Course Name:	Algebra 1		
Credits:	1		
Prerequisites:	N/A		
Description:	This course is designed to introduce the student to the topics needed to go into the upper level Algebra courses. It stresses rational expressions and problem solving with variables, number sets and real numbers, solving linear equations, graphing linear equations, writing linear equations, solving and graphing linear inequalities, systems of linear equations and inequalities, exponential functions, polynomials and factoring, rational expressions and equations, matrices, and radicals.		
Academic Standards:	Wisconsin State Standards in Mathematics (2011)		
Units:	Unit Length:	Unit Standards:	Unit Outcomes:
Solving Linear Equations	12 Days	HSA-CED.A.1, HSA-REI.A.1, HSA-REI.B.3, HSA-Q.A.1, HSA-CED.A.4	Students will be able to solve various equations; including one, two, and multi-step equations, equations with variables on both sides, as well as absolute value equations. Students will also practice manipulating equations to solve for different variables.
Solving Linear Inequalities	12 Days	HSA-CED.A.1, HSA-REI.B.3	Students will apply the knowledge acquired solving equations to the solving of linear inequalities.
Graphing Linear Functions	14 Days	HSF-IF.A.1, HSA-CED.A.2, HSA-REI.D.10, HSA-IF.B.5, HSF-IF.C.7a, HSF-LE.A.1b, HSA-IF.A.1, HSF-IF.A.2, HSF-IF.C.9, HSF-IF.B.4, HSF-BF.B.3, HSF-IF.C.7b, HSA-LE.B.5	Applying the knowledge from the previous two chapters, students will be exploring the linear functions in standard form as well as the absolute value equations.
Writing Linear Functions	13 Days	HSA-CED.A.2, HSF-BF.A.1a, HSF-LE.A.1b, HSF-LE.A.2, HSF-IF.A.3, HSF-BF.A.2, HSA-REI.D.10, HSF-IF.C.7b	Students will be able to write equations in different forms given different situations. The situations will include scatter plots, given two points, given the slope and a point, given a scatter plot, and an arithmetic sequence.
Solving Systems of Linear Equations	11 Days	HSA-CED.A.3, HSA-REI.C.6, HSA-REI.C.5, HSA-REI.D.12	After this unit, students will be able to solve systems of linear equations using different methods. They will be able to also solve systems of linear inequalities.
Exponential Functions	12 Days	HSN-RN.A.2, HSN-RN.A.1, HSA-CED.A.2, HSF-IF.B.4, HSF-IF.C.7e, HSF-IF.C.9, HSF-BF.A.1a, HSF-BF.B.3, HSF-LE.A.1a, HSF-LE.A.2, HSA-SSE.B.3c, HSF-IF.C.8b, HSF-LE.A.1c, HSA-REI.A.1, HSA-REI.D.11, HSF-IF.A.3, HSF-BF.A.2, HSF-LE.A.2, HSF-IF.A.3	Students will become familiar with exponential functions and their properties. There will many opportunities for students to see the real world applications of exponential functions especially growth and decay functions.
Polynomial Equations and Factoring	14 Days	HSA-APR.A.1, HSA-APR.B.3, HSA-REI.B.4b, HSA-SSE.A.2, HSA-SSE.B.3a	In this unit, students will take a deep dive into factoring and all of its components. At the conclusion of this unit, students will be well prepared to tackle the problems presented in more advanced algebra courses in the area of factoring and solving polynomials.

Graphing Quadratic Functions	11 Days	HSA-CED.A.2, HSF-IF.C.7a, HSF-BF.B.3, HSF-IF.C.9, HSF-IF.B.4, HSF-BF.A.1a, HSA-SSE.B.3a, HSA-APR.B.3, HSF-IF.C.8a, HSG-IF.B.6, HSF-LE.A.3	At the end of this unit students will be more comfortable with the graphs of quadratic equations and also be able to apply knowledge of the shifts to the graphs created by changes to the form. They will also be adept at comparing the graphs of the different types of equations studied in the previous units (linear, exponential, and quadratic).
Solving Quadratic Equations	12 Days	HSN-RN.A.2, HSN-RN.B.3, HSF-IF.C.7a, HSA-CED.A.1, HSA-CED.A.4, HSA-REI.B.4b, HSA-SSE.B.3b, HSA-REI.B.4a, HSF-IF.C.8a, HSA-REI.C.7, HSA-REI.D.11	Students will be able to solve quadratic equations in different forms. They will also be able to manipulate the equations to get them into a manageable form.
Radical Functions and Equations	7 Days	HSA-CED.A.2, HSF-IF.B.4, HSF-IF.B.6, HSF-IF.C.7b, HSF-IF.C.9, HSA-CED.A.1, HSF-BF.B.4a	Students will evaluate, compare, and graph square root and cube root functions. They will solve radical equations and identify extraneous solutions. Students will also relate the functions to real-world situations. They will also find inverses of relations, linear, and nonlinear functions.

Unit Name: **Solving Linear Equations**	**Length:** 12 days
Standards: HSA-CED.A.1, HSA-REI.A.1, HSA-REI.B.3, HSA-Q.A.1, HSA-CED.A.4	**Outcomes:** Students will be able to solve various equations; including one, two, and multi-step equations, equations with variables on both sides, as well as absolute value equations. Students will also practice manipulating equations to solve for different variables.
Essential Questions: How do you use simple equations to solve real-life problems? How can you solve an absolute value equation? How can you use a formula for one measurement to write a formula for a different measurement?	**Learning Targets:** Students will be successful at taking the simple one-step equations and applying the techniques to solve more complicated equations as well as manipulating equations to solve for different variables.
Topic 1: **Solving Simple/Multi-Step Equations**	**Length:** 6 days
Standard(s): HSA-CED.A.1, HSA-REI.A.1, HSA-REI.B.3, HSA-Q.A.1	**Academic Vocabulary:** equation, linear equation in one variable, solution, inverse operations, equivalent equations
Lesson Frame:	We will explore linear equations using addition and subtraction.
	I will successfully solve linear equations using addition and subtraction.
Lesson Frame:	We will explore linear equations using multiplication and division.
	I will successfully solve linear equations using multiplication and division.
Lesson Frame:	We will explore real world applications of linear equations.
	I will successfully solve linear equations with real world applications.
Lesson Frame:	We will explore multi-step equations.
	I will successfully solve multi-step equations.
Performance Tasks: Students will be able to solve various linear equations.	Notes:
Topic 2: **Solving Absolute Value Equations**	**Length:** 2 days
Standard(s): HSA-CED.A.1, HSA-REI.B.3	**Academic Vocabulary:** absolute value equation, extraneous solutions
Lesson Frame:	We will explore absolute value equations and their applications.
	I will successfully solve absolute value equations.
Performance Tasks: Students will explore different applications of absolute value equations, including industrial and practical situations.	Notes:

Topic 3: **Rewriting Equations and Formulas**	**Length:** 2 days
Standard(s): HSA-CED.A.4	**Academic Vocabulary:** literal equation, formula
Lesson Frame:	We will explore literal equations and their applications.
	I will be able to manipulate literal equations to solve for different variables.
Performance Tasks: Students will use manipulatives and other tools to solve equations for different variables.	Notes:

Unit Name: **Solving Linear Inequalities**	**Length:** 12 days
Standards: HSA-CED.A.1, HSA-REI.B.3	**Outcomes:** Students will apply the knowledge acquired solving equations to the solving of linear inequalities.
Essential Questions: How can you use an inequality to describe a real-life statement? How can you use operations to solve an inequality? How can you use inequalities to describe intervals on the real number line?	**Learning Targets:** Students will use many of the same techniques used previously to solve inequalities. They will also practice using a number line to display the solutions to inequalities. Students will be adept at discussing the difference between the special cases of no solution and all real solutions for inequalities.
Topic 1: **Basics of Inequalities**	**Length:** 2 days
Standard(s): HSA-CED.A.1	**Academic Vocabulary:** inequality, solution of an inequality, solution set, graph of an inequality
Lesson Frame:	We will practice writing and solving linear inequalities.
	I will be able to solve and display the solutions to linear inequalities.
Performance Tasks: Students will practice solving and displaying the solutions to linear inequalities in various ways.	Notes:
Topic 2: **Solving Linear Inequalities**	**Length:** 4 days
Standard(s): HSA-CED.A.1, HSA-REI.B.3	**Academic Vocabulary:** equivalent inequalities
Lesson Frame:	We will apply the knowledge of multi-step equations to that of inequalities.
	I will solve multi-step inequalities.
Lesson Frame:	We will explore the meaning of the all real solutions and no real solutions for inequalities.
	I will be able to discern the difference between no solution and all real solutions for inequalities.
Performance Tasks: Students will use many different methods to solve both single and multi-step inequalities.	Notes:
Topic 3: **Solving Compound Inequalities**	**Length:** 2 days
Standard(s): HSA-CED.A.1, HSA-REI.B.3	**Academic Vocabulary:** compound inequality
Lesson Frame:	We will explore the writing and solving of compound inequalities.
	I will be able to write and solve compound inequalities.
Lesson Frame:	We will use compound inequalities in real-world situations.
	I will apply knowledge around compound inequalities to real world problems.

Performance Tasks: Students will explore and explain to others the real world applications of compound inequalities.	Notes:
Topic 4: **Solving Absolute Value Inequalities**	**Length:** 2 days
Standard(s): HSA-CED.A.1, HSA-REI.B.3	**Academic Vocabulary:** absolute value inequality, absolute deviation
Lesson Frame:	We will explore absolute value inequalities.
	I will solve absolute value inequalities especially those problems with real world application.
Performance Tasks: Students will use technology to explore the application of absolute deviation to many real world problems.	Notes:

Unit Name: **Graphing Linear Functions**	**Length:** 14 days
Standards: HSF-IF.A.1, HSA-CED.A.2, HSA-REI.D.10, HSA-IF.B.5, HSF-IF.C.7a, HSF-LE.A.1b, HSA-IF.A.1, HSF-IF.A.2, HSF-IF.C.9, HSF-IF.B.4, HSF-BF.B.3, HSF-IF.C.7b, HSA-LE.B.5	**Outcomes:** Applying the knowledge from the previous two units, students will be exploring the linear functions in standard form as well as the absolute value equations.
Essential Questions: What is a function? How can you use function notation to represent a function? How can you describe the graph of the equation y = mx +b? How can you transform a parent function?	**Learning Targets:** Students will be able to recognize a function using various methods. They will also be able write a function using function notation. Students will be able to describe the graph of a linear function and any transformations of it. They will also be able to graph absolute value functions.
Topic 1: **Functions/Linear Functions**	**Length:** 6 days
Standard(s): HSF-IF.A.1, HSA-CED.A.2, HSA-REI.D.10, HSA-IF.B.5, HSF-IF.C.7a, HSF-LE.A.1b, HSA-IF.A.1, HSF-IF.A.2, HSF-IF.C.9	**Academic Vocabulary:** relation, function, domain, range, independent variable, dependent variable, linear equation in two variables, linear function, nonlinear function, solution of a linear equation in two variables, discrete domain, continuous domain, function notation
Lesson Frame:	We will explore the idea of functions.
	I will be able to determine if a relation is a function by looking at its graph, its ordered pairs, or its input/output table.
Lesson Frame:	We will explore linear functions.
	I will be able to describe a linear function using academic vocabulary.
Lesson Frame:	We will apply function notation to solving equations.
	I will be able to solve and graph functions using function notation.
Performance Tasks: Using graphing software, students will be able to graph and solve linear functions.	Notes:
Topic 2: **Graphing Linear Equations**	**Length:** 3 days
Standard(s): HSA-CED.A.2, HSF-IF.C.7a, HSF-IF.B.4, HSA-LE.B.5	**Academic Vocabulary:** standard form, x-intercept, y-intercept, slope, rise, run, slope-intercept form, constant function
Lesson Frame:	We will explore standard form and the intercepts of linear functions.
	I will be able to graph linear functions in standard form.
Performance Tasks: Using graphing software, students will explore the changes made to a linear function by changing the x and y intercepts.	Notes:

Topic 3: Transformations of Graphs/Absolute Value Graphs	**Length:** 3 days
Standard(s): HSA-CED.A.2, HSA-REI.D.10, HSF-IF.C.7a, HSF-BF.B.3, HSF-IF.C.7b	**Academic Vocabulary:** family of functions, parent function, transformation, translation, reflection, horizontal shrink/stretch, vertical shrink/stretch, absolute value function, vertex, vertex form
Performance Tasks:	Notes:

Unit Name: **Writing Linear Functions**	**Length:** 13 days
Standards: HSA-CED.A.2, HSF-BF.A.1a, HSF-LE.A.1b, HSF-LE.A.2, HSF-IF.A.3, HSF-BF.A.2, HSA-REI.D.10, HSF-IF.C.7b	**Outcomes:** Students will be able to write equations in different forms given different situations. The situations will include scatter plots, given two points, given the slope and a point, given a scatter plot, and an arithmetic sequence.
Essential Questions: Given the graph of a linear function, how can you write an equation of a line? How can you write an equation of a line when you are given the slope and a point on the line? How can you recognize lines that are parallel and perpendicular? How can you use an arithmetic sequence to describe a pattern? How can you describe a function that is represented by more than one equation?	**Learning Targets:** Students will be able to evaluate different situations and choose the appropriate model for the linear equation. Students will also be able to analyze scatter plots to recognize patterns. Students will also be able to write equations of parallel and perpendicular lines.
Topic 1: **Writing Equations in Slope-Intercept and Point-Slope Form**	**Length:** 4 days
Standard(s): HSA-CED.A.2, HSF-BF.A.1a, HSF-LE.A.1b, HSF-LE.A.2	**Academic Vocabulary:** linear model, point-slope form, slope-intercept form,
Lesson Frame:	We will explore linear models for real world situations.
	I will be able to write a linear model for a situation.
Lesson Frame:	We will write equations in slope-intercept form.
	I will be able to write equations in slope-intercept form.
Lesson Frame:	We will write equations in point-slope form.
	I will be able to write equations in point-slope form given different situations.
Performance Tasks: Students will use graphing software to analyze linear models.	Notes:
Topic 2: **Parallel and Perpendicular Lines**	**Length:** 2 days
Standard(s): HSA-CED.A.2, HSF-LE.A.2	**Academic Vocabulary:** parallel lines, perpendicular lines
Lesson Frame:	We will explore equations of parallel and perpendicular lines.
	I will be able to write the equations of parallel and perpendicular lines.
Performance Tasks: Analyze the slopes and graphs of parallel and perpendicular lines.	Notes:
Topic 3: **Arithmetic Sequences**	**Length:** 2 days

Standard(s): HSF-IF.A.3, HSF-BF.A.2, HSF-BF.A.1a, HSF-LE.A.2,	**Academic Vocabulary:** sequence, term, arithmetic sequence, common difference
Lesson Frame:	We will write arithmetic sequences and analyze patterns.
	I will be able to discern if a graph or set of ordered pairs is an arithmetic sequence.
Performance Tasks: Analyzing graphs of arithmetic and non-arithmetic sequences.	Notes:
Topic 4: **Piecewise Functions**	**Length:** 3 days
Standard(s): HSA-CED.A.2, HSA-REI.D.10, HSF-IF.C.7b	**Academic Vocabulary:** piecewise function, step function
Lesson Frame:	We will explore piecewise functions.
	I will be able to evaluate and graph piecewise functions.
Lesson Frame:	We will explore piecewise functions.
	I will be able to write piecewise and step functions.
Performance Tasks: Using graphing software, students will be able to graph and analyze piecewise and step functions.	Notes:

Unit Name: **Solving Systems of Linear Equations**	**Length:** 11 days
Standards: HSA-CED.A.3, HSA-REI.C.6, HSA-REI.C.5, HSA-REI.D.12	**Outcomes:** After this unit, students will be able to solve systems of linear equations using different methods. They will be able to also solve systems of linear inequalities.
Essential Questions: How can you solve a system of linear equations? How can a system of linear equations have no solution or infinitely many solutions? How can you graph a system of linear inequalities?	**Learning Targets:** Students will be able to solve systems of linear equations using substitution, elimination, and graphing. Students will also be able to solve systems of linear inequalities. Students will analyze situations where there are no clear solutions to systems of equations and inequalities.
Topic 1: **Solving Systems of Linear Equations by Substitution**	**Length:** 3 days
Standard(s): HSA-CED.A.3, HSA-REI.C.6	**Academic Vocabulary:** system of linear equations, solution of a system of linear equations
Lesson Frame:	We will explore systems of equations.
	I will be able to find solutions of systems of equations by using graphing.
Lesson Frame:	We will explore systems of equations.
	I will be able to find solutions of systems of equations by using substitution.
Performance Tasks: Students will use graphing software to explore systems of equations.	Notes:
Topic 2: **Solving Systems of Linear Equations by Elimination**	**Length:** 3 days
Standard(s): HSA-CED.A.3, HSA-REI.C.6, HSA-REI.C.5	**Academic Vocabulary:** coefficient
Lesson Frame:	We will explore systems of equations.
	I will find the solutions to systems of equations by elimination.
Lesson Frame:	We will explore special cases of systems of equations.
	I will be able to discern the differences between a system of equations with no solution and one with all real numbers as a solution.

Performance Tasks: Students will use graphing software to explore the special cases of systems of equations.	Notes:
Topic 3: Systems of Linear Inequalities	**Length:** 3 days
Standard(s): HSA-CED.A.3, HSA-REI.D.12	**Academic Vocabulary:** linear inequality in two variables, solution of a linear inequality in two variables, graph of a linear inequality, half-planes, system of linear inequalities
Lesson Frame:	We will explore linear inequalities.
	I will be able to find and graph the solution set of a linear inequality.
Lesson Frame:	We will explore a system of linear inequalities.
	I will be able to find and graph the solution set of a system of linear inequalities
Performance Tasks: Students will use graphing software to explore systems of linear inequalities.	Notes:

Unit Name: **Exponential Functions**	**Length:** 12 days
Standards: HSN-RN.A.2, HSN-RN.A.1, HSA-CED.A.2, HSF-IF.B.4, HSF-IF.C.7e, HSF-IF.C.9, HSF-BF.A.1a, HSF-BF.B.3, HSF-LE.A.1a, HSF-LE.A.2, HSA-SSE.B.3c, HSF-IF.C.8b, HSF-LE.A.1c, HSA-REI.A.1, HSA-REI.D.11, HSF-IF.A.3, HSF-BF.A.2, HSF-LE.A.2, HSF-IF.A.3	**Outcomes:** Students will become familiar with exponential functions and their properties. There will many opportunities for students to see the real world applications of exponential functions especially growth and decay functions.
Essential Questions: How can you write general rules involving properties of exponent? How can you write and evaluate an nth root of a number? What are some of the characteristics of the graph of an exponential function? What are some of the characteristics of exponential growth and decay functions? How can you solve an exponential equation graphically? How can you use a geometric sequence to describe a pattern? How can you define a sequence recursively?	**Learning Targets:** Students will be able to simplify expressions using the properties of exponents. Students will be able to simplify and evaluate nth roots and radicals. Students will be able to graph exponential functions and identify significant parts of the graphs. Students will also be able to identify exponential growth and decay functions as well as discerning the differences between them. They will also become adept at solving exponential equations. Students will be able to find and describe recursive and explicit rules for sequences and well as connect the geometric sequences to exponential functions.
Topic 1: **Properties of Exponents**	**Length:** 3 days
Standard(s): HSN-RN.A.2	**Academic Vocabulary:** power, exponent, base
Lesson Frame:	We will explore properties of exponents.
	I will be able to simplify expressions using the properties of exponents.
Performance Tasks:	Notes:
Topic 2: **Radicals and Rational Exponents**	**Length:** 2 days
Standard(s): HSN-RN.A.1, HSN-RN.A.2	**Academic Vocabulary:** nth root of a, radical, index of a radical
Lesson Frame:	We will explore nth roots and radicals.
	I will be able to simplify and evaluate roots and radical expressions.
Performance Tasks: Students will use graphing software to explore roots and radicals.	Notes:
Topic 3: **Exponential Functions**	**Length:** 4 days

Standard(s): HSA-CED.A.2, HSF-IF.B.4, HSF-IF.C.7e, HSF-IF.C.9, HSF-BF.A.1a, HSF-BF.B.3, HSF-LE.A.1a, HSF-LE.A.2, HSA-SSE.B.3c, HSF-IF.C.8b, HSF-LE.A.1c, HSA-REI.A.1, HSA-CED.A.1, HSA-REI.D.11	**Academic Vocabulary:** exponential function, exponential growth, exponential decay, exponential growth function, exponential decay function, compound interest, exponential equation
Lesson Frame:	We will explore exponential functions.
	I will be able to identify and graph exponential functions.
Lesson Frame:	We will explore exponential growth and decay functions.
	I will be able to identify and graph exponential growth and decay functions.
Lesson Frame:	We will practice solving exponential equations.
	I will be able to solve exponential equations.
Performance Tasks: Using graphing software, students will be able to identify the vital parts of exponential functions and equations.	Notes:
Topic 4: Geometric Sequences & Recursive Rules	**Length:** 2 days.
Standard(s): HSF-IF.A.3, HSF-BF.A.2, HSF-LE.A.2, HSF-BF.A.1a	**Academic Vocabulary:** geometric sequences, common ratio, explicit rule, recursive rule
Lesson Frame:	We will explore geometric sequences and their relationship to exponential equations.
	I will be able to find the common ratio and discuss the characteristics of geometric sequences.
Lesson Frame:	We will explore explicit and recursive rules for sequences.
	I will be able to find the recursive rule for a sequence given the explicit rule and vice versa.
Performance Tasks: Using geometric software, students will explore the relationship between geometric sequences and exponential functions.	Notes:

Unit Name: **Polynomial Equations and Factoring**	**Length:** 14 days
Standard(s): HSA-APR.A.1, HSA-APR.B.3, HSA-REI.B.4b, HSA-SSE.A.2, HSA-SSE.B.3a	**Outcomes:** In this unit, students will take a deep dive into factoring and all of its components. At the conclusion of this unit, students will be well prepared to tackle the problems presented in more advanced algebra courses in the area of factoring and solving polynomials.
Essential Questions: How can you add and subtract polynomials? How can you multiply two polynomials? What are the patterns of special products (a +b)(a-b), (a-b)^2, and (a+b)^2? How can you solve a polynomial equation? How can you use different methods to factor a trinomial in standard form into a product of two binomials? How can you recognize and factor special products? How can you factor a polynomial completely?	**Learning Targets:** Students will be able to multiply, add, and subtract polynomials whether or not they are in standard form. Students will be able to simplify using the special products rules. Students will be able to apply knowledge of the zero product property to solving polynomials. Students will be able to factor quadratic equations with a = 1 using different methods. They will also be able to factor when a is not equal to 1. Students will be able to factor special products and also factor polynomials completely by using grouping and other methods.
Topic 1: **Adding, Subtracting, and Multiplying Polynomials**	**Length:** 3 days
Standard(s): HSA-APR.A.1	**Academic Vocabulary:** monomial, binomial, trinomial, polynomial, degree of a monomial, degree of a polynomial, standard form, leading coefficient, closed, FOIL method
Lesson Frame:	We will explore adding and subtracting polynomials.
	I will be able to add and subtract polynomials.
Lesson Frame:	We will explore multiplying polynomials.
	I will be able to multiply polynomials.
Lesson Frame:	We will discuss the FOIL method.
	I will be able to apply different methods to the problems involving multiplying polynomials.
Performance Tasks:	Notes:
Topic 2: **Special Products of Polynomials**	**Length:** 1 day
Standard(s): HSA-APR.A.1	**Academic Vocabulary:**
Lesson Frame:	We will explore the special products.

	I will be able to simplify the products using the shortcuts presented.
Performance Tasks:	Notes:
Topic 3: **Solving Polynomial Equations in Factored Form**	**Length:** 2 days
Standard(s): HSA-APR.B.3, HSA-REI.B.4b	**Academic Vocabulary:** factored form, zero-product property, roots, repeated roots
Lesson Frame:	We will explore the zero product property and its implications.
	I will be able to solve polynomials in factored form.
Lesson Frame:	We will explore the zero product property and its implications.
	I will be able to recognize the roots of an polynomial by inspecting its graph.
Performance Tasks: Using graphing software, students will find and discuss roots of polynomial functions.	Notes:
Topic 4: **Factoring x^2 +bx + c**	**Length:** 3 days
Standard(s): HSA-SSE.A.2, HSA-SSE.B.3a	**Academic Vocabulary:**
Lesson Frame:	We will explore factoring quadratic equations.
	I will be able to factor quadratic equations using different methods.
Performance Tasks:	Notes:
Topic 5: **Factoring ax^2 +bx +c**	**Length:** 2 days
Standard(s): HSA-SSE.A.2, HSA-SSE.B.3a	**Academic Vocabulary:**
Lesson Frame:	We will explore factoring quadratic equations.
	I will be able to factor quadratic equations using different methods.
Performance Tasks:	Notes:
Topic 6: **Factoring Special Products and Factoring Polynomials Completely**	**Length:** 3 days

Standard(s): HSA-SSE.A.2, HSA-SSE.B.3a	**Academic Vocabulary:** factoring by grouping, factored completely
Lesson Frame:	We will explore factoring special products.
	I will be able to apply the knowledge of special products to factoring.
Lesson Frame:	We will explore factoring by grouping.
	I will be able to factor polynomials completely by using grouping and other methods.
Performance Tasks:	Notes:

Unit Name: **Graphing Quadratic Functions**	**Length:** 11 days
Standards: HSA-CED.A.2, HSF-IF.C.7a, HSF-BF.B.3, HSF-IF.C.9, HSF-IF.B.4, HSF-BF.A.1a, HSA-SSE.B.3a, HSA-APR.B.3, HSF-IF.C.8a, HSG-IF.B.6, HSF-LE.A.3	**Outcomes:** At the end of this unit students will be more comfortable with the graphs of quadratic equations and also be able to apply knowledge of the shifts to the graphs created by changes to the form. They will also be adept at comparing the graphs of the different types of equations studied in the previous units (linear, exponential, and quadratic).
Essential Questions: What are some of the characteristics of a graph of a quadratic equation of the form f(x) = ax^2? How does the value of c affect the graph of f(x) = ax^2 + c? How can you find the vertex of the graph of f(x) = ax^2 + bx + c? How can you describe the graph of f(x) = a(x-h) ^2? What are some of the characteristics of the graph of f(x) = a(x-p)(x-q)? How can you compare the growth rates of linear, exponential, and quadratic functions?	**Learning Targets:** Students will be able to identify the characteristics of quadratic functions of the form f (x) = ax^2 and f(x) = ax^2 +c. They will also be able to graph functions of the form f(x) = ax^2 +bx +c and describe the changes to the graph made by different values of a, b and c. Students will also be able to graph quadratic functions in vertex form and use that information to find the zeros of the functions. They will be able to decide what type of function is represented by a particular data set and will use prior knowledge to solve problems involving those functions.
Topic 1: **Graphing f(x) = ax^2 and f(x) = ax^2 +c**	**Length:** 4 days
Standard(s): HSA-CED.A.2, HSF-IF.C.7a, HSF-BF.B.3	**Academic Vocabulary:** quadratic function, parabola, vertex, axis of symmetry, zero of a function
Lesson Frame:	We will explore quadratic functions of the form f(x) = ax^2.
	I will be able to graph functions of the form f(x) = ax^2.
Lesson Frame:	We will explore quadratic functions of the form f(x) = ax^2 +c.
	I will be able to describe the changes c makes to the graph of f(x) = ax^2 +c.
Lesson Frame:	We will use graphing software to help with the lesson.
	I will be able to use graphing software to help graph the parabolas.
Performance Tasks: Students will use graphing software to help make connections.	Notes:
Topic 2: **Graphing f(x) = ax^2 +bx +c and f(x) = a(x-h)^2 +k and Intercept form**	**Length:** 5 days

Standard(s): HSA-CED.A.2, HSF-IF.C.7a, HSF-IF.C.9, HSF-IF, B.4, HSF-BF.A.1a, HSF-BF.B.3, HS-IF.C.8a, HSA-APR.B.3, HSA.SSE.B.3a	**Academic Vocabulary:** maximum value, minimum value, even function, odd function, vertex form of a quadratic function
Lesson Frame:	We will explore the graphs of f(x) = ax^2 +bx +c.
	I will be able to graph functions of this form and discuss their characteristics.
Lesson Frame:	We will explore the graphs of quadratic functions in vertex form.
	I will be able to graph functions of this form and discuss their characteristics.
Lesson Frame:	We will explore the different characteristics of quadratic functions.
	I will use prior knowledge to find roots of quadratic functions using the graphs.
Performance Tasks:	Notes:
Topic 3: **Comparing Linear, Exponential, and Quadratic Functions**	**Length:** 2 days
Standard(s): HSF-IF.B.6, HSF-BF.A.1a, HSF-LE.A.3	**Academic Vocabulary:** average rates of change
Lesson Frame:	We will compare functions using average rates of change.
	I will be able to appropriately choose a type of function to model a set of data.
Lesson Frame:	We will explore real life problems involving different functions.
	I will be able to solve real life problems using prior knowledge of the different types of functions.
Performance Tasks:	Notes:

Unit Name: **Solving Quadratic Equations**	**Length:** 12 days
Standards: HSN-RN.A.2, HSN-RN.B.3, HSF-IF.C.7a, HSA-CED.A.1, HSA-CED.A.4, HSA-REI.B.4b, HSA-SSE.B.3b, HSA-REI.B.4a, HSF-IF.C.8a, HSA-REI.C.7, HSA-REI.D.11	**Outcomes:** Students will be able to solve quadratic equations in different forms. They will also be able to manipulate the equations to get them into a manageable form.
Essential Questions: How can you multiply and divide square roots? How can you use a graph to solve a quadratic equation in one variable? How can you determine the number of solutions of a quadratic equation of the form x^2 +c = 0? How can you use the method of completing the square to solve a quadratic equation? How can you derive a formula that can be used to write the solution of any quadratic equation in standard form? How can you solve a system of nonlinear equations?	**Learning Targets:** Applying knowledge of square roots, students will be able to solve quadratic equations. Students will also be able to manipulate equations in order to more easily solve them. Including completing the square and writing the equations in standard form.
Topic 1: **Properties of Radicals and Solving Quadratics by Graphing**	**Length:** 3 days
Standard(s): HSN-RN.A.2, HSA-RN.B.3, HSA-REI.D.11, HSF-IF.C.7a	**Academic Vocabulary:** counterexample, radical expression, simplest form, rationalizing the denominator, conjugates, like radicals, quadratic equation
Lesson Frame:	We will apply previous knowledge of order of operations and properties to radicals.
	I will be able to simplify radicals using previous knowledge.
Lesson Frame:	We will explore radicals.
	I will be able to simplify radicals in many different forms.
Lesson Frame:	We will explore solving by graphing.
	I will be able to find solutions to quadratic equations by graphing.
Performance Tasks: Students will use graphing software to graph quadratic equations.	Notes:
Topic 2: **Solving Quadratic Equations Using Square Roots and Completing the Square**	**Length:** 4 days
Standard(s): HSA-CED.A.1, HSA-CED.A4, HSA-REI.B.4b, HSA-SSE.B.3b, HSA-REI.B. 4a, HSF-IF.C.8a	**Academic Vocabulary:** completing the square
Lesson Frame:	We will solve quadratic equations of the form ax^2 + c = 0.
	I will be able to apply the work of radical simplification to solving quadratics.
Lesson Frame:	We will approximate solutions of equations.
	I will be able to approximate the solutions of quadratic equations.

Lesson Frame:	We will explore completing the square as a method to solve quadratic equations.
	I will be able to solve quadratic equations by completing the square.
Performance Tasks:	Notes:
Topic 3: **Solving Quadratic Equations by Using the Quadratic Formula**	**Length:** 3 days
Standard(s): HSA-CED.A.1, HSA-REI.B.4a, HSA-REI.B.4b	**Academic Vocabulary:** quadratic formula, discriminant
Lesson Frame:	We will explore the quadratic formula.
	I will be able to apply the quadratic formula to solving quadratic equations.
Lesson Frame:	We will explore the discriminant.
	I will be able to describe the differences between the values of the discriminant and interpret the meaning of those differences.
Performance Tasks: Students will use graphing software to graph different values of discriminant.	Notes:
Topic 4: **Solving Nonlinear Systems of Equations**	**Length:** 2 days
Standard(s): HSA-REI.C.7, HSA-REI.D.11	**Academic Vocabulary:** system of nonlinear functions
Lesson Frame:	We will explore systems of nonlinear functions.
	I will be able to solve both graphically and algebraically systems of nonlinear functions.
Performance Tasks: Using graphing software, students will solve systems of nonlinear equations.	Notes:

Unit Name: **Radical Functions and Equations**	**Length:** 7 days
Standards: HSA-CED.A.2, HSF-IF.B.4, HSF-IF.B.6, HSF-IF.C.7b, HSF-IF.C.9, HSA-CED.A.1, HSF-BF.B.4a	**Outcomes:** Students will evaluate, compare, and graph square root and cube root functions. They will solve radical equations and identify extraneous solutions. Students will also relate the functions to real-world situations. They will also find inverses of relations, linear, and nonlinear functions.
Essential Questions: What are some of the characteristics of the graph of a square root function? What are some of the characteristics of a cube root function? How can you solve an equation that contains square roots? How are a function and its inverse related?	**Learning Targets:** Students will be able to discern the differences and similarities between square root and cube root functions. Students will become adept at finding solutions of radical equations as well as explaining the nature of extraneous solutions.
Topic 1: **Graphing Square Root and Cube Root Functions**	**Length:** 3 days
Standard(s): HSA-CED.A.2, HSF-IF.B.4, HSF-IF.B.6, HSF-IF.C.7b, HSF-IF.C.9	**Academic Vocabulary:** square root function, radical function, cube root function
Lesson Frame:	We will explore the graphs of square root functions.
	I will describe the characteristics of square root functions using appropriate vocabulary.
Lesson Frame:	We will explore the graphs of cube root functions.
	I will describe the characteristics of cube root functions using appropriate vocabulary.
Lesson Frame:	We will connect root functions to rates of change.
	I will compare root functions using average rates of change.
Performance Tasks: Using graphing software students will be able to analyze square root and cube root functions.	Notes:
Topic 2: **Solving Radical Equations**	**Length:** 2 days
Standard(s): HSA-CED.A.1	**Academic Vocabulary:** radical equations
Lesson Frame:	We will explore radical equations.
	I will be able to solve radical equations using prior knowledge regarding solving of equations.

Lesson Frame:	We will explore radical equations.
	I will be able to identify extraneous solutions and the situations that create them.
Performance Tasks: Students will be using graphing software to explore the nature of the graphs of radical equations- especially the end behavior.	Notes:
Topic 3: **Inverse of a Function**	**Length:** 2 days
Standard(s): HSF-BF.4a	**Academic Vocabulary:** inverse relation, inverse function
Lesson Frame:	We will find the inverses of relations and functions.
	I will be able to recognize the unique relationship between a function (or relation) and its inverse.
Performance Tasks: Students will use graphing software to describe the graphs of functions (or relations) and their inverses.	Notes:

September	October	November	December	January	February	March	April	May	June