Suggested Teacher Supplies	Suggested Student Supplies
Two-Pan Algebra Balance Hands-on Algebra I kit with tiles Algebra I Flip Chart Scientific calculator Number cubes Electronic spreadsheets Geogebra (free download) and/or other geometry cad software National Library of Virtual Manipulative http://nlvm.usu.edu/en/nav/vlibrary.html (use Internet Explorer) Free virtual scientific calculator http://www.calculator.org/jcalc98.aspx	Classroom set of hands-on Algebra I kit with tiles Classroom set of scientific calculators Classroom set of number cubes Electronic spreadsheets Geogebra (free download) and/or other geometry cad software (classroom& home use) National Library of Virtual Manipulatives (classroom & home use) http://nlvm.usu.edu/en/nav/vlibrary.html (use Internet Explorer) Free virtual calculators (classroom & home use) **Suggested Student Materials** Pencils/Pens/ Colored pencils Erasers/Cap Erasers Composition notebooks/Notebook paper/Spiral Notebooks Graph paper/ Notebooks with graph paper Binder/Folder Ruler Scientific Calculator

Algebra I Suggested Activities to Support Mathematics Education

Number & Quantity

Quantities	**http://www.cpalms.org/Public/PreviewResource/Preview/48866** In this activity, students will utilize measurement data provided in a chart to calculate areas, volumes, and densities of cookies. They will then analyze their data and determine how these values can be used to market a fictitious brand of chocolate chip cookie. Finally, they will integrate cost and taste into their analyses and generate a marketing campaign for a cookie brand of their choosing based upon a set sample data which has been provided to them. **Suggested Technology:** Scientific calculators and Microsoft Word **Suggested Materials:** activity sheets (included) and mathematics formulas reference sheets **MAFS.912.N-Q.1.1:** 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. **MAFS.912.N-Q.1.2:** Define appropriate quantities for the purpose of descriptive modeling. **MAFS.912.N-Q.1.3:** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

The Real Number System	**http://www.cpalms.org/Public/PreviewResource/Preview/32542** This lesson unit is intended to help you assess how well students reason about the properties of rational and irrational numbers. In particular, this unit aims to help you identify and assist students who have difficulties with: • Finding irrational and rational numbers to exemplify general statements. • Reasoning with properties of rational and irrational numbers. **Suggested Technology:** interactive whiteboard, Scientific calculators, LCD projector, and overhead projector **Suggested Materials:** mini-whiteboards, pens, erasers, and a copy of *Rational or Irrational?* and *Rational or Irrational? (Revisited).* A copy of the task sheet *Always, Sometimes or Never True,* a copy of the *Poster Headings*, scissors, a large sheet of paper, calculator (optional) and glue sticks. **MAFS.912.N-RN.1.1** 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 $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5. **MAFS.912.N-RN.1.2** Rewrite expressions involving radicals and rational exponents using the properties of exponents.

	MAFS.912.N-RN.2.3 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.

Arithmetic with Polynomials & Rational Expressions

Algebra	**http://www.cpalms.org/Public/PreviewResource/Preview/31701** This learning activity guides students to make connections between linear and polynomial functions through exploring their graphs. This lesson plan is outlined with step-by-step directions for teachers to follow as well as guiding questions and assessment options to ensure ample feedback on students' progress and mastery levels. **Suggested Technology:** computer for presenter and Internet connection **Suggested Materials:** activity sheets (included), colored pencils, rulers, and a graphing calculator (**OPTIONAL**) **MAFS.912.A-APR.1.1** 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. Algebra I Course: Linear and quadratic

	MAFS.912.A-APR.2.3 Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.

Reasoning with Equations & Inequalities

Algebra	**http://www.cpalms.org/Public/PreviewResource/Preview/51105** Students will review the properties used in solving simple equations through a quiz-quiz-trade activity. As a class, they will then associate these properties with individual steps in solving equations. The students will then participate in a Simultaneous Round Table to practice their justifications. Finish the lesson with a discussion on the different methods that students could use to acquire the correct answer. The following day, students will take a short quiz to ensure that they understood the lesson. **Suggested Technology:** document camera **Suggested Materials:** activity sheets (included), whiteboards for each student, dry-erase markers for each student, index cards, and stickers **http://www.cpalms.org/Public/PreviewResource/Preview/51208** Students will sort various quadratic equations by the method they would use for solving (i.e. factoring, quadratic formula). Then as a class they justify their placements and eventually discover that there are many ways to solve and that some make sense in different situations, however there is no real "correct" method for each equation type. **Suggested Technology:** document camera **Suggested Materials:** activity sheets (included), for each pair of

	students one copy of Sorting Mat and one set of equations. **http://www.cpalms.org/Public/PreviewResource/Preview/32457** This lesson unit is intended to help you assess how well students are able to solve quadratics in one variable. In particular, the lesson will help you identify and help students who have the following difficulties; making sense of a real life situation and deciding on the math to apply to the problem, solving quadratic equations by taking square roots, completing the square, using the quadratic formula, and factoring, and interpreting results in the context of a real life situation. **Suggested Technology:** Scientific calculators, LCD projector, and overhead projector **Suggested Materials:** a copy of *Cutting Corners* and the *How Did You Work?* questionnaire (included), each small group of students will need an enlarged copy of the *Cutting Corners* task and a copy of each of the *Sample Responses to Discuss, calculators (optional)* **MAFS.912.A-REI.1.1** 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.Algebra I Course: Master linear; learn as general principle **MAFS.912.A-REI.2.3** Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. Algebra I Course: Linear inequalities; literal that are linear in the variables being solved for; quadratics with real solutions **MAFS.912.A-REI.2.4.a**

	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. Algebra I Course: Linear inequalities; literal that are linear in the variables being solved for; quadratics with real solutions **MAFS.912.A-REI.2.4.b** Solve quadratic equations in one variable. 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. Algebra I Course: Linear inequalities; literal that are linear in the variables being solved for; quadratics with real solutions **MAFS.912.A-REI.3.5** 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. Algebra I Course: Linear-linear and linear-quadratic **MAFS.912.A-REI.3.6** Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. Algebra I Course: Linear-linear and linear-quadratic **MAFS.912.A-REI.4.10** 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). Algebra I Course: Linear and exponential; learn as general principle

	MAFS.912.A-REI.4.11 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. Algebra I Course: Linear and exponential; learn as general principle **MAFS.912.A-REI.4.12** 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. Algebra I Course: Linear and exponential; learn as general principle

Interpreting Categorical & Quantitative Data

Statistics & Probability	**http://www.cpalms.org/Public/PreviewResource/Preview/122303** Students will enjoy this project lesson that allows them to choose and collect their own data. They will create a scatter plot and find their line of best fit. Next they write interpretations of their slope and *y*-intercept. Their final challenge is to calculate residuals and conclude whether or not their data is consistent with their linear model. **Suggested Technology:** document camera, computer for presenter, and LCD projector **Suggested Materials:** all students will need a copy of *Is My Data Linear?* project pages

	http://www.cpalms.org/Public/PreviewResource/Preview/72326 This lesson uses real world examples to help explain the meaning of slope and y-intercept of a linear model in the context of data. Literacy will also be infused during the independent practice portion of the lesson. A PowerPoint is included for guidance throughout the whole lesson and to provide visual representation for students. There are guided notes available as well to provide assistance in note-taking for students. **Suggested Technology:** document camera, computer for presenter, interactive whiteboard, LCD projector, and Microsoft Word **Suggested Materials:** activity sheets (included) **MAFS.912.S-ID.3.7** Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. **MAFS.912.S-ID.3.8** Compute (using technology) and interpret the correlation coefficient of a linear fit. **MAFS.912.S-ID.3.9** Distinguish between correlation and causation. **MAFS.912.S-ID.2.6.a** 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 context. Emphasize linear, quadratic, and exponential models.

	Algebra I Course: Linear focus, discuss general principle **MAFS.912.S-ID.2.6.b** Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. b. Informally assess the fit of a function by plotting and analyzing residuals. Algebra I Course: Linear focus, discuss general principle **MAFS.912.S-ID.2.6.c** Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. c. Fit a linear function for a scatter plot that suggests a linear association. Algebra I Course: Linear focus, discuss general principle **MAFS.912.S-ID.1.1** Represent data with plots on the real number line (dot plots, histograms, and box plots). **MAFS.912.S-ID.1.2** 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. **MAFS.912.S-ID.1.3** Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). **MAFS.912.S-ID.1.4** 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.

Seeing Structure in Expressions

Algebra	**http://www.cpalms.org/Public/PreviewResource/Preview/42120** This problem asks students to consider algebraic expressions calculating the number of floor tiles in given patterns. The purpose of this task is to give students practice in reading, analyzing, and constructing algebraic expressions, attending to the relationship between the form of an expression and the context from which it arises. The context here is intentionally thin; the point is not to provide a practical application to kitchen floors, but to give a framework that imbues the expressions with an external meaning. **Suggested Technology:** none **Suggested Materials:** activity sheets (included) **http://www.cpalms.org/Public/PreviewResource/Preview/32496** This lesson unit is intended to help you assess how well students are able to understand what the different algebraic forms of a quadratic function reveal about the properties of its graphical representation. In particular, the lesson will help you identify and help students who have the following difficulties in understanding how the factored form of the function can identify a graph's roots, how the completed square form of the function can identify a graph's maximum or minimum point, and how the standard form of the function can identify a graph's intercept. **Suggested Technology:** interactive whiteboard

	Suggested Materials: Each student will need two copies of the *Quadratic Functions* assessment task and a mini-whiteboard, pen, and eraser. Each pair of students will need *Domino Cards 1* and *Domino Cards 2*, cut into ten 'dominoes. **MAFS.912.A-SSE.1.1.b** Interpret expressions that represent a quantity in terms of its context. 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. Algebra I Course: Linear, exponential, quadratic **MAFS.912.A-SSE.1.2** Use the structure of an expression to identify ways to rewrite it. For example, see x4 – y4 as $(x^2)^2 – (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 – y^2)(x^2 + y^2)$. Algebra I Course: Linear, exponential, quadratic **MAFS.912.A-SSE.2.3.a** 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. Algebra I Course: Quadratic and exponential **MAFS.912.A-SSE.2.3.b** Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. Algebra I Course: Quadratic and exponential **MAFS.912.A-SSE.2.3.c** Choose and produce an equivalent form of an expression to reveal

	and explain properties of the quantity represented by the expression. c. Use the properties of exponents to transform expressions for exponential functions. For example the expression 1.15t can be rewritten as (1.151/12)12t ≈ 1.01212t to reveal the approximate equivalent monthly interest rate if the annual rate is 15%. Algebra I Course: Quadratic and exponential

Creating Equations

Algebra	**http://www.cpalms.org/Public/PreviewResource/Preview/38181** In this lesson, students learn how to use the graph of a system of linear inequalities to determine the feasible region. Students practice solving word problems to find the optimal solution that maximizes profits. Students will use the free application, GeoGebra (see download link under Suggested Technology) to help them create different graphs and to determine the feasible or non-feasible solutions. **Suggested Technology:** document camera, computer for presenter, computers for students, LCD projector, Adobe Acrobat Reader, Microsoft Word, Java Plugin, GeoGebra free software (download the free GeoGebra software) **Suggested Materials:** activity sheets (included), students need to be familiar with the basic functions of GeoGebra, pencils, Scientific calculators, rulers, and colored pencils **http://www.cpalms.org/Public/PreviewResource/Preview/26881** This lesson is intended to help students develop an understanding of how to solve realistic problems using two linear equations and in the process strengthen and support the skills involved in translating situations into algebraic expressions. The lesson includes printable

	materials for students to use during the lesson. **Suggested Technology:** document camera and graphing calculator **(OPTIONAL)** **Suggested Materials:** activity sheets (included), chart paper, markers, sticky notes, and graph paper **http://www.cpalms.org/Public/PreviewResource/Preview/43571** The given solutions for this task involve the creation and solving of a system of two equations and two unknowns, with the caveat that the context of the problem implies that we are interested only in non-negative integer solutions. Indeed, in the first solution, we must also restrict our attention to the case that one of the variables is further even. This aspect of the task is illustrative of mathematical practice standard MP4 (Model with mathematics), and crucial as the system has an integer solution for both situations, that is, whether or not we include the dollar on the floor in the cash box or not. **Suggested Technology:** none **Suggested Materials:** activity sheets (included) **MAFS.912.A-SSE.1.1.a** Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors, and coefficients. Algebra I Course: Linear, exponential, quadratic **MAFS.912.A-CED.1.1** 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. Algebra I Course: Linear, quadratic, and exponential (integer inputs

	only) **MAFS.912.A-CED.1.2** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. Algebra I Course: Linear, quadratic, and exponential (integer inputs only) **MAFS.912.A-CED.1.3** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods. Algebra I Course: Linear (integer inputs only) **MAFS.912.A-CED.1.4** 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. Algebra I Course: Linear, quadratic, and exponential (integer inputs only)

Interpreting Functions

Functions	**http://www.cpalms.org/Public/PreviewResource/Preview/31798** This lesson asks students to use graphs, tables, number lines, verbal descriptions, and symbols to represent the domain of various functions. The material allows students to examine and utilize connections between a function's symbolic representation, a function's graphical representation, and a function's domain.

	Suggested Technology: graphing calculator **(OPTIONAL)** and Adobe Acrobat Reader **Suggested Materials:** activity sheets (included) **http://www.cpalms.org/Public/PreviewResource/Preview/32523** This lesson unit is intended to help you assess how well students are able to translate between graphs and algebraic representations of polynomials. In particular, this unit aims to help you identify and assist students who have difficulties in recognizing the connection between the zeros of polynomials when suitable factorizations are available, and graphs of the functions defined by polynomials as well as recognizing the connection between transformations of the graphs and transformations of the functions obtained by replacing(x) by $f(x + k)$, $f(x) + k$, $-f(x)$, $f(-x)$. **Suggested Technology:** LCD projector and overhead projector **Suggested Materials:** Each student will need a mini-whiteboard, pen, and eraser, and a copy of *Cubic Graphs and Their Equations* and *Cubic Graphs and Their Equations (revisited).* Each small group of students will need cut-up cards *Cubic Graphs*, *Cubic Functions* and *Statements to Discuss: True or False?,* a large sheet of poster paper, and a glue stick. You may want to enlarge the cards and/or copy them onto transparencies to be used on an overhead projector to support the whole-class discussion. **http://www.cpalms.org/Public/PreviewResource/Preview/38991** This is a great lab activity that allows students to develop a true understanding of slope as a rate of change. Students are active and involved and must use higher order thinking skills in order to answer questions. Students work through an activity, measuring heights of

	cups that are stacked. Students them determine a "rate of change-slope". Students are then asked to put this into slope-intercept form. The important part here is in their determining the y-intercept of the equation. Students then take this further and finally attempt to create a linear inequality to determine how many cups, stacked vertically, will fit under a table. **Suggested Technology:** none **Suggested Materials:** Each group of 3 or 4 students will need 5 Styrofoam cups (with lids preferred) and rulers **http://www.cpalms.org/Public/PreviewResource/Preview/32452** This lesson unit is intended to help you assess how well students are able to articulate verbally the relationships between variables arising in everyday contexts, translate between everyday situations and sketch graphs of relationships between variables, interpret algebraic functions in terms of the contexts in which they arise and reflect on the domains of everyday functions and in particular whether they should be discrete or continuous. **Suggested Technology:** graphing calculator and interactive whiteboard **Suggested Materials:** Each student will need a copy of *Four Situations* and *Another Four Situations* and a mini-whiteboard, pen, and eraser. Each small group of students will need cut-up card sets: Everyday Situations 1, 2, and 3; Graphs 1 and 2; and Algebraic Functions, poster paper, glue, and a graphing calculator to check answers. There is a projector resource to support whole-class discussions. You may also want to copy the card sets onto transparencies to be used on an overhead projector. **http://www.cpalms.org/Public/PreviewResource/Preview/46505**

	This is an entry lesson into quadratic functions and their shapes. Students see many real-life representations of parabolas. This lesson provides important vocabulary associated with quadratic functions and their graphs in an interactive manner. Students create a foldable and complete a worksheet using their foldable notes. **Suggested Technology:** document camera, LCD projector, and overhead projector **Suggested Materials:** activity sheets (included) **MAFS.912.F-IF.1.1** 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). Algebra I Course: Learn as general principle; focus on linear and exponential and on arithmetic and geometric sequences **MAFS.912.F-IF.1.2** Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. Algebra I Course: Learn as general principle; focus on linear and exponential and on arithmetic and geometric sequences **MAFS.912.F-IF.1.3** 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 $n \geq 1$. Algebra I Course: Learn as general principle; focus on linear and exponential and on arithmetic and geometric sequences **MAFS.912.F-IF.2.4** 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. Algebra I Course: Linear, exponential, and quadratic **MAFS.912.F-IF.2.5** 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. Algebra I Course: Linear, exponential, and quadratic **MAFS.912.F-IF.2.6** 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. Algebra I Course: Linear, exponential, and quadratic **MAFS.912.F-IF.3.9** 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. Algebra I Course: Linear, exponential, quadratic, absolute value, step, piecewise-defined **MAFS.912.F-IF.3.7.a** 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. Algebra I Course: Linear, exponential, quadratic, absolute value, step, piecewise-defined **MAFS.912.F-IF.3.7.b** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. Algebra I Course: Linear, exponential, quadratic, absolute value, step, piecewise-defined **MAFS.912.F-IF.3.7c** c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. **MAFS.912.F-IF.3.7e** e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period,

	midline, and amplitude, and using phase shift. **MAFS.912.F-IF.3.8.a** 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. Algebra I Course: Linear, exponential, quadratic, absolute value, step, piecewise-defined **MAFS.912.F-IF.3.8.b** Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. b. Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as y =, y =, y =, y =, and classify them as representing exponential growth or decay.

Building Functions

Functions	**http://www.cpalms.org/Public/PreviewResource/Preview/76488** Students use information about credit card Annual Percentage Rate (APR), introductory APR, balance transfer fees and APR, and special offers such as frequent flyer miles or "cash back" to determine which card is the best to help a college student pay expenses and begin establishing a credit rating. **Suggested Technology:** Scientific calculators **Suggested Materials:** activity sheets (included), pencils, and paper **http://www.cpalms.org/Public/PreviewResource/Preview/42436**

	The context of this example is the spread of a flu virus on campus and the related sale of tissue boxes sold. Students interpret the composite function and determine values simply by using the tables of values. **Suggested Technology:** none **Suggested Materials:** activity sheets (included) **MAFS.912.F-BF.1.1.a** 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. Algebra I Course: Linear, exponential, and quadratic **MAFS.912.F-BF.1.1.b** Write a function that describes a relationship between two quantities. 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. Algebra I Course: Linear, exponential, and quadratic **MAFS.912.F-BF.1.1.c** Write a function that describes a relationship between two quantities. c. Compose functions. For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.

	MAFS.912.F-BF.2.3 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. Algebra I Course: Linear, exponential, quadratic, and absolute value

Linear, Quadratic, & Exponential Models

Functions	**http://www.cpalms.org/Public/PreviewResource/Preview/32452** This lesson unit is intended to help you assess how well students are able to articulate verbally the relationships between variables arising in everyday contexts, translate between everyday situations and sketch graphs of relationships between variables, interpret algebraic functions in terms of the contexts in which they arise and reflect on the domains of everyday functions and in particular whether they should be discrete or continuous. **Suggested Technology:** graphing calculator **(OPTIONAL)** and interactive whiteboard **Suggested Materials:** Each student will need a copy of *Four Situations* and *Another Four Situations* and a mini-whiteboard, pen, and eraser. Each small group of students will need cut-up card sets: Everyday Situations 1, 2, and 3; Graphs 1 and 2; and Algebraic Functions, poster paper, glue, and a graphing calculator **(OPTIONAL)** to check answers. There is a projector resource to support whole-class discussions. You may also want to copy the card sets onto transparencies to be used on an overhead projector.

	http://www.cpalms.org/Public/PreviewResource/Preview/31999 The purpose of this lesson is to engage and excite students about financial investments, and to educate them about credit card and other debt. **Suggested Technology:** computer for presenter, computers for students, Internet connection, scientific calculators, and LCD projector **Suggested Materials:** activity sheets (included) **http://www.cpalms.org/Public/PreviewResource/Preview/28034** Exponential growth is keenly applicable to a variety of different fields ranging from cell growth in biology, nuclear chain reactions in physics to computational complexity in computer science. In this *video-based lesson*, through various examples and activities, we have tried to compare exponential growth to polynomial growth and to develop an insight about how quickly the number can grow or decay in exponentials. A basic knowledge of scientific notation, plotting graphs and finding intersection of two functions is assumed. It would be better if the students have done pre-calculus, though this is not a requirement. The lesson is about 20 minutes, interspersed with simple activities that can require up to half an hour. The webpage for this video also includes tabs where additional resources and information can be found. These include a Teacher's Guide, a Powers of 2 table, links to other helpful lessons and resources, a transcript of the video, and even an option to download the video. **Suggested Technology:** computer for presenter, Internet connection, LCD projector, Adobe Flash Player, Adobe Acrobat Reader, and Microsoft Word **Suggested Materials:**

	http://blossoms.mit.edu/resources/math_resources (view link provided) **MAFS.912.F-LE.1.1.a** 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. **MAFS.912.F-LE.1.1.b** Distinguish between situations that can be modeled with linear functions and with exponential functions. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. **MAFS.912.F-LE.1.1.c** Distinguish between situations that can be modeled with linear functions and with exponential functions. c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another. **MAFS.912.F-LE.2.5** Interpret the parameters in a linear or exponential function in terms of a context. Algebra 1 Course: Linear and exponential of form $f(x)=b^{x+k}$ **MAFS.912.F-LE.1.3** Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.

	<u>MAFS.912.F-LE.1.2</u> 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).