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- Items must have real-world context.
- The equivalent form must reveal something about the real-world context.
- The domain of exponential functions limited to integers.

**Calculator Code:** X

**A.APR Arithmetic with Polynomials and Rational Expressions****A.APR.A Perform arithmetic operations on polynomials.**

**A.APR.A.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.

**Evidence Statement:**

- Add, subtract, and multiply polynomials.

**Clarifications:**

- The understand part of this standard is not assessed.
- Polynomials must be of degree one, two or three.

**Calculator Code:** X

**A.APR.B Understand the relationship between zeros and factors of polynomials.**

**A.APR.B.3** ★ Identify zeros of polynomials when suitable factorizations are available and/or use the zeros to construct a rough graph of the function defined by the polynomial.

*\*This standard is also taught in Algebra II\**

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- Cubic polynomials may be used if one linear factor and an easily factorable quadratic factor are provided. (e.g.,  $(x - 1)(x^2 - 9)$ ).
- Zeros of cubic polynomials must be integers.
- Construction of a rough graph is limited to the graph of a quadratic polynomial.

**Calculator Code:** N

**A.CED**      **Creating Equations****A.CED.A**      **Create equations that describe the 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.

*\*This standard is also taught in Algebra II\**

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- Items must have real-world context.
- Limit equations to those arising from linear, quadratic functions and exponential functions with domain limited to integers.
- Limit inequalities to those arising from linear functions.
- Rational functions are addressed in Algebra II.

**Calculator Code:** X

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

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- Items must have real-world context
- Limit equations to two variables.

**Calculator Code:** X

**A.CED.A.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.

**Evidence Statement:**

- Provide constraints based on real-world context for equations, inequalities, systems of equations and systems of inequalities.
- Determine if a solution is viable based on real-world context.

**Clarifications:**

- Items must have real-world context.
- Systems are limited to systems of equations with two equations and two unknowns.

**Calculator Code: X**

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

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- Items must have real-world context.
- Limit quadratic formulas to those that do not contain a linear term. (e.g. DO NOT ask students to solve for “t” in an expression such as  $r = \frac{1}{2}at^2 + v_0t + r_0$ )

**Calculator Code: X**

**A.REI Reasoning with Equations and Inequalities****A.REI.A 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.

*\*This standard is also taught in Algebra II\**

**Evidence Statement:**

- Identify or justify a solution method.

**Clarifications:**

- Items that require solving linear equations will require the student to explain the properties used in the solution process.
- Items may include solving quadratic equations.

**Calculator Code:** X

**A.REI.B Solve equations and inequalities in one variable.**

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

Note: (A.REI.B.3-1 focuses on linear equations, A.REI.B.3-2 focuses on linear inequalities)

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- Items do not include compound inequalities.
- Linear equations should be more complex than those assessed in 8<sup>th</sup> grade.

**Calculator Code:** X

**A.REI.B.4** Solve quadratic equations in one variable.

**4a.** 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.

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- Items do not require finding solutions
- The “derive the quadratic formula from this form” part of the standard is not assessed.

**Calculator Code:** X

**4b.** Solve quadratic equations with rational number coefficients 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.

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- Items may require student to identify cases where the equation has “no real solutions”
- Items that require the use of factoring to solve **multiple** quadratic equations should limit the quadratics to those that have a leading coefficient of 1.

**Calculator Code:** X**A.REI.C** **Solve Systems of Equations.**

**A.REI.C.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.

**Not assessed. This is an instructional standard only.**

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

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- Items may have real-world context.
- Items do not require student to use a particular method.
- Systems are to be provided for students when assessing this standard.

**Calculator Code:** X

**A.REI.D** **Represent and solve equations and inequalities graphically.**

**A.REI.D.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).

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- Limit to linear and quadratic functions.

**Calculator Code:** X

**A.REI.D.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.

*\*This standard is also taught in Algebra II\**

**Evidence Statement:**

- Approximate the solutions to an equation of the form  $f(x)=g(x)$  using the point(s) of intersection of the graphs of the equations  $y=f(x)$  and  $y=g(x)$  intersect.



**Clarifications:**

- If the graphs of the two equations are provided with clearly identified points of intersection, then combinations of linear, quadratic, absolute value and exponential functions may be used for items that involve approximation of the solutions.

**Calculator Code:** Y

**A.REI.D.12** 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.

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- Items may ask students to graph solutions or require that the student select a graph that displays the solutions to a linear inequality or a system of linear inequalities.

**Calculator Code:** N

## Functions

### F.IF Interpreting Functions

#### F.IF.A Understand the concept of a function and use function notation.

**F.IF.A.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  $y = f(x)$

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- Items may require students to identify the domain and/or range of a function.

**Calculator Code:** X

**F.IF.A.2** Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a real-world context.

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- N/A

**Calculator Code:** X

**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  $f(0) = f(1) = 1$ ,  $f(n+1) = f(n) + f(n-1)$  for  $n \geq 1$ .

*\*This standard is also taught in Algebra II\**

**Evidence Statement:**

- Identify a given sequence as arithmetic or geometric
- Match a given sequence to a given algebraic representation for the sequence.

- Given a recursive or explicit rule, evaluate the expression to find the value for a specified term in the sequence
- Create an explicit function rule for a sequence.

**Clarifications:**

- Limit sequences to simple arithmetic or geometric sequences.

**Calculator Code:** X**F.IF.B Interpret functions that arise in applications in terms of the real-world 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

*\*This standard is also taught in Algebra II\**

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- Items must have real-world context.
- Limit key features to: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior.
- Items may include determining the equation of the axis of symmetry of the graph of a given quadratic function.
- End behavior is assessed informally. (e.g. Describe what happens to the graph  $f(x) = 5(.9^x)$  as values of  $x$  increase.)
- Limit items to linear, quadratic, square root functions, piecewise-defined (including step functions, and absolute-value functions), and exponential functions. Exponential functions are limited to those with domains in the integers.
- Items may include determining and/or interpreting the slope/rate of change of a linear function from table or graph.

**Calculator Code:** X

**F.IF.B.** Relate the domain of a function to a graph and, where applicable, to the quantitative relationship it describes.

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- Items must have real-world context.
- Limit items to linear, quadratic, square root, piecewise-defined (including step functions, and absolute-value functions), and exponential functions. Exponential functions are limited to those with domains in the integers.
- An item containing a graph, equation or verbal description is acceptable to assess this standard.

**Calculator Code:** X

**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.

Note: (F.IF.B.6-1 focuses on graphic representations, F.IF.B.6-2 focuses on symbolic representations, F.IF.B.6-3 focuses on tabular representations )

*\*This standard is also taught in Algebra II\**

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- Items must have real-world context.
- Limit functions to linear, quadratic, and exponential functions.
- Limit exponential functions to those with integer domains.

**Calculator Code:** X

**F.IF.C** **Analyze functions using different representations.**

**F.IF.C. 7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

**7a.** Graph linear and quadratic functions and show intercepts, maxima and minima.

Note: (F.IF.C.7a-1 focuses on linear functions, F.IF.C.7a-2 focuses on quadratic functions)

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- N/A

**Calculator Code:** X

**7b.** Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- N/A

**Calculator Code:** X

**F.IF.C.8** Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.

**8a.** 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 real-world context.

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- Items must have real-world context.
- Items will not require students to use completing the square to manipulate a quadratic expression with a leading coefficient not equal to 1.
- Items may include interpretation of quadratics in vertex form.

**Calculator Code:** Y

**F.IF.C.9** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

*\*This standard is also taught in Algebra II\**

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- Function types are limited to linear, quadratic, square root, cube root, piecewise-defined (including step functions and absolute value functions), and exponential functions. Limit exponential functions to those with domains in the integers.
- Items may or may not have real world context.

**Calculator Code: X**

**F.BF Building Functions****F.BF.A Build a function that models a relationship between two quantities.**

**F.BF.A.1** Write a function that describes a relationship between two quantities.

**1a.** Determine an explicit expression, a recursive process, or steps for calculation from a real-world context.

Note: (F.BF.A.1a-1 focuses on linear, F.BF.A.1a-2 focus on exponential, F.BF.A.1a-3 focus on quadratic)

*\*This standard is also taught in Algebra II\**

**Evidence Statement:**

- Write a function based on an observed pattern in a real-world scenario.

**Clarifications:**

- Items must have real-world context.
- Limit to linear, quadratic and exponential functions with domains in the integers.
- Similar to creating a function from a scatterplot but for this standard the relationship between the two quantities is clear from the context.

**Calculator Code:** X

**F.BF.B Build new functions from existing functions.**

**F.BF.B.3** Identify the effect on the graph of replacing  $f(x)$  by  $f(x) + k$ ,  $kf(x)$ ,  $f(kx)$ , 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.

*\*This standard is also taught in Algebra II\**

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- Limit to linear and quadratic functions.
- Even and odd functions are not assessed In Algebra I.
- The experiment part of the standard is instructional only. This aspect of the standard is not assessed.

**Calculator Code: X**



**F.LE Linear, Quadratic, and Exponential Functions****F.LE.A Construct and compare linear, quadratic, and exponential models and solve problems.****F.LE.A.1** Distinguish between situations that can be modeled with linear functions and with exponential functions.**1a.** Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.**Evidence Statement:**

- The prove part of this standard is not assessed.

**Clarifications:**

- Given real-world situations identify those that can be modeled with a linear function versus an exponential function.

**Calculator Code: X****1b.** Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.**Evidence Statement:**

- Identify the relationship between two quantities in a given contextual situation where the rate of change over equal intervals is the same.

**Clarifications:**

- Items must have real-world context.

**Calculator Code: X****1c.** Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.**Evidence Statement:**

- Identify the relationship between two quantities in a given contextual situation where one quantity changes by a constant percent per unit interval relative to another.

**Clarifications:**

- Items must have real-world context.

**Calculator Code: X**

**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).

*\*This standard is also taught in Algebra II\**

**Evidence Statement:**

- Solve multi-step contextual problems with degree of difficulty appropriate to the course by constructing linear, or exponential function models, where exponentials are limited to integer exponents.

**Clarifications:**

- Items must have real-world context.
- Items do not reveal the type of function that should be constructed.

**Calculator Code: X**

**F.LE.A.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.

**Not assessed. This is an instructional standard only.**

**F.LE.B 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.

Note: (F.LE.B.5-1. focuses on linear functions, F.LE.B.5-2 focuses on exponential functions)

*\*This standard is also taught in Algebra II\**

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- Items must have real-world context.
- Explain the meaning of the slope and y-intercept in terms of real-world context given a linear model.
- Explain the meaning of the base, the exponent, and the coefficient in terms of real-world context, given an exponential model with a domain in the integers.

**Calculator Code: X**

## Statistics

### S.ID Interpreting Categorical and Quantitative Data

#### S.ID.B Summarize, represent, and interpret data on two categorical and quantitative variables.

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

6a. Fit a function to the data; use functions fitted to data to solve problems in the real-world context of the data. Use given functions or choose a function suggested by the real-world context. Emphasize linear, quadratic, and exponential models.

Note: (S.ID.B.6a-1 focuses on linear models, S.ID.B.6a-2 focuses on exponential models, S.ID.B.6a-3 focus on quadratic models)

*\*This standard is also taught in Algebra II\**

#### Evidence Statement:

- As stated in the standard.

#### Clarifications:

- Items must have real-world context.
- Predictions should not extrapolate far beyond the set of data provided.
- Items may involve linear, quadratic or exponential functions.

#### Calculator Code: Y

6b. Informally assess the fit of a function by plotting and analyzing residuals.

#### Evidence Statement:

- As stated in the standard.

#### Clarifications:

- Items must have real-world context.
- Analysis of residuals may include the identification of a pattern in a residual plot as an indication of a poor fit.

#### Calculator Code: Y

6c. Fit a linear function for a scatter plot that suggests a linear association.

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- Items must have real-world context.

**Calculator Code:** Y

**S.ID.C Interpret Linear Models.**

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

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- Items must have real-world context.

**Calculator Code:** Y

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

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- Focus on the interpretation of the correlation coefficient.

**Calculator Code:** Y

**S.ID.C.9** Distinguish between correlation and causation.

**Evidence Statement:**

- As stated in the standard.

**Clarifications:**

- Items must have real-world context.

**Calculator Code:** Y

## Reasoning Subclaim

All reasoning assessment items connect to both the Algebra I reasoning evidence statements and the content evidence statements.

Students must provide evidence of their ability to reason mathematically by responding to Type I and Type II items.

### Type I

- Items are machine scored.
- Items are 1 point per item.
- Items may be aligned to any of the content standards.
- Calculators are allowed on all reasoning items.
- Four items from this grouping will appear on each assessment.

### Type II

- Items are human scored constructed response.
- Items are 4 points per item.
- Items may be aligned to any of the content standards.
- Calculators are allowed on all reasoning items.
- Two items from this grouping will appear on each assessment.

The following pages provide the reasoning evidence statements and specific clarifications.

## Reasoning Evidence Statements

### A1.R.1 Evidence Statement:

- Given an equation reason about the number and/or nature of the solutions

#### Clarifications:

- Focus on quadratic equations.

### A1.R.2 Evidence Statement:

- Given a system of equations reason about the number or nature of the solutions

#### Clarifications:

- Systems may be comprised of various combinations of linear, quadratic and exponential functions.
- Items may require understanding of the basic shape of the graph of the parent function of linear, quadratic, and exponential functions.
- Items do not require determining the solution to a system.

### A1.R.3 Evidence Statement:

- Reasoning based on the principle that the graph of an equation and inequality in two variables is the set of all its solutions plotted in the coordinate plane.

#### Clarifications:

- Content scope: A.REI.D Represent and solve equations and inequalities graphically.

### A1.R.4 Evidence Statement:

- Identify an option that would refute a conjecture/claim.

#### Clarifications:

- N/A

**A1.R.5 Evidence Statement:**

- Identify a correct method and justification given two or more chains of reasoning.

**Clarifications:**

- Items may involve two or more steps in a single reasoning chain.

**A1.R.6 Evidence Statement:**

- Given a proposition determine cases where the proposition is true or false.

**Clarifications:**

- N/A

**A1.R.7 Evidence Statement:**

- Identify an unstated assumption that would make a problem well-posed or make a particular method viable.

**Clarifications:**

- N/A

**A1.R.8 Evidence Statement:**

- Given an equation or system of equations, present the solution steps as a logical argument that concludes with the set of solutions (if any).

**Clarifications:**

- Content scope: A-REI.1, A-REI.4a, A-REI.4b, limited to real solutions only.
- Items are limited to those that require solving quadratic equations.
- Limit systems of equations to two linear equations.

**A1.R.9 Evidence Statement:**

- Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures about functions.

**Clarifications:**

- Content scope: F-IF.8a.
- Items may have a mathematical or real-world context.



**A1.R.10 Evidence Statement:**

- Express reasoning about transformations of functions.

**Clarifications:**

- Content scope: F-BF.3 excluding even and odd functions.
- Items limited to linear and quadratic functions.

**A1.R.11 Evidence Statement:**

- Express reasoning about linear and exponential growth.

**Clarifications:**

- Content scope: F-LE.1a, F-IF.B.4.

## Modeling Subclaim

All modeling assessment items connect to both the Algebra I modeling evidence statements and the content evidence statements.

Students must provide evidence of their ability to apply one or more steps of the modeling cycle by responding to Type I and Type III items.

### Type I

- Items are machine scored.
- Items are 1 point per item.
- Items may be aligned to any of the content standards.
- Calculators are allowed on all reasoning items.
- Four items from this grouping will appear on each assessment.

### Type II

- Items are human scored constructed response.
- Items are 4 points per item.
- Items may be aligned to any of the content standards.
- Calculators are allowed on all reasoning items.
- Two items from this grouping will appear on each assessment.

Modeling items can have context even if the aligned content evidence statement clarifies that “Items do not have context”.

The following pages provide the modeling evidence statements, specific clarifications.

## Modeling Evidence Statements

### A1.M.1 Evidence Statement:

- Choose between competing mathematical models to solve real-world problems.

#### Clarifications:

- Limit to linear functions, linear inequalities, systems of linear equations or inequalities, quadratic functions, and exponential functions.

### A1.M.2 Evidence Statement:

- Construct a mathematical model to solve a problem.

#### Clarifications:

- Limit to linear functions, linear inequalities, systems of linear equations or inequalities, quadratic functions, and exponential functions.

### A1.M.3 Evidence Statement:

- Validate a given model and make improvement.

#### Clarifications:

- Limit to linear functions, linear inequalities, systems of linear equations or inequalities, quadratic functions, and exponential functions.

### A1.M.4 Evidence Statement:

- Interpret the solution to a real-world problem in terms of context.

#### Clarifications:

- Limit to linear functions, linear inequalities, systems of linear equations or inequalities, quadratic functions, and exponential functions.

**A1.M.5 Evidence Statement:**

- Compare the result from a model with real world data.

**Clarifications:**

- Limit to linear functions, linear inequalities, systems of linear equations or inequalities, quadratic functions, and exponential functions.

**A1.M.6 Evidence Statement:**

- Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in the standards.

**Clarifications:**

- Limit to linear functions, linear inequalities, systems of linear equations or inequalities, quadratic functions, and exponential functions.

**A1.M.7 Evidence Statement:**

- Identify information or assumptions needed to solve a problem.

**Clarifications:**

- Type I items only.

**A1.M.8 Evidence Statement:**

- Provide a reasoned estimate of a quantity needed to solve a problem.

**Clarifications:**

- Type I items only.