Algebra 1 EOY

Evidence Statement Key	Evidence Statement Text	Clarifications	MP	Calculator
N-RN.3	Apply properties of rational and irrational numbers to identify rational and irrational numbers.	For rational solutions, exact values are required. For irrational solutions, exact or decimal approximations may be required. Simplifying or rewriting radicals is not required.	6	No
A-SSE.1-1	Interpret exponential expressions, including related numerical expressions that represent a quantity in terms of its context.★ a) Interpret parts of an expression, such as terms, factors, and coefficients. b) Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret $P(1+r)^n$ as the product of *P* and a factor not depending on *P*.	i) See illustrations for A-SSE.1 at http://illustrativemathematics.org, e.g., http://illustrativemathematics.org/illustrations/390	7	Neutral
A-SSE.1-2	Interpret quadratic expressions that represent a quantity in terms of its context. ★ a) Interpret parts of an expression, such as terms, factors, and coefficients. b) Interpret complicated expressions by viewing one or more of their parts as a single entity.	i) See illustrations for A-SSE.1 at http://illustrativemathematics.org, e.g., http://illustrativemathematics.org/illustrations/90	7	Neutral
A-SSE.2-1	Use the structure of numerical expressions and polynomial expressions in one variable to identify ways to rewrite it.	i) Examples: Recognize 53^2-47^2 as a difference of squares and see an opportunity to rewrite it in the easier-to-evaluate form $(53+47)(53-47)$. See an opportunity to rewrite $a^2+9a+14$ as $(a+7)(a+2)$.	7	Neutral
A-SSE.2-4	Use the structure of a numerical expression or polynomial expression in one variable to rewrite it, in a case where two or more rewriting steps are required.	i) Example: Factor completely $x^2-1+(x-1)^2$. (A first iteration might give $(x+1)(x-1)+(x-1)^2$, which could be rewritten as $(x-1)(x+1+x+1)$ on the way to factoring completely as $2x(x-1)$. Or the student might first expand as x^2-1+x^2-2x+1, rewriting as $2x^2-2x$ then factoring as $2x(x-1)$. ii) Tasks do not have a context.	7, 1	Neutral

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Evidence Statement Key	Evidence Statement Text	Clarifications	MP	Calculator
A-SSE.3a	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.	None	7	Neutral
A-SSE.3b	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. b) Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.	None	7	Neutral
A-SSE.3c-1	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression, where exponentials are limited to integer exponents.★ c) Use the properties of exponents to transform expressions for exponential functions. *For example the expression* 1.15^t *can be rewritten as* $\left(1.15^{\frac{1}{12}}\right)^{12t} \approx 1.012^{12t}$ *to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*	i) Tasks have a context. As described in the standard, there is an interplay between the mathematical structure of the expression and the structure of the situation such that choosing and producing an equivalent form of the expression reveals something about the situation.	1, 2, 4, 7	Neutral
A-APR.1-1	Add, subtract, and multiply polynomials.	i) The “understand” part of the standard is not assessed here; it is assessed under Sub-claim C on the PBA.	-	Neutral
A-APR.3-1	Identify zeros of quadratic and cubic polynomials in which linear and quadratic factors are available, and use the zeros to construct a rough graph of the polynomial.	i) For example, find the zeros of $(x-2)(x^2-9)$	7	No
A-CED.3-1	Solve multi-step contextual problems that require writing and analyzing systems of linear inequalities in two variables to find viable solutions.	i) Tasks have hallmarks of modeling as a mathematical practice (less defined tasks, more of the modeling cycle, etc.). ii) Scaffolding in tasks may range from substantial to very little or none.	1, 2, 4	Item Specific
A-CED.4-1	Rearrange linear formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm’s law* $V = IR$ *to highlight resistance R.*	i) Tasks have a context.	2, 6, 7	Neutral

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Evidence Statement Key	Evidence Statement Text	Clarifications	MP	Calculator
A-CED.4-2	Rearrange formulas that are quadratic in the quantity of interest to highlight the quantity of interest, using the same reasoning as in solving equations.	i) Tasks have a context.	2, 6, 7	Neutral
A-REI.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	None	7	Item Specific
A-REI.4a-1	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.	i) The derivation part of the standard is not assessed here; it is assessed under Sub-Claim C on the PBA.	1, 7	Item Specific
A-REI.4b-1	Solve quadratic equations in one variable. b) 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.	i) Tasks should exhibit variety in initial forms. Examples of quadratic equations with real solutions: $t^2=49$, $3a^2=4$, $7=x^2$, $r^2=0$, $\frac{1}{2}y^2=\frac{1}{5}$, $y^2-8y+15=0$, $2x^2-16x+30=0$, $2p=p^2+1$, $t^2=4t$, $7x^2+5x-3=0$, $\frac{3}{4}c(c-1)=c$, $(3x-2)^2=6x-4$ ii) Methods are not explicitly assessed; strategy is assessed indirectly by presenting students with a variety of initial forms. iii) For rational solutions, exact values are required. For irrational solutions, exact or decimal approximations may be required. Simplifying or rewriting radicals is not required. iv) Prompts integrate mathematical practices by not indicating that the equation is quadratic. (E.g., "Find all real solutions of the equation $t^2=4t$"…not, "Solve the quadratic equation $t^2=4t$.")	7, 5	Item Specific

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Evidence Statement Key	Evidence Statement Text	Clarifications	MP	Calculator
A-REI.4b-2	Solve quadratic equations in one variable. b) Recognize when the quadratic formula gives complex solutions.	i) Tasks involve recognizing an equation with complex solutions, e.g., "Which of the following equations has no real solutions?" with one of the options being a quadratic equation with non-real solutions. ii) Writing solutions in the form $a \pm bi$ is not assessed here. (N-CN.7 is assessed in Algebra 2)	7, 5	Neutral
A-REI.6-1	Solve multi-step contextual problems that require writing and analyzing systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	i) Tasks have hallmarks of modeling as a mathematical practice (less defined tasks, more of the modeling cycle, etc.). ii) Scaffolding in tasks may range from substantial to very little or none.	1, 2, 4	Item Specific
A-REI.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).	None	7	Item Specific
A-REI.11-1b	Find the solutions of where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Limit $f(x)$ and/or $g(x)$ to polynomial functions.★	i) The "explain" part of standard A-REI.11 is not assessed here. For this aspect of the standard, see Sub-claim C on the PBA. ii) Polynomials are of degree two and higher.	1, 5	Yes
A-REI.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.	None	1, 5, 6	No
A.Int.1	Solve equations that require seeing structure in expressions.	i) Tasks do not have a context. ii) Equations simplify considerably after appropriate algebraic manipulations are performed. For example, if $24+10x-x^2 = p-(x-5)^2$, then find the value of p; solve $(3x-2)^2 = 6x-4$.	7, 1	No

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Evidence Statement Key	Evidence Statement Text	Clarifications	MP	Calculator
F-IF.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 $y = f(x)$.	None	2	Neutral
F-IF.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	See illustrations for F-IF.2 at http://illustrativemathematics.org	6, 7	Item Specific
F-IF.A.Int.1	Understand the concept of a function and use function notation.	i) Tasks require students to use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. ii) About a quarter of tasks involve functions defined recursively on a domain in the integers.	2	Item Specific
F-IF.4-1	For a linear or quadratic function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the functions is increasing, decreasing, positive, or negative; relative maximums and minimums; end behavior; and symmetries.*	i) See illustrations for F-IF.4 at http://illustrativemathematics.org, e.g., http://illustrativemathematics.org/illustrations/649, http://illustrativemathematics.org/illustrations/637, http://illustrativemathematics.org/illustrations/639	6, 4	Item Specific
F-IF.5-1	Relate the domain of a function to a graph and, where applicable, to the quantitative relationship it describes, limiting to linear functions, square root functions, cube root functions, piecewise-defined functions (including step functions and absolute-value functions), and exponential functions with domains in the integers. *For example, if the function $h(n)$ gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for this function.*	i) Tasks have a real-world context.	2	Neutral

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Evidence Statement Key	Evidence Statement Text	Clarifications	MP	Calculator
F-IF.5-2	Relate the domain of a function to a graph and, where applicable, to the quantitative relationship it describes, limiting to quadratic functions. *For example, if the function* $h(n)$ *gives the number of person-hours it takes to assemble* n *engines in a factory, then the positive integers would be an appropriate domain for this function.*	i) Tasks have a real-world context.	2	Neutral
F-IF.6-1b	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval with functions limited to square root functions, cube root functions, and piecewise-defined (including step functions and absolute value functions) functions with domains in the integers. ★	i) Tasks have a context.	1, 4, 5, 7	Item Specific
F-IF.6-6b	Estimate the rate of change from a graph utilizing linear functions, quadratic functions, square root functions, cube root functions, piecewise-defined functions (including step functions and absolute value functions), and/or exponential functions with domains in the integers.★	i) Tasks have a context.	1, 4, 5, 7	Item Specific
F-IF.7a-1	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★ a) Graph linear functions and show intercepts.	None	1, 5, 6	Item Specific
F-IF.7a-2	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★ a) Graph quadratic functions and show intercepts, maxima, and minima.	None	1, 5, 6	Item Specific
F-IF.7b	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★ b) Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.	None	1, 5, 6	Item Specific

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Evidence Statement Key	Evidence Statement Text	Clarifications	MP	Calculator
F-IF.8a	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 context.	i) Tasks have a context.	2	Yes
F-IF.9-1	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.* Function types should be limited to linear functions, quadratic functions, square root functions, cube root functions, piecewise-defined functions (including step functions and absolute value functions), and exponential functions with domains in the integers.	i) Tasks may or may not have a context.	1, 3, 5, 6, 8	Item Specific
F-BF.3-1	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 limiting the function types to linear and quadratic functions.	i) Tasks do not involve recognizing even and odd functions. ii) Experimenting with cases and illustrating an explanation are not assessed here.	3, 5, 7	Item Specific
F-BF.3-4	Identify the effect on the graph of a quadratic function 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 using technology.	i) Illustrating an explanation is not assessed here. (See Sub-claim C on the PBA)	5, 3, 8	Item Specific
F-LE.2-1	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).	i) Tasks are limited to constructing linear and exponential functions with domains in the integers, in simple context (not multi-step).	1, 2, 5	Item Specific

Evidence Statement Key	Evidence Statement Text	Clarifications	MP	Calculator
F-LE.2-2	Solve multi-step contextual problems with degree of difficulty appropriate to the course by constructing linear and/or exponential function models, where exponentials are limited to integer exponents.	i) Prompts describe a scenario using everyday language. Mathematical language such as "function," "exponential," etc. is not used. ii) Students autonomously choose and apply appropriate mathematical techniques without prompting. For example, in a situation of doubling, they apply techniques of exponential functions. iii) For some illustrations, see tasks at http://illustrativemathematics.org under F-LE.	1, 2, 6, 4	Item Specific
F-Int.1-1	Given a verbal description of a linear or quadratic functional dependence, write an expression for the function and demonstrate various knowledge and skills articulated in the Functions category in relation to this function.	i) Given a verbal description of a functional dependence, the student would be required to write an expression for the function and then, e.g., identify a natural domain for the function given the situation; use a graphing tool to graph several input-output pairs; select applicable features of the function, such as linear, increasing, decreasing, quadratic, nonlinear; and find an input value leading to a given output value. e.g., a functional dependence might be described as follows: "The area of a square is a function of the length of its diagonal." The student would be asked to create an equation such as $f(x)=\frac{1}{2}x^2$ for this function. The natural domain for the function would be the positive real numbers. The function is increasing and nonlinear, and so on. e.g., a functional dependence might be described as follows: "The slope of the line passing through the points $(1, 3)$ and $(7, y)$ is a function of y." The student would be asked to create an equation such as $s(y)=\frac{3-y}{1-7}$ for this function. The natural domain for this function would be the real numbers. The function is increasing and linear, and so on.	1, 2, 8	Neutral

Evidence Statement Key	Evidence Statement Text	Clarifications	MP	Calculator
S-ID.5	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.	None	1, 5, 7	Yes
S-ID.Int.1	Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in S-ID, excluding normal distributions and plotting residuals, and limiting function fitting to linear functions and exponential functions with domains in the integers.	None	1, 2, 5, 6, 4	Yes
S-ID.Int.2	Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in S-ID excluding normal distributions and limiting function fitting to quadratic functions.	None	1, 2, 5, 6, 4	Yes

Evidence Statement Key	Evidence Statement Text	Clarifications	MP	Calculator
HS-Int.1	Solve multi-step contextual problems with degree of difficulty appropriate to the course by constructing quadratic function models and/or writing and solving quadratic equations.	i) A scenario might be described and illustrated with graphics (or even with animations in some cases). ii) Solutions may be given in the form of decimal approximations. For rational solutions, exact values are required. For irrational solutions, exact or decimal approximations may be required. Simplifying or rewriting radicals is not required. iii) Some examples: -A company sells steel rods that are painted gold. The steel rods are cylindrical in shape and 6 cm long. Gold paint costs $0.15 per square inch. Find the maximum diameter of a steel rod if the cost of painting a single steel rod must be $0.20 or less. You may answer in units of centimeters or inches. Give an answer accurate to the nearest hundredth of a unit. - As an employee at the Gizmo Company, you must decide how much to charge for a gizmo. Assume that if the price of a single gizmo is set at *P* dollars, then the company will sell $1000-0.2P$ gizmos per year. Write an expression for the amount of money the company will take in each year if the price of a single gizmo is set at *P* dollars. What price should the company set in order to take in as much money as possible each year? How much money will the company make per year in this case? How many gizmos will the company sell per year? (Students might use graphical and/or algebraic methods to solve the problem.) - At $t=0$, a car driving on a straight road at a constant speed passes a telephone pole. From then on, the car's distance from the telephone pole is given by $C(t)=30t$, where *t* is in seconds and *C* is in meters. Also at $t=0$, a motorcycle pulls out onto the road, driving in the same direction, initially 90 m ahead of the car. From then on, the motorcycle's distance from the telephone pole is given by $M(t)=90+2.5t^2$, where *t* is in seconds and *M* is in meters. At what time *t* does the car catch up to the motorcycle? Find the answer by setting *C* and *M* equal. How far are the car and the motorcycle from the telephone pole when this happens? (Students might use graphical and/or algebraic methods to solve the problem.)	1, 2, 5, 6, 4	Yes

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Evidence Statement Key	Evidence Statement Text	Clarifications	MP	Calculator
HS-Int.2	Solve multi-step mathematical problems with degree of difficulty appropriate to the course that require analyzing quadratic functions and/or writing and solving quadratic equations.	i) Tasks do not have a context. ii) Exact answers may be required or decimal approximations may be given. Students might choose to take advantage of the graphing utility to find approximate answers or clarify the situation at hand. For rational solutions, exact values are required. For irrational solutions, exact or decimal approximations may be required. Simplifying or rewriting radicals is not required. iii) Some examples: Given the function $f(x) = x^2 + x$, find all values of k such that $f(3-k) = f(3)$. (Exact answers are required.) Find a value of c so that the equation $2x^2 - cx + 1 = 0$ has a double root. Give an answer accurate to the tenths place.	1, 5, 6	Yes
HS-Int.3-1	Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-LE, A-CED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear functions and exponential functions with domains in the integers.	i) F-LE is the primary content and at least one of the other listed content elements will be involved in tasks as well.	4, 2	Yes
HS-Int.3-2	Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-LE, A-CED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear and quadratic functions.	i) F-LE is the primary content and at least one of the other listed content elements will be involved in tasks as well. For rational solutions, exact values are required. For irrational solutions, exact or decimal approximations may be required. Simplifying or rewriting radicals is not required.	4, 2	Yes