Math
Grade 8 - Algebra I
Big Ideas

SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	JANUARY
Solving Equations and Inequalities (Cross Curricular - Science) **Learning Scale (3)**	**Linear Relationships and Graphing (Cross Curricular - Science)** **Learning Scale (3)**	**Systems of Equations and Inequalities** **Learning Scale (3)**	**Functions** **Learning Scale (3)**	**Operations With Polynomials and Factoring** **Learning Scale (3)**
FEBRUARY	**MARCH**	**APRIL**	**MAY**	**JUNE**
Graphing Quadratics **Learning Scale (3)**	**Solving Quadratics** **Learning Scale (3)**	**Graphing Nonlinear Functions** **Learning Scale (3)**	**Statistics and Data Analysis (Cross Curricular - Science)** **Learning Scale (3)**	**Applying Algebra** **(Cross Curricular - Science)** **Learning Scale (3)**

Math
Algebra
Curriculum Map

Big Idea: Solving Linear Equations and Inequalities **Month: September**

Enduring Understandings	Essential Questions	Skills	Standards	Assessments
Linear equations and inequalities can be used to model real life situations. Equations are an efficient tool to find solutions to problems and predict future outcomes. **Vocabulary:** Equations Inequalities Solutions Solve Simplify	Where are linear equations and inequalities used in everyday life? How do you create an equation to model a real life situation? How do I use solutions to solve equations? How are inequalities and equations similar or different? **Red Hot Topics:** Distributing with negatives. Work with fractions. Application Problems.	Solve multistep linear equations and inequalities. Create linear equations and inequalities based on real life examples. Solve a linear equation for a given variable. Interpret solutions in terms of the context of the problem. *Communication and Collaboration* *Critical Thinking* *Problem Solving* *Creativity and Innovation* **Suggested Modifications:** Integer solutions and coefficients. Calculator Technology assisted instruction	N.Q.1 -Use units as a way to understand problems and to guide the solution of multi-step problems. N.Q.3 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities A.SSE.1 - Interpret expressions that represent a quantity in terms of its context. A.CED.1 - Create equations and inequalities in one variable and use them to solve problems. 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. A.REI.3 - Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	**Learning Scale: 3** **Required Assessments:** Homework Daily Formative Quizzes Cumulative Unit Tests Performance Tasks **Suggested Resources:** Text Based resources Web based practice and tutorials. Teacher created materials Desmos graphing software.

Math
Grade 8 Algebra
Curriculum Map

Big Idea: Linear Relationships and Graphing **Month: October**

Enduring Understandings	Essential Questions	Skills	Standards	Assessments
Graphs and equations are alternative (and often equivalent) ways for depicting and analyzing patterns of change. Interpret linear models. Real world situations can be modeled by graphs and equations. **Vocabulary:** Slope, rate of change, x-intercept, y-intercept, slope intercept form, standard form, independent, dependent, parallel, perpendicular, scatter plot, line of best fit	What is a linear relationship? What are the different ways a linear relationship may be represented? What is the significance of a linear relationship's slope and y-intercept? How may linear relationships model real world situations? How may linear relationships help us analyze real world situations and solve practical problems? **Red Hot Topics:** Independent vs. dependent variables Labeling scales correctly	Find slope given two points. Interpret slope as the rate of change. Find the equation of a line. Model linear relationships. Graph linear relationships. Find slopes of parallel and perpendicular lines. Rearrange equations of a line into a different form. *Collaboration* *Critical Thinking* *Problem Solving* *Creativity and Innovation* **Suggested Modifications:** Small group Technology assisted instruction	A.REI.10. Find approximate solutions of linear equations by making a table of values, using technology to graph and successive approximations. A.RE1.11 Find approximate solutions of linear equations by making a table of values, using technology to graph and successive approximations. 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. F.IF6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. F.IF7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. S-ID6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related	**Learning Scale:**3 **Required Assessments:** Homework Daily Formative Quizzes Cumulative Unit Tests Performance Tasks **Suggested Resources:** Text Based resources Web based practice and tutorials. Teacher created materials Desmos graphing software.

Math
Algebra
Curriculum Map

Big Idea: Solving Systems of Linear Equations and Inequalities **Month: November**

Enduring Understandings	Essential Questions	Skills	Standards	Assessments
Systems of linear equations and inequalities can be used to model real life situations. Some systems of linear equations have 1 solution, some have no solution, and some have infinitely many solutions. The solutions to a system of linear equations in two variables correspond to points of intersection of their graphs. **Vocabulary:** System of Equations Region Half-Plane	How can you solve a system of linear equations? How can you use substitution to solve a system of linear equations? How can you use elimination to solve a system of linear equations. Can a system of linear equations have no solution? Can a system of linear equations have many solutions? How can you sketch the graph of a system of linear inequalities? **Red Hot Topics:** Picking correct variable to isolate when using substitution Distributing to whole equation when working with elimination technique.	Solve systems by graphing. Solve systems by substitution Solve systems by elimination Solve and graph systems of linear inequalities and interpret solutions Model real-life examples using systems. *Collaboration* *Critical Thinking* *Problem Solving* *Creativity and Innovation* **Suggested Modifications:** Integer solutions and coefficients. Calculator desmos.com Technology assisted instruction	8.EE.8a Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs. 8.EE.8b Solve system of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. 8.EE.8c Solve Real-world and mathematical problems leading to two linear equations in two variables. A.CED.3 Represent constraints by systems of equations and interpret solutions as viable and nonviable options in a modeling context. A.REI.5 Prove that, given a system of two equations in two variables, replacing one equations by the sum of that equation and a multiple of the other produces a system with the same solution. A.REI.6 Solve systems of linear equations exactly and approximately, focusing on pairs of linear equations in two variables. A.REI.12 Graph the solution to a linear inequality in two variables as a half-plane, and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.	**Learning Scale:** **Required Assessments:** Homework Daily Formative Quizzes Cumulative Unit Tests Performance Tasks **Suggested Resources:** Text Based resources Web based practice and tutorials. Teacher created materials Desmos graphing software.

Math
Algebra
Curriculum Map

Big Idea: Functions **Month: December**

Enduring Understandings	Essential Questions	Skills	Standards	Assessments
A function is a relationship between two quantities where each input has only one output. Equations are an efficient tool to find solutions to problems and predict future outcomes. The domain and range describe the inputs and output of a function. Functions and sequences represent real world examples. Functions may be linear or nonlinear. **Vocabulary:** Functions, Relations Domain Range Piecewise Discrete Continuous Sequences	What is the difference between functions and equations? How do I use function notation? How do I graph a function? What makes a function continuous or discrete? How can I tell whether it's a function by just looking at a graph? What are the similarities and differences between arithmetic and geometric sequences? What makes a function exponential or linear? How do I create a linear or exponential function from real world situation? **Red Hot Topics:** Compound Interest Percentage growth Piecewise functions	Write linear functions. Write and evaluate functions in function notation. Find the domain and range of nonlinear functions. Graph piecewise and absolute value functions. Form graphs form functions and vice versa. Compare functions in different forms. Write an equation for an arithmetic sequence based on a_n. *Collaboration* *Critical Thinking* *Problem Solving* *Creativity and Innovation* **Suggested Modifications:** Integer examples. Linear piecewise functions only.	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. 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. F.IF.3 - Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. F.IF.5 - Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. 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. F.IF.9 Compare properties of two functions each represented in a different way.	**Learning Scale:3** **Required Assessments:** Homework Daily Formative Quizzes Cumulative Unit Tests Performance Tasks **Suggested Resources:** Text Based resources Web based practice and tutorials. Teacher created materials Desmos graphing software.

		Technology assisted instruction		

Math
Algebra
Curriculum Map

Big Idea: Operations With Polynomials and Factoring **Month: January**

Enduring Understandings	Essential Questions	Skills	Standards	Assessments
Polynomials are the basis of many real life applications. The properties of integers apply to polynomials. Factors are a subset of a product and with the distributive property allow options in solving polynomials. The knowledge of polynomials is a basis for higher level mathematics. **Vocabulary:** Polynomial, monomial, binomial, trinomial, linear, quadratic, cubic, like	Where do we use polynomials in real life? How can polynomials be simplified and applied to solve problems? Can two algebraic expressions that appear to be different be equivalent? How does explaining a process help me to better understand the idea? **Red Hot Topics:** Factoring completely GCF	Perform operations on polynomials. Write expressions in equivalent forms to solve problems. Identify polynomials by degree and number of terms. Factor out common monomial factors, perfect-square trinomials and differences of squares. Interpret the structure of expressions. Solve polynomials in factored form. *Communication and Collaboration* *Critical Thinking* *Problem Solving* *Creativity and Innovation* **Suggested Modifications:**	N.RN.1 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. N.RN.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents. N.RN.3 Explain why 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 non-zero rational number and irrational number is irrational. A.SSE.1 Interpret expressions that represent a quantity in terms of its context. A.SSE.2 Use the structure of an expression to identify ways to rewrite. A.SSE.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. 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.APR.3 Identify zeros of polynomials when suitable factorizations are available, and	**Learning Scale: 3** **Required Assessments:** Homework Daily Formative Quizzes Cumulative Unit Tests Performance Tasks **Suggested Resources:** Text Based resources Web based practice and tutorials. Teacher created materials

terms, square root, factor, GCF		Technology assisted instruction	use the zeros to construct a rough graph of the function defined by the polynomial.	

Math
Algebra
Curriculum Map

Big Idea: Graphing Quadratics **Month: February**

Enduring Understandings	Essential Questions	Skills	Standards	Assessments

The graph of any quadratic function is a translation, rotations, stretch or shrink of the basic quadratic function $f(x) = x^2$. The vertex of a quadratic function provides the maximum or minimum output value of the function and the input at which it occurs. Every quadratic equation can be solved using the Quadratic formula The complex numbers are an extension of the real number system and have many useful applications. **Vocabulary:** vertex parabola axis of symmetry quadratic function Focus vertex form minimum value maximum value	What are the characteristics of the graph if the quadratic function $y=ax^2$. How do the values of 'a' affect the graph of $y = ax^2$. Why do satellite dishes and spotlights reflectors have parabolic shapes? How does the value of c affect the graph of $y=ax^2+c$? How can you find the vertex of the graph of $y=ax^2+bx+c$? How can you compare the growth rates, exponential, and quadratic functions? **Red Hot Topics:** Finding axis of symmetry Compare and contrast quadratic and exponential functions	Identify the characteristics of a function. Graph quadratic functions. Find foci of parabolas Write equations of parabolas with vertices at the origin given the foci. Graph quadratic functions of the form $y=ax^2+c$ and compare the graph of $y=x^2$. Find the axis of symmetry and the vertices of parabolas. Find maximum and minimum values of parabolas. *Graph quadratic functions in standard from.* *Critical Thinking* *Problem Solving* **Suggested Modifications:** Technology assisted instruction	F.BF.3 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; find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Including recognizing even and odd functions from their graphs and algebraic expressions of them. F.IF.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of quatities, and sketch graphs showing key features given a verbal description of the relatinship. F.IF.6 Calculate and interpret the average rate of change of a function over a specific interval. Estimate the rate of change from the graph F.IF.7a Graph linear and quadratic functions and show intercepts, maxima, and minima F.LE.3Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or as a polynomial function.	**Learning Scale:3** **Required Assessments:** Homework Daily Formative Quizzes Cumulative Unit Tests Performance Tasks **Suggested Resources:** Text Based resources Web based practice and tutorials. Teacher created materials Desmos graphing software.

Math
Algebra
Curriculum Map

Big Idea: Solving Quadratic Equations **Month: March**

Enduring Understandings	Essential Questions	Skills	Standards	Assessments

● Quadratic equations can be can be used to model real life situations. ● There are many different methods to solve quadratic equations. ● Quadratic equations often offer multiple solutions to a problem. **Vocabulary:** Quadratic Solutions Factoring Quadratic Formula Completing the Square	● Where do quadratic patterns occur in the real world? ● How do I apply the solutions to quadratic equations in terms of reality? ● How do I choose which way to solve a quadratic equation? ● How do the solutions to a quadratic equation relate to its graph?	● Solve quadratic equations by graphing. ● Solve quadratic equations using square roots. ● Solve quadratic equations by completing the square. ● Solve quadratic equations by using the quadratic formula. ● Apply the methods of solving quadratic equations to find solutions to real life examples. **Suggested Modifications:** ● Technology assisted instruction. ● Integer solutions and coefficients. ● Calculator	A.REI.4 Solve quadratic equations in one variable. A.CED.1 Create equations and inequalities in one variable and use them to solve problems. 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.IF.7 Graph functions expressed symbolically and show key features of the graph. A.CED.2 - Create equations and inequalities in one variable and use them to solve problems.	**Learning Scale:3** **Required Assessments:** Exit Tickets Chapter Quizzes Cumulative Unit Tests **Suggested Resources:** ● Text Based resources ● Web based practice and tutorials. ● Teacher created materials

Math
Algebra
Curriculum Map

Big Idea: Graphing Nonlinear Functions **Month: April**

Enduring Understandings	Essential Questions	Skills	Standards	Assessments
Graphs are used to depict and analyze patterns of non-linear change. Mathematics models can be used to describe physical relationships; these are often non-linear. Real world situations, involving exponential relationships can be solved using multiple representations. **Vocabulary:** exponential function, exponential growth, exponential decay, domain, range	What characterizes exponential growth and decay? How can one differentiate an exponential model from a linear model given a real world data set? What are limitations of exponential growth models? **Red Hot Topics:** Comparing linear and nonlinear functions	Construct graphs for exponential functions. Analyze and compare graphs between linear or nonlinear functions, including quadratic, exponential and other non-linear relationships. Find the solutions of nonlinear systems through graphing. Recognize when an exponential model is appropriate (growth or decay). Interpret expressions for functions in terms of the situation they model. *Communication and Collaboration* *Critical Thinking* *Problem Solving* *Creativity and Innovation* **Suggested Modifications:** Technology assisted instruction	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. F.IF.9 Interpret the parameters in a linear or exponential function in terms of a context. 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; find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. F.LE.1 Distinguish between situations that can be modeled with linear functions and with exponential functions. 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). F.LE.3 Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function. F.LE.5 Interpret the parameters in a linear or exponential function in terms of a context.	**Learning Scale: 3** **Required Assessments:** Homework Daily Formative Quizzes Cumulative Unit Tests Performance Tasks **Suggested Resources:** Text Based resources Web based practice and tutorials. Teacher created materials

Math
Algebra
Curriculum Map

Big Idea: Statistics and Data Analysis **Month: May**

Enduring Understandings	Essential Questions	Skills	Standards	Assessments
Average is the center of the data and can be found with mean, median, and mode The way data is displayed can either support or refute a point A line of best fit can be used to analyze and predict outcomes for a set of data **Vocabulary:** Measure of central tendency measure of dispersion range box-and-whisker plot quartiles interquartile range scatter plot line of fit residual linear regression correlation coefficient causation two-way table joint frequency marginal frequency.	How can you use measures of central tendency to distribute an amount evenly among a group of people? How can you measure the dispersion of a data set? How can you use a box-and-whisker plot to describe a set of data? How can you use a histogram to characterize the basic shape of distribution? How can you use data to predict an event? How can you find a line of best fit that models a data set? How can you read and make two-way tables? How can you display data in a way that helps you make decisions? **Red Hot Topics:** Quartiles with B&W Drawing best fit lines Picking best method to display data.	Find the mean, median, mode, range, and interquartile range of a set of data. Identify and remove outliers. Explain the effects of changing values in data sets. Find standard deviation of data sets. Make, interpret, and compare box-and-whisker plots and scatter plots. Describe shapes of distribution. Find lines of lit. Identify correlations of causation Make, read, and find relationships in two-way tables. Solve real-life problems **Suggested Modifications:** Technology assisted instruction	S.ID.1 Represent Data with plots on the real number line S.ID.2 Use statistics appropriate to the shape of the data distribution to compare center and spread of two or more different data sets. 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. S.ID.4 Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. S.ID.5 Summarize categorical data for two categories in two-way frequency tables. Recognize trends in sets of data. S.ID.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. S.ID.8 Compute and interpret the correlation coefficient of a linear fit. S.ID.9 Distinguish between correlation and causation. 8.SP.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. 8.SP.4 Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Use relative frequencies for rows or columns to describe associations.	**Learning Scale:** **3** **Required Assessments:** Homework Daily Formative Quizzes Cumulative Unit Tests Performance Tasks **Suggested Resources:** Text Based resources Web based practice and tutorials. Teacher created materials Desmos graphing software.

Math
Algebra
Curriculum Map

Big Idea: Applying Algebra **Month: June**

Enduring Understandings	Essential Questions	Skills	Standards	Assessments

Algebra can be used to solve problems and predict outcomes in a multitude of real world situations. Algebraic representations of a single problem can take many forms. **Vocabulary:** Application Representations Visual Modeling	How can I represent a single algebraic situation in multiple ways? When and how can I use algebra in my everyday life? How do I determine what algebraic method to employ? Is Algebra really this much fun? **Red Hot topics:** Syncing multiple representations. Fitting an equation to data.	Analyze a situation and determine how to apply algebraic reasoning. Use algebra to model real world situations. Create algebraic functions from experimental data. Connect Algebra to other subject areas. *Collaboration* *Critical Thinking* *Problem Solving* *Creativity and Innovation* **Suggested Modifications:** Technology assisted instruction	F.IF.9 Compare properties of two functions each represented in a different way F.IF.7 Graph functions expressed symbolically and show key features of the graph. S.ID.3 Interpret differences in shape, center, and spread in the context of the data sets. S.ID.5 Summarize categorical data for two categories in two-way frequency tables. S.ID.6a Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. S.ID.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. S.ID.8 Compute (using technology) and interpret the correlation coefficient of a linear fit. S.ID.9 Distinguish between correlation and causation.	**Learning Scale: 3** **Required Assessments:** Homework Daily Formative Quizzes Cumulative Unit Tests Performance Tasks Application based projects **Suggested Resources:** Text Based resources Web based practice and tutorials. Teacher created materials Internet resources. Desmos graphing software.