

Thomas Edison EnergySmart Charter School 2015-16
Curriculum for Algebra-1
Mrs.Bhattad

Big Idea: Expressions, Equations and Functions						
Content: Mathematics		Course: Algebra-1			Unit: Digits	
Essential questions	Content	Skills	Key terms	Assessment	CCSS	Text
Why is it useful to represent real life situations algebraically?	Identify constant and variable terms in algebraic expressions and equations	Identifying the constant	Variable	Teacher created assessments	A.SSE.1 – Interpret expressions that represent a quantity in terms of its context. A.SSE.1a – Interpret parts of an expression, such as terms, factors, and coefficients.	Digit s
Which of the terms in an algebraic equation stay the same and which term has the ability to change its value?		Identifying the variable	Isolate	Teacher Observations		
Why don't we combine variables that are different?	Simplify algebraic expressions, discriminating between unlike variables.	Simplifying algebraic expression	Expression	Rubrics	A.SSE.1 – Interpret expressions that represent a quantity in terms of its context.	
How can I isolate a variable to one side of an equation so that I can find its value?	Solve equations in one Variable	Solve an equation with variable on one or both sides	Equation	Benchmarks	A.SSE.1a – Interpret parts of an expression, such as terms, factors, and coefficients.	
How can we use mathematical language to describe nonlinear change?	Solve equations and inequalities in one variable	Solve an inequality with variable on one or both sides	Function	Projects	A.REI.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.	
How can patterns, relations, and functions be used as tools to best describe and help explain real-life situations?	Create equations that describe numbers or relationships	Create equations		Progress check 1		
	Identify solutions of inequalities in one	Graph inequalities		Progress check 2		
		Write an equation for the word problem		Homework		
		Solve an equation for the word problem		Classroom observations (whole group)	A.REI.3 - Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	
				Individual observations		

How can we use algebraic representation to analyze patterns?	variable. Write and graph inequalities in one variable				A.CED.4 – Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.	
How are functions and their graphs related?	Solve inequalities that contain variable terms on both sides				A.CED.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.	
How can change be represented mathematically?	Solve one-step Inequalities					
	Solve equations in one variable that contain variable terms on both sides					
	Write and solve problems involving proportions					
	Solve an equation in two or more variables for one of the variables					

Big Idea: Graphing and Writing Linear equations

Content: Mathematics		Course: Algebra-1			Unit: Digits	
Essential questions	Content	Skill	Key terms	Assessment	CCSS	Text
How do we rewrite the equations in different forms?	Understanding the difference between expression and equation	Differentiating between an expression and an equation	Expressions Equations	Teacher created assessments	F.LE.1 – Distinguish between situations that can be modeled with linear functions and with exponential functions.	Digits
How can change be best represented mathematically?	Equations with variables to	Write an equation with a variable to	Variable Linear	Teacher Observations	F.LE.1a - Prove that linear functions grow by equal differences over equal	

How do I calculate the slope of a line?	represent quantities Solving equations	represent quantities Re write an equation with different forms of numbers like percents, decimals and fractions	equations Slope y-intercept	Rubrics Benchmarks	intervals, and that exponential functions grow by equal factors over equal intervals.
How do I find a time dependent bar graph in the media. How do I use the graph to calculate, label and compare the slopes between the intervals of time?	Converting numbers from one form to another like percents, decimals and fraction	Solving and graphing linear equations	discount tax percents decimals	Projects Progress check 1 Progress check 2	F.LE.1b – Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. F.IF.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.
How can I use an equation written in slope intercept form to determine slope and y-intercept of a function.	Solving and graphing inequalities Slope and y-intercept	Solving and graphing inequalities Calculating the slope of a line for a linear equation in the slope-intercept form	fractions solve evaluate graph	Homework Classroom observations (whole group) Individual observations	A.CED.2 – Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. F.BF.1 - Write a function that describes a relationship between two quantities.
How does the graph change with changing values of m and b?	Identify, write, and graph direct variations	Finding the slope of a line looking at the graph	inequalities greater than		F.BF.1a - Determine an explicit expression, a recursive process, or steps for calculation from a context.
What happens to the graph if a function if I change the values of m and b?	Write equations for lines in slope intercept form from several different pieces of given information	Understanding slope as a rate of change	greater than or equal to less than		
How can you determine if an answer is viable based on the context of the problem?	Use an equation written in slope intercept form to determine slope and y-intercept of a	Understanding the effects of changing the slope and y-intercept on the graph Determining the reasonableness of	less than or equal to		F.LE.2 - Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

	<p>function.</p> <p>Describe the effects of changing the values of m and b in a function on a graph</p> <p>Determine the viability of solutions to a linear equation or inequality in a real world context</p>	the solution in real world context			<p>S.ID.7 - Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.</p> <p>F.BF.3 - Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.</p>	
Big Idea: Systems of Equations						
Content: Mathematics		Course: Algebra-1			Unit: Digits Unit 4	
Essential questions	Content	Skill	Key terms	Assessment	CCSS	Text
<p>How can change be best represented mathematically?</p> <p>How can we use mathematical language to describe change?</p> <p>Which method to use to solve a system of equations?</p>	<p>Graphs and equations are alternative ways for depicting and analyzing patterns of change.</p> <p>Solve systems of equations by graphing</p> <p>Solve systems of equations by</p>	<p>Graphing systems of equations</p> <p>Analyzing the system</p> <p>Solving the system of equations by graphing</p> <p>Solving the system of equations by substituting</p>	<p>System of equations</p> <p>Solution</p> <p>Slope</p> <p>Y-intercept</p>	<p>Teacher created assessments</p> <p>Teacher Observations</p> <p>Rubrics</p> <p>Benchmarks</p> <p>Projects</p>	<p>A.REI.5 - Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.</p> <p>A.REI.6 - Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.</p>	Digit s

<p>How can I determine a special system by looking at a graph or an equation?</p> <p>How do you determine if a point is part of the solution to a system of linear inequalities?</p>	<p>substitution</p> <p>Represent and solve equations and inequalities graphically</p> <p>Solve systems of equations by elimination</p> <p>Solve special systems</p> <p>Determine if a point is part of the solution to a system of linear inequalities</p> <p>Determine the viability of solutions to a system of linear equations or inequalities in a real world context.</p>	<p>Solving the system of equations by elimination</p> <p>Identifying the special systems of equations</p> <p>Solving the special systems of equations</p>		<p>Progress check 1</p> <p>Progress check 2</p> <p>Homework</p> <p>Classroom observations (whole group)</p> <p>Individual observations</p>	<p>A.REI.11 - Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.</p> <p>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</p> <p>A.CED.3 – Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and viable or non-viable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.</p>	
Big Idea: Exponents and exponential functions						
Content: Mathematics		Course: Algebra-1			Unit: Digits Unit 3	

Essential questions	Content	Skill	Key terms	Assessment	CCSS	Text
How do we extend the properties of exponents to rational exponents?	Extending the concept of exponents to rational exponents	Understanding rational exponents	Exponents	Teacher created assessments	N.RN1 - Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.	Digit s
How do I create a table of values for an exponential function with an integer base whose domain is consecutive integers whose lowest and highest values have equal absolute values?	Evaluating expressions containing fractional exponents	Evaluating rational exponents	Rational numbers	Teacher Observations		
How do we evaluate expressions containing zero and integer exponents	Evaluating expressions containing zero and integer exponents	Evaluating zero and integer exponents	Base	Rubrics	N.RN2 – Rewrite expressions involving radicals and rational exponents using the properties of exponents	
How do I use multiplication properties of exponents to evaluate and simplify expressions?	Solve problems involving exponential growth and decay, including compound interest	Solving problems involving exponential growth and decay	Power	Benchmarks	F.IF.7 - Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.	
How do I use division properties of exponents to evaluate and simplify expressions?		Solving problems involving compound interest	Exponential growth	Projects		
How do I evaluate exponential functions?		Using the rules of exponents to multiply/divide	Exponential decay	Progress check 1	F.LE.5 - Interpret the parameters in a linear or exponential function in terms of a context.	
Evaluate and graph exponential functions		Simplifying expressions with exponents	Half-life	Progress check 2	F.IF.8 - Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.	
How do we solve problems		Evaluate and graph the exponential functions	Compound interest	Homework	F.LE.1 – Distinguish between situations that can be modeled with linear functions and with exponential functions.	
		Modelling or graphing exponential		Classroom observations (whole group)		
				Individual observations		

involving exponential growth and decay, including compound interest		functions				
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Big Idea: Radicals						
Content: Mathematics		Course: Algebra-1			Unit: Digits Unit 3	
Essential questions	Content	Skill	Key terms	Assessment	CCSS	Text
<p>How can we use properties of rational and irrational numbers</p> <p>How do we multiply, divide, and manipulate numerical or algebraic expressions with square roots.</p> <p>How do we add, subtract, and manipulate numerical or algebraic expressions with square roots</p>	<p>Evaluate expressions containing zero and integer exponents</p> <p>Multiply, divide, and manipulate numerical or algebraic expressions with square roots.</p>	<p>Performing operations on numerical or algebraic expressions with square roots.</p> <p>Evaluating expressions with zero and integer exponents</p> <p>Sol</p>	<p>Rational numbers</p> <p>Irrational numbers</p> <p>Square roots</p> <p>Radicals</p> <p>Exponents</p> <p>Base</p> <p>Power</p>	<p>Teacher created assessments</p> <p>Teacher Observations</p> <p>Rubrics</p> <p>Benchmarks</p> <p>Projects</p> <p>Progress check 1</p> <p>Progress check 2</p> <p>Homework</p> <p>Classroom observations (whole group)</p> <p>Individual</p>	<p>N.RN.3 - Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.</p>	<p>Digits</p>

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Big Idea: Polynomials and factoring						
Content: Mathematics		Course: Algebra-1			Unit: Digits Unit 3	
Essential questions	Content	Skill	Key terms	Assessment	CCSS	Text
How do we classify polynomials?	Finding the degree and leading coefficient of a polynomial?	Finding the highest degree of the polynomial	Polynomial Binomial	Teacher created assessments	A.SSE.1 – Interpret expressions that represent a quantity in terms of its context. A.APR.1 – Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. A.SSE.2 - Use the structure of an expression to	Digits
How do I find a degree and leading coefficient of a polynomial?	Classifying polynomials	Multiply, divide, and manipulate numerical or algebraic expressions with square roots.	Trinomial	Teacher Observations		
How do I determine if a polynomial is a monomial, a binomial, or a polynomial?	Find special products of Binomials Factor polynomials using the Greatest Common Factor	Factoring the polynomials using the GCF	Degree	Rubrics		
What terms can I combine when adding or subtracting polynomials?	Factor perfect square trinomials and the difference of two squares	Factor special product binomials		Benchmarks		
What terms can I combine when multiplying polynomials?	Choose an appropriate method for factoring polynomials	Factor perfect square trinomials		Projects		
Are there any special circumstances that need to be known when multiplying binomials?		Deciding the appropriate method to factor polynomials		Progress check 1 Progress check 2		
How do we choose an				Homework Classroom observations (whole group) Individual observations		

<p>appropriate method for factoring polynomials?</p> <p>What are the different methods for factoring polynomials and when should I use them?</p>					<p>identify ways to rewrite it.</p> <p>A.SSE.3 - Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.</p> <p>A.SSE.3a - Factor a quadratic expression to reveal the zeros of the function it defines.</p>	
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Big Idea: Quadratic equations						
Content: Mathematics		Course: Algebra-1			Unit: Digits Unit 3	
Essential questions	Content	Skill	Key terms	Assessment	CCSS	Text
<p>How do I identify a quadratic function?</p> <p>How do I determine if a quadratic function has a minimum and</p>	<p>Identify quadratic functions and determine whether they have a minimum and maximum.</p> <p>Find the zeros of a quadratic function from its graph</p>	<p>Finding the discriminant</p> <p>Determining if the function has a maximum or the minimum</p>	<p>Quadratic</p> <p>Roots</p> <p>Maxima</p> <p>Minima</p>	<p>Teacher created assessments</p> <p>Teacher Observations</p> <p>Rubrics</p>	<p>F.IF.4 - For a function that models a relationship between two quantities, interpret key</p>	<p>Digits</p>

<p>maximum?</p> <p>How do I use the graph of a quadratic function to identify the zeroes?</p> <p>How do we graph a quadratic function in the form: $y = ax^2 + bx + c$</p> <p>How do we find the vertex of a quadratic function by completing the square</p> <p>How we solve quadratics by graphing?</p> <p>How do I use the quadratic formula to solve quadratic equations?</p> <p>How do I use factoring to solve quadratic equations?</p> <p>How do I use square roots to solve quadratic equations?</p> <p>How can I solve systems involving linear and quadratic equations?</p>	<p>Graph a quadratic function in the form: $y = ax^2 + bx + c$</p> <p>Find the vertex of a quadratic function by completing the square</p> <p>Solve equations by using the quadratic formula and determine the number of solutions by using the discriminant</p> <p>Solve quadratics by graphing</p> <p>Solve quadratic equations by factoring</p> <p>Solve quadratics by using square roots</p> <p>Solve systems involving linear and quadratic equations, both algebraically and graphically.</p>	<p>Identifying the maximum or the minimum</p> <p>Finding the vertex of a quadratic function</p> <p>Solving the quadratics by graphing</p> <p>Solving by factoring</p> <p>Solving by using square roots</p> <p>Solving systems involving quadratic equations</p> <p>Using the formula to find the roots of a quadratic equations</p>	<p>Vertex</p> <p>Solution</p>	<p>Benchmarks</p> <p>Projects</p> <p>Progress check 1</p> <p>Progress check 2</p> <p>Homework</p> <p>Classroom observations (whole group)</p> <p>Individual observations</p>	<p>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 function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</p> <p>F.IF.7 - Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.</p>	
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					<p>F.IF.7a - Graph linear and quadratic functions and show intercepts, maxima, and minima.</p> <p>A.SSE.3 - Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.</p> <p>A.SSE.3b - Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.</p> <p>A.REI.4 – Solve quadratic equations in one variable.</p>	
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					<p>A.REI.4b – Solve quadratic equations by taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b</p> <p>F.IF.8 - Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.</p> <p>F.IF.8a - Use the process of factoring and completing the square in a</p>	
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					<p>quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.</p> <p>A.REI.7 - Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.</p>	
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Big Idea: Statistics and probability						
Content: Mathematics		Course: Algebra-1			Unit: Digits Unit 3	
Essential questions	Content	Skill	Key terms	Assessment	CCSS	Text

<p>How can we collect, organize, interpret and display of data that can be used to answer questions?</p>	<p>Interpreting categorical and quantitative data</p>	<p>Displaying data by graphing</p>	<p>Graphs</p>	<p>Teacher created assesments</p>	<p>S.ID.2. – Use statistics to the shape of the data distribution to compare center(median, mean) and spread (inter quartile range, standard deviation) of two or more different data sets.</p>	<p>Digits</p>
<p>How can representation of data influence decision?</p>	<p>Summarizing, representing data on a single count or measurement variable</p>	<p>Making a scatter plot</p>	<p>Two-way tables</p>	<p>Teacher Observations</p>	<p>Progress check 1</p>	
<p>How do we create a list of values that satisfies given measures of central tendency?</p>	<p>Scatter plots</p>	<p>Creating a scatter plot</p>	<p>Scatter plots</p>	<p>Rubrics</p>	<p>Progress check 2</p>	
<p>How do we create a scatter plot?</p>	<p>Two-way tables</p>	<p>Interpreting graphs</p>	<p>Trend</p>	<p>Benchmarks</p>	<p>S.ID.3 – Interpret differences in shape, center and spread in the context of the data sets, accounting for possible effects of extreme data points(outliers)</p>	
<p>How do we create two-way tables?</p>	<p>Measure of center</p>		<p>Mean</p>	<p>Projects</p>	<p>S.ID.5- Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data</p>	
<p>How do we interpret two-way tables?</p>	<p>Measures of variability</p>		<p>Median</p>	<p>Progress check 1</p>		
			<p>Mode</p>	<p>Progress check 2</p>		
			<p>Range</p>	<p>Homework</p>		
			<p>Inter quartile range</p>	<p>Classroom observations (whole group)</p>		
			<p>Standard deviation</p>	<p>Individual observations</p>		
			<p>Outliers</p>			

					<p>(including joint, marginal and conditional relative frequencies). Recognize possible associations and trends in data.</p> <p>S.ID.6 – Represent data on two quantitative variables on a scatter plot and describe how the variable are related.</p> <p>S.ID.7 – Interpret the slope(rate of change) and the interpret(constant term) of a linear model in the context of the data.</p> <p>S.ID.8- Compute (using technology) and interpret the correlation coefficient of a linear fit.</p>	
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					S.ID.9- Distinguish between correlation and causation	
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