Algebra I

Performance Level Descriptors

Introduction

The federal government requires states to adopt and assess standards and report assessment results using three or more levels. Federal guidance specifies that state's academic performance levels must include descriptions of the content-based competencies associated with each level. The descriptions, referred to as **Performance Level Descriptors (PLDs**), convey the degree of student achievement at each level. The Maryland Comprehensive Assessment Program (MCAP) Policy, Content, and Range PLDs are included in this document.

MCAP Policy Performance Level Descriptors

The MCAP Policy PLDS provide high-level descriptions of a student's ability to apply the knowledge and skills defined by the Maryland Content Standards for English Language Arts (ELA), Mathematics, Science, and Social Studies as demonstrated by their performance on MCAP assessments. Maryland elected to use the four performance levels, described below, when reporting assessment results.

Performance Level	MCAP Policy Performance Level Descriptors
4	**Distinguished Learners** demonstrate advanced proficiency. The students are well prepared for the next grade level or course and are well prepared for college and career readiness.
3	**Proficient Learners** demonstrate proficiency. The students are prepared for the next grade level or course and are on track for college and career readiness.
2	**Developing Learners** demonstrate partial proficiency. The students need additional academic support to ensure success in the next grade level or course and to be on track for college and career readiness.
1	**Beginning Learners** do not yet demonstrate proficiency. The students need substantial academic support to be prepared for the next grade level or course and to be on track for college and career readiness.

MCAP Mathematics Content Performance Level Descriptors

The results from each MCAP Mathematics assessment are reported using four performance levels. Mathematics Content PLDs for Algebra I provide broad descriptions of what a student performing at each level means in terms of the mathematics content for the course.

Algebra I

Performance Level	MCAP Mathematics Content Performance Level Descriptors for Algebra I
4	**Distinguished Learners** demonstrate advanced proficiency in solving complex problems involving number and quantity, algebra, functions, and statistics, and demonstrates an ability to connect multiple grade-level concepts to conceptualize and apply mathematics to model, reason through, and solve problems efficiently, and relate mathematics to the real world.
3	**Proficient Learners** demonstrate proficiency in solving problems involving number and quantity, algebra, functions, and statistics, and demonstrates an ability to conceptualize and apply mathematics to model, reason through, and solve problems efficiently, and relate mathematics to the real world.
2	**Developing Learners** demonstrate partial proficiency in solving problems involving number and quantity, algebra, functions, and statistics, and may need some support in conceptualizing and applying mathematics to model, reason through, and solve problems efficiently, and in relating mathematics to the real world.
1	**Beginning Learners** do not yet demonstrate proficiency in solving problems involving number and quantity, algebra, functions, and statistics where the required mathematics is either directly indicated or uses common grade level procedures, and typically needs support in conceptualizing and applying mathematics to model, reason through, and solve problems efficiently, and in relating mathematics to the real world.

MCAP Mathematics Range Performance Level Descriptors

Range PLDs are grade/course specific descriptors of the cognitive and content level rigor expected at each performance level. The individual grade-level/course PLD documents provide robust descriptions associated with specific content. To show proficiency of the Maryland College and Career Readiness Standards, students must demonstrate their knowledge and skills as described by the Level 3 and Level 4 PLDs.

The Big Ideas

The Maryland College and Career Ready Standards for Mathematics (MCCRSM) for the high school courses are divided into conceptual categories. To better outline the knowledge and skills detailed within these conceptual categories, the Performance Level Descriptors for Algebra I have been grouped into Big Ideas. These Big Ideas describe common threads within the MCCRSM regarding expected student performance. Refer to the Performance Level Descriptor Crosswalk to navigate between the Big Ideas and the corresponding Evidence Statements.

Big Ideas
1. Use properties of rational numbers and irrational numbers.
2. Reason quantitatively and use units to solve problems.
3. Interpret representations.
4. Produce and/or use equivalent forms of algebraic expressions, equations, and functions.
5. Create a symbolic representation to represent the relationship between quantities.
6. Solve and understand solutions of given equations, inequalities, systems of equations, and systems of inequalities.
7. Understand, compare, and use properties of functional relationships.
8. Graph functions and/or analyze/interpret graphs.
9. Analyze connections between data sets or real-world scenarios and functional relationships.

Performance Level Descriptors Crosswalk

Evidence Statement Code	PLD Big Idea Number	Evidence Statement Code	PLD Big Idea Number
N-RN.B.3	1	A-REI.D.12	6
N-Q.A.1	2	F-IF.A.1	7
N-Q.A.2	2	F-IF.A.2	7
N-Q.A.3	Not assessed	F-IF.A.3	3, 4, 5, 7
A.SSE.A.1.a	3	F-IF.B.4	3, 8
A.SSE.A.1.b	3	F-IF.B.5	3, 7
A.SSE.A.2	4	F-IF.B.6-1	3, 7
A-SSE.B.3a	4	F-IF.C.7-1.a	8
A-SSE.B.3b	4	F-IF.C.7b	8
A-SSE.B.3c	4	F-IF.C.8a	3, 8
A-APR.A.1	4	F-IF.C.9	7
A-APR.B.3	4	F.BF.A.1-1.a	5
A-CED.A.1	5	F-BF.B.3	8
A-CED.A.2	5	F-LE.A.1a	3, 9
A-CED.A.3	5, 6	F-LE.A.2	5
A-CED.A.4	6	F-LE.A.3	Not assessed
A.REI.A.1	6	F-LE.B.5-1	3
A-REI.B.3-1	6	S-ID.B.6.a	5, 9
A-REI.B.4a	4	S-ID.B.6b	9
A-REI.B.4b	6	S-ID.B.6c	5
A-REI.C.6	6	S-ID.C.7	3
A-REI.D.10	6	S-ID.C.8	9
A-REI.D.11	6	S-ID.C.9	9

Big Idea 1: Use properties of rational numbers and irrational numbers.

N.RN The Real Number System

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

N.RN.B.3 Apply properties of rational and irrational numbers to identify rational and irrational numbers.

Evidence Statement Code	Level 4 – Distinguished *A student performing at this level should be able to:*	Level 3 – Proficient *A student performing at this level should be able to:*	Level 2 – Developing *A student performing at this level should be able to:*	Level 1 – Beginning *A student performing at this level should be able to:*
N.RN.B.3	make **generalizations** about sums and/or products of rational and irrational numbers.	**make a generalization** about sums or products of rational and irrational numbers.	identify rational and/or irrational expressions containing **at least** one arithmetic operation with all terms and factors in numeric form.	identify rational and/or irrational expressions containing **at most** one arithmetic operation with all terms and factors in **simplified** numeric form.

Big Idea 2: Reason quantitatively and use units to solve problems.

N.Q Quantities

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

N.Q.A.1 Determine an appropriate scale for a graph. Use dimensional analysis to convert units.
N.Q.A.2 Select an appropriate quantity for a real-world context.

Evidence Statement Code	Level 4 – Distinguished *A student performing at this level should be able to:*	Level 3 – Proficient *A student performing at this level should be able to:*	Level 2 – Developing *A student performing at this level should be able to:*	Level 1 – Beginning *A student performing at this level should be able to:*
N.Q.A.1 N.Q.A.2	determine, use, and **interpret** appropriate quantities or scale to solve problems in a real-world context.	determine and **use** appropriate quantities or scale to **solve problems** in a real-world context.	**determine** appropriate quantities or scale in a real-world context.	choose an appropriate quantity or scale in a real-world context.

Big Idea 3: Interpret representations.

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 context.

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

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

F.IF.A Interpreting Functions

F.IF.A Understand the concept of 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.

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.

F.IF.B.5 Relate the domain of a function to a graph and, where applicable, to the quantitative relationship it describes.

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.

F.IF.C Analyze functions using different representations.

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.

a. 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.

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.

a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.

b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.

c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.

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.

S.ID Interpreting Categorical and Quantitative Data

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 Code	Level 4 – Distinguished *A student performing at this level should be able to:*	Level 3 – Proficient *A student performing at this level should be able to:*	Level 2 – Developing *A student performing at this level should be able to:*	Level 1 – Beginning *A student performing at this level should be able to:*
A.SSE.A.1a A.SSE.A.1b F.IF.B.4 F.IF.B.5 F.IF.C.8a F.LE.A.1a F.LE.A.1b F.LE.B.5 S.ID.C.7	interpret, compare, and/or relate any course appropriate functional relationships or expressions in terms of a mathematical or a real-world context.	interpret, compare, and/or relate linear, quadratic, or exponential functional relationships or expressions in terms of a mathematical or a real-world context.	interpret linear, quadratic, or exponential functional relationships or expressions in terms of a mathematical or a real-world context.	interpret defined linear functional relationships or expressions in terms of a mathematical or a real-world context.
F.IF.A.3	identify a given sequence as arithmetic, geometric, or neither in problems that may require perseverance.	identify a given sequence as arithmetic, geometric, or neither.	identify a given sequence as arithmetic or geometric.	identify a given sequence as arithmetic.

Big Idea 4: Produce and/or use equivalent forms of algebraic expressions, equations, and functions.

A.SSE Seeing Structure in Expressions

A.SSE.A Interpret the Structure of expressions.

A.SSE.A.2 Rewrite linear, quadratic and exponential expressions.

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.

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

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

C. Use the properties of exponents to transform expressions for exponential functions.

A.APR Arithmetic with Polynomials and Rational Expressions

A.APR.A Perform operations on polynomial.

A.APR.A.1 Add, subtract, and multiply polynomials.

A.APR.B Understand the relationship between zeros and factors of a polynomial.

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.

A.REI.B Solve equations and inequalities on one variable.

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

a. 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.

F.IF Interpreting Functions

F.IF.A.3 Understand the concept of 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.

Evidence Statement Code	Level 4 – Distinguished *A student performing at this level should be able to:*	Level 3 – Proficient *A student performing at this level should be able to:*	Level 2 – Developing *A student performing at this level should be able to:*	Level 1 – Beginning *A student performing at this level should be able to:*
A.SSE.A.2 A.SSE.B.3a A.SSE.B.3b A.SSE.B.3c A.APR.A.1 A.APR.B.3 A.REI.B.4 F.IF.A.3	use the structure of expressions and equations to rewrite them in different forms in order to **make generalizations and draw conclusions**.	use the structure of expressions and equations to rewrite them in different forms **and/or use the equivalent form to determine needed information**.	use the structure of simple expressions and equations to identify or produce equivalent forms in situations involving **more than two** operations.	use the structure of simple expressions and equations to identify or produce equivalent forms in situations involving **no more than two operations.**

Big Idea 5: Create a symbolic representation to represent the relationship between quantities.

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.

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

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.

F.IF Interpreting Functions

F.IF.A Understand the concept of 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.

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.

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

F.LE Linear, Quadratic and Exponential Functions

F.LE.A Construct and compare linear, quadratic, and exponential models and solve problems.

F.LE.A.2 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.

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.

a. 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.

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

Evidence Statement Code	Level 4 – Distinguished *A student performing at this level should be able to:*	Level 3 – Proficient *A student performing at this level should be able to:*	Level 2 – Developing *A student performing at this level should be able to:*	Level 1 – Beginning *A student performing at this level should be able to:*
A.CED.A.1 A.CED.A.2 A.CED.A.3 F.BF.A.1a F.LE.A.2 S.ID.B.6a S.ID.B.6c	create or choose mathematical representations that model relationships between quantities **relating multiple grade-level concepts** and when prompted use the representation to make further decisions about mathematical and real-world problems.	**create** or choose a mathematical representation to model a relationship between quantities and **when prompted use the representation to make further decisions about mathematical and real-world problems.**	choose a representation that models a linear or an **exponential** relationship between quantities.	choose a representation that models a **linear** relationship between quantities.
F.IF.A.3	create or choose the explicit rule for a given arithmetic or geometric sequence in problems **relating multiple grade-level concepts.**	**create** or choose the explicit rule for a given arithmetic or geometric sequence.	choose the explicit rule for a given arithmetic or **geometric** sequence.	choose the explicit rule for a given arithmetic sequence.

Big Idea 6: Solve and understand solutions of given equations, inequalities, systems of equations and systems of inequalities.

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.

A.REI.B Solve equations and inequalities on one variable.

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

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

A.REI.C Solve systems of equations.

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.

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

A.REI.D.11 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.

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.

A.CED Creating Equations

A.CED.A Create equations that describe numbers or relationships

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.

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

Evidence Statement Code	Level 4 – Distinguished *A student performing at this level should be able to:*	Level 3 – Proficient *A student performing at this level should be able to:*	Level 2 – Developing *A student performing at this level should be able to:*	Level 1 – Beginning *A student performing at this level should be able to:*
A.REI.B.3 A.REI.B.4 A.REI.C.6 A.REI.D.10 A.REI.D.11 A.CED.A.4	solve equations, inequalities, and systems of equations/inequalities, including literal equations, that require the use of a combination of procedures, or require perseverance.	solve equations, inequalities, and systems of equations **including literal equations.**	solve **quadratic** equations by factoring where the leading coefficient equals 1 and b and c are integers, by taking square roots, the quadratic formula, or graphing and solve linear equations, inequalities, and systems of equations.	solve **linear** equations, inequalities, and systems of equations that entail little procedural demand.
A.REI.A.1	communicate the reasoning used to determine a solution.	**communicate** the reasoning used to determine a solution.	**identify the reasoning for a step in the solution process.**	
A.REI.D.12	represent the solution to a linear inequality in two variables, and to systems of linear inequalities graphically.	**represent** the solution to a linear inequality in two variables, and to **systems of linear inequalities** graphically.	**identify the graphic representation of the solutions to a linear inequality or a system of linear inequalities in two variables**.	
A.CED.A.3	**interpret solutions to equations, inequalities, and systems of equations or inequalities as viable or nonviable in a modeling context.**			

Big Idea 7: Understand, compare, and use properties of functional relationships.

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 $y = f(x)$.

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.

F.IF.A.3 Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.

F.IF.B Interpret functions that arise in applications in terms of real-world context.

F.IF.B.5 Relate the domain of a function to a graph and, where applicable, to the quantitative relationship it describes.

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 rate of change from graph.

F.IF.C 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).

Evidence Statement Code	Level 4 – Distinguished *A student performing at this level should be able to:*	Level 3 – Proficient *A student performing at this level should be able to:*	Level 2 – Developing *A student performing at this level should be able to:*	Level 1 – Beginning *A student performing at this level should be able to:*
F.IF.A.1 F.IF.B.5	determine the domain and/or range of a function representing a real-world context in problems **relating multiple grade-level concepts**.	determine the domain and/or range of a function **representing a real-world context.**	determine the domain and range of a linear, quadratic, or exponential function given in numeric, **graphic**, or **algebraic** form.	identify the domain and range of a function given in **numeric form**.
F.IF.A.1	determine if a relation is a function in problems **that require the use of a complex line of reasoning.**	determine if a relation given in numeric, **algebraic** or graphic form is a function.	determine if a relation given in **numeric** or graphic form is a function.	determine if a relation given **in graphic form** is a function.
F.IF.A.2 F.IF.B.5	use, evaluate, and interpret functions for inputs in their domain that **require a complex line of reasoning**.	use, evaluate, and **interpret** functions for inputs in their domain in terms of real-world context.	**use and** evaluate functions for inputs in their domain.	evaluate functions for inputs in their domain.

Evidence Statement Code	Level 4 – Distinguished *A student performing at this level should be able to:*	Level 3 – Proficient *A student performing at this level should be able to:*	Level 2 – Developing *A student performing at this level should be able to:*	Level 1 – Beginning *A student performing at this level should be able to:*
F.IF.A.3	use a recursive or explicit rule for a function or sequence to determine the value of a specified term or determine which term has a specified value **in problems relating multiple grade-level concepts.**	use a **recursive** or explicit rule for an arithmetic **or geometric** sequence to determine the value of a specified term or determine which term has a specified value**.**	use an explicit rule for an arithmetic sequence to determine the value of a specified term or **determine which term has a specified value**.	use an explicit rule for a sequence to determine the value of a specified term.
F.IF.B.6	calculate/estimate the average rate of change of a function from an algebraic, numeric, or graphic representation; interpret the average rate of change in terms of real world context and/or **compare rates of change over multiple intervals**.	calculate/**estimate** the average rate of change of a function from an algebraic, numeric, or graphic representation and/or **interpret the average rate of change in terms of real world context**.	calculate the average rate of change of a function from an **algebraic,** numeric**, or graphic** representation.	calculate the average rate of change of a function from the **numeric** representation.
F.IF.C.9	compare properties of **any two course appropriate functions** each represented in different forms (algebraic, numeric, graphic or verbal) **in problems requiring perseverance and/or relating multiple grade-level concepts.**	compare properties of any two functions (linear, **quadratic, or exponential)** each represented in different forms (algebraic, numeric, graphic or **verbal**).	compare properties of two **linear** functions given in algebraic, numeric, or graphic forms.	

Big Idea 8: Graph functions and/or analyze/interpret graphs.

F.IF Interpreting Functions

F.IF.B Interpret functions that arise in applications in terms of 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

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.

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.

a. 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.

F.BF Building Functions

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

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

Evidence Statement Code	Level 4 – Distinguished *A student performing at this level should be able to:*	Level 3 – Proficient *A student performing at this level should be able to:*	Level 2 – Developing *A student performing at this level should be able to:*	Level 1 – Beginning *A student performing at this level should be able to:*
F.IF.B.4 F.IF.C.7 F.IF.C.8a	graph or identify the graph of **any course appropriate function** and analyze the graph.	graph or identify the graph of linear, quadratic, exponential, **square root, and absolute value functions and analyze the graph.**	graph or identify the graph of a linear, **exponential**, or **quadratic** functions.	graph or identify the graph of a **linear** function.
F.IF.B.4 F.IF.C.7 F.IF.C.8a	interpret the key features, in terms of a mathematical or a real-world context, of **course appropriate** functions.	interpret the key features, in terms of a mathematical or a real-world context, of linear, quadratic, or exponential functions**.**	interpret the key features, in terms of a mathematical or a real-world context, of linear, **quadratic, or exponential functions,** when given the graph.	interpret the key features, in terms of a mathematical or a real-world context, of **linear** functions **when given the graph.**
F.BF.B.3	select, produce, **and/or** analyze the graph of a function under one or more transformations**.**	select, produce, or analyze the graph of a function **under one or more transformations**.	select the graph of a functions under a vertical and/or a **horizontal** translation.	select the graph of a function under a **vertical** translation.

Big Idea 9: Analyze connections between data sets or real-world scenarios and functional relationships.

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.

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

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.

a. 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.

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

S.ID.C Interpret Linear Models.

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

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

Evidence Statement Code	Level 4 – Distinguished *A student performing at this level should be able to:*	Level 3 – Proficient *A student performing at this level should be able to:*	Level 2 – Developing *A student performing at this level should be able to:*	Level 1 – Beginning *A student performing at this level should be able to:*
F.LE.A.1a	analyze a real-world scenario or data set **and provide an argument as to why it could be represented** by a linear, quadratic, or exponential function.	analyze a real-world scenario **and/or** a data set to determine whether it could be represented by a linear, **quadratic,** or exponential function.	analyze a real-world scenario presented with a data set to determine whether it could be represented by a linear or **exponential function**.	analyze a real-world scenario presented with a data set, to determine whether it could be represented by a linear function.
S.ID.B.6a S.ID.B.6b S.ID.C.8	determine how well a linear function represents a data set by **computing** and/or analyzing residuals and/or interpreting the correlation coefficient.	determine how well a linear function represents a data set by **analyzing residuals** and/or interpreting the correlation coefficient.	determine the difference between the actual and predicted values from the best-fit equation.	
S.ID.C.9	distinguish between correlation and causation **in problems that require the use of analysis, judgement or creative thought.**	distinguish between correlation and causation.	determine how well a linear function represents a data set, given a correlation coefficient and a graph.	

Reasoning Performance Level Descriptors

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:

- one-point machine scored items. For one-point reasoning items, refer to the associated content PLDs.
- four-point constructed response items. For four-point reasoning items, refer to both the reasoning PLDs below and the associated content PLDs.

Reasoning Evidence Statements

A1.R.1 Given an equation, reason about the number and nature of the solutions.
A1.R.2 Given a system of equations, reason about the number of solutions.
A1.R.3 Reasoning based on the principle that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane.
A1.R.4 Identify an option that would refute a conjecture/claim.
A1.R.5 Identify a correct method and justification given two or more chains of reasoning.
A1.R.6 Given a proposition, determine cases where the proposition is true or false.
A1.R.7 Identify an unstated assumption that would make a problem well posed or make a particular method viable.
A1.R.8 Given an equation or system of equations, present the solution steps as a logical argument that concludes with the set of solutions (if any).
A1.R.9 Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures about functions.
A1.R.10 Express reasoning about transformations of functions.
A1.R.11 Express reasoning about linear and exponential growth.

Level 4 – Distinguished *A student performing at this level should be able to provide evidence of mathematical reasoning by communicating:*	**Level 3 – Proficient** *A student performing at this level should be able to provide evidence of mathematical reasoning by communicating:*	**Level 2 – Developing** *A student performing at this level should be able to provide evidence of mathematical reasoning by communicating:*	**Level 1 – Beginning** *A student performing at this level should be able to provide evidence of mathematical reasoning by communicating:*
a sophisticated chain of reasoning.	a well-developed chain of reasoning.	a partially developed, valid chain of reasoning.	the beginning of a chain of reasoning.
a precise, logical solution pathway.	a logical solution pathway that may contain minor flaws.	a solution pathway that contains some correct processes yielding an incorrect solution.	an attempted solution pathway.
an extensive command of mathematical representations and vocabulary.	a proficient command of mathematical representations and vocabulary.	an understanding of some mathematical representations and vocabulary.	a developing understanding of some mathematical representations and vocabulary.

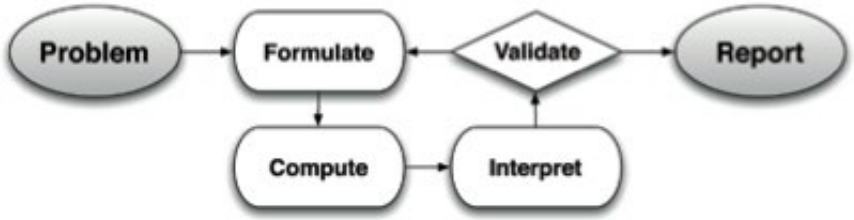
Modeling Performance Level Descriptors

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 use one or more steps of the modeling cycle by responding to:

- one-point machine scored items. For one-point modeling items, refer to the associated content PLDs.
- four-point constructed response items. For four-point modeling items, refer to both the modeling PLDs below and the associated content PLDs.

Modeling Cycle



Modeling Evidence Statements

A1.M.1	Choose between competing mathematical models to solve real-world problems.
A1.M.2	Construct a mathematical model to solve a problem.
A1.M.3	Validate a given model and make improvement.
A1.M.4	Interpret the solution to a real-world problem in terms of context.
A1.M.5	Compare the result from a model with real world data.
A1.M.6	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.
A1.M.7	Identify information or assumptions needed to solve a problem.
A1.M.8	Provide a reasoned estimate of a quantity needed to solve a problem.

Stage of the Modeling Cycle	Student Actions during this stage	Evidence Statement
Formulate	Make assumptions Define variables Create a mathematical model	A1.M.2 A1.M.7 A1.M.8
Compute	Perform procedures using a formulated or given model	Including within A1.M.6
Interpret	Relate the results of the compute stage to the real-world situation.	A1.M.4 A1.M.5
Validate	Test the reasonableness of answers in terms of the real-world situation.	A1.M.1 A1.M.3

Level 4 – Distinguished *A student performing at this level should be able to provide evidence of the ability to use the modeling cycle by:*	**Level 3 - Proficient** *A student performing at this level should be able to provide evidence of the ability to use the modeling cycle by:*	**Level 2 - Developing** *A student performing at this level should be able to provide evidence of the ability to use the modeling cycle by:*	**Level 1 - Beginning** *A student performing at this level should be able to provide evidence of the ability to use the modeling cycle by:*
determining the information or mathematics needed to solve a problem that requires connecting multiple grade-level concepts.	determining needed information or mathematics.	identifying needed information or mathematics.	identifying some needed information or mathematics.
communicating an accurate, organized solution path aligned to the problem using appropriate, effective, and precise representations.	communicating an accurate, organized solution path aligned to the problem using appropriate, effective, and precise representations that may contain minor flaws.	communicating a partial solution path that may contain mathematical errors.	communicating the beginning of a solution path, containing mathematical errors.
evaluating or validating a solution path or showing how to improve a model or correct a given solution.	evaluating or validating a solution path or showing how to improve a model, but work may include minor flaws.	partially validating a solution path or incorrectly improving the model.	attempting to validate a solution path.