

Revised: 1/17/14
 EASTERN LEBANON COUNTY SCHOOL DISTRICT
 STUDENT LEARNING MAP







Course/Subject: Algebra 2
 Unit 1: Equations & Inequalities

Days: 10 days
 Grade Level: 9, 10, 11

Concept Solve Equations in One Variable	Concept Solve Inequalities in One Variable	Concept Solve Combined Inequalities
Standards: A2.1.3.2.2	Standards: A2.2.2.1.2	Standards: A2.2.2.1.1
↓	↓	
Lesson Essential Question What are the steps to isolate the variable in equations?	Lesson Essential Question How do you solve simple inequalities in one variable?	Lesson Essential Question How do you solve conjunctions and disjunctions?
↓	↓	↓
Vocabulary open sentence solution root solution set equivalent equations solve empty set null set identity formula constant	Vocabulary inequality comparison property transitive property addition property multiplication property equivalent inequalities	Vocabulary conjunction disjunction

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Concept Solve Problems Using Inequalities	Concept Absolute Value in Open Sentences	Concept Solve Absolute Value Sentences Graphically
Standards: A2.2.2.1.1	Standards: A2.2.2.1.1	Standards: A2.2.2.1.1
		
Lesson Essential Question How do you use equations or inequalities to solve word problems?	Lesson Essential Question How do you solve open sentences involving absolute value?	Lesson Essential Question How do you use a number line to obtain quick solutions to certain equations and inequalities involving absolute value?
		
Vocabulary	Vocabulary absolute value	Vocabulary

Additional Information/Resources:

Algebra & Trigonometry: Structure & Method Book 2 Classic; Brown, Dolciani, Sorgenfrey, Kane Copyright 1990
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Course/Subject: Algebra 2
 Unit 2: Linear Functions

Days: 15 to 20 days
 Grade Level: 9, 10, 11

Key Learning

Graphing, writing equations, and identifying characteristics of linear functions



Unit Essential Question

How do you graph and write linear equations and use them to interpret data and to make predictions?

Concept Open Sentences in Two Variables	Concept Graphs of Linear Equations in Two Variables	Concept The Slope of a Line
Standards: A1.1.2.1; A1.1.3.1	Standards: A1.1.2.1; A1.2.1.2.2; A1.2.2.1.4	Standards: A1.1.2.1; A1.2.2.1.1
↓	↓	↓
Lesson Essential Question How do you find solutions of open sentences in two variables and solve problems involving open sentences in two variables?	Lesson Essential Question How do you graph a linear equation in two variables?	Lesson Essential Question How do you find the slope of a line and graph a line given its slope and a point on it?
↓	↓	↓
Vocabulary open sentence solution ordered pair solution set	Vocabulary coordinate plane origin x-axis y-axis quadrants graph coordinates	Vocabulary Slope Rise Run coefficient

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Concept Correlation	Concept Systems of Linear Equations and Inequalities in Two Variables	Concept Finding an Equation of a Line
Standards: A2.2.3.1.1; A2.2.3.1.2	Standards: A2.1.3.2.2	Standards: A1.2.2.1.3; A1.2.2.1.4
↓	↓	↓
Lesson Essential Question How does a line help you determine correlation of data?	Lesson Essential Question How do you solve systems of linear equations in two variables?	Lesson Essential Question How do you find the equation of a line given information about the slope and or points on the line?
↓	↓	↓
Vocabulary correlation strong/weak/no correlation pos/neg correlation	Vocabulary systems of linear equations simultaneous solution equivalent system graphing method substitution method elimination method linear combination dependent independent	Vocabulary standard form slope-intercept form point-slope form parallel lines perpendicular lines

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Concept Relations	Concept Functions	Concept Linear Functions
Standards: A2.2.1.1.3	Standards: A2.2.1.1.3	Standards: A2.2.1.1.1; A2.2.3.1.1; A2.2.3.1.2
↓	↓	↓
Lesson Essential Question What is a relation? How do you determine domain and range of relations?	Lesson Essential Question What is a function? When is a relation a function?	Lesson Essential Question How do you find equations of linear functions and use them to make predictions given real-world data?
↓	↓	↓
Vocabulary relation mapping domain range set notation interval notation graph of relation	Vocabulary one-to-one correspondence function function notation vertical line test	Vocabulary linear function constant function rate of change

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 STUDENT LEARNING MAP

Course/Subject: Algebra 2
 Unit 3: Polynomials

Days: 10 – 15 days
 Grade Level: 9, 10, 11

Key Learning

The ability to understand numerical relationships and to use them in making decisions is important in many careers, as well as in daily life.



Unit Essential Question

How can polynomial equations and their graphs be used to model real life situations?

Concept Polynomials	Concept Using Laws of Exponents	Concept Multiplying Polynomials
Standards: A1.1.1.2.1	Standards: A2.1.2.1.2 A2.1.2.1.3	Standards: A2.1.2.1.2 A2.1.2.1.3
↓	↓	↓
Lesson Essential Question How do you simplify, add, and subtract polynomials?	Lesson Essential Question How do you use laws of exponents to simplify terms and expressions containing exponents and like bases?	Lesson Essential Question How do you use laws of exponents to multiply a polynomial by a monomial? A polynomial by another polynomial?
↓	↓	↓
Vocabulary constant monomial coefficient degree of a variable degree of a monomial similar monomials polynomial simplified polynomial degree of a polynomial	Vocabulary like bases laws of exponents product of powers power of powers power of a product	Vocabulary binomial trinomial FOIL

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 STUDENT LEARNING MAP

Concept Using Prime Factorization	Concept Factoring Polynomials	Concept Factoring Quadratic Polynomials
Standards: A2.1.2.2.1	Standards: A2.1.2.2.1	Standards: A2.1.2.2.1
↓	↓	↓
Lesson Essential Question How do you find the GCF and LCM of integers and monomials?	Lesson Essential Question How do you factor polynomials by using the GCF by recognizing special products, and by grouping terms?	Lesson Essential Question How do you factor quadratic polynomials?
↓	↓	↓
Vocabulary prime prime factorization factor tree factor GCF LCM factor set	Vocabulary greatest monomial factor perfect square trinomial difference of squares sum or difference of cubes factored completely	Vocabulary quadratic polynomial quadratic term linear term constant term quadratic trinomial irreducible

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Concept Solving Polynomial Equations	Concept Approximating Irrational Roots	Concept
Standards: A2.1.3.1.1 A2.2.1.1.4	Standards: A2.2.1.1.4	Standards:
↓	↓	↓
Lesson Essential Question How do you solve polynomial equations and solve problems using polynomial equations?	Lesson Essential Question How can you make sense of irrational roots of a polynomial equation?	Lesson Essential Question
↓	↓	↓
Vocabulary polynomial equation root/solution zero of a function multiple roots/ zeros mathematical model	Vocabulary irrational root Intermediate Value Theorem Descartes' Rule real zero magnification	Vocabulary

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 STUDENT LEARNING MAP

Course/Subject: Algebra 2
 Unit 4: Rational Expressions &
 Equations

Days: 10 – 15 days
 Grade Level: 9, 10, 11

Key Learning

The ability to understand numerical relationships and to use them in making decisions is important in many careers, as well as in daily life.



Unit Essential Question

How can working with rational equations help me to become a better problem solver?

Concept Quotients of Monomials	Concept Zero and Negative Exponents	Concept Rational Algebraic Expressions
Standards: A2.1.2.1.2 A2.1.2.1.3	Standards: A2.1.2.1.1 A2.1.2.1.2 A2.1.2.1.3	Standards: A2.1.2.2.2
↓	↓	↓
Lesson Essential Question How do you simplify quotients using the laws of exponents?	Lesson Essential Question How do you simplify expressions involving the exponent zero and negative integral exponents?	Lesson Essential Question How do you simplify rational algebraic expressions? What does it mean to restrict a Domain?
↓	↓	↓
Vocabulary multiplication rule for fractions simplify laws of exponents power base exponent power of a quotient quotient of powers	Vocabulary negative integral exponent zero exponent	Vocabulary rational algebraic expression rational function domain restrictions on domain

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Concept Products and Quotients of Rational Expressions	Concept Sums and Differences of Rational Expressions	Concept Complex Fractions
Standards: A2.1.2.2.2	Standards: A2.1.2.2.2	Standards: A2.1.2.2.2
↓	↓	↓
Lesson Essential Question How do you multiply and divide rational expressions?	Lesson Essential Question How do you add and subtract rational expressions?	Lesson Essential Question How do you simplify complex fractions?
↓	↓	↓
Vocabulary division rule for fractions	Vocabulary least common denominator	Vocabulary complex fraction

Concept Fractional Coefficients	Concept Fractional Equations	Concept
Standards: A2.1.3.1.2	Standards: A2.1.3.1.2	Standards:
↓	↓	↓
Lesson Essential Question How do you solve equations and inequalities having fractional coefficients?	Lesson Essential Question How do you solve and use fractional equations?	Lesson Essential Question
↓	↓	↓
Vocabulary 5 Step Plan percent	Vocabulary fractional equation extraneous root	Vocabulary

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Course/Subject: Algebra 2
 Unit 5: Irrational and Complex Numbers

Days: 10
 Grade Level: 9, 10, 11







Key Learning
 Simplifying expressions and solving equations that involve radicals.



Unit Essential Question
 How does one simplify expressions or solve equations that involve irrational numbers (radicals)?

<p>Concept Simplifying radical expressions using the properties of radicals.</p>	<p>Concept Simplify radical expression involving the sums of radicals.</p>	<p>Concept Simplifying radicals that contain a product or quotient of binomials.</p>
<p>Standards: A1.1.1.1.2</p>	<p>Standards: A1.1.1.1.2</p>	<p>Standards: A1.1.1.2</p>
↓	↓	↓
<p>Lesson Essential Question How do you simplify radical expressions using the properties of radicals?</p>	<p>Lesson Essential Question How do you simplify radical expressions involving the sums of radicals?</p>	<p>Lesson Essential Question How do you simplify radicals that contain a product and quotient of binomials?</p>
↓	↓	↓
<p>Vocabulary Square root Principal square root Cube root nth root Product Property of Radicals Quotient Property of Radicals Rationalizing the denominator Simplest radical form</p>	<p>Vocabulary Like Radicals</p>	<p>Vocabulary Conjugates</p>

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Concept Solving equations containing radicals.	Concept Simplifying square roots of negative number using the imaginary number i .	Concept Adding, subtracting, and dividing complex numbers.
Standards: A2.1.3.1.2	Standards: A2.1.1.1.1, A2.1.1.1.2, A2.1.1.2.1, A2.1.1.2.2	Standards: A2.1.1.1.1, A2.1.1.1.2, A2.1.1.2.1, A2.1.1.2.2
		
Lesson Essential Question How do you solve and equation containing radicals?	Lesson Essential Question How do you simplify square roots of negative number using the imaginary number i ?	Lesson Essential Question How do you add, subtract, and divide complex numbers?
		
Vocabulary Radical Equation Extraneous root	Vocabulary Imaginary numbers $i = \sqrt{-1}$ $i^2 = -1$ pure imaginary numbers	Vocabulary Complex number Sum of complex numbers Product of complex numbers

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Course/Subject: Algebra II Unit 6
 Unit 6: Quadratic Equations and
 Functions

Days: 12 to 15 Days
 Grade Level: 9, 10, 11

Key Learning
 Solving and Graphing Quadratic Equations and Functions



Unit Essential Question
 How do you visualize quadratic functions/parabolas?
 Explain why you need to know different methods of solving quadratic equations or what is the BEST method to use to solve certain situations.

Concept Solving Quadratic Equations.	Concept Determine the roots of the discriminant.	Concept Graphing Quadratic Functions.	Concept Writing Quadratic Equations and Functions
Standards: A2.1.3.1.1	Standards: A2.1.3.1.1	Standards: A2.1.3.2.1; A2.2.1.1.4; A2.2.2.1.3; A2.2.2.1.4; A2.2.2.2.1	Standards: A2.1.3.1.1; A2.2.2.1.3
↓	↓	↓	↓
Lesson Essential Question When do you utilize “Completing the Square” vs. using the “Quadratic Formula”?	Lesson Essential Question How would you describe the three different natures of the discriminant?	Lesson Essential Question What real life examples of graphs of quadratic functions can you give?	Lesson Essential Question What is the difference between Quadratic Equations and Quadratic Functions?
↓	↓	↓	↓
Vocabulary Completing the Square Quadratic Formula	Vocabulary Discriminant Roots	Vocabulary Parabola; Vertex Axis of Symmetry Quadratic Function Maximum Value Minimum Value Directrix Focus Latus Rectum	Vocabulary Roots

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Course/Subject: Algebra 2
 Unit 7: Exponential & Logarithmic
 Functions

Days: 10 – 15 days
 Grade Level: 9, 10, 11

Key Learning

There are certain types of equations for which logarithms provide the best, or even the only, method of solution. Logarithms are used in studying exponential equations and their applications to such occurrences as compound interest, population growth, and radioactive decay.



Unit Essential Question

What is a logarithm and how are they used to solve problems?

Concept Rational Exponents	Concept Real Number Exponents	Concept Composition & Inverses of Functions
Standards: A2.1.2.1.2 A2.1.2.1.3	Standards: A2.1.3.1.3	Standards: A2.2.1.1.3
↓	↓	↓
Lesson Essential Question How do rational exponents and radicals relate?	Lesson Essential Question How do you solve an exponential equation?	Lesson Essential Question How do functions that are inverses relate graphically and algebraically?
↓	↓	↓
Vocabulary Rational number Exponential form	Vocabulary Real number Exponential function One-to-one	Vocabulary Composite Composition Identity function Inverse function Horizontal line test

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Concept Definition of Logarithms	Concept Laws of Logarithms	Concept Applications of Logarithms
Standards: A2.1.2.1.4	Standards: A2.1.3.1.3	Standards: A2.1.3.1.3
↓	↓	↓
Lesson Essential Question How do expressions written in exponential form and logarithmic form relate?	Lesson Essential Question How do you simplify expressions using the laws of logarithms?	Lesson Essential Question How and when are logarithms used to solve problems?
↓	↓	↓
Vocabulary Logarithm Logarithmic function	Vocabulary Laws of logarithms	Vocabulary Common logarithm Characteristic Mantissa Antilogarithm Change of base formula

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Concept Exponential Growth & Decay	Concept Natural Logarithms	Concept
Standards: A2.1.3.1.4	Standards: A2.1.3.1.3	Standards:
↓	↓	↓
Lesson Essential Question How are exponential and logarithmic functions used in solving growth and decay problems?	Lesson Essential Question What is a natural logarithm and how is it used to solve problems?	Lesson Essential Question
↓	↓	↓
Vocabulary Exponential growth Compound interest formula Doubling time growth formula Exponential decay Half life Half life decay formula	Vocabulary Natural logarithm Natural logarithmic function	Vocabulary

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Course/Subject: Algebra 2
 Unit 8: Sequences & Probability

Days: 10 - 13
 Grade Level: 9, 10, 11

Key Learning

There are many cases where numbers appear in a particular sequence. Many of these are arithmetic and geometric. Additionally, many decisions we make are based on the probability that a particular event will or will not occur.



Unit Essential Question

How are sequences and probability used in our daily lives?

<u>Concept</u> Types of Sequences	<u>Concept</u> Arithmetic Sequences	<u>Concept</u> Geometric Sequences
<u>Standards:</u> A2.2.1.1.1	<u>Standards:</u> A2.2.1.1.2	<u>Standards:</u> A2.2.1.1.2
<u>Lesson Essential Question</u> How do you determine whether a sequence is arithmetic, geometric, or neither?	<u>Lesson Essential Question</u> How do you determine the formula for an arithmetic sequence then find specific terms of that sequence?	<u>Lesson Essential Question</u> How do you determine the formula for a geometric sequence then find specific terms of that sequence?
<u>Vocabulary</u> Sequence Terms of a sequence Finite Infinite Arithmetic sequence Arithmetic progression Common difference Geometric sequence Geometric progression Common ratio	<u>Vocabulary</u> Arithmetic mean	<u>Vocabulary</u> Geometric mean

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Concept Fundamental Counting Principle	Concept Permutations	Concept Combinations
Standards: A2.2.3.2.1	Standards: A2.2.3.2.1	Standards: A2.2.3.2.1
↓	↓	↓
Lesson Essential Question How do you apply the Fundamental Counting Principle?	Lesson Essential Question How do you determine the number of permutations of a set of elements?	Lesson Essential Question How do you determine the number of combinations of a set of elements?
↓	↓	↓
Vocabulary Mutually exclusive	Vocabulary Permutation	Vocabulary Subset Combination

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Concept Sample Spaces & Events	Concept Probability	Concept
Standards: A2.2.3.2.3	Standards: A2.2.3.2.3	Standards:
↓	↓	↓
Lesson Essential Question How do you specify sample spaces and events for random experiments?	Lesson Essential Question How do you determine the probability that an event will occur?	Lesson Essential Question
↓	↓	↓
Vocabulary Random experiment Sample space Event Simple event	Vocabulary Equally likely events	Vocabulary

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