Course Name:	Advanced Algebra		
Credits:	1		
Prerequisites:	Algebra and Geometry		
Description:	Extends the student's knowledge of the real number systems and operations with complex numbers. It will develop the students knowledge of conic sections, polynomial functions, rational expressions, explential and logarithmic functions, sequesces and series, descrete mathematics and trigonomic fuctions. It gives students a degree of understanding that helps them become more proficient in many lines of work. NOTE: This course is required for college and university admission.		
Academic Standards:	Wisconsin State Standards in Mathematics (2011)		
Units:	**Unit Length:**	**Unit Standards:**	**Unit Outcomes:**
Linear Functions	10 Days	HSF-BF.B.3, HSACEDA2, HSFIFC9, HSFBFA1A, HSFLEA2, HSSIDB6A, HSACEDA3, HSAREIC6	Students will be able to identify families of functions, describe transformations of parent functions, and write functions representing combinations of transformations. They will be able to write equations of linear functions using points and slopes, find lines of fit and lines of best fit, and solve systems of linear equations in three variables algebraically.
Quadratic Functions	10 days	HSFIFC7C, HSFBFB3, HSFIFB4, HSFIFC9, HSAAPRB3, HSGGPEA2, HSACEDA2, HSFIFB6, HSFBFA1A, HSSIDB6A	In this unit the students will describe and write transformations of quadratic functions, graph quadratic functions using x-intercepts, write equations of parabolas, and write quadratic equations to model data sets.
Quadratic Equations and Complex Numbers	14 days	HSN-CN.A.1, HSN-CN.A.2, HSN-CN.C.7, HSA-CED.A.1, HSA-CED.A.3, HSA-SSE.A.2, HSA-REI.B.4b, HSA-REI.C.7, HSA-REI.D.11, HSF-IF.C.8a	In this unit students will solve quadratic equations for real and complex solutions, add, subtract, and multiply complex numbers, solve systems of nonlinear equations, and solve and graph quadratic inequalities in two variables.
Polynomial Functions	20 days	HSN-CN.C.8, HSN-CN.C.9, HSA-SSE.A.2, HSA-APR.A.1, HSA-APR.B.2, HSA-APR.B.3, HSA-APR.C.4, HSA-APR.C.5, HSA-APR.D.6, HSA-CED.A.2, HSF-IF.B.4, HSF-IF.C.7c, HSF-BF.A.1a, HSF-BF.B.3	In this unit students will graph and analyze the graphs of polynomial functions, including transformations, add, subtract, multiply, divide, and factor polynomials, including cubic polynomials, find solutions of polynomial equations and zeros of polynomial functions use the Fundamental Theorem of Algebra, and write polynomial functions.

Rational Exponents and Radical Functions	14 days	HSN-RN.A.1, HSN-RN.A.2, HSF-IF.C.7b, HSF-BF.A.1b, HSF-BF.B.3, HSF-BF.B.4a, HSA-REI.A.1, HSA-REI.A.2 HSA-CED.A.4	In this unit students will evaluate expressions using properties of rational exponents, graph radical functions, solve equations containing radicals and rational exponents, solve radical inequalities, and explore inverses of functions
Exponential and Logarithmic Functions	16 days	HSA-SSE.A.2, HSA-SSE.B.3c, HSA-REI.A.1, HSA-CED.A.2, HSF-IF.C.7e, HSF-IF.C.8b, HSF-BF.A.1a, HSF-BF.B.3, HSF-BF.B.4a, HSF-LE.A.2, HSF-LE.A.4, HSF-LE.B.5	In this unit students will define and evaluate logarithms, using the properties of logarithms and the change-of-base formula, graph logarithmic functions, transform graphs of logarithmic functions, solve logarithmic equations, and write logarithmic models for data sets.
Rational Functions	12 days	HSA-CED.A.1, HSA-CED.A.2, HSA-CED.A.3, HSA-CED.A.4, HSA-APR.D.6, HSA-APR.D.7, HSA-REI.A.1, HSA-REI.A.2, HSF-BF.B.3	In this unit students will classify and write direct and inverse variations, graph rational functions, add, subtract, multiply, and divide rational expressions, and solve rational equations.
Sequences and Series	12 days	HSA-SSE.B.4, HSF-IF.A.3, HSF-BF.A.1a, HSF-BF.A.2, HSF-LE.A.2	In this unit students will use sequence notation to write terms of sequences, write a rule for the nth term of a sequence, find the sums of finite arithmetic and finite geometric series, and find partial sums of infinite geometric series, evaluate recursive rules for sequences and translate between recursive and explicit rules for sequences.

Unit Name: **Linear Functions**	**Length:** 10 Days
Standard(s): HSF-BF.B.3, HSACEDA2, HSFIFC9, HSFBFA1A, HSFLEA2, HSSIDB6A, HSACEDA3, HSAREIC6	**Outcomes:** Students will be able to identify families of functions, describe transformations of parent functions, and write functions representing combinations of transformations. They will be able to write equations of linear functions using points and slopes, find lines of fit and lines of best fit, and solve systems of linear equations in three variables algebraically.
Essential Questions: What are the characteristics of some of the basic parent functions? How do the graphs of y = f(x) + k, y = f(x − h), and y = −f(x) compare to the graph of the parent function f? How can you use a linear function to model and analyze a real-life situation? How can you determine the number of solutions of a linear system?	**Learning Targets:** The students will able to identify transformations. The students will be able to write equations of best fit. The students will be able to solve systems of linear equations and real life problems.
Topic 1: **Parent Functions and Transformations**	**Length:** 2 days
Standard(s): HSFBFB3	**Academic Vocabulary:** reflection, translation
Lesson Frame:	We will be able to identify transformations.
	I will be able to identify transformations through visual demonstrations.
Lesson Frame:	We will write equations of best fit.
	I will write equations of lines of best fit given a specific situation.
Lesson Frame:	We will solve systems of linear equations.
	I will solve systems of linear equations.
Performance Tasks: Exit Tickets	Notes:
Topic 2: **Absolute Value Transformations**	**Length:** 2 days
Standard(s): HSFBFB3	**Academic Vocabulary:** Parent function, transformation, reflection
Lesson Frame:	We will be able to identify absolute value transformations.
	I will be able to identify transformations through visual demonstrations.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:

Topic 3: **Modeling with Linear Functions**	**Length:** 2 days
Standard(s): HSACEDA2, HSFIFC9, HSFBFA1A, HSFLEA2, HSSIDB6A	**Academic Vocabulary:** Line of fit, correlation coefficient
Lesson Frame:	We will be able to identify a linear equation that represents a real life situation.
	I will be able to match linear equations with given situations.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 4: **Solving Linear Systems**	**Length:** 2 days
Standard(s): HSACEDA3, HSAREIC6	**Academic Vocabulary:** Linear equation in three variables, ordered triple
Lesson Frame:	We will solve systems of linear equations.
	I will solve systems of linear equations by writing models within a group setting.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:

Unit Name: **Quadratic Functions**	**Length:** 10 days
Standards: HSFIFC7C, HSFBFB3, HSFIFB4, HSFIFC9, HSAAPRB3, HSGGPEA2, HSACEDA2, HSFIFB6, HSFBFA1A, HSSIDB6A	**Outcomes:** In this unit the students will describe and write transformations of quadratic functions, graph quadratic functions using x-intercepts, write equations of parabolas, and write quadratic equations to model data sets.
Essential Questions: How do the constants a, h, and k affect the graph of the quadratic function g(x) = a(x − h)2 + k? What type of symmetry does the graph of f(x) = a(x − h)2 + k have and how can you describe this symmetry? What is the focus of a parabola? How can you use a quadratic function to model a real-life situation?	**Learning Targets:** The students will be able to write transformations of quadratic functions. The students will be able to explore properties of quadratic functions. The students will be able to solve real life problems. The students will be able to write equations of parabolas.
Topic 1: **Transformations of quadratic functions**	**Length:** 2 days
Standard(s): HSFIFC7C, HSFBFB3	**Academic Vocabulary:** Quadratic Function, Parabola, Vertex Form,
Lesson Frame:	We will write transformations of quadratic equations.
	I will write transformations of quadratic equations by reflecting across the x and y axis.
Lesson Frame:	We will write transformations of quadratic equations.
	I will write transformations of quadratic equations by stretching and shrinking a parent function.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 2: **Characteristics of quadratic functions**	**Length:** 2 days
Standard(s): HSFIFC7C, HSFBFB3, HSFIFB4, HSFIFC9, HSAAPRB3	**Academic Vocabulary:** Axis of symmetry, standard form, minimum value, maximum value, intercept form
Lesson Frame:	We will identify axis of symmetry on parabolas.
	I will identify axis of symmetry on parabolas from given equations or graphs.
Lesson Frame:	We will write equations in standard form when the equation is given to us not in standard form.
	I will change the form that equations are written in from standard to intercept from and vice versa.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 3: **Focus of a Parabola**	**Length:** 3 days

Standard(s): HSFIFC7C, HSFIFB4, HSGGPEA2	**Academic Vocabulary:** Focus, directrix
Lesson Frame:	We will write and equation of a parabola using the distance formula.
	I will write an equation of a parabola given its focus and directrix.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 4: **Modeling with Quadratic Functions**	**Length:** 3 days
Standard(s): HSA CEDA2, HSFIFB6, HSFBFA1A, HSSIDB6A	**Academic Vocabulary:** Average rate of change, systems of three linear equations
Lesson Frame:	We will write equations of quadratic functions.
	I will write equations of quadratic functions using vertices, points, and x intercepts.
Lesson Frame:	We will write quadratic equations.
	I will write quadratic equations to model data sets.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:

Unit Name: **Quadratic Equations and Complex Numbers**	**Length:** 14 days
Standards: HSN-CN.A.1, HSN-CN.A.2, HSN-CN.C.7, HSA-CED.A.1, HSA-CED.A.3, HSA-SSE.A.2, HSA-REI.B.4b, HSA-REI.C.7, HSA-REI.D.11, HSF-IF.C.8a	**Outcomes:** In this unit students will solve quadratic equations for real and complex solutions, add, subtract, and multiply complex numbers, solve systems of nonlinear equations, and solve and graph quadratic inequalities in two variables.
Essential Questions: How can you use the graph of a quadratic equation to determine the number of real solutions of the equation? What are the subsets of the set of complex numbers? How can you complete the square for a quadratic expression? How can you derive a general formula for solving a quadratic equation? How can you solve a nonlinear system of equations? How can you solve a quadratic inequality?	**Learning Targets:** The students will be able to: Solve quadratic equations by graphing. Solve quadratic equations algebraically. Define and use the imaginary unit i. Add, subtract, and multiply complex numbers. Find complex solutions and zeros. Solve quadratic equations using square roots. Solve quadratic equations by completing the square. Write quadratic functions in vertex form. Solve quadratic equations using the Quadratic Formula. Analyze the discriminant to determine the number and type of solutions. Solve real-life problems. Solve systems of nonlinear equations. Graph quadratic inequalities in two variables. Solve quadratic inequalities in one variable.
Topic 1: **Solving Quadratic Equations**	**Length:** 2 days
Standard(s): HSASSEA2, HSAREIB4B, HSFIFC8A	**Academic Vocabulary:** Quadratic equations, roof of an equation, zero of a function
Lesson Frame:	We will solve quadratic equations.
	I will solve quadratic equations by graphing.
Lesson Frame:	We will solve quadratic equations.
	I will solve quadratic equations algebraically.
Lesson Frame:	We will solve real life problems.
	I will solve real life problems by modeling.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:

Topic 2: **Complex Numbers**	**Length:** 2 days
Standard(s): HSNCNA1, HSNCNA2, HSNCNC7, HSAREIB4B	**Academic Vocabulary:** Imaginary unit, complex number, imaginary number, pure imaginary number
Lesson Frame:	We will define the imaginary unit i.
	I will define the imaginary unit i by using it.
Lesson Frame:	We will add, subtract, and multiply complex numbers.
	I will add, subtract and multiply complex numbers by doing practice problems.
Lesson Frame:	We will find complex solutions.
	I will find complex solutions by finding zeros.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 3: **Completing the Square**	**Length:** 2 days
Standard(s): HSNCNC7, HSAREIB4B, HSFIFC8A	**Academic Vocabulary:** completing the square
Lesson Frame:	We will solve quadratic equations.
	I will solve quadratic equations by using square roots.
Lesson Frame:	We will solve quadratic equations.
	I will solve quadratic equations by completing the square.
Lesson Frame:	We will write quadratic equations.
	I will write quadratic equations by putting them in vertex form.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 4: **Using the Quadratic Formula**	**Length:** 2 days
Standard(s): HSNCEDA3, HSAREIC7	**Academic Vocabulary:** quadratic formula, discriminant
Lesson Frame:	We will solve quadratic equations.
	I will solve quadratic equations using the Quadratic Formula.

Lesson Frame:	We will analyze the discriminant.
	I will analyze the discriminant to determine the number and types of solutions.
Lesson Frame:	We will solve real life problems.
	I will apply the quadratic formula to real life problems.
Performance Tasks:	Notes:
Topic 5: **Solving Nonlinear Systems**	**Length:** 2 days
Standard(s): HSACEDA3, HSAREIC7, HASREID11	**Academic Vocabulary:** system of nonlinear equations
Lesson Frame:	We will solve nonlinear equations.
	I will solve nonlinear equations by doing systems.
Lesson Frame:	We will solve quadratic equations.
	I will solve quadratic equations by graphing.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 6: **Quadratic Inequalities**	**Length:** 2 days
Standard(s): HSACEDA1, HSACEDA3	**Academic Vocabulary:** quadratic inequality
Lesson Frame:	We will graph inequalities.
	I will graph inequalities by using two variables.
Lesson Frame:	We will solve one variable inequalities.
	I will solve one variable inequalities given a word problem.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:

Unit Name: **Polynomial Functions**	**Length:** 20 days
Standards: HSN-CN.C.8, HSN-CN.C.9, HSA-SSE.A.2, HSA-APR.A.1, HSA-APR.B.2, HSA-APR.B.3, HSA-APR.C.4, HSA-APR.C.5, HSA-APR.D.6, HSA-CED.A.2, HSF-IF.B.4, HSF-IF.C.7c, HSF-BF.A.1a, HSF-BF.B.3	**Outcomes:** In this unit students will graph and analyze the graphs of polynomial functions, including transformations, add, subtract, multiply, divide, and factor polynomials, including cubic polynomials, find solutions of polynomial equations and zeros of polynomial functions use the Fundamental Theorem of Algebra, and write polynomial functions.
Essential Questions: How can you determine whether a polynomial equation has a repeated solution? How can you determine whether a polynomial equation has imaginary solutions? How can you transform the graph of a polynomial function? How many turning points can the graph of a polynomial function have? How can you find a polynomial model for real-life data? What are some common characteristics of the graphs of cubic and quartic polynomial functions? How can you cube a binomial? How can you use the factors of a cubic polynomial to solve a division problem involving the polynomial? How can you factor a polynomial?	**Learning Targets:** The students will be able to: Identify polynomial functions. Graph polynomial functions using tables and end behavior. Add and subtract polynomials. Multiply polynomials. Use Pascal's Triangle to expand binomials. Use long division to divide polynomials by another polynomials. Use synthetic division to divide polynomials by binomials of the form x − k. Use the Remainder Theorem. Factor polynomials. Use the Factor Theorem. Find solutions of polynomial equations and zeros of polynomial functions. Use the Rational Root Theorem. Use the Irrational Conjugates Theorem.
Topic 1: **Graphing Polynomial Functions**	**Length:** 2 days
Standard(s): HSFIFB4, HSFC7C	**Academic Vocabulary:** Polynomial, polynomial function, end behavior
Lesson Frame:	We will identify polynomial functions.
	I will identify polynomial functions given a list of functions.
Lesson Frame:	We will graph polynomial functions.
	I will graph polynomial functions using tables and end behaviors.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 2: **Adding, Subtracting, and Multiplying Polynomials**	**Length:** 2 days

Standard(s): HSAAPRA1, HSAAPRC4, HSAAPRC5	**Academic Vocabulary:** Pascal's Triangle
Lesson Frame:	We will add or subtract polynomials
	I will add or subtract polynomials given a set situation.
Lesson Frame:	We will expand binomials.
	I will expand binomials using Pascal's Triangle.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 3: **Dividing Polynomials**	**Length:** 2 days
Standard(s): HSAAPRB2, HSAAPRD6	**Academic Vocabulary:** Polynomial long division, Synthetic division
Lesson Frame:	We will divide polynomials.
	I will divide polynomials using synthetic division.
Lesson Frame:	We will divide polynomials.
	I will divide polynomials using the Remainder Theorem.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 4: **Factoring Polynomials**	**Length:** 2 days
Standard(s): HSASSEA2, HSAAPRB2, HSAAPRB3	**Academic Vocabulary:** Factored completely, factor by grouping, quadratic form
Lesson Frame:	We will factor polynomials.
	I will factor polynomials given a variety of polynomials.
Lesson Frame:	We will factor polynomials.
	I will factor polynomials using the Factor Theorem.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 5: **Solving Polynomial Equations**	**Length:** 2 days

Standard(s): HSAAPRB3	**Academic Vocabulary:** repeated solution
Lesson Frame:	We will find solutions to polynomial equations.
	I will find solutions to polynomial equations by finding the zeros of the equations.
Lesson Frame:	We will use the Rational Root Theorem.
	I will use the Rational Root Theorem to find the solutions to the polynomial equations.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 6: **The Fundamental Theorem of Algebra**	**Length:** 2 days
Standard(s): HSNCNC8, HSNCNC9, HSAAPRB3	**Academic Vocabulary:** Complex Conjugates
Lesson Frame:	We will use the Fundamental Theorem of Algebra.
	I will use the Fundamental Theorem of Algebra to solve polynomial equations.
Lesson Frame:	We will find conjugate pairs of complex zeros.
	I will find conjugate pairs of complex zeros using Descartes Rule of Signs.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 7: **Transformations of Polynomial Functions**	**Length:** 2 days
Standard(s): HSFIFC7C, HSFBFB3	**Academic Vocabulary:** None
Lesson Frame:	We will describe transformations of polynomial functions.
	I will describe transformations of polynomial functions by identifying key parts of a function.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 8: **Analyzing Graphs of Polynomial Functions**	**Length:** 2 days

Standard(s): HSAAPRB3, HSFIFB4, HSFIFC7C, HSFBFB3	**Academic Vocabulary:** Local max, Local Minimum, Even function, Odd Function
Lesson Frame:	We will graph polynomial functions.
	I will graph polynomial functions using the x intercepts.
Lesson Frame:	We will identify zeros of polynomial functions.
	I will identify zeros of polynomial functions using the location principle.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:

Topic 9: **Modeling with Polynomial Functions**	**Length:** 2 days
Standard(s): HSACEDA2, HSFBFA1A	**Academic Vocabulary:** Finite Differences
Lesson Frame:	We will write polynomial functions.
	I will write polynomial functions given set points.
Lesson Frame:	We will write polynomial functions.
	I will write polynomial functions using finite differences.
Lesson Frame:	We will find models for data sets.
	I will find models for data sets using technology.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:

Unit Name: **Rational Exponents and Radical Functions**	**Length:** 14 days
Standards: HSN-RN.A.1, HSN-RN.A.2, HSF-IF.C.7b, HSF-BF.A.1b, HSF-BF.B.3, HSF-BF.B.4a, HSA-REI.A.1, HSA-REI.A.2 HSA-CED.A.4	**Outcomes:** In this unit students will evaluate expressions using properties of rational exponents, graph radical functions, solve equations containing radicals and rational exponents, solve radical inequalities, and explore inverses of functions.
Essential Questions: How can you use a rational exponent to represent a power involving a radical? How can you use properties of exponents to simplify products and quotients of radicals? How can you identify the domain and range of a radical function? How can you solve a radical equation? How can you use the graphs of two functions to sketch the graph of an arithmetic combination of the two functions? How can you sketch the graph of the inverse of a function?	**Learning Targets:**The students will be able to: Find nth roots of numbers. Evaluate expressions with rational exponents. Solve equations using nth roots. Use properties of rational exponents to simplify expressions with rational exponents. Use properties of radicals to simplify and write radical expressions in simplest form. Graph radical functions. Write transformations of radical functions. Graph parabolas and circles. Solve equations containing radicals and rational exponents. Solve radical inequalities. Add, subtract, multiply, and divide functions. Explore inverses of functions. Find and verify inverses of nonlinear functions. Solve real-life problems using inverse functions.
Topic 1:**Nth Roots and Rational Exponents**	**Length:** 2 days
Standard(s): HSNRNA1, HSNRNA2	**Academic Vocabulary:** Nth root, Index of a radical
Lesson Frame:	We will identify nth roots of numbers.
	I will identify nth roots of numbers by using our knowledge of exponents.
Lesson Frame:	We will evaluate expressions with rational exponents.
	I will evaluate expressions with rational exponents by solving exit tickets.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 2: **Properties of Rational Exponents and Radicals**	**Length:** 2 days
Standard(s): HSNRNA2	**Academic Vocabulary:** Simplest form of a radical, like radicals, Conjugate
Lesson Frame:	We will use properties of rational exponents.
	I will use properties of rational exponents to simplify expressions with rational exponents.
Lesson Frame:	We will use properties of radicals.

	I will use properties of radicals to simplify radical expressions.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 3: **Graphing Radical Functions**	**Length:** 2 days
Standard(s): HSFIFC7B, HSFBFB3	**Academic Vocabulary:** Radical function
Lesson Frame:	We will graph radical functions.
	I will graph radical functions using a graphing calculator.
Lesson Frame:	We will write transformations of radical functions.
	I will write transformations of radical functions by identifying key part of equations.
Lesson Frame:	We will graph parabolas and circles.
	I will graph parabolas and circles using technology.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 4: **Solving Radical Equations and Inequalities**	**Length:** 2 days
Standard(s): HSAREIA1, HSAREIA2	**Academic Vocabulary:** Radical equation, extraneous solutions
Lesson Frame:	We will solve equations.
	I will solve equations with radicals and rational exponents.
Lesson Frame:	We will solve radical inequalities.
	I will solve radical inequalities by identifying similarities between equalities and inequalities.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 5: **Performing Function Operations**	**Length:** 2 days
Standard(s): HSFBFA1B	**Academic Vocabulary:** None
Lesson Frame:	We will add, subtract, multiply, and divide functions.
	I will add subtract, multiply, and divide functions by applying rules of combining functions.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:

Topic 6: **Inverse of a Function**	**Length:** 2 days
Standard(s): HSACEDA4, HSFBFB4A	**Academic Vocabulary:** Inverse functions
Lesson Frame:	We will explore inverses of functions.
	I will explore inverses of functions by comparing the original and inverse functions.
Lesson Frame:	We will solve real life problems.
	I will solve real life problems by using inverse functions.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:

Unit Name: **Exponential and Logarithmic Functions**	**Length:** 16 days
Standards: HSA-SSE.A.2, HSA-SSE.B.3c, HSA-REI.A.1, HSA-CED.A.2, HSF-IF.C.7e, HSF-IF.C.8b, HSF-BF.A.1a, HSF-BF.B.3, HSF-BF.B.4a, HSF-LE.A.2, HSF-LE.A.4, HSF-LE.B.5	**Outcomes:** In this unit students will define and evaluate logarithms, using the properties of logarithms and the change-of-base formula, graph logarithmic functions, transform graphs of logarithmic functions, solve logarithmic equations, and write logarithmic models for data sets.
Essential Questions: What are some of the characteristics of the graph of an exponential function? What is the natural base e? What are some of the characteristics of the graph of a logarithmic function? How can you transform the graphs of exponential and logarithmic functions? How can you use properties of exponents to derive properties of logarithms? How can you solve exponential and logarithmic equations? How can you recognize polynomial, exponential, and logarithmic models?	**Learning Targets:**The students will be able to: Graph exponential growth and decay functions. Use exponential models to solve real-life problems. Define and use the natural base e. Graph natural base functions. Solve real-life problems. Define and evaluate logarithms. Use inverse properties of logarithmic and exponential functions. Graph logarithmic functions. Transform graphs of exponential functions. Transform graphs of logarithmic functions.

Topic 1: **Exponential Growth and Decay Functions**	**Length:** 2 days
Standard(s): HSASSEB3C, HSFIFC7E, HSFIFC8B, HSFLEA2, HSFLEB5	**Academic Vocabulary:** Exponential function, exponential growth, exponential decay, growth factor, decay factor
Lesson Frame:	We will explore growth and decay functions.
	I will explore growth and decay functions by graphing.
Lesson Frame:	We will solve real life problems.
	I will solve real life problems using exponential models.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:

Topic 2: **The Natural Base e**	**Length:** 2 days
Standard(s): HSFIFC7E, HSFLEB5	**Academic Vocabulary:** Natural base e
Lesson Frame:	We will use natural base e.

	I will use natural base e by defining it.
Lesson Frame:	We will graph natural base functions.
	I will graph natural base functions using technology.
Lesson Frame:	We will solve real life problems.
	I will solve real life problems by applying natural bases.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 3:**Logarithms and Logarithmic Functions**	**Length:** 2 days
Standard(s): HSFIFC7E, HSFBFB4A, HSFLEA4	**Academic Vocabulary:** Natural logarithm, common logarithm
Lesson Frame:	We will define logarithms.
	I will define logarithms by evaluating them.
Lesson Frame:	We will use inverse properties of logarithmic and exponential functions.
	I will use inverse properties of logarithmic and exponential functions to solve problems.
Lesson Frame:	We will solve logarithmic functions.
	I will solve logarithmic functions by graphing.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 4: **Transformations of Exponential and Logarithmic Functions**	**Length:** 2 days
Standard(s): HSFIFC7E, HSFBFB3	**Academic Vocabulary:** None
Lesson Frame:	We will transform graphs of exponential functions.
	I will transform graphs of exponential functions by applying key rules to functions.
Lesson Frame:	We will transform graphs of logarithmic functions.
	I will transform graphs of logarithmic functions by applying key rules of transformations.
Lesson Frame:	We will solve real life problems.
	I will solve real life problems by writing transformations of graphs of exponential and logarithmic functions.

Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 5: **Properties of Logarithms**	**Length:** 2 days
Standard(s): HSASSEA2, HSFLEA4	**Academic Vocabulary:** None
Lesson Frame:	We will evaluate logarithms.
	I will evaluate logarithms by applying their properties.
Lesson Frame:	We will expand or condense logarithmic expressions.
	I will expand or condense logarithmic expressions by applying their characteristics.
Lesson Frame:	We will evaluate logarithms.
	I will evaluate logarithms by using the change of base formula.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 6: **Solving Exponential and Logarithmic Equations**	**Length:** 2 days
Standard(s): HSAREIA1, HSFLEA4	**Academic Vocabulary:** Logarithmic equations, exponential equations
Lesson Frame:	We will solve exponential equations.
	I will solve exponential equations by doing practice problems.
Lesson Frame:	We will solve logarithmic equations by using inverses.
	I will solve logarithmic equations by using inverses practice problems.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 7: **Modeling with Exponential and Logarithmic Functions**	**Length:** 2 days
Standard(s): HSACEDA2, HSFBFA1A, HSFLEA2	**Academic Vocabulary:** None
Lesson Frame:	We will classify data sets.
	I will classify data sets by analyzing charts.
Lesson Frame:	We will write exponential functions.
	I will write exponential functions use a chart.

Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:

Unit Name: **Rational Functions**	**Length:** 12 days
Standards: HSA-CED.A.1, HSA-CED.A.2, HSA-CED.A.3, HSA-CED.A.4, HSA-APR.D.6, HSA-APR.D.7, HSA-REI.A.1, HSA-REI.A.2, HSF-BF.B.3	**Outcomes:** In this unit students will classify and write direct and inverse variations, graph rational functions, add, subtract, multiply, and divide rational expressions, and solve rational equations.
Essential Questions: How can you recognize when two quantities vary directly or inversely? What are some of the characteristics of the graph of a rational function? How can you determine the excluded values in a product or quotient of two rational expressions? How can you determine the domain of the sum or difference of two rational expressions? How can you solve a rational equation?	**Learning Targets:** The students will be able to: Classify direct and inverse variation. Write inverse variation equations. Graph simple rational functions. Translate simple rational functions. Graph other rational functions. Simplify rational expressions. Multiply rational expressions. Divide rational expressions. Add or subtract rational expressions. Rewrite rational expressions and graph the related function. Simplify complex fractions. Solve rational equations by cross multiplying. Solve rational equations by using the least common denominator. Use inverses of functions.
Topic 1: **Inverse Variation**	**Length:** 2 days
Standard(s): HSACEDA1, HSACEDA2, HSACEDA3	**Academic Vocabulary:** Inverse variation, constant of variation
Lesson Frame:	We will classify variations.
	I will classify variations by using direct and inverse variation.
Lesson Frame:	We will write inverse variation equations.
	I will write inverse variation equations by identifying key components to the equations.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 2: **Graphing Rational Expressions**	**Length:** 2 days

Standard(s): HSAAPRD6, HSAAPRD7	**Academic Vocabulary:** Rational function
Lesson Frame:	We will graph rational functions.
	I will graph rational functions using technology.
Lesson Frame:	We will translate simple rational functions.
	I will translate simple rational functions by comparing them to the parent function.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 3: **Multiplying and Dividing Rational Expressions**	**Length:** 2 days
Standard(s): HSAAPRD6, HSAAPRD7	**Academic Vocabulary:** Rational expression, simplified form of a rational expression
Lesson Frame:	We will simplify rational expressions.
	I will simplify rational expressions by applying simplification rules.
Lesson Frame:	We will multiply and divide rational expressions.
	I will multiply and divide rational expressions to solve real life problems.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 4: **Adding and Subtracting Rational Expressions**	**Length:** 2 days
Standard(s): HSAAPRD6, HSAAPRD7	**Academic Vocabulary:** Complex Fraction
Lesson Frame:	We will add and subtract rational expressions.
	I will add and subtract rational expressions by finding common denominators.
Lesson Frame:	We will simplify complex fractions.
	I will simplify complex fractions by factoring.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:

Topic 5: **Solving Rational Equations**	**Length:** 2 days
Standard(s): HSACEDA4, HSAREIA1, HSAREIA2	**Academic Vocabulary:** Cross multiplying
Lesson Frame:	We will solving rational equations.
	I will solving rational equations using cross multiplying.
Lesson Frame:	We will solving rational equations.
	I will solving rational equations using the least common denominator.
Lesson Frame:	We will solving equations.
	I will solving equations using inverses.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:

Unit Name: **Sequences and Series**	**Length:** 12 days
Standards: HSA-SSE.B.4, HSF-IF.A.3, HSF-BF.A.1a, HSF-BF.A.2, HSF-LE.A.2	**Outcomes:** In this unit students will use sequence notation to write terms of sequences, write a rule for the nth term of a sequence, find the sums of finite arithmetic and finite geometric series, and find partial sums of infinite geometric series, evaluate recursive rules for sequences and translate between recursive and explicit rules for sequences.
Essential Questions: How can you write a rule for the nth term of a sequence? How can you recognize an arithmetic sequence from its graph? How can you recognize a geometric sequence from its graph? How can you find the sum of an infinite geometric series? How can you define a sequence recursively?	**Learning Targets:** The students will be able to: Use sequence notation to write terms of sequence. Write a rule for the nth term of a sequence. Sum the terms of a sequence to obtain a series and use summation notation. Identify artithmetic sequences. Write rules for arthmetic sequences. Find sums of finite arithmatic series. Identify geometric sequences. Write rules for gemetric sequences. Find sums of finite geometric series. Find partial sums of infinite gemetric series. Find sums of infinite geometric series. Evaluate recursive rules ofr sequences. Write recursive rules for sequences Translate between recursive and explicit rules for sequences. Use recursive rules to solve real-life problems.
Topic 1: **Defining and Using Sequences and Series**	**Length:** 2 days
Standard(s): HSFIFA3	**Academic Vocabulary:** Sequence, terms of a sequence, series, summation notation, sigma notation
Lesson Frame:	We will write terms of sequences.
	I will write terms of sequences using sequence notation.
Lesson Frame:	We will write a rule for the nth term in a sequence.
	I will write a rule for the nth term in a sequence by using previous terms in a sequence.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 2: **Analyzing Arithmetic Sequences and Series**	**Length:** 2 days
Standard(s): HSFIFA3, HSFBFA2, HSFLEA2	**Academic Vocabulary:** Arithmetic sequence, common difference, arithmetic series

Lesson Frame:	We will identify arithmetic sequences.
	I will identify arithmetic sequences by finding the common difference.
Lesson Frame:	We will write rules for arithmetic sequences.
	I will write rules for arithmetic sequences using a term and a common difference.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 3: **Analyzing Geometric Sequences and Series**	**Length:** 2 days
Standard(s): HSASSEB4, HSFIFA3, HSFBFA2. HSFLEA2	**Academic Vocabulary:** Geometric sequence, geometric series, common ratio
Lesson Frame:	We will identify geometric sequences.
	I will identify geometric sequences by finding the common ratio.
Lesson Frame:	We will write rules for geometric sequences.
	I will write rules for geometric sequences using a term and a common ratio.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 4: **Finding Sums of Infinite Geometric Series**	Length: 2 days
Standard(s): HSASSEB4	**Academic Vocabulary:** Partial sum
Lesson Frame:	We will find partial sums.
	I will find partial sums given infinite geometric series.
Lesson Frame:	We will find total sums.
	I will find total sums using infinite geometric series.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes:
Topic 5: **Using Recursive Rules with Sequences**	**Length:** 2 days
Standard(s): HSFIFA3, HSFBFA1A, HSFBFA2	**Academic Vocabulary:** Explicit rule, recursive rule
Lesson Frame:	We will evaluate recursive rules.
	I will evaluate recursive rules given a sequence.
Lesson Frame:	We will write recursive rules.

	I will write recursive rules when given a sequence.
Lesson Frame:	We will solve real life problems.
	I will solve real life problems using recursive rules.
Performance Tasks: Exit Tickets, Entrance Challenge Problems	Notes: