High School---Algebra	Introduced	Practiced	Mastered
Number and Quantity Overview			
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.*			
2. Rewrite expressions involving radicals and rational exponents using the properties of exponents.			
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.			
Quantities			
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.			
2. Define appropriate quantities for the purpose of descriptive modeling.			
3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.			
The Complex Number System			
1. Know there is a complex number *i* such that *i* 2 = –1, and every complex number has the form *a* + *bi* with *a* and *b* real.			
2. Use the relation *i* 2 = –1 and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.			
3. (+) Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.			
4. (+) Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number.			
5. (+) Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. *For example,* (–1 + √3 i)3 = 8 *because* (–1 + √3 i) *has modulus* 2 *and argument* 120°.			
6. (+) Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.			
7. Solve quadratic equations with real coefficients that have complex solutions.			
8. (+) Extend polynomial identities to the complex numbers. *For example, rewrite x* 2 + 4 *as* (*x* + 2*i*)(*x* – 2*i*).			
9. (+) Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.			

High School---Algebra (page 2)	**Introduced**	**Practiced**	**Mastered**
Seeing Structure in Expressions			
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.*			
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).			
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. *For example the expression* 1.15t *can be rewritten as* (1.151/12)12*t* ≈ 1.01212t *to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*			
4. Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. *For example, calculate mortgage payments.* ★			
Arithmetic with Polynomials and Rational Expressions			
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.			
2. Know and apply the Remainder Theorem: For a polynomial *p* (*x*) and a number *a* , the remainder on division by *x* – *a* is *p* (*a*), so *p* (*a*) = 0 if and only if (*x* – *a*) is a factor of *p* (*x*).			
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.			
4. Prove polynomial identities and use them to describe numerical relationships. *For example, the polynomial identity* (*x* 2 + *y* 2)2 = (*x* 2 – *y* 2)2 + (2*xy*)2 *can be used to generate Pythagorean triples.*			
5. (+) Know and apply the Binomial Theorem for the expansion of (*x* + *y*)n in powers of *x* and *y* for a positive integer *n* , where *x* and *y* are any numbers, with coefficients determined for example by Pascal's Triangle.			
6. Rewrite simple rational expressions in different forms; write *a* (*x*)/*b* (*x*) in the form *q* (*x*) + *r* (*x*)/*b* (*x*), where *a* (*x*), *b* (*x*), *q* (*x*), and *r* (*x*) are polynomials with the degree of *r* (*x*) less than the degree of *b* (*x*), using inspection, long division, or, for the more complicated examples, a computer algebra system.			
7. (+) Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.			

High School---Algebra (page 3)	**Introduced**	**Practiced**	**Mastered**
Creating Equations★			
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.*			
2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.			
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.*			
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.*			
Reasoning with Equations and Inequalities			
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.			
2. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.			
3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.			
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.			
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.			
6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.			
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.*			
8. (+) Represent a system of linear equations as a single matrix equation in a vector variable.			
9. (+) Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension 3 × 3 or greater).			
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).			
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.★			
12. Graph the solutions to a linear inequality in two variables as a halfplane (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.			