Algebra I
Mathematics Curriculum

DOMAIN DESCRIPTION	CLUSTER DESCRIPTION	MLS CODE	MLS DESCRIPTION	DOK	Instructional Activities	Assessments
Number and Quantity	Extend and use properties of rational exponents.	A1.NQ.A.1	Explain how the meaning of rational exponents extends from the properties of integer exponents.	2	Translate (5 1/3)3 as 5.	Students will apply the power property of exponents.
	Extend and use properties of rational exponents.	A1.NQ.A.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents. Limit to rational exponents with a numerator of 1.	2	Rewrite 5 1/3 to be the cube root of 5.	Students will rewrite a number with a rational exponent in radical form.
	Use units to solve problems.	A1.NQ.B.3 *a, b, c*	Use units of measure as a way to understand and solve problems involving quantities. *- Identify, label and use appropriate units of measure within a problem.* *- Convert units and rates.* *- Use units within problems.*	2	Choose and interpret units in the context of multi--step problems and formulas.	Include work problems where quantities are given in different units, which must be converted.
	Use units to solve problems.	A1.NQ.B.3d	Use units of measure as a way to understand and solve problems involving quantities. *- Choose and interpret the scale and the origin in graphs and data displays.*	2	choose and interpret the scale and origin in graphs and data displays	Graphs must include lines, circles, scatterplots and second order equations
	Use units to solve problems.	A1.NQ.B.4	Define and use appropriate quantities for representing a given context or problem.	2	Identify the variables or quantities of significance from the data provided. Identify or choose the appropriate unit of measure for each variable or quantity.	What type of measurements would one use to determine revenue and profit for one month? How could one express the number of births in Missouri?

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Number and Quantity	Use units to solve problems.	A1.NQ.B.5	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	2	Upon completion of a problem, the student will be able to judge the reasonableness of their answer.	Students will estimate the solution to a problem before beginning or compare the actual solution with the estimate or include the solution is a complete sentence to check for understanding.
Seeing Structure in Expressions	Interpret and use structure.	A1.SSE.A.1	Interpret the contextual meaning of individual terms or factors from a given problem that utilizes formulas or expressions.	3	Interpret parts of an expression, such as terms, factors, and coefficients. 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.*	Students should be able to recognize and interpret the parts that make up the algebraic expression.
	Interpret and use structure.	A1.SSE.A.2	Analyze the structure of polynomials to create equivalent expressions or equations.	2	Rearrange an expression according to correct factoring rules.	Identify $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.
	Interpret and use structure.	A1.SSE.A.3a	Choose and produce equivalent forms of a quadratic expression or equations to reveal and explain properties. *- Find the zeros of a quadratic function by rewriting it in factored form.*	3	Find the solution to a quadratic equation.	$F(x)=x^2-5x+6$, find the zeros.
	Interpret and use structure.	A1.SSE.A.3b	Choose and produce equivalent forms of a quadratic expression or equations to reveal and explain properties. *- Find max or min value of a quadratic function by completing the square.*	3	Find the y-coordinate of the vertex of a quadratic equation by completing the square.	Complete the square on (ax^2+bx+c) to find vertex form $(a(x-h)^2+k)$

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Creating Equations	Create equations that describe linear, quadratic and exponential relationships.	A1.CED.A.1	Create equations and inequalities in one variable and use them to model and/or solve problems.	2	Create equations and inequalities representing real world scenarios. Compare linear, quadratic and exponential equations.	Create equations and inequalities that arise when comparing the values of two different functions including linear, quadratic and exponential.
	Create equations that describe linear, quadratic and exponential relationships.	A1.CED.A.2	Create and graph linear, quadratic and exponential equations in two variables.	2	Formulate and graph equations involving two variables on a coordinate axes, labeling appropriately.	Write an equation to represent the final balance of a savings account with an initial deposit of $1000 that pays 2% interest compounded annually.
	Create equations that describe linear, quadratic and exponential relationships.	A1.CED.A.3	Represent constraints by equations or inequalities and by systems of equations or inequalities, and interpret the data points as a solution or non-solution in a modeling context.	2	Determine if a given number is a solution to an equation, inequality, or system of equations or inequalities.	Determine if $x = -3$ is a solution to $3x + 1 < 3x + 1$.
	Create equations that describe linear, quadratic and exponential relationships.	A1.CED.A.4	Solve literal equations and formulas for a specified variable that highlights a quantity of interest.	2	Rearrange formulas to highlight a quantity of interest using the same reasoning as solving equations.	Rearrange Ohm's Law $V = IR$ to highlight the resistance R.

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Reasoning with Equations and Inequalities	Understand solving equations as a process, and solve equations and inequalities in one variable.	A1.REI.A.1	Explain how each step taken when solving an equation or inequality in one variable creates an equivalent equation or inequality that has the same solution(s) as the original.	3	Using algebraic properties and the properties of real numbers, justify the steps of a simple one solution equation.	Students should justify their own steps or if given two or more steps of an equations, explain the progression from one step to the next using properties.
	Understand solving equations as a process, and solve equations and inequalities in one variable.	A1.REI.A.2a	Solve problems involving quadratic equations. *- Use the method of completing the square to create an equivalent quadratic equation.*	2	Apply the method of completing the square to solve various quadratic equations.	Given $x^2 + 2x + 9 = 0$ apply the method of completing the square.
	Understand solving equations as a process, and solve equations and inequalities in one variable.	A1.REI.A.2b	Solve problems involving quadratic equations. *- Derive the quadratice formula.*	2	Apply the quadratic formula to solve various quadratic equations.	Given $3x^2 + -4x + 7 = 0$ derive the quadratic formula.
	Understand solving equations as a process, and solve equations and inequalities in one variable.	A1.REI.A.2c	Solve problems involving quadratic equations. *- Analyze different methods of solving quadratic equations.*	3	Choose the most appropriate method in which to solve a quadratic equation.	Given $2x^2 + 7x - 1 = 0$ solve using the most appropriate method.
	Solve systems of equations.	A1.REI.B.3	Solve a system of linear equations algebraically and/or graphically.	3	The system solution methods can include graphing, elimination or substitution.	Which is the better value? You can rent a car for $300/day with unlimited mileage or you can rent a car for $50/day and pay 55 cents per mile. You need to travel 1 day and 400 miles.

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Reasoning with Equations and Inequalities	Solve systems of equations.	A1.REI.B.4	Solve a system consisting of a linear equation and a quadratic equation algebraically and/or graphically.	3	Given a variety of functions both linear and nonlinear find their points of intersection, if any.	Find the points of intersection between the line y = –3x and the quadratic equation $y = x^2 + 3$.
	Solve systems of equations.	A1.REI.B.5	Justify that the technique of linear combination produces an equivalent system of equations.	3	Apply the substitution and elimination methods to find an exact solution to the original system of equations.	y=2x+1 2x+3y=11 Solve by the method of your choice.
	Represent and solve linear and exponential equations and inequalities graphically	A1.REI.C.6	Explain that the graph of an equation in two variables is the set of all its solutions plotted in the Cartesian coordinate plane.	2	Interpret a graph as a collection of infinite solutions (x,y). Understand that graphical solution methods may produce approximate solutions, while algebraic solution methods use precise solutions.	Given 2x+3y=6 is the point (1,4) a solution? y=5 y=x^2 Find an exact solution.
	Represent and solve linear and exponential equations and inequalities graphically	A1.REI.C.7	Graph the solution to a linear inequality in two variables.	2	Solve linear inequalities exactly and approximately, focusing on pairs of linear inequalities in <u>two</u> variables.	Graph the solution to y<3 and y>x+1.
	Represent and solve linear and exponential equations and inequalities graphically	A1.REI.C.8	Solve problems involving a system of linear inequalities.	2	Graph the solution to a linear inquality in two variables.	Graph the solution to y<2x + 1 and y>x+1.

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Arithmetic with Polynomials and Rational Expressions	Perform operations on polynomials.	A1.APR.A.1	Add, subtract and multiply polynomials, and understand that polynomials follow the same general rules of arithmetic and are closed under these operations.	2	Add, subtract and multiply polynomials.	(2x - 4) - (-3x + 1) (x - 7)(3x - 10)
	Perform operations on polynomials.	A1.APR.A.2	Divide polynomials by monomials.	2	Divide polynomials	$(8x^2 - 4x + 10) / 2x$
Interpreting Functions	Understand the concept of a function and use function notation.	A1.IF.A.1a	Understand that a function from one set (domain) to another set (range) assigns to each element of the domain exactly one element of the range. *- Represent a function using function notation.*	3	Write a function in function notation.	Students will be able to write y = 2x + 3 in function notation f(x) = 2x + 3
	Understand the concept of a function and use function notation.	A1.IF.A.1b	Understand that a function from one set (domain) to another set (range) assigns to each element of the domain exactly one element of the range. *- Understand that the graph of a function labeled is the set of all ordered pairs (x, y) that satisfy the equation =f( ).*	3	Given a variety of graphs, identify the domain and range of each function.	Apply the vertical line test to determine if a relation is a function.
	Understand the concept of a function and use function notation.	A1.IF.A.2	Use function notation to evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	3	Use substitution to evaluate a function for a given value of x.	If P(t) is the population of Cape Girardeau t years after 1990, interpret the statements P(0)=32,000 and P(25)=40,000.

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Interpreting Functions	Interpret linear, quadratic and exponential functions in terms of the context.	A1.IF.B.3	Using tables, graphs and verbal descriptions, interpret key characteristics of a function that models the relationship between two quantities.	3	Given a function, identify key features in graphs and tables including intercepts, whether the function is increasing, decreasing, positive, negative, zero or undefined.	Given a parabola h(t)=-1.6t2+64 find the vertex, intercepts, max or min values, intervals over t for which the function is increasing or decreasing and interpret these in the context of the problem. Then sketch the graph of the situation with appropriate labels.
	Interpret linear, quadratic and exponential functions in terms of the context.	A1.IF.B.4	Relate the domain and range of a function to its graph and, where applicable, to the quantitative relationship it describes.	3	Given the graph of a function, determine the practical domain of the function as it relates to the numerical relationship it describes.	Given the graph of a parabola representing the path of a ball and height after *t* seconds, determine the number of seconds before the ball reaches it's maximum height and before it hits the ground.
	Interpret linear, quadratic and exponential functions in terms of the context.	A1.IF.B.5	Determine the average rate of change of a function over a specified interval and interpret the meaning.	3	Given a specified interval or table, calculate and interpret the average rate of change of a function.	Given $f(x)=x^2+2x-5$ find the average rate of change from f(1) to f(8). Show your results in a table.

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Interpreting Functions	Interpret linear, quadratic and exponential functions in terms of the context.	A1.IF.B.6	Interpret the parameters of a linear or exponential function in terms of the context.	2	Given a real world situation determine the effect for altering the parameter.	The total cost for an electrician who charges $50 for a house call and $85 an hour would be expressed as y=85x+50. If the rate were raised to $90 an hour, how would the rate change?
	Analyze linear, quadratic and exponential functions using different representations.	A1.IF.C.7	Graph functions expressed symbolically and identify and interpret key features of the graph.	3	Graph linear and quadratic functions finding x and y-intercepts.Using a graphing calculator, explore graphs of square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. Using a graphing calculator, explore exponential functions.	Given y=x2-1 find the x and y-intercepts and graph. Use a graphing calculator to graph y=√x+1, y=|x-2|, y=[[x]]. Use a graphing calculator to graph y=2x.
	Analyze linear, quadratic and exponential functions using different representations.	A1.IF.C.8	Translate between different but equivalent forms of a function to reveal and explain properties of the function and interpret these in terms of a context.	2	Given a quadratic function find zeros, extreme values and describe symmetry. Then interpret.	Given $f(x)=x^2-6x+8$ find zeros, extreme values and describe symmetry.
	Analyze linear, quadratic and exponential functions using different representations.	A1.IF.C.9	Compare the properties of two functions given different representations.	2	Compare the graph of a function to an algebraic expression of another function and determine which has the larger maximum.	Given a graph of one quadratic function and an algebraic expression for another, explain which has the larger maximum.

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DOMAIN DESCRIPTION	CLUSTER DESCRIPTION	MLS CODE	MLS DESCRIPTION	DOK	Instructional Activities	Assessments
Building Functions	Build new functions from existing functions (limited to linear, quadratic and exponential).	A1.BF.A.1	Analyze the effect of translations and scale changes on functions.	2	Students understand the vertical translation for a function of linear and exponential graphs.	Consider the function y=f(x). What is the new function if you move this function up 3 units?
Linear, Quadratic and Exponential Models	Construct and compare linear, quadratic and exponential models and sole problems.	A1.LQE.A.1a	Distinguish between situations that can be modeled with linear or exponential functions. - *Determine that linear functions change by equal differences over equal intervals.*	2	Given a t-chart, show that the slope between each pair of points is the same for a linear function. Given a t-chart, show that the growth from one y-coordinate to the next is the same factor.	Given the equation y=2x+4, students will create a t-chart and show that the slope between consecutive pairs is constant. Given the equation $y=2^x$ students will create a t-chart and show that the growth/decay from one y-coordinate to the next is the same factor.
	Construct and compare linear, quadratic and exponential models and sole problems.	A1.LQE.A.1b	Distinguish between situations that can be modeled with linear or exponential functions. - *Recognize exponential situations in which a quantity grows or devays by constant percent rate per unit interval.*	2	Provide examples of exponential functions and determine which are growth and which are decay.	Given population as a function of time in years; such as $p(t)=2^t$. Determine if there is growth or decay.
	Construct and compare linear, quadratic and exponential models and sole problems.	A1.LQE.A.2	Describe, using graphs and tables, that a quantity increasing exponentially eventually exceeds a quantity increasing linearly or quadratically.	3	Analyze from a graph at a given time which payment method is greater.	Would you choose $100 a day for a month or a penny doubling every day for a month? Why?

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Linear, Quadratic and Exponential Models	Construct and compare linear, quadratic and exponential models and sole problems.	A1.LQE.A.3	Construct linear, quadratic and exponential equations given graphs, verbal descriptions or tables.	3	Determine from a list of numbered pairs whether the function is linear or exponential. Create a function that describes a given explicit or recursively stated situation.	Given (2,3) (3,5) (4,7) or given (0,1) (1,3) (2,9) determine whether each relation is linear or exponential and justify. A second example: A new social networking website was made available. The website had 10 members its first week, beginning the second week, the creators of the website have a goal to double the number of members every week. Create a function that describes the above situation.
	Use arithmetic and geometric sequences.	A1.LQE.B.4	Write arithmetic and geometric sequences in recursive and explicit forms, and use them to model situations and translate between the two forms.	3	Create a function that describes a given explicit or recursively stated situation.	Given $a_0=4$ and $a_n=a_{n-1}+3$, write the explicit formula.
	Use arithmetic and geometric sequences.	A1.LQE.B.5	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the set of integers.	3	Given a function, determine the domain.	Understand that the Fibonacci sequence is defined recursively by f(0)=f(1)=1, f(n+1)=f(n)+f(n-1) for n1.
	Use arithmetic and geometric sequences.	A1.LQE.B.6	Find the terms of sequences given an explicit or recursive formula.	2	Find a specified term of a sequence both arithmetic and	If the first term is $a_1 = 4$, the common difference is -5 find the 25th term.

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Data and Statistical Analysis	Summarize, represent and interpret data.	A1.DS.A.1	Analyze and interpret graphical displays of data.	2	Choose the best representation for a set of data.	Construct a dot plot, histogram and box plot for the set of data. Give a situation for which each representation would be a good choice.
	Summarize, represent and interpret data.	A1.DS.A.2	Use statistics appropriate to the shape of the data distribution to compare center and spread of two or more different data sets.	2	Compare the distributions of two or more data sets by examining their shapes, centers and spreads when drawn on the same scale.	Given a set of chapter one test scores find the measures of central tendency.
	Summarize, represent and interpret data.	A1.DS.A.3	Interpret differences in shape, center and spreads in the context of the data sets, accounting for possible effects of outliers.	2	Predict the effect an outlier will have on the shape, center and spread of data. Decide whether to include outliers as part of the data set.	Given a set of student's ages find the measures of central tendency and decide whether the teacher's age should be included.
	Summarize, represent and interpret data.	A1.DS.A.4 *a-b*	Summarize data in two-way frequency tables. *- Interpret relative frequencies in the context of the data.* *- Recognize possible associations and trends in the data.*	2	Create two-way frequency tables. Read and interpret the data.	Collect data from students about i-Phone: Yes/No Internet: Yes/No

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Data and Statistical Analysis	Summarize, represent and interpret data.	A1.DS.A.5 *a-b*	Construct a scatter plot of bivariate quantitative data describing how the variables are related; determine and use a function that models the relationship. *- Construct a linear function to model bivariate data represented on a scatter plot that minimizes residuals.* *- Construct an exponential function to model bivariate data represented on a scatter plot that minimizes residuals.*	2	Provide data that will produce either linear, quadratic or exponential functions. Graph the data from above and compare to your basic graph of linear, quadratic or exponential functions. Create a linear function of best fit from a scatterplot.	Given a linear or exponential data set, create a scatter plot.
	Summarize, represent and interpret data.	A1.DS.A.6	Interpret the slope (rate of change) and the y-intercept (constant term) of a linear model in the context of the data.	3	Given data draw a line of best fit to determine the slope and y-intercept for the linear function.	Given a set of data, draw a line of best fit and write the equation of the line.
	Summarize, represent and interpret data.	A1.DS.A.7	Determine and interpret the correlation coefficient for a linear association.	3	Using a graphing calculator find the correlation coefficient of a linear fit.	Using a graphing calculator with the data from standard 6 compute the correlation coefficient of a linear fit.
	Summarize, represent and interpret data.	A1.DS.A.8	Distinguish between correlation and causation.	3	Reason the difference between correlation and causation.	Compare and contrast the ideas of correlation and causation using data from standards 6 and 7.