Mathematics Curriculum: Algebra 1

Algebra 1 Mapping

Dates	September 4- October 24, 2014		October 27 – December 22 2014		January 5 –Feb 27 2015		March 2 – Apr 24, 2014		Apr 27-June 19, 2014	
	5 Weeks Instruction	2 Weeks Assessment/ Enrichment/	5 Weeks Instruction	2 Weeks Assessment/ Enrichment/	5 Weeks Instruction	2 Weeks Assessment/ Enrichment/	5 Weeks Instruction	2 Weeks Assessment/ Enrichment/	5 Weeks Instruction	2 Weeks Assessment/ Enrichment/
Math	Unit 1	Asmnt 1/Unit 1	Unit 2	Asmnt 2/Unit2	Unit 3	Asmnt 3/Unit 3	Unit 4	Asmnt 4/Unit 4	Unit 3	Asmnt 5/Unit 5

Unit #1:

Mathematics: Algebra 1		Unit #1: Relationships Between Quantities and Reasoning with Equations 9/4/14-10/24/14	Unit #1
Standard	**Description**	**Student Learning Objectives**	**Interdisciplinary Connections/Critical Thinking**
• N.Q.1 • N.Q.2 • N.Q.3 • A.SSE.1 • A.CED.4 • A.REI.3 • A.CED.1 • A.REI.1 • A.CED.2 • A.REI.1	• Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. • Define appropriate quantities for the purpose of descriptive modeling. • Choose a level of accuracy appropriate to limitations on measurement when	• Solve multi-step problems that can be represented algebraically with accurate and appropriately defined units, scales, and models (such as graphs, tables, and data displays). • Interpret terms, factors, coefficients and	• Scale drawing activity. Students will construct a scale drawing of their home/room in their home and create a scale drawing. **Writing Assigment/Analysis** • Students will answer questions on the data collected such as: How precise an answer do we want or need? What aspects of the situation do we most need to understand, control, or optimize? What resources of time and tools do we have? The range of models that we can create and analyze is also constrained by the limitations of our mathematical, statistical, and technical skills, and our ability to recognize significant variables

	reporting quantities. • Interpret 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. • Rearrange 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. • 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. • Solve linear equations and inequalities in one variable, including	expressions (including complex linear and exponential expressions) in terms of context. • Solve linear equations and inequalities in one variable (Including literal equations). Justify each step in the process and solution. • Create linear equations and inequalities in one variable and use them to solve problems. Justify each step in the process and the solution. • Create linear equations in two or more variables to represent relationships between quantities; graph equations on	and relationships among them. Diagrams of various kinds, spreadsheets and other technology, and algebra are powerful tools for understanding and solving problems drawn from different types of real-world situations. **Business Ed/Life Skills** • Students will research trends in sales of two different cars (or any item) to compare the relationship. Students will graph data and interpret and predict future sales of the same item.

	equations with coefficients represented by letters. • Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear functions. • Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	coordinate axes with labels and scales. • Model and describe constraints with linear equations and inequalities and systems of equations and/or inequalities to determine if solutions are viable or non-viable.	

Technology

Standard	Description	Performance Task
8.1.12.C.1	Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.	Students will research a real word problem such as, increasing gas prices, and present a solution through Edmodo to create a discussion forum. The research will develop data and students must create equations to predict future trends based on the data gathered.
8.1.12.A.5	Create a report from a relational database consisting of at least two tables and describe the process, and explain the report results.	Students will research a topic of their choice that analyzes two independent variables that can be compared. Then the student will create two tables and graph both results to compare and contrast both variables.
8.2.12.D.6	Synthesize data, analyze trends and draw conclusions regarding the effect of a technology on the individual, society, or the environment and publish conclusions.	Research and gather data on the effects of technology on data gathering or stats of a specified topic. (Sports data, voting, homework etc. ..) Then present the data using trend lines and predict the effect this trend will have in the future.

Gifted and Talented

Standard	Description	Performance Task
2.1.2.	Educators provide parents/guardians with information regarding diverse characteristics and behaviors that are associated with giftedness.	Teacher will communicate to parents the requirements of the honors programs and which behaviors and characteristics are associated with being gifted and talented
3.5.2.	Educators integrate career exploration experiences into learning opportunities for students with gifts and talents, e.g. biography study or speakers.	Teacher integrates career standards into the curriculum. Gifted and talented students can be given opportunities to meet with professionals in the discipline. Math professors, scientists, etc.
3.6.1.	Teachers and administrators demonstrate familiarity with sources for high quality resources and materials that are appropriate for learners with gifts and talents.	Teacher directs students who are gifted and talented towards online resources that allow students to complete activities on basic equations.

Careers

Standard	Description	Performance Task
9.3 HT-TT.11	Design promotional packages to effectively market travel and tourism.	Students will create spreadsheets comparing expenses for different travel packages that they create using real sources. They will also create equations that can predict how much each package will cost per customer. Presentation must include a discussion on how hospitality and tourism advertise in order to promote their individual company's needs, all collected data, and graphs of each packages equations.
9.1.12.B.2	Compare strategies for saving and investing and the factors that influence how much should be saved or invested to meet financial goals.	Students will create basic equations that predict how much money must be invested in various accounts that return different amounts. Factors that should be included in equations include but are not limited to amount invested, rate of increase, and total time.
9.3.MK-MER.5	Determine and adjust prices to maximize return and meet customers' perceptions of value.	Compare similar products across different companies to analyze different returns for various companies. Use data and percent to interpret how companies use sales to distort perceptions of value to customers.

Reading/Writing

RST.9-10.9	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.	Find different financial plans through articles and test if they support their claims in the article by creating equations and graphs to display their data.
RST.9-10.10	By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently.	While solving real world problems using acceleration and velocity, understand the terminology while solving the problem.
RST.11-12.2	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.	Learn to break down data in text or real world problems to solve efficiently.

Unit #2:

Mathematics: Algebra 1		Unit #2: Linear Relationships 10/27/14-12/22/14	Unit #2
Standard	**Description**	**Student Learning Objectives**	**Interdisciplinary Connections/Critical Thinking**
• A.REI.11 • A.REI.10 • A.REI.12 • F.IF.1, • F.IF.2 • F.IF.3 • F.IF.5	• 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). • 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	• Solve systems of linear equations in two variables graphically and algebraically. Include solutions that have been found by replacing one equation by the sum of that equation and a multiple of the other. • Find approximate solutions of linear equations by making a table of values,	• WebQuest: The goal of any business is to maximize profits as products are manufactured, packaged, and shipped. Suppose a company makes two different models of a product. The deluxe model brings in a higher profit, but is more expensive and time-consuming to make. The business owner will want to determine the optimal combination of standard and deluxe model that must be made in order to maximize profits. The basis of this problem can be represented graphically by a system of linear inequalities. http://www.brookscole.com/math_d/special_features/ext/ internet_activities/wq_algebra/systems_ineqs/index.htm • Students will research a real life example using linear inequalities and will create a similar scenario. They will demonstrate all the steps to the problem and explain the graphing and shading in details. (student presentations)

	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. • 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. • Understand that	using technology to graph and successive approximations. • Graph equations, inequalities, and systems of inequalities in two variables and explain that the solution to an equation is all points along the curve, the solution to a system of linear functions is the point of intersection, and the solution to a system of inequalities is the intersection of the corresponding half-planes. • Explain and interpret the definition of functions	

	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). • Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. • Recognize that sequences are functions, sometimes	including domain and range and how they are related; correctly use function notation in a context and evaluate functions for inputs and their corresponding outputs. • Write a function for a geometric sequence defined recursively, whose domain is a subset of the integers. • Graph functions by hand (in simple cases) and with technology (in complex cases) to describe linear relationships between two	

	defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1. • Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. 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 the function.	quantities and identify, describe, and compare domain and other key features in one or multiple representations.	

Technology

Standard	Description	Performance Task
8.1.12.A.4	Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts and data from all worksheets to convey the results.	Research populations, sales, membership prices, or sport stats on the internet and create a scatter plot of the data using excel. Create a line of best fit to predict future outcomes for multiple, related topics using drawing tools.
8.1.12.A.5	Create a report from a relational database consisting of at least two tables and describe the process, and explain the report results.	After finding lines of best fit for different related data, graph all the lines on one worksheet on excel to compare and contrast the data and find points of intersection.
8.2.12.D.6	Synthesize data, analyze trends and draw conclusions regarding the effect of a technology on the individual, society, or the environment and publish conclusions.	Using excel graphs as well as different solving methods to compare the data. Use power point or another program to display the data for the public to review finding.

Reading/Writing

Standard	Description	Performance Task
RST.9-10.9	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.	Find different financial plans through articles and test if they support their claims in the article by creating equations and graphs to display their data.
RST.9-10.10	By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently.	While solving real world problems using acceleration and velocity, understand the terminology while solving the problem.
RST.11-12.2	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.	Learn to break down data in text or real world problems to solve efficiently.

Careers

Standard	Description	Performance Task
9.1.12.A.3	Analyze the relationship between various careers and personal earning goals.	Use systems of linear equations to graph job salaries to compare career choices.
9.3.12.BM.1	Utilize mathematical concepts, skills and problem solving to obtain necessary information for decision-making in business.	Research sales of a product and create a scatter plot to determine what the products worth is.
9.2.12.C.9	Analyze the correlation between personal and financial behavior and employability.	Review the levels of math that is needed for different career paths and tie the degree of math into a range needed by employment.

Differentiation-ELL/GnT

Standard	Description	Performance Task
2.1.1	Educators develop environments and instructional activities that encourage students to express diverse characteristics and behaviors that are associated with giftedness.	Student projects can range according to their interest and level of learning. Projects do not limit students to one topic.
3.1.4.	Educators design differentiated curricula that incorporate advanced, conceptually challenging, in-depth, distinctive, and complex content for students with gifts and talents.	Extensions for problems for advanced students to be challenged.
4.2.1.	Educators understand the needs of students with gifts and talents for both solitude and social interaction.	Having student present their work but not limit them to the way they present. Students can present through video, song, art, or traditionally.

Unit #3:

Mathematics: Algebra 1		**Unit #3: Expressions and Equations 1/5/15-2/27/15**	**Unit # 3**
Standard	**Description**	**Student Learning Objectives**	**Interdisciplinary Connections/Critical Thinking**
• A.SSE.1 • A.SSE.2 • A.APR.1 • F.BF.2 • A.CED.1 • A.CED.4 • A.CED.2 • A.REI.4	• Interpret 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 c. P(1+r)n as the product of P and a factor not depending on P. • Use the structure of an expression to identify ways to	• Interpret parts of expressions in terms of context including those that represent square and cube roots; use the structure of an expression to identify ways to rewrite it. • Perform addition, subtraction and multiplication with polynomials and relate it to arithmetic operations with	**Real-World/Life Skills** • a.Students will research purchasing fininacial security options such as retirement plans 401k, IRA's, etc. b. Students will use the formula: They will find the population of a City/Country in a certain year and determine the population in "n" amount of years. P represents population represents the starting population n represents the number of years **Sciences** • Students will manipulate formulas used in Physics and Chemistry and other sciences to solve problems. Student use white boards for presentation

	rewrite it. For example, see x4 – y4 as (x2)2 – (y2)2, thus recognizing it as a difference of squares that can be factored as (x2 – y2)(x2 + y2). • 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. • 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. • Create equations in two or more variables to represent relationships between quantities; graph equations on	integers. • Write linear and exponential functions (e.g. growth/decay and arithmetic and geometric sequences) from graphs, tables, or a description of the relationship, recursively and with an explicit formula, and describe how quantities increase linearly and exponentially over equal intervals. • Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and	

	coordinate axes with labels and scales. • Rearrange 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. • 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. Derive the quadratic formula from this form. b. Solve quadratic equations by inspection (e.g., for x2 = 49), taking square roots,	quadratic functions, simple rational and exponential functions and highlighting a quantity of interest in a formula. • Create linear and quadratic equations that represent a relationship between two or more variables. Graph equations on the coordinate axes with labels and scale. • Derive the quadratic formula by completing the square and recognize when there are no real solutions. • Solve quadratic equations in one variable using a	

	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 ± bi for real numbers a and b.	variety of methods [including inspection (e.g. x2 = 81), factoring, completing the square, and the quadratic formula].	

Technology

Standard	Description	Performance Task
8.1.12.A.5	Create a report from a relational database consisting of at least two tables and describe the process, and explain the report results.	Research different vehicle and speeds that can be entered into different programs using acceleration equations.
8.1.12.B.2	Apply previous content knowledge by creating and piloting a digital learning game or tutorial.	Play a jeopardy game using power point and a projector to review physic and math formulas to solve real world problems
8.1.12.C.1	Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.	Have students rearrange speed and distant formulas to calculate their distant from the school and times of arrival.

Reading/Writing

Standard	Description	Performance Task
RST.11-12.2	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.	Students will research flight plans and dialogues and calculate distances and speeds using text of flight plan.
RST.11-12.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11-12 texts and topics*.	Read a physics article and explain how the symbols used to explain theorems are also used in math.
.RST.9-10.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.	Research different formulas used in math and rearrange the terms to prove other formulas. Such as the Pythagorean theorem to prove slope.

Careers

Standard	Description	Performance Task
9.1.12.D.5	Justify the use of savings and investment options to meet targeted goals.	Create an equation that represents their own financial incomes and use substitution to find when they would reach their goal.
9.3.MK-MGT.5	Determine and adjust prices to maximize return and meet customers' perceptions of value.	Research the cost of products and selling prices to create an equation that will maximize profits.
9.3.ST.2	Use technology to acquire, manipulate, analyze and report data.	Use different weights on a cart to find the various speeds and change.

Differentiation-ELL/GnT

Standard	Description	Performance Task
1.5.1.	Educators collaborate with families in accessing resources to develop their child's talents.	Have student families participate in calculating distances and times for getting to school and deriving formulas.
3.1.1.	Educators use local, state, and national standards to align and expand Curriculum and instructional plans.	Align lesson plans accordingly with Common Core curriculum
5.7.1.	Educators provide professional guidance and counseling for individual student strengths, interests, and values.	Arrange a variety of different problems that are geared to students interest that the teacher knows of.

Unit #4:

Mathematics: Algebra 1		**Unit # 4: Quadratic Functions and Modeling 3/2/15-4/24/15**	**Unit # 4**
Standard	**Description**	**Student Learning Objectives**	**Interdisciplinary Connections/Critical Thinking**
• **F.IF.4** • **F.IF.5** • **F.IF.6** • **F.IF. 8** • **F.BF.1** • **F.LE.3** • **F.LE.5** • **S.ID.7** • **S.ID.8** • **S.ID.9** • **S.ID.5** • **S.ID.6** • **S.ID.1** • **S.ID.2** • **S.ID.3** • **S.ID.4**	• For a 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 function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. • Relate the domain of a function to its graph and, where	• Sketch the graph of a function that models a relationship between two quantities (expressed symbolically or from a verbal description) showing key features (including intercepts, minimums/maximums, domain, and rate of change) by hand in simple cases and using technology in more complicated cases and relate the domain of the function to its graph. • Calculate (over a	**Health** • Students will be put into groups and measure their arm span vs. their heights and create a scatter plot to determine the best-fitted line. **Science** • Students will be put into groups and compute the measurements for g (gravity) on each planet and find an objects weight and explain the measurements of the object on various planets. Students will create a scatter plot and find the best – fitted line.

	applicable, to the quantitative relationship it describes. 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 the function. • 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. • Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function • Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation	specified period if presented symbolically or as a table) or estimate (if presented graphically) and interpret the average rate of change of a function. • Write functions in different but equivalent forms by manipulating quadratic expressions using methods such as factoring and completing the square. • Write a function that describes a linear or quadratic relationship between two quantities given in context using an explicit expression, a recursive process, or steps for calculation and relate these functions to the model. • Compare (using graphs and	

	from a context. • Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function. • Interpret the parameters in a linear or exponential function in terms of a context.	tables) linear, quadratic, and exponential models to determine that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function, include interpretation of parameters in terms of a context.	
	• Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.	• Interpret the slope, intercept and correlation coefficient (compute using technology) of a	**The Survey Says…" Activity:** • Students will conduct a survey among the student body where they create the topic. Students will construct an appropriate graph to represent the outcome of their surveys. Utilizing online tools.

	• Compute (using technology) and interpret the correlation coefficient of a linear fit. • Distinguish between correlation and causation. • 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. • Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the	linear model. • Distinguish between correlation and causation in a data context. • Summarize and interpret categorical data for two categories in two-way frequency tables; recognize associations and trends in the data. • Represent and describe data for two variables on a scatter plot, fit a function to the data, analyze residuals (in order to informally assess fit), and use the function to solve problems. a) Uses a given function or choose a function suggested by the context. Emphasize linear and exponential models. • Represent data on the real number line (i.e. dot plots, histograms, and	• Students will compare **"Survey Says…"** activity results. Students will take their survey results and compare them to their classmates. Students will apply the measures of central tendency and analyze results. • Students will compare **"Survey Says…"** activity results. Students will take their survey results and compare them to their classmates. Students will apply the measures of central tendency and analyze results. • Students will research and gather data/statistics of populations of various countries. Compare and contrast the data, and create an analysis. • Students will gather data and create a line of best-fit for that data. Students will interpret the meaning behind the graphs of the data and make predictions for the future given the data and the best-fit line. • Students will write functions, and apply their function to make predictions on future outcomes of data collected. • Students will research and gather data about the history of time and measured Olympic events. Students will make predictions of future Olympics using the best-fit line. • Students will utilize their data/outcomes in the previous activity to determine the equation of the line of best-fit. Using the slope of the best-fit line, they will define, determine, and predict outcomes for future events. • Students will use the TI graphing calculator to analyze data collected. Students will graph

	context. Emphasize linear and exponential models. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association. • Represent data with plots on the real number line (dot plots, histograms, and box plots). • Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. • Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points	box plots) and use statistics to compare and interpret differences in shape, center, and spread in the context of the data (account for effects of outliers). • Use the mean and standard deviation of a data set to fit it to a normal distribution, estimate population percentages, and recognize that there are data sets for which such a procedure is not appropriate (use calculators, spreadsheets, and tables to estimate areas under the normal curve).	functions, best-fit lines and make interpretations based on their graphs, and analysis.

	(outliers). • Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.		

Technology

Standard	Description	Performance Task
8.1.12.A.4	Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts and data from all worksheets to convey the results.	Draw Multiple parabolas to predict the flight of a projectile and solve for the parabola to best fit the situation.
8.1.12.D.5	Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address personal, social, lifelong learning, and career needs.	Find the domain, range, average useages for technology and represent it in bar graphs or box and whisker plots to show data.
8.1.12.E.1	Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.	Research projectiles and their maximums to predict the height of different items.

Reading/Writing

Standard	Description	Performance Task
RST.9-10.9	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.	Watch and read sections of October sky to provide proof that the projectile could not reach the landing point using parabolas.
RST.9-10.10	By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently.	While solving real world problems using acceleration and velocity, understand the terminology while solving the problem.
RST.11-12.2	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.	Learn to break down data in text or real world problems to solve efficiently.

Careers

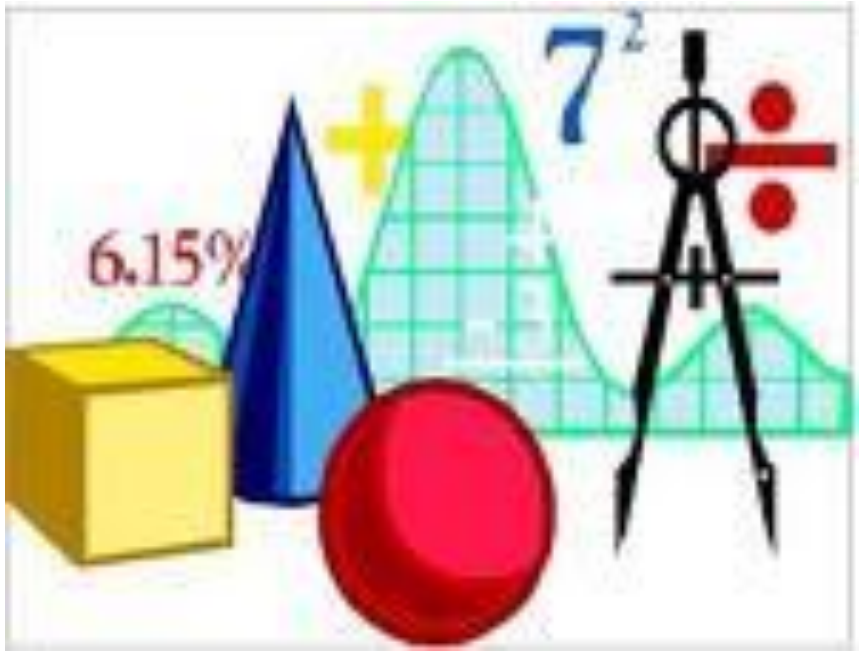
Standard	Description	Performance Task
9.1.12.A.1	Differentiate among the types of taxes and employee benefits.	Use different equations and exponential equations to show the growth of 401k's and pensions.
9.2.12.C.2	Modify Personalized Student Learning Plans to support declared career goals.	Research different jobs with benefits to create realistic equations with maximums to plan a retirement age.
9.3.MK-RES.2	Design and conduct research activities to facilitate marketing business decisions.	Research stock prices to find a domain and range of the stock as well as a average price over years.

Differentiation-ELL/GnT

Standard	Description	Performance Task
1.4.1.	Educators provide role models (e.g., through mentors, bibliotherapy) for students with gifts and talents that match their abilities and interests.	Provide math problems that relate to activates and role models that students idolize.
2.4.1	Educators use differentiated pre- and post- performance-based assessments to measure the progress of students with gifts and talents.	Students set goals for test and quizzes and review their grades after to understand their grades.
3.3.3	Educators provide opportunities for students with gifts and talents to explore, develop, or research their areas of interest and/or talent.	Don't limit the student to topics of research. Provide many examples of different topics and examples for students to use.

Curriculum Guide
for
Algebra 1

Resources by standard



North Arlington Public Schools

Content Area: Algebra 1 **Target Course/Grade level:** 9 **Unit Title:** Numbers and Quantities

Essential Questions: What are the relationships between quantities and how do we reason with equations?

Unit Overview: By the end of eighth grade, students have learned to solve linear equations in one variable and have applied graphical and algebraic methods to analyze and solve systems of linear equations in two variables. Now, students analyze and explain the process of solving an equation. Students develop fluency writing, interpreting, and translating between various forms of linear equations and inequalities, and using them to solve problems. They master the solution of linear equations and apply related solution techniques and the laws of exponents to the creation and solution of simple exponential equations.

Standards/ CPI's	**Unit Learning Targets** ***As a result of this segment of learning, students will...***	**Lessons and Activities** ***The learning experiences that will facilitate engagement and achievement***	**Evidence of Learning** ***Formative and Summative measures***	**Resources Books, articles, text, etc.**
N.Q.1	**N.Q.1** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.	**N.Q.1** Scale drawing activity. Students will construct a scale drawing of their home/room in their home and create a scale drawing.	**N.Q.1** Student finished produce and presentation. Accuracy of measurements and calculations will determine understanding	**N.Q.1** Teacher-created prompts. Textbook resources.
N.Q.2	**N.Q.2** Define appropriate quantities for the purpose of descriptive modeling.	**N.Q.2** Students will answer questions on the data collected such as: How precise an answer do we want or need? What aspects of the situation do we most need to understand, control, or optimize? What resources of time and tools do we have? The range of models that we can create and analyze is also constrained by the limitations of our mathematical, statistical, and technical		**N.Q.2** Examples: http://www.corestandards.org/the-standards/mathematics/high-school-modeling/introduction/

Content Area: Algebra 1 **Target Course/Grade level:** 9 **Unit Title:** Numbers and Quantities

Essential Questions: What are the relationships between quantities and how do we reason with equations?

		skills, and our ability to recognize significant variables and relationships among them. Diagrams of various kinds, spreadsheets and other technology, and algebra are powerful tools for understanding and solving problems drawn from different types of real-world situations.		
N.Q.3	**N.Q.3** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. *the product of P and a factor not depending on P.*	**N.Q.3** Measurement of the flagpole using shadows. Students will estimate using appropriate units and methods the height of the flagpole using shadows and ground distance.	**N.Q.3** Accuracy of estimation based on actual measurements.	**N.Q.3** Measuring tapes and prior knowledge of estimation. Teacher-created prompts.
A.CED.1	**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.*	**A.CED.1** Students will "match" a graph presented through the TI-graphing calculators. Students will utilize their calculators and prior knowledge to determine the equation of the function displayed.	**A.CED.1** Students results on graphing calculator. Group discussion and communication. Calculator displays	**A.CED.1** TI-calculator for students and TI presenter for overhead model.

Content Area: Algebra 1 **Target Course/Grade level:** 9 **Unit Title:** Numbers and Quantities

Essential Questions: What are the relationships between quantities and how do we reason with equations?

A.CED.2	**A.CED.2** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	**A.CED.2** Students will research trends in sales of two different cars (or any item) to compare the relationship. Students will graph data and interpret and predict future sales of the same item.	**A.CED.2** Student presentation results.	**A.CED.2** Internet search engine for statistics for sales. Teacher-created prompts.
A.CED.3	**A.CED.3** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*	**A.CED.3** Students will investigate two different quantities using a search engine or newspaper. They will then identify the different combinations that occur when combining the quantities. Students will graph and interpret the data.	**A.CED.3** Group discussion. Teacher-prompted responses	**A.CED.3** Venue for presentation.
A.CED.4	**A.CED.4** Rearrange 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.*	**A.CED.4** Students will list and research various formulas in Physics. They will then change the formula to solve for a specified variable and explain steps.	**A.CED.4** Students will use the white-boards to explain all results	**A.CED.4** Internet Research (search engine) and white boards

Content Area: Algebra 1 **Target Course/Grade level:** 9 **Unit Title:** Numbers and Quantities

Essential Questions: What are the relationships between quantities and how do we reason with equations?

A.REI.1	**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	**A.REI.1** Students will model different levels of equations using algebra tiles. Students will manipulate the tiles to represent given equations and proceed through the steps of solving them.	**A.REI.1** Presentation with tiles results. Directed discussion. Teacher-prompted responses	**A.REI.1** Algebra tiles. Overhead tile models.
A.REI.3	**A.REI.3** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	**A.REI.3** Students will solve equations to find all solutions to find the values of the variable to make the sentence true. They will use algebra tiles as models to develop an understanding of the addition and subtraction properties. They will expand this same understanding to the multiplication and division properties of equality	**A.REI.3** Directed discussion, Teacher-prompted responses.	**A.REI.3** http://illuminations.nctm.org/LessonDetail.aspx?ID=U144
+ N.VM.1, 2, 3	<u>Vectors</u> Represent and model with vector quantities.	Students will investigate an interactive vector game that allows the user to investigate a single-vector and a dual-vector system.	Student game scores/results	

Content Area: Algebra 1 **Target Course/Grade level:** 9 **Unit Title:** Algebra and Functions – Linear and Exponential

Essential Questions: What are Linear and Exponential relationships?

Unit Overview: In earlier grades, students define, evaluate, and compare functions, and use them to model relationships between quantities. In this unit, students will learn function notation and develop the concepts of domain and range. They explore many examples of functions, including sequences; they interpret functions given graphically, numerically, symbolically, and verbally, translate between representations, and understand the limitations of various representations. Students build on and informally extend their understanding of integer exponents to consider exponential functions. They compare and contrast linear and exponential functions, distinguishing between additive and multiplicative change. Students explore systems of equations and inequalities, and they find and interpret their solutions. They interpret arithmetic sequences as linear functions and geometric sequences as exponential functions.

Standards/ CPI's	**Unit Learning Targets** ***As a result of this segment of learning, students will...***	**Lessons and Activities** ***The learning experiences that will facilitate engagement and achievement***	**Evidence of Learning** ***Formative and Summative measures***	**Resources Books, articles, text, etc.**
N.RN.1	**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. *For example, we define 51/3 to be the cube root of 5 because we want (51/3)3 = 5(1/3)3 to hold, so (51/3)3 must equal 5.*	**N.RN.1** 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. For the first "explain", use two generic rationales, A = p/q and B = s/t. Then do the addition and multiplication, and show that the results are also rational. For the second "explain", think about what it would mean if the sum of rational A and irrational B was rational C. What then would have to be true of B = C - A? For the third "explain", do the same sort of thing with multiplication as you just did with addition.	**N.RN.1** Directed discussion, teacher-prompted responses.	**N.RN.1** Teacher-created materials, student textbook

Content Area: Algebra 1 **Target Course/Grade level:** 9 **Unit Title:** Algebra and Functions - Linear and Exponential

Essential Questions: What are Linear and Exponential relationships?

N.RN.2 **A.REI.5**	**N.RN.2** Rewrite expressions involving radicals and rational exponents using the properties of exponents. **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.	**N.RN.2** Rational Exponents and Radical Functions discusses operations and compositions of functions as well as inverse functions. Search newspapers, online advertisements, or stores to find items that have two or more discounts. The discounts can come from coupons, sales, or additional discounts given by the store if a credit card account is opened. In each case you will define the functions and find compositions of the functions. Determine which order of compositions is most beneficial to the seller and which is most beneficial to the buyer. You might expect the discounted be applied to the benefit of the seller. But you never know. You may find a mistake or two! **A.REI.5** • Rewrite a rational exponent in radical notation. • Simplify an expression that contains a rational exponent. • Use rational exponents to simplify a radical expression.	**N.RN.2** Students will be evaluated through their research, determinations, predictions and presentations. Quizzes and benchmarks will also be used. **A.REI.5** Group discussion and graphing calculators	**N.RN.2** **Internet(Rational)** **http://hawaii.hawaii.edu/math/Courses/Math110/Notes/Math110cPs3.pdf** **Project:** **http://mathstudioweb.uccollegeprep.org/UCCollegePrep/MathStudio/Projects/A2_Unit4_Project.pdf** **A.REI.5** **Internet:** http://hotmath.com/help/gt/genericalg2/section_7_6.html http://www.wtamu.edu/academic/anns/mps/math/mathlab/int_algebra/int_alg_tut38_ratexp.htm

Content Area: Algebra 1 **Target Course/Grade level:** 9 **Unit Title:** Algebra and Functions - Linear and Exponential

Essential Questions: What are Linear and Exponential relationships?

A.REI.6	**A.REI.6** Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables	**A.REI.6** System of equations: Students will get into groups and solve various systems of equations in two and three variables using substitution. The two values make up the solution of the system. They are written in the form(x, y).	**A.REI.6** Group discussion and graphing calculators	**A.REI.6** Textbook & **Kuta Software** http://www.kutasoftware.com/FreeWorksheets/Alg1Worksheets/Systems%20of%20Equations%20Substitution.pdf
A.REI.10	**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).	**A.REI.10** Students will graph several problems and self-check their results using the graphing calculator. Students will then identify whether it's a one solution, no solution or infinitely many solutions.	**A.REI.10** Student group discussion and graphing calculators.	**A.REI.10** Textbook pages 375 and 372

Content Area: Algebra 1 **Target Course/Grade level:** 9 **Unit Title:** Algebra and Functions - Linear and Exponential

Essential Questions: What are Linear and Exponential relationships?

A.REI.11	**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.	**A.REI.11/12** WebQuest: The goal of any business is to maximize profits as products are manufactured, packaged, and shipped. Suppose a company makes two different models of a product. The deluxe model brings in a higher profit, but is more expensive and time-consuming to make. The business owner will want to determine the optimal combination of standard and deluxe model that must be made in order to maximize profits. The basis of this problem can be represented graphically by a system of linear inequalities	**A.REI.11/12** Web quest results, students individually or in groups display their quest results.	**A.REI.11/12** WebQuest: http://www.brookscole.com/math_d/special_features/ext/internet_activities/wq_algebra/systems_ineqs/index.htm
A.REI.12	**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.	**A.REI.12** Students will research a real life example using linear inequalities and will create a similar scenario. They will demonstrate all the steps to the problem and explain the graphing and shading in details.	**A.REI.12** Student presentations	**A.REI.12** http://www.youtube.com/watch?v=EIrgsiRZc7s

Content Area: Algebra 1 **Target Course/Grade level:** 9 **Unit Title:** Algebra and Functions - Linear and Exponential

Essential Questions: What are Linear and Exponential relationships?

F.LE.1 **F.LE.2**	**F.LE.1** Distinguish between situations that can be modeled with linear functions and with exponential functions. a. Prove that linear functions grow by equal differences over equal intervals; and that exponential functions grow by equal factors over equal intervals. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another **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.1** Students will search for data that can be represented by linear and quadratic (exponential functions) using the internet (various search engines. Students will establish their data into the appropriate categories through presentations **F.LE.2** Students will match equations/functions with their graphs using graphing calculators/teacher-created worksheets.	**F.LE.1** Student presentation and interpretation of data **F.LE.2** Student solutions/work in groups to determine functions	**F.LE.1** Various search engines/internet and graphing calcluators. **F.LE.2** Graphing calculators, teacher-created worksheets

Content Area: Algebra 1 **Target Course/Grade level:** 9 **Unit Title:** Algebra and Functions - Linear and Exponential

Essential Questions: What are Linear and Exponential relationships?

F.LE.3	**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.3** Students will compare tables and graphs of exponential and other functions to observe that a quantity increasing exponentially exceeds all others.	**F.LE.3** Students prediction will be evaluated based on discussion and solution	**F.LE.3** Teacher-created examples, TI-calculator overhead model.
F.LE.5	**F.LE.5** Interpret the parameters in a linear or exponential function in terms of a context.	**F.LE.5** Students work in groups to interpret graphs given data and graphs that represent data. Students write analysis and interpretation to justify their findings.	**F.LE.5** Students in groups/directed discussion whiteboards, and group presentations.	**F.LE.5** Teacher-created material, white boards, graphing calculators.

Content Area: Algebra 1 **Target Course/Grade level:** 9 **Unit Title:** Statistics and Probability

Essential Questions: How do we use Descriptive Statistics?

Unit Overview: This unit builds upon prior students' prior experiences with data, providing students with more formal means of assessing how a model fits data. Students use regression techniques to describe approximately linear relationships between quantities. They use graphical representations and knowledge of the context to make judgments about the appropriateness of linear models. With linear models, they look at residuals to analyze the goodness of fit.

Standards/ CPI's	**Unit Learning Targets** ***As a result of this segment of learning, students will…***	**Lessons and Activities** ***The learning experiences that will facilitate engagement and achievement***	**Evidence of Learning** ***Formative and Summative measures***	**Resources Books, articles, text, etc.**
S.ID.1 **S.ID.2**	**S.ID.1** Represent data with plots on the real number line (dot plots, histograms, and box plots). **S.ID.2** Use statistics appropriate 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	**S.ID.1** **The Survey Says…" Activity:** Students will conduct a survey among the student body where they create the topic. Students will construct an appropriate graph to represent the outcome of their surveys. Utilizing the online tools listed. **S.ID.2** Students will compare **"Survey Says…"** activity results. Students will take their survey results and compare them to their classmates. Students will apply the measures of central tendency and analyze results.	**S.ID.1** Students will present their results to the class. Students will interpret their results during presentations. **S.ID.2** Students will hold a question/answer session with the class.	**S.ID.1** http://www.surveymonkey.com/ http://www.shodor.org/interactivate/activities/Histogram/ **S.ID.2/3** http://www.surveymonkey.com/ Student-created surveys, and presentation notes. http://www.surveymonkey.com/

Content Area: Algebra 1 **Target Course/Grade level:** 9 **Unit Title:** Statistics and Probability

Essential Questions: How do we use Descriptive Statistics?

S.ID.3	**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).	**S.ID.3** Students will compare **"Survey Says…"** activity results. Students will take their survey results and compare them to their classmates. Students will apply the measures of central tendency and analyze results.	**S.ID.3** Students discuss survey results with classmates, directed discussion and presentation preparation.	**S.ID.3** Student-created surveys, and presentation notes. Internet will be used to gather data.
S.ID.5	**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.	**S.ID.5** Students will research and gather data/statistics of populations of various countries. Compare and contrast the data, and create an analysis.	**S.ID.5** Students will display their findings on poster/white-boards and present to the class. Students will be evaluated on their analysis.	**S.ID.5** Students will utilize graphing software of their choice to create their trend lines for analysis.

Content Area: Algebra 1 **Target Course/Grade level:** 9 **Unit Title:** Statistics and Probability

Essential Questions: How do we use Descriptive Statistics?

S.ID.6	**S.ID.6** Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions or chooses a function suggested by the context. Emphasize linear and exponential models.* b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association.	**S.ID.6** Students will gather data and create a line of best-fit for that data. Students will interpret the meaning behind the graphs of the data and make predictions for the future given the data and the best-fit line. Students will write functions, and apply their function to make predictions on future outcomes of data collected. Students will research and gather data about the history of time and measured Olympic events. Students will make predictions of future Olympics using the best-fit line.	**S.ID.6** Students will present their topics to the class. Students will interpret their results and will explain and discuss their results. Evaluation of presentation, and directed discussion Students will be evaluated on their presentations of their projects	**S.ID.6** Teacher-created questions/guide discussion questions. Wikispaces.com Timetoast.com Varied search engines.

Content Area: Algebra 1 **Target Course/Grade level:** 9 **Unit Title:** Statistics and Probability

Essential Questions: How do we use Descriptive Statistics?

S.ID.7	**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.7** Students will utilize their data/outcomes in the previous activity to determine the equation of the line of best-fit. Using the slope of the best-fit line, they will define, determine, and predict outcomes for future events.	**S.ID.7** Students will be evaluated on their graph construction. Students will be evaluated on their success of predictions based on their calculations applying the equation for the best-fit line. Students will be evaluated by directed discussion and classroom presentation and participation.	**S.ID.7** Teacher-created questions/guide discussion questions
S.ID.8	**S.ID.8** Compute (using technology) and interpret the correlation coefficient of a linear fit.	**S.ID.8** Students will use the TI graphing calculator to analyze data collected. Students will graph functions, best-fit lines and make interpretations based on their graphs, and analysis.	**S.ID.8** Students will be assessed on their calculations and accuracy of their predictions. .	

Content Area: Algebra 1 **Target Course/Grade level:** 9 **Unit Title:** Expressions and Equations

Essential Questions: How do we use and evaluate equations and expressions?

Unit Overview: In this unit, students build on their knowledge from unit 2, where they extended the laws of exponents to rational exponents. Students apply this new understanding of number and strengthen their ability to see structure in and create quadratic and exponential expressions. They create and solve equations, inequalities, and systems of equations involving quadratic expressions.

A.SSE.1 **A.SSE.2**	**A.SSE.1** Interpret 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. **A.SSE.2** Use the structure of an expression to identify ways to rewrite it. *For example:* *see* $x^4 - y^4$ *as* $(x^2)^2 - (y^2)^2$ *thus recognizing it as a difference of squares that can be factored as* $(x^2 - y^2)(x^2 + y^2)$	**A.SSE.1** a.Students will research purchasing fininacial security options such as retirement plans 401k, IRA's, etc. b. Students will use the formula: $p = p_0(1.06)^n$ They will find the population of a City/Country in a certain year and determine the population in "n" amount of years. P represents population P_0 represents the starting population n represents the number of years.	**A.SSE.1** a.Students that find/determine the best plan/option that have mastered the material b.Students must justify and explain reasoning	**A.SSE.1** Internet research(search engine). Banking websites, Teacher-created prompts

Content Area: Algebra 1 **Target Course/Grade level:** 9 **Unit Title:** Expressions and Equations

Essential Questions: How do we use and evaluate equations and expressions?

A.SSE.3	. **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. Factor a quadratic expression to reveal the zeros of the function it defines. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. c. Use the properties of exponents to transform expressions for exponential functions.	**A.SSE.3** Write original problem and rearrange it to $ax^2 + bx + c = 0$ form. Find the zeros, identify max/min and calculate the discriminant. State any conclusions you can draw from it. If the problem is factorable, solve it by factoring. If the problem is not factorable, solve it by completing the square. Solve the problem using the Quadratic Formula.	**A.SSE.3** Directed discussion, teacher-prompted questions	**A.SSE.3** http://teachers.sduhsd.net/abrown/Resources/PresentationStuff/Algebra/Quadratics%20Presentations.htm

Content Area: Algebra 1 **Target Course/Grade level:** 9 **Unit Title:** Expressions and Equations

Essential Questions: How do we use and evaluate equations and expressions?

A.APR.1	**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.1** Students apply operations to polynomials. Students in groups with white boards to solve different forms of polynomials under the operations.	**A.PR.1** Student presentation and directed discussion in class. Teacher assesses group activity, discussion and presentation	**A.PR.1** Teacher-created problems, whiteboards
A.CED.1	**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.	**A.CED.1** Students apply problem-solving skills to solve problems using inequalities. Problems such as cost, inflation, etc. Students work with white boards in groups.	**A.CED.1** Students present problem solutions with white boards in class assessed by solutions and justifications	**A.CED.1** Teacher-created problems, white boards, graphing calculators
A.CED.2	**A.CED.2** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	**A.CED.2** Students graph data researched through the internet. Students must choose the appropriate graphing method to represent their data such as, bar, line, circle, etc. Students will display/present their data/graphs on white boards.	**A.CED.2** Students are assessed by data interpretation and correct graph representation. Presentation.	**A.CED.2** Internet search engines for data, white boards

Content Area: Algebra 1 **Target Course/Grade level:** 9 **Unit Title:** Expressions and Equations

Essential Questions: How do we use and evaluate equations and expressions?

A.CED.4	**A.CED.4** Rearrange 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.	**A.CED.4** Students will manipulate formulas used in Physics and Chemistry and other sciences to solve problems. Student use white boards for presentation	**A.CED.4** Students are assessed by presentation and justification of findings	**A.CED.4** Teacher-created material. Physics/science materials incorporated from PUM material
A. A.REI.4	**A.REI.4** 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. Derive the quadratic formula from this form. b. Solve quadratic equations 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. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.	**A.AREI.4** Students will apply quadratics to geometry. Finding basic area of simple and complex figures. Students will complete teacher-created problems in groups with the white board.	**A.AREI.4** Students are assessed by their interpretation and application to geometry and whiteboard presentation.	**A.AREI.4** Teacher-created material, white boards

Content Area: Algebra 1 **Target Course/Grade level:** 9 **Unit Title:** Expressions and Equations

Essential Questions: How do we use and evaluate equations and expressions?

A.REI.7	**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 $x^2 + y^2 = 3$.*	**A.REI.7** Students apply quadratics to basic geometry area and perimeter. Graphing skills are applied to help solve systems graphically as well as algebraically. Teacher-created materials/problems are used.	**A.REI.7** Students are assessed in white board presentation, applications to geometry and graphing skills	**A.REI.7** Whiteboards, teacher-created material, and online textbook resources/geometry.

Content Area: Algebra 1 **Target Course/Grade level:** 9 **Unit Title:** Quadratic Functions and Modeling

Essential Questions: How do we use mathematical modeling of functions?

Unit Overview: In preparation for work with quadratic relationships students explore distinctions between rational and irrational numbers. They consider quadratic functions, comparing the key characteristics of quadratic functions to those of linear and exponential functions. They select from among these functions to model phenomena. Students learn to anticipate the graph of a quadratic function by interpreting various forms of quadratic expressions. In particular, they identify the real solutions of a quadratic equation as the zeros of a related quadratic function. Students learn that when quadratic equations do not have real solutions the number system must be extended so that solutions exist, analogous to the way in which extending the whole numbers to the negative numbers allows x+1 = 0 to have a solution. Formal work with complex numbers comes in Algebra II. Students expand their experience with functions to include more specialized functions—absolute value, step, and those that are piecewise-defined..

Standards/ CPI's	**Unit Learning Targets** *As a result of this segment of learning, students will…*	**Lessons and Activities** *The learning experiences that will facilitate engagement and achievement*	**Evidence of Learning** *Formative and Summative measures*	**Resources** Books, articles, text, etc.
N.RN.3	**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.	**N.RN.3** • Discuss with students the definition of rational and irrational numbers. • Students will participate in an activity that will help them obtain a feeling of how numbers are related to each other. They will determine whether a number is rational or irrational. Students will explore various operations to solve problems involving rational and irrational numbers.	**N.RN.3** Students will be evaluated through class discussion, whiteboard presentation, quizzes and benchmark assessments.	**N.RN.3** http://www.quia.com/pop/37541.html?AP_rand=792227877 **II.** **http://alex.state.al.us/lesson_view.php?id=24079**

Content Area: Algebra 1 **Target Course/Grade level:** 9 **Unit Title:** Quadratic Functions and Modeling

Essential Questions: How do we use mathematical modeling of functions?

Standards/ CPI's	**Unit Learning Targets** *As a result of this segment of learning, students will…*	**Lessons and Activities** *The learning experiences that will facilitate engagement and achievement*	**Evidence of Learning** *Formative and Summative measures*	**Resources** Books, articles, text, etc.
F.IF.1 **F.IF.2**	**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)*. **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.1 & F.IF2:** Students will work in groups to identify whether each given ordered pair or equations is a function. Students will: • Evaluate equations to find pattern in functions. • Create an input-output table from a linear, quadratic, exponetial function and absolute value. • Use the input-output table to graph functions. • Explain when a relation is a function and identify the domain and range of the	**F.IF.1&F.IF2** Group discussion, teacher-prompted questions, student display results from tables.	**F.IF.1 & F.IF2** http://www.algebralab.org/lessons/lesson.aspx?file=Algebra_FunctionsRelationsIntro.xml

Content Area: Algebra 1 **Target Course/Grade level:** 9 **Unit Title:** Quadratic Functions and Modeling

Essential Questions: How do we use mathematical modeling of functions?

Standards/ CPI's	**Unit Learning Targets** *As a result of this segment of learning, students will…*	**Lessons and Activities** *The learning experiences that will facilitate engagement and achievement*	**Evidence of Learning** *Formative and Summative measures*	**Resources** Books, articles, text, etc.
F.IF.3	**F.IF.3** Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1.*	**F.IF.3** The Aussie Fir Tree uses the investigation of growing patterns as a vehicle to teach students to visualize, identify and describe real world mathematical relationships. This task asks students to recognize geometric patterns, visualize and extend the pattern, generate a non-linear sequence, develop and algebraic generalization that models the growth of a quadratic function and verify the inverse relationship of the quadratic relationship.	**F.IF.3** Student presentation, group discussion/interpretation.	**F.IF.3** http://www.algebralab.org/lessons/lesson.aspx?file=Algebra_FunctionsRelationsIntro.xml

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F.IF.4 **F.IF.5**	**F.IF.4** for a 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 function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.★ **F.IF.5** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. 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 the function.★	**F.IF.4** • **Linear:** Students will determine whether each graph shows a positive correlation, negative correlation, or no correlation. They will be given values of two variables in a set of data. Students will use the values to graph a scatter plot and approximate the best-fitting line. They will identify the slope and y-intercept of the function and whether it is increasing, decreasing, positive or negative. • **Quadratic:** Students will use the graph to identify the vertex. They will use the vertex to determine the line of symmetry and whether it is a minimum or maximum. **F.IF.5** Relations can be presented as a table, graph or mapping. Students will represent a relation and graph each ordered pair to determine the domain.	**F.IF.4** Students are evaluated through directed discussion, group activities, quizzes and benchmarks.	**F.IF.4** http://www.algebralab.org/lessons/lesson.aspx?file=Algebra_FunctionsRelationsIntro.xml **F.IF.5** **http://www.analyzemath.com/Graph-Basic-Functions/Graph-Basic-Functions.html**

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F.IF.6	**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.★	**F.IF.6** **Slope is a ratio that can be expressed as vertical change over horizontal change or change in y over change in x or rise over run.** • Students will examine the slope of a straight line by identifying two points on the graph (optional: point-slope formula). They will realize the rate of change describes how rapidly a line rises or falls as it expresses the relationship between two variables.	**F.IF.6** Student discussion and group interpretation	**F.IF.6** **http://math.rice.edu/~lanius/Algebra/stress.html** **http://regentsprep.org/REgents/math/ALGEBRA/AC1/Rate.htm**
F.IF.7	**F.IKF.7** 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 and quadratic functions and show intercepts, maxima, and minima.	**F.IF.7** **a.** Students will use a poster and a graphing calculator. • Each student will have two quadratic equations in which one is a minimum and the other is a maximum. They will find the vertex and create a chart to graph both parabolas. In the poster students will show the vertex,	**F.IF.7** Students will be evaluated on their graph presentation, and their discussion through group activity. And their comfort in the use of the graphing	**F.IF.7** **TI-Graphing calculator**

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	b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.	intercepts and min/max. They will use the graphing calculator to check their results. **b.** • Students will use the graphing calculator to graph equations using various functions such as square roots, cube roots, quadratic functions and absolute value. They will compare the graph of all equations.	calculator. Students are evaluated individually based on their use of the graphing calculator and their predictions through discussion questions	
F.IF.8	**F.IF.8** 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.	**F.IF.8** **a.** Worksheet activity: Students will rewrite the standard form of a quadratic function to the vertex form. • write the steps for completing the square; • find the zeros of a quadratic equation using the method of completing the square • understand and explain the rationale behind the strategy that is involved	**F.IF.8** Students will be assessed on their interpretation of growth and decay through their self-created word problems and presentations. Student production of real-world examples will be evaluated	**F.IF.8** **TI-Graphing Calculator**

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	b. Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$ and classify them as representing exponential growth or decay.	a. Ask students to write their own exponential growth or decay word problems, using data from periodicals or the internet. b. Students will identify examples of exponential growth and decay. Exponential growth and decay are rates; that is, they represent the change in some quantity through time. Exponential growth is any increase in a quantity (N) -- exponential decay is any decrease in N -- through time.		**Students can use various search engines on the internet. Students will be responsible for locating sources for their problems.**
F.IF.9	**F.IF.9** 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.	**F.IF.9** Students will compare the minimum and maximum of various functions.	**F.IF.9** Student directed discussion, and interpretation. In groups to present results.	

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F.BF.1	**F.BF.1** Write a function that describes a relationship between two quantities.★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.*	**F.BF.1** • Students will be put into groups and measure their arm span vs. their heights and create a scatter plot to determine the best-fitted line. • Students will be put into groups and compute the measurements for g (gravity) on each planet and find an objects weight and explain the measurements of the object on various planets. Students will create a scatter plot and find the best – fitted line.	**F.BF.1** Student group participation and discussion will be evaluated. Student predictions and results displayed on graphs.	**F.BF.1** **Tape measures/poster board/graph paper/white boards** Excel may be used here or other spreadsheet software.
F.BF.2	**F.BF.2** Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.	**F.BF.2** Excel Spreadsheet Investigation Students will use the spreadsheet to generate number sequences and patterns.	**F.BF.2** Student presentation of spreadsheet, correct formulas and spreadsheet outcome.	**F.BF.2** Page 232 # 1- 5

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F.BF.3	**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.	**F.BF.3** Students will determine whether a function is odd, even or neither algebraically and graphically. • A function is even if $g(-x) = g(x)$ for all x in the domain of g • A function is even if $f(-x) = f(x)$ for all x in the domain of f.	**F.BF.3** Prompted discussion through presented examples. Quizzes and benchmark assessments	**F.BF.3** Teacher-created examples, graphing calculator overhead model.
F.BF.4	**F.BF.4** Find inverse functions. a. Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse. *For example,* $f(x) = 2x^3$ *or* $f(x) = (x+1)/(x-1)$ *for* $x \neq 1$.	**F.BF.4** a. Students will learn how to write equations of quantities which vary inversely. They will investigate quantities and graphs of inverse relationships.	**F.BF.4** Students will be assessed on their solutions to teacher-created examples, tests/quizzes	**F.BF.4** TI-calculator, teacher-created examples