

Office of Assessments, Analytics, and Accountability

Algebra I

Achievement Level Descriptors

Major Content

The student solves problems involving the Major Content for the course with connections to the Standards for Mathematical Practice.

	Major Content				
Content	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic	
Expressions A1: A-SSE.A.1 A1: A-SSE.A.2 A1: A-APR.A.1	Writes and analyzes equivalent numerical and polynomial expressions in one variable, using addition, subtraction, multiplication and factoring, including multi- step problems.	Writes equivalent numerical and polynomial expressions in one variable, using addition, subtraction, multiplication, and factoring .	Writes equivalent numerical and polynomial expressions in one variable, using addition, subtraction, and multiplication.	Writes equivalent numerical and polynomial expressions in one variable, using addition, subtraction, and multiplication.	
	Interprets parts of exponential and quadratic expressions that represent a quantity in terms of its context	Interprets parts of exponential and quadratic expressions that represent a quantity in terms of its context.	Identifies components of exponential and quadratic expressions.	Identifies components of exponential expressions.	
Interpreting Functions	Determines if a given relation is a function.	Determines if a given relation is a function.	Determines if a given relation is a function.	Determines if a given relation is a function.	
A1: F-IF.A.1 A1: F-IF.A.2 A1: F-IF.B.4	Evaluates with, uses, and interprets with function notation within a context.	Evaluates with and uses function notation within a context.	Evaluates with and uses function notation.	Evaluates with and uses function notation.	
A1: F-IF.B.5 LEAP.I.A1.1	Given a context, writes and analyzes a linear function.	Given a context, writes a linear function.	Given a context, writes a linear function.	Given a context, writes a linear function.	

	Major Content				
Content	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic	
LEAP.I.A1.2 LEAP.I.A1.3	For linear and quadratic functions that model contextual relationships, determines and interprets key features, graphs the function, and solves problems.	For linear and quadratic functions that model relationships, determines key features and graphs the function.	For linear and quadratic functions that model relationships, determines key features.	For linear functions that model relationships, determines key features.	
	Determines the domain and relates it to the quantitative relationship it describes for linear, quadratic, exponential (limited to domains in the integers), piece-wise, and absolute value functions.	Determines the domain and relates it to the quantitative relationship it describes for linear, quadratic, and exponential (limited to domains in the integers) functions.	Determines the domain of linear and quadratic functions.		
Rate of Change A1: F-IF.B.6	Calculates and interprets the average rate of change of linear, exponential, quadratic, and piecewise- defined functions (presented symbolically or as a table) over a specified interval, and estimates the rate of change from a graph.	Calculates the average rate of change of linear, exponential, and quadratic functions (presented symbolically or as a table) over a specified interval and estimate the rate of change from a graph.	Calculates the average rate of change of linear, exponential, and quadratic functions (presented symbolically or as a table) over a specified interval.	Calculates the average rate of change of linear, exponential, and quadratic functions (presented as a table) over a specified interval.	
	Compares rates of change associated with different intervals.				

	Major Content				
Content	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic	
Solving Algebraically A1: A-REI.B.3 A1: A-REI.B.4 A1: A-CED.A.4 LEAP.I.A1.4 LEAP.I.A1.5 LEAP.I.A1.6	Algebraically solves linear equations, linear inequalities, and quadratics in one variable (at complexity appropriate to the course), including those with coefficients represented by letters. Utilizes structure and	Algebraically solves linear equations, linear inequalities, and quadratics in one variable (at complexity appropriate to the course), including those with coefficients represented by letters.	Algebraically solves linear equations, linear inequalities, and quadratics in one variable (at complexity appropriate to the course).	Algebraically solves linear equations and linear inequalities in one variable (at complexity appropriate to the course).	
	rewriting as strategies for solving.				
Solving Graphically A1: A-CED.A.3 A1: A-REI.D.10 A1: A-REI.D.11	Graphs and analyzes the solution sets of equations, linear inequalities, and systems of linear inequalities.	Graphs the solution sets of equations, linear inequalities, and systems of linear equations and linear inequalities.	Graphs the solution sets of equations and linear inequalities.	Graphs the solution sets of equations and linear inequalities.	
A1: A-REI.D.12	Finds the solutions to two polynomial functions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations.	Finds the solutions to two polynomial functions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations.	Finds the solutions to two polynomial functions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations.	Given the graph, identify the solutions of a system of two polynomial functions.	
	Writes a system of linear inequalities given a context.				

Additional & Supporting Content

The student solves problems involving the Additional & Supporting Content for the course with connections to the Standards for Mathematical Practice.

	Additional & Supporting Content				
Content	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic	
Number Systems	Identifies rational and irrational numbers.	Identifies rational and irrational numbers.	Identifies rational and irrational numbers.	Identifies rational and irrational numbers.	
LEAP.I.A1.7	Calculates sums and products of two rational and/or irrational numbers and determines whether and generalizes when the sums and products are rational or irrational.	Calculates sums and products of two rational and/or irrational numbers.			
Equivalent Expressions and Functions A1: A-SSE.B.3 A1: F-IF.C.8a	Determines equivalent forms of quadratic and exponential (with integer domain) expressions and functions to reveal and explain their properties.	Determines equivalent forms of quadratic expressions and functions. Uses equivalent forms to reveal and explain zeros, extreme values and symmetry.	Identifies equivalent forms of quadratic expressions and functions. Identifies zeros and symmetry .	Identifies equivalent forms of quadratic expressions and functions in cases where suitable factorizations are provided.	
Interpreting Graphs of Functions A1: A-APR.B.3 A1: F-IF.C.7	Graphs linear, quadratic, and piecewise-defined functions, showing key features. Determines a function, given a graph with key	Graphs linear and quadratic functions, showing key features.	Graphs linear and quadratic functions , showing key features.	Graphs linear functions, showing key features.	
Function Transformations A1: F-BF.B.3	features identified. Identifies the effects of multiple transformations on graphs of linear and quadratic functions and finds the value of k given a transformed graph.	Identifies the effects of a single transformation on graphs of linear and quadratic functions, including $f(x)+k$, $kf(x)$, $f(kx)$ and $f(x+k)$, and finds the value of k given a transformed graph.	Identifies the effects of a single transformation on graphs of linear and quadratic functions, limited to <i>f</i> (<i>x</i>)+ <i>k</i> and <i>kf</i> (<i>x</i>).	Identifies the effects of a single transformation on graphs of linear and quadratic functions, limited to <i>f</i> (<i>x</i>)+ <i>k</i> .	

Additional & Supporting Content				
Content	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic
	Experiments with cases using technology.			
	Given the equation of a transformed linear or quadratic function, creates an appropriate graph.			
Multiple Representations of Functions A1: A-REI.C.6	Writes and analyzes systems of linear equations in multi-step contextual problems.	Writes systems of linear equations in multi-step contextual problems.	Writes systems of linear equations in multi-step contextual problems.	Writes systems of linear equations in simple contextual problems.
A1: F-LE.A.2 A1: F-IF.C.9	Represents linear and exponential (with domain in the integers) functions symbolically, graphically, with a verbal description, as a sequence, and with input- output pairs to solve mathematical problems.	Represents linear and exponential (with domain in the integers) functions symbolically, graphically, and with input-output pairs to solve mathematical problems.	Given a symbolic representation, graph, verbal description, sequence, or input-output pairs for linear and exponential functions (with domains in the integers), solves mathematical problems.	Given a symbolic representation, graph, verbal description, sequence, or input-output pairs for linear functions, solves mathematical problems.
	Compares the properties of two functions represented in different ways, limited to linear, quadratic, exponential (with domains in the integers), absolute value , and piecewise .	Compares the properties of two functions represented in different ways, limited to linear, quadratic, and exponential (with domains in the integers).	Compares the properties of two functions represented in different ways, limited to linear and quadratic .	Compares the properties of two linear functions represented in different ways.

	Additional & Supporting Content				
Content	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic	
Summarizing Representing and Interpreting Data A1: S-ID.B.5	Determines appropriate representations of categorical and quantitative data, summarizing and interpreting the data and characteristics of the representations.	Determines appropriate representations of categorical and quantitative data, summarizing the data and characteristics of the representations.	Given representations of categorical and quantitative data, summarizes the data and characteristics of the representations.	Given representations of categorical and quantitative data, describes the characteristics of the representations.	
	Describes and interprets possible associations and trends in the data.				

Expressing Mathematical Reasoning

In connection with content, the student expresses course-level appropriate mathematical reasoning by constructing viable arguments, critiquing the reasoning of others and/or attending to precision when making mathematical statements.

		Expressing Mathematic	al Reasoning	
Content	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic
	The student clearly	The student clearly	The student constructs and	The student constructs and
	constructs and	constructs and	communicates a partial	communicates an incomplete
	communicates a complete	communicates a response	response based on the	response based on the
	response based on the	based on the principle that a	principle that a graph of an	principle that a graph of an
	principle that a graph of an	graph of an equation in two	equation in two variables is	equation in two variables is
	equation in two variables is	variables is the set of all its	the set of all its solutions;	the set of all its solutions;
	the set of all its solutions;	solutions; reasoning about	reasoning about linear and	reasoning about linear and
	reasoning about linear and	linear and exponential	exponential growth;	exponential growth;
	exponential growth;	growth; properties of	properties of rational	properties of rational
	properties of rational	rational numbers or	numbers or irrational	numbers or irrational
	numbers or irrational	irrational numbers;	numbers; transformations of	numbers; transformations of
	numbers; transformations	transformations of	functions;	functions;
	of functions;	functions;	a chain of reasoning to	a chain of reasoning to justify
	a chain of reasoning to	a chain of reasoning to	justify or refute algebraic,	or refute algebraic, function,
	justify or refute algebraic,	justify or refute algebraic,	function, or linear-equation	or linear-equation
	function, or linear-equation	function, or linear-equation	propositions or conjectures; a	propositions or conjectures; a
	propositions or conjectures;	propositions or conjectures;	given equation or system of	given equation or system of
	a given equation or system	a given equation or system	equations; the number or	equations; the number or
	of equations; the number or	of equations; the number or	nature of solutions by:	nature of solutions by:
<u> </u>	nature of solutions by:	nature of solutions by:	· · · · · ·	
Reasoning	 using a logical approach 	 using a logical approach 	• using a logical approach	using an approach based
LEAP.II.A1.1	based on a conjecture	based on a conjecture	based on a conjecture	on a conjecture and/or
LEAP.II.A1.2	and/or stated	and/or stated	and/or stated	stated assumptions
LEAP.II.A1.3	assumptions, utilizing	assumptions, utilizing	assumptions	
LEAP.II.A1.4	mathematical	mathematical		
LEAP.II.A1.5	connections (when	connections (when		
LEAP.II.A1.6	appropriate)	appropriate)		

		Expressing Mathematic	al Reasoning	
Content	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic
Content	Level 5: Advanced The student clearly constructs and communicates a complete response based on the principle that a graph of an equation in two variables is the set of all its solutions; reasoning about linear and exponential growth; properties of rational numbers or irrational numbers; transformations of functions; a chain of reasoning to justify or refute algebraic, function, or linear-equation propositions or conjectures; a given equation or system of equations; the number or	Level 4: Mastery The student clearly constructs and communicates a response based on the principle that a graph of an equation in two variables is the set of all its solutions; reasoning about linear and exponential growth; properties of rational numbers or irrational numbers; transformations of functions; a chain of reasoning to justify or refute algebraic, function, or linear-equation propositions or conjectures; a given equation or system of equations; the number or	Level 3: Basic The student constructs and communicates a partial response based on the principle that a graph of an equation in two variables is the set of all its solutions; reasoning about linear and exponential growth; properties of rational numbers or irrational numbers; transformations of functions; a chain of reasoning to justify or refute algebraic, function, or linear-equation propositions or conjectures; a given equation or system of equations; the number or nature of solutions by:	Level 2: Approaching Basic The student constructs and communicates an incomplete response based on the principle that a graph of an equation in two variables is the set of all its solutions; reasoning about linear and exponential growth; properties of rational numbers or irrational numbers; transformations of functions; a chain of reasoning to justify or refute algebraic, function, or linear-equation propositions or conjectures; a given equation or system of equations; the number or nature of solutions by:
LEAP.II.A1.7 LEAP.II.A1.8 LEAP.II.A1.9 LEAP.II.A1.10	 nature of solutions by: providing an efficient and logical progression of steps or chain of reasoning with appropriate justification performing precise calculations using correct grade- level vocabulary, symbols and labels 	 nature of solutions by: providing a logical progression of steps or chain of reasoning with appropriate justification performing precise calculations using correct grade-level vocabulary, symbols and labels 	 providing a logical, but incomplete, progression of steps or chain of reasoning performing minor calculation errors using some grade-level vocabulary, symbols and labels 	 providing an incomplete or illogical progression of steps or chain of reasoning making an intrusive calculation error using limited grade-level vocabulary, symbols and labels
	 providing a justification of a conclusion 	• providing a justification of a conclusion	 providing a partial justification of a 	 providing a partial justification of a conclusion based on own calculations

		Expressing Mathematic	al Reasoning	
Content	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic
Content	Level 5: Advanced The student clearly constructs and communicates a complete response based on the principle that a graph of an equation in two variables is the set of all its solutions; reasoning about linear and exponential growth; properties of rational numbers; transformations of functions; a chain of reasoning to justify or refute algebraic, function, or linear-equation propositions or conjectures; a given equation or system of equations; the number or	Level 4: Mastery The student clearly constructs and communicates a response based on the principle that a graph of an equation in two variables is the set of all its solutions; reasoning about linear and exponential growth; properties of rational numbers or irrational numbers; transformations of functions; a chain of reasoning to justify or refute algebraic, function, or linear-equation propositions or conjectures; a given equation or system of equations; the number or	Level 3: Basic The student constructs and communicates a partial response based on the principle that a graph of an equation in two variables is the set of all its solutions; reasoning about linear and exponential growth; properties of rational numbers or irrational numbers; transformations of functions; a chain of reasoning to justify or refute algebraic, function, or linear-equation propositions or conjectures; a given equation or system of equations; the number or nature of solutions by:	Level 2: Approaching Basic The student constructs and communicates an incomplete response based on the principle that a graph of an equation in two variables is the set of all its solutions; reasoning about linear and exponential growth; properties of rational numbers or irrational numbers; transformations of functions; a chain of reasoning to justify or refute algebraic, function, or linear-equation propositions or conjectures; a given equation or system of equations; the number or nature of solutions by:
	 nature of solutions by: evaluating, interpreting and critiquing the validity of others' responses, approaches, and reasoning – using mathematical connections (when appropriate) – and providing a counter- example where applicable 	 evaluating, interpreting and critiquing the validity of others' responses, approaches, and reasoning – using mathematical connections(when appropriate) 	conclusion based on own calculations • evaluating the validity of others' approaches and conclusions	

	Expressing Mathematical Reasoning				
Content	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic	
	The student clearly	The student clearly	The student constructs and	The student constructs and	
	constructs and	constructs and	communicates a partial	communicates an incomplete	
	communicates a complete	communicates a response	response based on the	response based on the	
	response based on the	based on the principle that a	principle that a graph of an	principle that a graph of an	
	principle that a graph of an	graph of an equation in two	equation in two variables is	equation in two variables is	
	equation in two variables is	variables is the set of all its	the set of all its solutions;	the set of all its solutions;	
	the set of all its solutions;	solutions; reasoning about	reasoning about linear and	reasoning about linear and	
	reasoning about linear and	linear and exponential	exponential growth;	exponential growth;	
	exponential growth;	growth; properties of	properties of rational	properties of rational	
	properties of rational	rational numbers or	numbers or irrational	numbers or irrational	
	numbers or irrational	irrational numbers;	numbers; transformations of	numbers; transformations of	
	numbers; transformations	transformations of	functions;	functions;	
	of functions;	functions;	a chain of reasoning to	a chain of reasoning to justify	
	a chain of reasoning to	a chain of reasoning to	justify or refute algebraic,	or refute algebraic, function,	
	justify or refute algebraic,	justify or refute algebraic,	function, or linear-equation	or linear-equation	
	function, or linear-equation	function, or linear-equation	propositions or conjectures; a	propositions or conjectures; a	
	propositions or conjectures;	propositions or conjectures;	given equation or system of	given equation or system of	
	a given equation or system	a given equation or system	equations; the number or	equations; the number or	
	of equations; the number or	of equations; the number or	nature of solutions by:	nature of solutions by:	
	nature of solutions by:	nature of solutions by:			
	 determining whether an 				
	argument or conclusion				
	is generalizable				

Modeling & Application

In connection with content, the student solves real-world problems with a degree of difficulty appropriate to the grade/course by applying knowledge and skills articulated in the standards for the current grade/course (or for more complex problems, knowledge and skills articulated in the standards for previous grades/courses), engaging particularly in the Modeling practice, and where helpful making sense of problems and persevering to solve them, reasoning abstractly, and quantitatively, using appropriate tools strategically, looking for the making use of structure and/or looking for and expressing regularity in repeated reasoning

	Modeling & Application				
	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic	
Content	The student devises and ena- workplace by:	cts a plan to apply mathematics	s in solving problems arising in e	veryday life, society, and the	
LEAP.III.A1.1 LEAP.III.A1.2 LEAP.III.A1.3 LEAP.III.A1.4	 using stated assumptions and making assumptions and approximations to simplify a real-world situation (include micro- models) 	 using stated assumptions and making assumptions and approximations to simplify a real-world situation (include micro- models) 	 using stated assumptions and approximations to simplify a real-world situation 	 using stated assumptions and approximations to simplify a real-world situation 	
	 mapping relationships between important quantities 	 mapping relationships between important quantities 	 illustrating relationships between important quantities 	 identifying important quantities 	
	 analyzing relationships mathematically between quantities to draw conclusions 	 analyzing relationships mathematically between quantities to draw conclusions 	 analyzing relationships mathematically between quantities to draw conclusions 	 analyzing relationships mathematically to draw conclusions 	
	 interpreting mathematical results in the context of the situation 	 interpreting mathematical results in the context of the situation 	 interpreting mathematical results in a simplified context 		
	• reflecting on whether the results make sense	• reflecting on whether the results make sense	 reflecting on whether the results make sense 		
	• improving the model if it has not served its purpose	• improving the model if it has not served its purpose	 modifying the model if it has not served its purpose 		

	Modeling & Application				
	Level 5: Advanced	Level 4: Mastery	Level 3: Basic	Level 2: Approaching Basic	
Content	The student devises and enacts a plan to apply mathematics in solving problems arising in everyday life, society, and the workplace by:				
	• writing an algebraic expression or equation to describe a situation	 writing an algebraic expression or equation to describe a situation 	 writing an algebraic expression or equation to describe a situation 	 writing an algebraic expression or equation to describe a situation 	
	 applying proportional reasoning and percentages justifying and defending models which lead to a conclusion 	 applying proportional reasoning and percentages 	 applying proportional reasoning and percentages 	 applying proportional reasoning and percentages 	
	 writing and using functions in any form to describe how one quantity of interest depends on another 	 writing and using functions in any form to describe how one quantity of interest depends on another 	• writing and using functions to describe how one quantity of interest depends on another	• using functions to describe how one quantity of interest depends on another	
	 using statistics using reasonable estimates of known quantities in a chain of reasoning that yields an estimate of an unknown quantity 	 using statistics using reasonable estimates of known quantities in a chain of reasoning that yields an estimate of an unknown quantity 	 using statistics using reasonable estimates of known quantities in a chain of reasoning that yields an estimate of an unknown quantity 	 using statistics using estimates of known quantities in a chain of reasoning that yields an estimate of an unknown quantity 	
	 analyzing and/or creating constraints, relationships and goals 				