ALEKS®

Algebra 2

This course covers the topics shown below.
Students navigate learning paths based on their level of readiness.
Institutional users may customize the scope and sequence to meet curricular needs.

Curriculum (524 topics + 763 additional topics)

- Real Numbers (37 topics)
  - Plotting and Ordering (3 topics)
    - Using a calculator to approximate a square root
    - Absolute value of a number
    - Finding all numbers with a given absolute value
  - Operations with Signed Numbers (17 topics)
    - Integer addition: Problem type 1
    - Integer addition: Problem type 2
    - Integer subtraction: Problem type 1
    - Integer subtraction: Problem type 2
    - Integer subtraction: Problem type 3
    - Operations with absolute value: Problem type 1
    - Computing the distance between two integers on a number line
    - Integer multiplication and division
    - Multiplication of 3 or 4 integers
    - Least common multiple of 2 numbers
    - Signed fraction addition or subtraction: Basic
    - Signed fraction subtraction involving double negation
    - Least common multiple of 3 numbers
    - Signed fraction multiplication: Basic
    - Signed fraction division
    - Complex fraction without variables: Problem type 1
    - Signed decimal addition and subtraction
  - Exponents and Order of Operations (3 topics)
    - Exponents and integers: Problem type 1
    - Exponents and signed fractions
    - Order of operations with integers
  - Evaluating Expressions (2 topics)
    - Evaluating a linear expression: Integer multiplication with addition or subtraction
    - Evaluating a quadratic expression: Integers
  - Venn Diagrams and Sets of Real Numbers (1 topics)
    - Interpreting a Venn diagram of 2 sets
  - Properties of Operations (9 topics)
    - Introduction to adding fractions with variables and common denominators
    - Combining like terms: Integer coefficients
    - Combining like terms: Fractional coefficients
    - Distributive property: Whole number coefficients
    - Distributive property: Integer coefficients
    - Distributive property: Fractional coefficients
    - Using distribution and combining like terms to simplify: Univariate
    - Using distribution with double negation and combining like terms to simplify: Multivariate
    - Combining like terms in a quadratic expression

- Review of Geometry (2 topics)
  - Writing algebraic expressions for the perimeter of a figure
  - Circumference of a circle

- Linear Equations and Inequalities (64 topics)
  - Linear Equations (18 topics)
    - Multiplicative property of equality with whole numbers
    - Additive property of equality with signed fractions
    - Multiplicative property of equality with signed fractions
    - Identifying solutions to a linear equation in one variable: Two-step equations
    - Additive property of equality with a negative coefficient
    - Solving a two-step equation with integers
    - Solving a multi-step equation given in fractional form
    - Solving a linear equation with several occurrences of the variable: Variables on the same side
    - Solving a linear equation with several occurrences of the variable: Variables on both sides
    - Solving a linear equation with several occurrences of the variable: Variables on the same side and distribution
    - Solving a linear equation with several occurrences of the variable: Variables on both sides and distribution
    - Solving a linear equation with several occurrences of the variable: Variables on both sides and two distributions
    - Clearing fractions in an equation
    - Solving a linear equation with several occurrences of the variable: Fractional forms with monomial numerators
    - Solving a two-step equation with signed fractions
    - Solving a linear equation with several occurrences of the variable: Variables on both sides and fractional coefficients
    - Solving a linear equation with several occurrences of the variable: Fractional forms with binomial numerators
    - Solving equations with zero, one, or infinitely many solutions
  - Writing Expressions and Equations (6 topics)
    - Writing a one-step expression for a real-world situation
    - Translating a phrase into a one-step expression
    - Translating a phrase into a two-step expression
    - Translating a sentence into a one-step equation
    - Writing an equation to represent a proportional relationship
    - Translating a sentence into a multi-step equation
  - Applications of Linear Equations (8 topics)
    - Writing an equation of the form Ax + B = C to solve a word problem
    - Solving a decimal word problem using a linear equation of the form Ax + B = C
    - Solving a word problem with two unknowns using a linear equation
    - Writing an equation to represent a real-world problem: Variable on both sides
    - Solving a one-step word problem using the formula d = rt
    - Solving a distance, rate, time problem using a linear equation
    - Finding side lengths of rectangles given one dimension and an area or a perimeter
    - Finding the dimensions of a rectangle given its perimeter and a relationship between sides
  - Solving for a Variable and Dimensional Analysis (4 topics)
    - Solving for a variable in terms of other variables using addition or subtraction: Basic
    - Solving for a variable in terms of other variables using multiplication or division: Basic
    - Solving for a variable in terms of other variables using addition or subtraction with division
    - Solving for a variable inside parentheses in terms of other variables
  - Applications with Proportions and Percents (7 topics)
    - Solving a proportion of the form x/a = b/c
    - Solving a proportion of the form (x+a)/b = c/d
    - Solving a proportion of the form a/(x+b) = c/x
    - Word problem on proportions: Problem type 1
    - Finding the multiplier to give a final amount after a percentage increase or decrease
    - Finding the final amount given the original amount and a percentage increase or decrease
    - Finding the sale price given the original price and percent discount
  - Absolute Value Equations (3 topics)

- Introduction to solving an absolute value equation
- Solving an absolute value equation: Problem type 1
- Solving an absolute value equation: Problem type 2

- Writing and Graphing Inequalities (4 topics)
  - Translating a sentence into a one-step inequality
  - Writing an inequality for a real-world situation
  - Graphing a linear inequality on the number line
  - Graphing a compound inequality on the number line

- Linear Inequalities (9 topics)
  - Additive property of inequality with integers
  - Multiplicative property of inequality with integers
  - Identifying solutions to a two-step linear inequality in one variable
  - Solving a two-step linear inequality with whole numbers
  - Solving a two-step linear inequality: Problem type 1
  - Solving a two-step linear inequality: Problem type 2
  - Solving a linear inequality with multiple occurrences of the variable: Problem type 1
  - Solving a word problem using a two-step linear inequality
  - Solving a decimal word problem using a two-step linear inequality

- Sets (1 topics)
  - Set-builder and interval notation

- Compound Inequalities (1 topics)
  - Solving a compound linear inequality: Graph solution, basic

- Absolute Value Inequalities (3 topics)
  - Solving an absolute value inequality: Problem type 1
  - Solving an absolute value inequality: Problem type 3
  - Solving an absolute value inequality: Problem type 4

- Graphs and Functions (78 topics)

  - Ordered Pairs (2 topics)
    - Naming the quadrant or axis of a point given its coordinates
    - Naming the quadrant or axis of a point given the signs of its coordinates

  - Graphs of Lines (11 topics)
    - Table for a linear equation
    - Identifying solutions to a linear equation in two variables
    - Finding a solution to a linear equation in two variables
    - Graphing a linear equation of the form y = mx
    - Graphing a line given its equation in slope-intercept form: Integer slope
    - Graphing a line given its equation in slope-intercept form: Fractional slope
    - Graphing a line given its equation in standard form
    - Graphing a vertical or horizontal line
    - Finding x- and y-intercepts given the graph of a line on a grid
    - Finding x- and y-intercepts of a line given the equation: Basic
    - Graphing a line by first finding its x- and y-intercepts

  - Slope (3 topics)
    - Finding slope given the graph of a line on a grid
    - Finding slope given two points on the line
    - Finding the slope of horizontal and vertical lines

  - Equations of Lines (8 topics)
    - Finding the slope and y-intercept of a line given its equation in the form y = mx + b
    - Finding the slope and y-intercept of a line given its equation in the form Ax + By = C
    - Graphing a line by first finding its slope and y-intercept
    - Writing an equation of a line given its slope and y-intercept

- Writing an equation in slope-intercept form given the slope and a point
- Writing an equation of a line given the y-intercept and another point
- Writing the equation of the line through two given points
- Writing the equations of vertical and horizontal lines through a given point

- Applications of Linear Equations with Two Variables (7 topics)
  - Writing and evaluating a function that models a real-world situation: Advanced
  - Writing an equation and drawing its graph to model a real-world situation: Advanced
  - Finding the intercepts and rate of change given a graph of a linear function
  - Finding the initial amount and rate of change given a table for a linear function
  - Combining functions to write a new function that models a real-world situation
  - Comparing properties of linear functions given in different forms
  - Interpreting the parameters of a linear function that models a real-world situation

- Introduction to Functions (10 topics)
  - Identifying functions from relations
  - Vertical line test
  - Domain and range from ordered pairs
  - Table for a linear function
  - Evaluating functions: Linear and quadratic or cubic
  - Variable expressions as inputs of functions: Problem type 1
  - Evaluating a piecewise-defined function
  - Finding outputs of a two-step function with decimals that models a real-world situation: Function notation
  - Finding inputs and outputs of a two-step function that models a real-world situation: Function notation
  - Domain and range of a linear function that models a real-world situation

- Graphs of Functions (25 topics)
  - Finding an output of a function from its graph
  - Finding inputs and outputs of a function from its graph
  - Domain and range from the graph of a discrete relation
  - Finding domain and range from a linear graph in context
  - Domain and range from the graph of a continuous function
  - Finding where a function is increasing, decreasing, or constant given the graph
  - Finding where a function is increasing, decreasing, or constant given the graph: Interval notation
  - Finding intercepts of a nonlinear function given its graph
  - Finding local maxima and minima of a function given the graph
  - Finding values and intervals where the graph of a function is zero, positive, or negative
  - Choosing a graph to fit a narrative: Basic
  - Choosing a graph to fit a narrative: Advanced
  - Graphing a function of the form $f(x) = ax + b$: Integer slope
  - Graphing an absolute value equation of the form $y = A|x|$
  - Graphing an absolute value equation in the plane: Basic
  - Graphing a parabola of the form $y = ax^2$
  - Graphing a parabola of the form $y = ax^2 + c$
  - Graphing a function of the form $f(x) = ax^2$
  - Graphing a parabola of the form $y = (x-h)^2 + k$
  - Graphing a cubic function of the form $y = ax^3$
  - Graphing a piecewise-defined function: Problem type 1
  - Graphing a piecewise-defined function: Problem type 2
  - Finding the average rate of change of a function given its equation
  - Finding the average rate of change of a function given its graph
  - Word problem involving average rate of change

- Transformations (12 topics)
  - Translating the graph of a parabola: One step
  - Translating the graph of a parabola: Two steps
  - How the leading coefficient affects the shape of a parabola
  - Graphing quadratic functions of the form $y=ax^2$ and $y=(bx)^2$ by transforming the parent graph $y=x^2$

- Translating the graph of an absolute value function: One step
- Translating the graph of an absolute value function: Two steps
- How the leading coefficient affects the graph of an absolute value function
- Writing an equation for a function after a vertical translation
- Translating the graph of a function: One step
- Translating the graph of a function: Two steps
- Transforming the graph of a quadratic, cubic, square root, or absolute value function
- Writing an equation for a function after a vertical and horizontal translation

- Linear Systems (21 topics)
  - Systems of Linear Equations in Two Variables (9 topics)
    - Identifying solutions to a system of linear equations
    - Graphically solving a system of linear equations
    - Using a graphing calculator to solve a system of linear equations: Basic
    - Using a graphing calculator to solve a system of linear equations: Advanced
    - Solving a system of linear equations of the form $y = mx + b$
    - Solving a system of linear equations using substitution
    - Solving a system of linear equations using elimination with addition
    - Solving a system of linear equations using elimination with multiplication and addition
    - Solving systems of linear equations with 0, 1, or infinitely many solutions
  - Applications (4 topics)
    - Interpreting the graphs of two functions
    - Solving a word problem involving a sum and another basic relationship using a system of linear equations
    - Writing and solving a system of two linear equations given a table of values
    - Solving a value mixture problem using a system of linear equations
  - Linear Inequalities with Two Variables (4 topics)
    - Identifying solutions to a linear inequality in two variables
    - Graphing a linear inequality in the plane: Vertical or horizontal line
    - Graphing a linear inequality in the plane: Slope-intercept form
    - Graphing a linear inequality in the plane: Standard form
  - Systems of Inequalities and Linear Programming (4 topics)
    - Graphing a system of two linear inequalities: Basic
    - Graphing a system of three linear inequalities
    - Writing a multi-step inequality for a real-world situation
    - Solving a word problem using a system of linear inequalities: Problem type 1

- Exponents and Polynomials (56 topics)
  - Product, Power, and Quotient Rules (12 topics)
    - Introduction to the product rule of exponents
    - Product rule with positive exponents: Univariate
    - Product rule with positive exponents: Multivariate
    - Introduction to the power of a power rule of exponents
    - Introduction to the power of a product rule of exponents
    - Power rules with positive exponents: Multivariate products
    - Power rules with positive exponents: Multivariate quotients
    - Simplifying a ratio of multivariate monomials: Basic
    - Introduction to the quotient rule of exponents
    - Simplifying a ratio of univariate monomials
    - Quotient of expressions involving exponents
    - Simplifying a ratio of multivariate monomials: Advanced
  - Negative Exponents (9 topics)
    - Evaluating expressions with exponents of zero
    - Evaluating an expression with a negative exponent: Whole number base
    - Evaluating an expression with a negative exponent: Positive fraction base

- Evaluating an expression with a negative exponent: Negative integer base
- Rewriting an algebraic expression without a negative exponent
- Introduction to the product rule with negative exponents
- Quotient rule with negative exponents: Problem type 1
- Power of a power rule with negative exponents
- Power rules with negative exponents

- Polynomial Addition and Subtraction (3 topics)
  - Degree and leading coefficient of a univariate polynomial
  - Simplifying a sum or difference of two univariate polynomials
  - Simplifying a sum or difference of multivariate polynomials

- Polynomial Multiplication (12 topics)
  - Multiplying a univariate polynomial by a monomial with a positive coefficient
  - Multiplying a univariate polynomial by a monomial with a negative coefficient
  - Multiplying binomials with leading coefficients of 1
  - Multiplying binomials with leading coefficients greater than 1
  - Multiplying binomials in two variables
  - Multiplying conjugate binomials: Univariate
  - Multiplying conjugate binomials: Multivariate
  - Squaring a binomial: Univariate
  - Squaring a binomial: Multivariate
  - Multiplying binomials with negative coefficients
  - Multiplication involving binomials and trinomials in one variable
  - Multiplication involving binomials and trinomials in two variables

- Polynomial Division (6 topics)
  - Dividing a polynomial by a monomial: Univariate
  - Polynomial long division: Problem type 1
  - Polynomial long division: Problem type 2
  - Polynomial long division: Problem type 3
  - Synthetic division
  - Closure properties of integers and polynomials

- Factoring Using the GCF (4 topics)
  - Greatest common factor of 2 numbers
  - Factoring a linear binomial
  - Introduction to the GCF of two monomials
  - Factoring out a monomial from a polynomial: Univariate

- Factoring by Grouping (1 topics)
  - Factoring a univariate polynomial by grouping: Problem type 1

- Factoring Quadratic Trinomials (5 topics)
  - Factoring a quadratic with leading coefficient 1
  - Factoring out a constant before factoring a quadratic
  - Factoring a quadratic with leading coefficient greater than 1: Problem type 1
  - Factoring a quadratic with leading coefficient greater than 1: Problem type 2
  - Factoring a quadratic with a negative leading coefficient

- Factoring Special Products (4 topics)
  - Factoring a perfect square trinomial with leading coefficient 1
  - Factoring a perfect square trinomial with leading coefficient greater than 1
  - Factoring a difference of squares in one variable: Basic
  - Factoring a difference of squares in one variable: Advanced

- Quadratic and Polynomial Functions (69 topics)

  - Solving Quadratic Equations by Factoring (8 topics)
    - Solving an equation written in factored form

- Finding the roots of a quadratic equation of the form $ax^2 + bx = 0$
- Finding the roots of a quadratic equation with leading coefficient 1
- Finding the roots of a quadratic equation with leading coefficient greater than 1
- Solving a quadratic equation needing simplification
- Roots of a product of polynomials
- Writing a quadratic equation given the roots and the leading coefficient
- Solving a word problem using a quadratic equation with rational roots

- Quadratic Functions (15 topics)
  - Finding the vertex, intercepts, and axis of symmetry from the graph of a parabola
  - Graphing a parabola of the form $y = a(x-h)^2 + k$
  - Completing the square
  - Graphing a parabola of the form $y = x^2 + bx + c$
  - Graphing a parabola of the form $y = ax^2 + bx + c$: Integer coefficients
  - Finding the zeros of a quadratic function given its equation
  - Writing a quadratic function given its zeros
  - Finding the x-intercept(s) and the vertex of a parabola
  - Rewriting a quadratic function to find its vertex and sketch its graph
  - Finding the maximum or minimum of a quadratic function
  - Word problem involving the maximum or minimum of a quadratic function
  - Domain and range from the graph of a parabola
  - Range of a quadratic function
  - Writing the equation of a quadratic function given its graph
  - Comparing properties of quadratic functions given in different forms

- Introduction to Radicals (11 topics)
  - Square root of a rational perfect square
  - Square roots of perfect squares with signs
  - Cube root of an integer
  - Simplifying the square root of a whole number less than 100
  - Introduction to square root addition or subtraction
  - Introduction to square root multiplication
  - Square root multiplication: Basic
  - Square root multiplication: Advanced
  - Introduction to simplifying a product involving square roots using the distributive property
  - Simplifying a quotient of square roots
  - Simplifying a quotient involving a sum or difference with a square root

- Complex Numbers (6 topics)
  - Using i to rewrite square roots of negative numbers
  - Simplifying a product and quotient involving square roots of negative numbers
  - Adding or subtracting complex numbers
  - Multiplying complex numbers
  - Dividing complex numbers
  - Simplifying a power of i

- Square Root Property (3 topics)
  - Solving an equation of the form $x^2 = a$ using the square root property
  - Solving a quadratic equation using the square root property: Exact answers, basic
  - Solving a quadratic equation using the square root property: Exact answers, advanced

- Completing the Square and the Quadratic Formula (5 topics)
  - Solving a quadratic equation by completing the square: Exact answers
  - Applying the quadratic formula: Exact answers
  - Solving a quadratic equation with complex roots
  - Discriminant of a quadratic equation
  - Solving a word problem using a quadratic equation with irrational roots

- Quadratic Inequalities (4 topics)

- Solving a quadratic inequality written in factored form
- Solving a quadratic inequality
- Graphing a quadratic inequality: Problem type 1
- Graphing a quadratic inequality: Problem type 2

- Polynomial Functions (8 topics)
  - Finding zeros of a polynomial function written in factored form
  - Finding zeros and their multiplicities given a polynomial function written in factored form
  - Finding a polynomial of a given degree with given zeros: Real zeros
  - Finding x- and y-intercepts given a polynomial function
  - Determining the end behavior of the graph of a polynomial function
  - Determining end behavior and intercepts to graph a polynomial function
  - Matching graphs with polynomial functions
  - Using a graphing calculator to find local extrema of a polynomial function

- Remainder and Factor Theorems (2 topics)
  - Using the remainder theorem to evaluate a polynomial
  - The Factor Theorem

- Real Zeros of Polynomial Functions (5 topics)
  - Finding all possible rational zeros using the rational zeros theorem: Problem type 1
  - Finding all possible rational zeros using the rational zeros theorem: Problem type 2
  - Using the rational zeros theorem to find all zeros of a polynomial: Rational zeros
  - Using the rational zeros theorem to find all zeros of a polynomial: Irrational zeros
  - Using a graphing calculator to find zeros of a polynomial function

- Complex Zeros of Polynomial Functions (2 topics)
  - Multiplying expressions involving complex conjugates
  - Using the rational zeros theorem to find all zeros of a polynomial: Complex zeros

- Rational Expressions (54 topics)

  - Simplifying Rational Expressions (9 topics)
    - Restriction on a variable in a denominator: Linear
    - Restriction on a variable in a denominator: Quadratic
    - Evaluating a rational function: Problem type 1
    - Evaluating a rational function: Problem type 2
    - Domain of a rational function: Excluded values
    - Simplifying a ratio of factored polynomials: Linear factors
    - Simplifying a ratio of polynomials using GCF factoring
    - Simplifying a ratio of polynomials by factoring a quadratic with leading coefficient 1
    - Simplifying a ratio of polynomials: Problem type 1

  - Multiplication and Division (6 topics)
    - Multiplying rational expressions involving multivariate monomials
    - Multiplying rational expressions made up of linear expressions
    - Multiplying rational expressions involving quadratics with leading coefficients of 1
    - Dividing rational expressions involving multivariate monomials
    - Dividing rational expressions involving linear expressions
    - Dividing rational expressions involving quadratics with leading coefficients of 1

  - Addition and Subtraction (1 topics)
    - Introduction to the LCM of two monomials
    - Finding the LCD of rational expressions with linear denominators: Relatively prime
    - Finding the LCD of rational expressions with linear denominators: Common factors
    - Finding the LCD of rational expressions with quadratic denominators
    - Writing equivalent rational expressions with polynomial denominators
    - Adding rational expressions with common denominators and monomial numerators
    - Adding rational expressions with common denominators and binomial numerators
    - Adding rational expressions with common denominators and GCF factoring

- Adding rational expressions with common denominators and quadratic factoring
- Adding rational expressions with different denominators and a single occurrence of a variable
- Adding rational expressions with denominators ax and bx: Basic
- Adding rational expressions with linear denominators without common factors: Basic
- Adding rational expressions with linear denominators with common factors: Basic
- Adding rational expressions involving different quadratic denominators

- Complex Fractions (4 topics)
  - Complex fraction without variables: Problem type 2
  - Complex fraction involving univariate monomials
  - Complex fraction: GCF factoring
  - Complex fraction: Quadratic factoring

- Rational Equations and Applications (15 topics)
  - Solving a rational equation that simplifies to linear: Denominator x
  - Solving a rational equation that simplifies to linear: Denominator x+a
  - Solving a rational equation that simplifies to linear: Denominators a, x, or ax
  - Solving a rational equation that simplifies to linear: Denominators ax and bx
  - Solving a rational equation that simplifies to linear: Like binomial denominators
  - Solving a rational equation that simplifies to linear: Unlike binomial denominators
  - Solving a rational equation that simplifies to linear: Factorable quadratic denominator
  - Solving a rational equation that simplifies to quadratic: Denominator x
  - Solving a rational equation that simplifies to quadratic: Binomial denominators, constant numerators
  - Solving a rational equation that simplifies to quadratic: Binomial denominators and numerators
  - Solving a rational equation that simplifies to quadratic: Factorable quadratic denominator
  - Solving for a variable in terms of other variables in a rational equation: Problem type 1
  - Word problem involving multiple rates
  - Solving a work problem using a rational equation
  - Solving a distance, rate, time problem using a rational equation

- Graphs of Rational Functions (6 topics)
  - Finding the intercepts, asymptotes, domain, and range from the graph of a rational function
  - Finding the asymptotes of a rational function: Constant over linear
  - Finding the asymptotes of a rational function: Linear over linear
  - Graphing a rational function: Constant over linear
  - Graphing a rational function: Linear over linear
  - Transforming the graph of a rational function

- Radicals (46 topics)

  - Roots of Perfect Powers (2 topics)
    - Introduction to simplifying a radical expression with an even exponent
    - Square root of a perfect square monomial

  - Radical Functions (7 topics)
    - Table for a square root function
    - Evaluating a cube root function
    - Domain of a square root function: Basic
    - Domain of a square root function: Advanced
    - Graphing a square root function: Problem type 1
    - Graphing a square root function: Problem type 2
    - Graphing a cube root function

  - Rational Exponents (7 topics)
    - Converting between radical form and exponent form
    - Rational exponents: Unit fraction exponents and whole number bases
    - Rational exponents: Non-unit fraction exponent with a whole number base
    - Rational exponents: Negative exponents and fractional bases
    - Rational exponents: Product rule
    - Rational exponents: Quotient rule

- Rational exponents: Power of a power rule

- Simplifying Expressions (3 topics)
  - Simplifying a radical expression with an even exponent
  - Introduction to simplifying a radical expression with an odd exponent
  - Simplifying a radical expression with an odd exponent

- Addition and Subtraction (1 topics)
  - Square root addition or subtraction

- Multiplication (4 topics)
  - Introduction to simplifying a product of radical expressions: Univariate
  - Simplifying a product of radical expressions: Univariate
  - Simplifying a product involving square roots using the distributive property: Basic
  - Simplifying a product involving square roots using the distributive property: Advanced

- Division and Rationalization (3 topics)
  - Rationalizing a denominator: Quotient involving square roots
  - Rationalizing a denominator: Square root of a fraction
  - Rationalizing a denominator using conjugates: Integer numerator

- Radical Equations and Applications (10 topics)
  - Introduction to solving a radical equation
  - Solving a radical equation that simplifies to a linear equation: One radical, basic
  - Solving a radical equation that simplifies to a linear equation: One radical, advanced
  - Solving a radical equation that simplifies to a linear equation: Two radicals
  - Solving a radical equation that simplifies to a quadratic equation: One radical, basic
  - Solving a radical equation that simplifies to a quadratic equation: One radical, advanced
  - Algebraic symbol manipulation with radicals
  - Word problem involving radical equations: Basic
  - Word problem involving radical equations: Advanced
  - Solving an equation with a root index greater than 2: Problem type 1

- The Pythagorean Theorem (1 topics)
  - Pythagorean Theorem

- Function Operations (4 topics)
  - Sum, difference, and product of two functions
  - Quotient of two functions: Basic
  - Introduction to the composition of two functions
  - Composition of two functions: Basic

- Inverse Functions (4 topics)
  - Determining whether two functions are inverses of each other
  - Inverse functions: Linear, discrete
  - Finding, evaluating, and interpreting an inverse function for a given linear relationship
  - Even and odd functions: Problem type 1

- Exponential and Logarithmic Functions (39 topics)

  - Graphs of Exponential Functions (5 topics)
    - Table for an exponential function
    - Graphing an exponential function: $f(x) = a^x$
    - Graphing an exponential function: $f(x) = a(b)^x$
    - Translating the graph of an exponential function
    - Finding domain and range from the graph of an exponential function

  - Applications of Exponential Functions (10 topics)
    - Using a calculator to evaluate exponential expressions
    - Evaluating an exponential function that models a real-world situation

- Using a calculator to evaluate exponential expressions involving base e
- Evaluating an exponential function with base e that models a real-world situation
- Introduction to compound interest
- Finding a final amount in a word problem on exponential growth or decay
- Finding the final amount in a word problem on compound interest
- Finding the initial amount and rate of change given an exponential function
- Writing an equation that models exponential growth or decay
- Finding the initial amount and asymptote given a graph of an exponential function

- Logarithmic Functions (6 topics)
  - Using a calculator to evaluate natural and common logarithmic expressions
  - Converting between logarithmic and exponential equations
  - Converting between natural logarithmic and exponential equations
  - Evaluating logarithmic expressions
  - Solving an equation of the form $\log_b a = c$
  - Graphing a logarithmic function: Basic

- Properties of Logarithms (4 topics)
  - Basic properties of logarithms
  - Expanding a logarithmic expression: Problem type 1
  - Expanding a logarithmic expression: Problem type 2
  - Change of base for logarithms: Problem type 1

- Logarithmic and Exponential Equations (10 topics)
  - Solving a multi-step equation involving a single logarithm: Problem type 1
  - Solving a multi-step equation involving a single logarithm: Problem type 2
  - Solving an equation involving logarithms on both sides: Problem type 1
  - Solving an equation involving logarithms on both sides: Problem type 2
  - Solving an exponential equation by finding common bases: Linear exponents
  - Solving an exponential equation by using logarithms: Decimal answers, basic
  - Solving an exponential equation by using natural logarithms: Decimal answers
  - Solving an exponential equation by using logarithms: Decimal answers, advanced
  - Solving an exponential equation by using logarithms: Exact answers in logarithmic form
  - Using a graphing calculator to solve an exponential or logarithmic equation

- Applications Involving Exponential Functions and Logarithms (4 topics)
  - Finding the time to reach a limit in a word problem on exponential growth or decay
  - Finding the time given an exponential function with base e that models a real-world situation
  - Finding the final amount in a word problem on continuous compound interest
  - Finding half-life or doubling time

- Statistics and Probability (60 topics)

  - Collecting Data (2 topics)
    - Choosing an appropriate method for gathering data: Problem type 2
    - Introduction to expectation

  - Frequency Tables (1 topics)
    - Constructing a frequency distribution for grouped data

  - Graphs of Data (2 topics)
    - Constructing a frequency distribution and a histogram
    - Constructing a percent bar graph

  - Measures of Center and Spread (9 topics)
    - Mode of a data set
    - Range of a data set
    - Rejecting unreasonable claims based on average statistics
    - Mean and median of a data set
    - Mean, median, and mode: Comparisons

- Approximating the mean of a data set given a histogram
- Percentage of data below a specified value
- Interpreting percentile ranks
- Percentiles

- Comparing Data (3 topics)
  - Five-number summary and interquartile range
  - Constructing a box-and-whisker plot
  - Using box-and-whisker plots to compare data sets

- Permutations and Combinations (10 topics)
  - Introduction to the counting principle
  - Counting principle
  - Counting principle with repetition allowed
  - Factorial expressions
  - Computing permutations and combinations
  - Word problem involving permutations
  - Introduction to permutations and combinations
  - Permutations and combinations: Problem type 1
  - Permutations and combinations: Problem type 2
  - Binomial formula

- Probability of Simple Events (7 topics)
  - Determining a sample space and outcomes for a simple event
  - Probability involving one die or choosing from n distinct objects
  - Probability involving choosing from objects that are not distinct
  - Probability of selecting one card from a standard deck
  - Experimental and theoretical probability
  - Computing expected value in a game of chance
  - Computing expected value in a business application

- Probability of Compound Events (15 topics)
  - Determining a sample space and outcomes for a compound event
  - Outcomes and event probability
  - Identifying independent events given descriptions of experiments
  - Probability of independent events
  - Probability of dependent events
  - Probabilities of draws with replacement
  - Determining outcomes for compound events and complements of events
  - Using a Venn diagram to understand the addition rule for probability
  - Probability of intersection or union: Word problems
  - Computing conditional probability using a sample space
  - Outcomes and event probability: Conditional probability
  - Computing conditional probability using a two-way frequency table
  - Computing conditional probability to make an inference using a two-way frequency table
  - Computing conditional probability using a large two-way frequency table
  - Conditional probability: Basic

- Simulations (3 topics)
  - Identifying outcomes in a random number table used to simulate a simple event
  - Generating random samples from a population with known characteristics
  - Using a random number table to make a fair decision

- The Binomial Distribution (2 topics)
  - Using the binomial formula to solve a word problem: Problem type 1
  - Using the binomial formula to solve a word problem: Problem type 2

- Standard Deviation and the Normal Distribution (6 topics)
  - Population standard deviation
  - Using the empirical rule to identify values and percentages of a normal distribution

- Word problem involving calculations from a normal distribution
- Shading a region and finding its standard normal probability
- Computing standard normal probabilities
- Finding a probability given a normal distribution: Basic

- Other Topics Available(*) (763 additional topics)
  - Real Numbers (80 topics)
    - Fractional position on a number line
    - Plotting integers on a number line
    - Plotting rational numbers on a number line
    - Ordering integers
    - Square root of a perfect square
    - Ordering real numbers
    - Addition and subtraction with 3 integers
    - Operations with absolute value: Problem type 2
    - Signed fraction addition or subtraction: Advanced
    - Addition and subtraction of 3 fractions involving signs
    - Signed fraction multiplication: Advanced
    - Signed decimal addition and subtraction with 3 numbers
    - Signed decimal multiplication
    - Signed decimal division
    - Exponents and integers: Problem type 2
    - Order of operations with integers and exponents
    - Converting between temperatures in Fahrenheit and Celsius
    - Evaluating a linear expression: Signed fraction multiplication with addition or subtraction
    - Evaluating a linear expression: Signed decimal addition and subtraction
    - Evaluating a linear expression: Signed decimal multiplication with addition or subtraction
    - Identifying numbers as integers or non-integers
    - Identifying rational decimal numbers
    - Identifying true statements about rational and irrational numbers
    - Identifying numbers as rational or irrational
    - Interpreting a Venn diagram of 3 sets
    - Constructing a Venn diagram to classify rational numbers
    - Constructing a Venn diagram to describe relationships between sets of rational numbers
    - Constructing a Venn diagram to classify real numbers
    - Constructing a Venn diagram to describe relationships between sets of real numbers
    - Properties of addition
    - Properties of real numbers
    - Identifying parts in an algebraic expression
    - Identifying equivalent algebraic expressions
    - Identifying properties used to simplify an algebraic expression
    - U.S. Customary length conversion with whole number values
    - U.S. Customary length conversions involving rounding decimals
    - Word problem involving a U.S. Customary length conversion
    - U.S. Customary volume conversion with whole number values
    - U.S. Customary weight conversions with whole number values
    - Metric distance conversion with whole number values
    - Metric distance conversion with decimal values
    - Time unit conversion with whole number values
    - Converting between metric and U.S. Customary unit systems
    - Conversions with currency
    - Perimeter of a square or a rectangle
    - Sides of polygons having the same perimeter
    - Area of a square or a rectangle
    - Introduction to area of a piecewise rectangular figure
    - Area of a piecewise rectangular figure
    - Area between two rectangles

- Writing algebraic expressions for the area of a figure
- Word problem involving the area of a rectangle: Problem type 2
- Word problem involving the area between two rectangles
- Area of a parallelogram
- Area of a triangle
- Area of a trapezoid
- Perimeter involving rectangles and circles
- Area of a circle
- Circumference and area of a circle
- Circumference and area of a circle: Exact answers in terms of pi
- Area involving rectangles and circles
- Area between two concentric circles
- Word problem involving the area between two concentric circles
- Area involving inscribed figures
- Volume of a rectangular prism
- Word problem involving the volume of a rectangular prism
- Word problem involving the rate of filling or emptying a rectangular prism
- Volume of a triangular prism
- Volume of a pyramid
- Volume of a cylinder
- Word problem involving the volume of a cylinder
- Word problem involving the rate of filling or emptying a cylinder
- Volume of a cone
- Volume of a cone: Exact answers in terms of pi
- Volume of a sphere
- Surface area of a cube or a rectangular prism
- Surface area of a triangular prism
- Surface area of a cylinder
- Surface area of a cylinder: Exact answers in terms of pi
- Surface area of a sphere

- Linear Equations and Inequalities (102 topics)
  - Additive property of equality with integers
  - Multiplicative property of equality with integers
  - Solving an equation to find the value of an expression
  - Solving a two-step equation with signed decimals
  - Identifying properties used to solve a linear equation
  - Solving a fraction word problem using a linear equation of the form $Ax = B$
  - Writing an equation of the form $A(x + B) = C$ to solve a word problem
  - Writing a multi-step equation for a real-world situation
  - Solving a decimal word problem using a linear equation with the variable on both sides
  - Solving a fraction word problem using a linear equation with the variable on both sides
  - Solving a word problem with three unknowns using a linear equation
  - Solving a word problem involving consecutive integers
  - Solving a value mixture problem using a linear equation
  - Word problem on unit rates associated with ratios of whole numbers: Decimal answers
  - Solving a word problem involving rates and time conversion
  - Converting a repeating decimal to a fraction
  - Finding the perimeter or area of a rectangle given one of these values
  - Finding a side length given the perimeter and side lengths with variables
  - Solving equations involving vertical angles
  - Finding angle measures of a triangle given angles with variables
  - Writing an equation to find angle measures of a triangle given angles with variables
  - Finding angle measures of an isosceles triangle given angles with variables
  - Solving for a variable in terms of other variables using addition or subtraction: Advanced
  - Solving for a variable in terms of other variables using multiplication or division: Advanced
  - Solving for a variable in terms of other variables in a linear equation with fractions
  - U.S. Customary length conversions involving dimensional analysis
  - Converting between compound units: Basic

- Word problem involving U.S. Customary length conversions using dimensional analysis
- Word problem involving a conversion between U.S. Customary units of weight and metric units of mass
- Converting between compound units: Advanced
- Word problem involving conversion between compound units using dimensional analysis
- Word problem on proportions: Problem type 2
- Finding a missing side length given two similar triangles
- Relationships about ratios within and between similar triangles
- Similar polygons
- Similar right triangles
- Indirect measurement
- Circumference ratios
- Finding the total amount given the percentage of a partial amount
- Finding the sale price without a calculator given the original price and percent discount
- Finding the total cost including tax or markup
- Combined effect of more than one markup or discount
- Finding the original amount given the result of a percentage increase or decrease
- Finding the original price given the sale price and percent discount
- Finding the percentage increase or decrease: Basic
- Finding the percentage increase or decrease: Advanced
- Finding the absolute error and percent error of a measurement
- Computing a percent mixture
- Solving a percent mixture problem using a linear equation
- Finding simple interest without a calculator
- Finding the interest and future value of a simple interest loan or investment
- Finding the principal, rate, or time of a simple interest loan or investment
- Computing the interest and repayment amount for a simple interest loan whose term is given in months or days
- Finding the principal, rate, or time for a simple interest loan whose term is given in months or days
- Gross pay with commission and salary
- Gross pay with variable commission scale
- Solving an absolute value equation: Problem type 3
- Solving an absolute value equation: Problem type 4
- Solving an absolute value equation of the form $|ax+b| = |cx+d|$
- Translating a sentence by using an inequality symbol
- Writing an inequality given a graph on the number line
- Additive property of inequality with signed fractions
- Additive property of inequality with signed decimals
- Multiplicative property of inequality with signed fractions
- Solving a two-step linear inequality with a fractional coefficient
- Solving a linear inequality with multiple occurrences of the variable: Problem type 2
- Solving a linear inequality with multiple occurrences of the variable: Problem type 3
- Solving inequalities with no solution or all real numbers as solutions
- Translating a sentence into a multi-step inequality
- Solving a decimal word problem using a linear inequality with the variable on both sides
- Writing sets of numbers using descriptive and roster forms
- Identifying elements of sets for a real world situation
- Writing sets for a real-world situation using descriptive and roster forms
- Identifying infinite sets and determining cardinalities of finite sets
- Identifying equivalent and equal sets
- Identifying equivalent and equal sets for a real-world situation
- Writing sets of numbers using set-builder and roster forms
- Set-builder notation
- Membership and cardinality of sets
- Identifying true statements involving subsets and proper subsets
- Identifying true statements about set membership and subsets
- Writing subsets
- Determining the total number of subsets of a set
- Writing subsets for a real-world situation
- Determining the number of subsets for a real-world situation

- Finding sets and complements of sets
- Finding sets and complements of sets for a real-world situation
- Union and intersection of finite sets
- Union and intersection of intervals
- Constructing a Venn diagram with 2 sets
- Interpreting Venn diagram cardinalities with 2 sets for a real-world situation
- Constructing a Venn diagram with 2 sets to solve a word problem
- Constructing a Venn diagram with 3 sets
- Interpreting Venn diagram cardinalities with 3 sets for a real-world situation
- Constructing a Venn diagram with 3 sets to solve a word problem
- Translating a sentence into a compound inequality
- Writing a compound inequality given a graph on the number line
- Solving a compound linear inequality: Graph solution, advanced
- Solving a compound linear inequality: Interval notation
- Writing an absolute value inequality given a graph on the number line
- Solving an absolute value inequality: Problem type 2
- Solving an absolute value inequality: Problem type 5

- Graphs and Functions (53 topics)
  - Reading a point in the coordinate plane
  - Plotting a point in the coordinate plane
  - Naming the quadrant or axis of a point given its graph
  - Finding distances between points that share a common coordinate given their coordinates
  - Finding x- and y-intercepts of a line given the equation: Advanced
  - Graphing a line given its x- and y-intercepts
  - Classifying slopes given graphs of lines
  - Finding the coordinate that yields a given slope
  - Graphing a line given its slope and y-intercept
  - Graphing a line through a given point with a given slope
  - Identifying linear equations: Basic
  - Identifying linear equations: Advanced
  - Identifying linear functions given ordered pairs
  - Rewriting a linear equation in the form Ax + By = C
  - Writing an equation and graphing a line given its slope and y-intercept
  - Finding the slope, y-intercept, and equation for a linear function given a table of values
  - Finding the slope and a point on a line given its equation in point-slope form
  - Graphing a line given its equation in point-slope form
  - Writing an equation in point-slope form given the slope and a point
  - Writing an equation in standard form given the slope and a point
  - Comparing linear functions to the parent function y=x
  - Finding slopes of lines parallel and perpendicular to a line given in slope-intercept form
  - Finding slopes of lines parallel and perpendicular to a line given in the form Ax + By = C
  - Identifying parallel and perpendicular lines from equations
  - Writing equations of lines parallel and perpendicular to a given line through a point
  - Identifying parallel and perpendicular lines from coordinates
  - Identifying coordinates that give right triangles
  - Application problem with a linear function: Finding a coordinate given the slope and a point
  - Application problem with a linear function: Finding a coordinate given two points
  - Identifying independent and dependent quantities from tables and graphs
  - Identifying independent and dependent variables from equations or real-world situations
  - Solving a linear equation by graphing
  - Constructing a scatter plot
  - Sketching the line of best fit
  - Scatter plots and correlation
  - Predictions from the line of best fit
  - Approximating the equation of a line of best fit and making predictions
  - Computing residuals
  - Interpreting residual plots
  - Classifying linear and nonlinear relationships from scatter plots

- Linear relationship and the correlation coefficient
- Identifying outliers and clustering in scatter plots
- Identifying correlation and causation
- Finding outputs of a one-step function that models a real-world situation: Function notation
- Domain and range from the graph of a piecewise function
- Graphing an integer function and finding its range for a given domain
- Graphing a function of the form f(x) = ax + b: Fractional slope
- Graphing an absolute value equation in the plane: Advanced
- Graphing a function of the form $f(x) = ax^2 + c$
- Graphing a piecewise-defined function: Problem type 3
- Transforming the graph of a function by reflecting over an axis
- Transforming the graph of a function by shrinking or stretching
- Transforming the graph of a function using more than one transformation

- Linear Systems (45 topics)
  - Classifying systems of linear equations from graphs
  - Writing a system of linear equations given its graph
  - Solving a system of linear equations with fractional coefficients
  - Solving a system of linear equations with decimal coefficients
  - Solving a 2x2 system of linear equations that is inconsistent or consistent dependent
  - Creating an inconsistent system of linear equations
  - Identifying the operations used to create equivalent systems of equations
  - Solving a word problem using a system of linear equations of the form Ax + By = C
  - Solving a word problem using a system of linear equations of the form y = mx + b
  - Solving a percent mixture problem using a system of linear equations
  - Solving a distance, rate, time problem using a system of linear equations
  - Solving a tax rate or interest rate problem using a system of linear equations
  - Writing an inequality given its graph in the plane: Horizontal or vertical boundary line
  - Writing an inequality given its graph in the plane: Slanted boundary line
  - Graphing a system of two linear inequalities: Advanced
  - Writing a linear inequality in two variables given a table of values
  - Solving a word problem using a system of linear inequalities: Problem type 2
  - Linear programming
  - Solving a word problem using linear programming
  - Introduction to solving a 3x3 system of linear equations
  - Solving a 3x3 system of linear equations: Problem type 1
  - Solving a 3x3 system of linear equations: Problem type 2
  - Solving a 3x3 system of linear equations that is inconsistent or consistent dependent
  - Solving a word problem using a 3x3 system of linear equations: Problem type 1
  - Solving a word problem using a 3x3 system of linear equations: Problem type 2
  - Scalar multiplication of a matrix
  - Addition or subtraction of matrices
  - Linear combination of matrices
  - Squaring and multiplying 2x2 matrices
  - Multiplication of matrices: Basic
  - Multiplication of matrices: Advanced
  - Word problem involving multiplication of matrices
  - Completing Gauss-Jordan elimination with a 2x2 matrix
  - Gauss-Jordan elimination with a 2x2 matrix
  - Completing Gauss-Jordan elimination with a 3x3 matrix
  - Writing solutions to 3x3 systems of linear equations from augmented matrices
  - Solving a system of linear equations given its augmented matrix
  - Finding the inverse of a 2x2 matrix
  - Finding the inverse of a 3x3 matrix
  - Finding the inverse of a matrix to solve a 2x2 system of linear equations
  - Using the inverse of a matrix to solve a 3x3 system of linear equations
  - Finding the determinant of a 2x2 matrix
  - Finding the determinant of a 3x3 matrix

- Using Cramer's rule to solve a 2x2 system of linear equations
- Using Cramer's rule to solve a 3x3 system of linear equations

- Exponents and Polynomials (47 topics)
  - Understanding the product rule of exponents
  - Ordering numbers with positive exponents
  - Understanding the power rules of exponents
  - Power and product rules with positive exponents
  - Power and quotient rules with positive exponents
  - Ordering numbers with negative exponents
  - Product rule with negative exponents
  - Quotient rule with negative exponents: Problem type 2
  - Power and quotient rules with negative exponents: Problem type 1
  - Power and quotient rules with negative exponents: Problem type 2
  - Power, product, and quotient rules with negative exponents
  - Scientific notation with positive exponent
  - Scientific notation with negative exponent
  - Converting between scientific notation and standard form in a real-world situation
  - Expressing calculator notation as scientific notation
  - Multiplying numbers written in scientific notation: Basic
  - Multiplying numbers written in scientific notation: Advanced
  - Multiplying numbers written in decimal form or scientific notation in a real-world situation
  - Dividing numbers written in scientific notation: Basic
  - Dividing numbers written in scientific notation: Advanced
  - Finding powers of numbers written in scientific notation
  - Finding the scale factor between numbers given in scientific notation in a real-world situation
  - Degree of a multivariate polynomial
  - Simplifying a sum or difference of three univariate polynomials
  - Multiplying a multivariate polynomial by a monomial
  - Dividing a polynomial by a monomial: Multivariate
  - Prime numbers
  - Prime factorization
  - Greatest common factor of 3 numbers
  - Greatest common factor of three univariate monomials
  - Greatest common factor of two multivariate monomials
  - Factoring out a monomial from a polynomial: Multivariate
  - Factoring out a binomial from a polynomial: GCF factoring, basic
  - Factoring a univariate polynomial by grouping: Problem type 2
  - Factoring a multivariate polynomial by grouping: Problem type 1
  - Factoring a multivariate polynomial by grouping: Problem type 2
  - Factoring a quadratic in two variables with leading coefficient 1
  - Factoring a quadratic with leading coefficient greater than 1: Problem type 3
  - Factoring a quadratic by the ac-method
  - Factoring a quadratic in two variables with leading coefficient greater than 1
  - Factoring a perfect square trinomial in two variables
  - Factoring a difference of squares in two variables
  - Factoring a polynomial involving a GCF and a difference of squares: Univariate
  - Factoring a polynomial involving a GCF and a difference of squares: Multivariate
  - Factoring a product of a quadratic trinomial and a monomial
  - Factoring with repeated use of the difference of squares formula
  - Factoring a sum or difference of two cubes

- Quadratic and Polynomial Functions (29 topics)
  - Graphing a parabola of the form $y = ax^2 + bx + c$: Rational coefficients
  - Using a graphing calculator to find the zeros of a quadratic function
  - Using a graphing calculator to find the x-intercept(s) and vertex of a quadratic function
  - Rewriting a quadratic function in standard form
  - Word problem involving optimizing area by using a quadratic function
  - Solving a quadratic equation by graphing

- Classifying the graph of a function
- Choosing a quadratic model and using it to make a prediction
- Finding all square roots of a number
- Estimating a square root
- Simplifying the square root of a whole number greater than 100
- Plotting complex numbers
- Solving a quadratic equation using the square root property: Decimal answers, basic
- Solving a quadratic equation using the square root property: Decimal answers, advanced
- Solving an equation of the form $x^3 = a$ using integers
- Solving a quadratic equation by completing the square: Decimal answers
- Applying the quadratic formula: Decimal answers
- Discriminant of a quadratic equation with parameter
- Identifying polynomial functions
- Inferring properties of a polynomial function from its graph
- Using a graphing calculator to solve a word problem involving a local extremum of a polynomial function
- Remainder theorem: Advanced
- Using a given zero to write a polynomial as a product of linear factors: Real zeros
- Descartes' Rule of Signs
- Using a graphing calculator to solve a word problem involving a polynomial of degree 3
- Finding a polynomial of a given degree with given zeros: Complex zeros
- Using a given zero to write a polynomial as a product of linear factors: Complex zeros
- Using the conjugate zeros theorem to find all zeros of a polynomial
- Linear factors theorem and conjugate zeros theorem

- Rational Expressions (62 topics)
  - Variable expressions as inputs of functions: Problem type 2
  - Simplifying a ratio of factored polynomials: Factors with exponents
  - Finding a difference quotient for a linear or quadratic function
  - Simplifying a ratio of linear polynomials: 1, -1, and no simplification
  - Simplifying a ratio of polynomials: Problem type 2
  - Simplifying a ratio of polynomials: Problem type 3
  - Simplifying a ratio of multivariate polynomials
  - Multiplying rational expressions involving quadratics with leading coefficients greater than 1
  - Multiplying rational expressions involving multivariate quadratics
  - Dividing rational expressions involving quadratics with leading coefficients greater than 1
  - Dividing rational expressions involving multivariate quadratics
  - Multiplication and division of 3 rational expressions
  - Least common multiple of two monomials
  - Writing equivalent rational expressions with monomial denominators
  - Writing equivalent rational expressions involving opposite factors
  - Adding rational expressions with denominators ax and bx: Advanced
  - Adding rational expressions with denominators ax^n and bx^m
  - Adding rational expressions with multivariate monomial denominators: Basic
  - Adding rational expressions with multivariate monomial denominators: Advanced
  - Adding rational expressions with linear denominators without common factors: Advanced
  - Adding rational expressions with linear denominators with common factors: Advanced
  - Adding rational expressions with denominators ax-b and b-ax
  - Adding 3 rational expressions with different quadratic denominators
  - Complex fraction involving multivariate monomials
  - Complex fraction made of sums involving rational expressions: Problem type 1
  - Complex fraction made of sums involving rational expressions: Problem type 2
  - Complex fraction made of sums involving rational expressions: Problem type 3
  - Complex fraction made of sums involving rational expressions: Problem type 4
  - Complex fraction made of sums involving rational expressions: Problem type 5
  - Complex fraction made of sums involving rational expressions: Problem type 6
  - Complex fraction made of sums involving rational expressions: Multivariate
  - Complex fraction with negative exponents: Problem type 1
  - Complex fraction with negative exponents: Problem type 2

- Complex fraction that contains a complex fraction
- Solving a rational equation that simplifies to quadratic: Proportional form, basic
- Solving a rational equation that simplifies to quadratic: Proportional form, advanced
- Solving for a variable in terms of other variables in a rational equation: Problem type 2
- Solving for a variable in terms of other variables in a rational equation: Problem type 3
- Ratio of volumes
- Ordering fractions with variables
- Identifying direct variation equations
- Identifying direct variation from ordered pairs and writing equations
- Writing a direct variation equation
- Word problem on direct variation
- Interpreting direct variation from a graph
- Writing an inverse variation equation
- Identifying direct and inverse variation equations
- Identifying direct and inverse variation from ordered pairs and writing equations
- Word problem on inverse variation
- Word problem on inverse proportions
- Writing an equation that models variation
- Word problem on combined variation
- Finding horizontal and vertical asymptotes of a rational function: Quadratic numerator or denominator
- Finding the asymptotes of a rational function: Quadratic over linear
- Graphing a rational function: Quadratic over linear
- Graphing rational functions with holes
- Matching graphs with rational functions: Two vertical asymptotes
- Finding x- and y-intercepts of the graph of a nonlinear equation
- Graphing a rational function with more than one vertical asymptote
- Solving a rational inequality: Problem type 1
- Solving a polynomial inequality: Problem type 1
- Solving a rational inequality: Problem type 2

- Radicals (67 topics)
  - Square roots of integers raised to even exponents
  - Using absolute value to simplify square roots of perfect square monomials
  - Finding n^{th} roots of perfect n^{th} powers with signs
  - Finding the n^{th} root of a perfect n^{th} power fraction
  - Finding the n^{th} root of a perfect n^{th} power monomial
  - Using absolute value to simplify higher radical expressions
  - Evaluating functions: Absolute value, rational, radical
  - Variable expressions as inputs of functions: Problem type 3
  - Graphing a square root function: Problem type 3
  - Rational exponents: Unit fraction exponents and bases involving signs
  - Rational exponents: Products and quotients with negative exponents
  - Rational exponents: Powers of powers with negative exponents
  - Simplifying a radical expression with two variables
  - Simplifying a higher root of a whole number
  - Introduction to simplifying a higher radical expression
  - Simplifying a higher radical expression: Univariate
  - Simplifying a higher radical expression: Multivariate
  - Square root addition or subtraction with three terms
  - Introduction to simplifying a sum or difference of radical expressions: Univariate
  - Simplifying a sum or difference of radical expressions: Univariate
  - Simplifying a sum or difference of radical expressions: Multivariate
  - Simplifying a sum or difference of higher roots
  - Simplifying a sum or difference of higher radical expressions
  - Simplifying a product of radical expressions: Multivariate
  - Simplifying a product of radical expressions: Multivariate, fractional expressions
  - Introduction to simplifying a product of higher roots
  - Simplifying a product of higher radical expressions

- Special products of radical expressions: Conjugates and squaring
- Classifying sums and products as rational or irrational
- Rationalizing a denominator: Quotient involving a monomial
- Rationalizing a denominator using conjugates: Square root in numerator
- Rationalizing a denominator using conjugates: Variable in denominator
- Rationalizing a denominator: Quotient involving a higher radical
- Rationalizing a denominator: Quotient involving higher radicals and monomials
- Simplifying products or quotients of higher radicals with different indices: Univariate
- Simplifying products or quotients of higher radicals with different indices: Multivariate
- Solving a radical equation with a quadratic expression under the radical
- Solving a radical equation with two radicals that simplifies to sqrt(x) = a
- Solving a radical equation that simplifies to a quadratic equation: Two radicals
- Solving an equation with a root index greater than 2: Problem type 2
- Solving an equation using the odd-root property: Problem type 1
- Solving an equation using the odd-root property: Problem type 2
- Solving an equation with exponent 1/a: Problem type 1
- Solving an equation with exponent 1/a: Problem type 2
- Solving an equation with positive rational exponent
- Solving an equation with negative rational exponent
- Solving an equation that can be written in quadratic form: Problem type 1
- Solving an equation that can be written in quadratic form: Problem type 2
- Introduction to the Pythagorean Theorem
- Word problem involving the Pythagorean Theorem
- Identifying side lengths that give right triangles
- Using the Pythagorean Theorem and a quadratic equation to find side lengths of a right triangle
- Composition of a function with itself
- Expressing a function as a composition of two functions
- Composition of two functions: Domain and range
- Composition of two functions: Advanced
- Word problem involving composition of two functions
- Rewriting a multivariate function as a univariate function given a relationship between its variables
- Determining whether an equation defines a function: Basic
- Determining whether an equation defines a function: Advanced
- Horizontal line test
- Inverse functions: Quadratic, square root
- Inverse functions: Cubic, cube root
- Inverse functions: Rational
- Graphing the inverse of a function given its graph
- Determining if graphs have symmetry with respect to the x-axis, y-axis, or origin
- Even and odd functions: Problem type 2

- Exponential and Logarithmic Functions (27 topics)
  - Graphing an exponential function and its asymptote: $f(x)=b^x$
  - Graphing an exponential function and its asymptote: $f(x) = a(b)^x$
  - Graphing an exponential function and its asymptote: $f(x)=b^{-x}$ or $f(x)=-b^{ax}$
  - The graph, domain, and range of an exponential function
  - Transforming the graph of a natural exponential function
  - Graphing an exponential function and its asymptote: $f(x) = a(e)^{x-b} + c$
  - Calculating and comparing simple interest and compound interest
  - Finding the future value and interest for an investment earning compound interest
  - Finding the present value of an investment earning compound interest
  - Writing an exponential function rule given a table of ordered pairs
  - Choosing an exponential model and using it to make a prediction
  - Comparing linear, polynomial, and exponential functions
  - Translating the graph of a logarithmic function
  - The graph, domain, and range of a logarithmic function
  - Graphing a logarithmic function: Advanced
  - Using properties of logarithms to evaluate expressions

- Expanding a logarithmic expression: Problem type 3
- Writing an expression as a single logarithm
- Change of base for logarithms: Problem type 2
- Solving a multi-step equation involving natural logarithms
- Solving an exponential equation by finding common bases: Linear and quadratic exponents
- Finding the time in a word problem on compound interest
- Finding the initial amount in a word problem on continuous compound interest
- Finding the final amount in a word problem on continuous exponential growth or decay
- Finding the rate or time in a word problem on continuous exponential growth or decay
- Writing and evaluating a function modeling continuous exponential growth or decay given doubling time or half-life
- Writing and evaluating a function modeling continuous exponential growth or decay given two outputs

- Statistics and Probability (54 topics)
  - Classifying samples
  - Making predictions using experimental data for compound events
  - Constructing a frequency distribution for non-grouped data
  - Constructing a relative frequency distribution for grouped data
  - Computing a percentage from a table of values
  - Making an inference using a two-way frequency table
  - Calculating relative frequencies in a contingency table
  - Making a reasonable inference based on proportion statistics
  - Constructing a line plot
  - Constructing a bar graph for non-numerical data
  - Interpreting a bar graph
  - Interpreting a double bar graph
  - Interpreting a histogram
  - Interpreting a stem-and-leaf display
  - Finding a percentage of a total amount in a circle graph
  - Computations from a circle graph
  - Angle measure in a circle graph
  - Finding the mode and range from a line plot
  - Mean of a data set
  - Finding the mean of a symmetric distribution
  - Computations involving the mean, sample size, and sum of a data set
  - Finding the value for a new score that will yield a given mean
  - Weighted mean
  - Finding outliers in a data set
  - Choosing the best measure to describe data
  - Identifying the center, spread, and shape of a data set
  - Comparing measures of center and variation
  - Finding sample size and comparing samples for estimating the mean
  - Using back-to-back stem-and-leaf displays to compare data sets
  - Interpreting a tree diagram
  - Permutations and combinations: Problem type 3
  - Probabilities of an event and its complement
  - Finding the odds in favor and against
  - Converting between probability and odds
  - Finding odds in favor and against drawing a card from a standard deck
  - Area as probability
  - Experimental and theoretical probability for compound events
  - Probabilities involving two dice
  - Probabilities of a permutation and a combination
  - Probability of independent events: Decimal answers
  - Probability of dependent events: Decimal answers
  - Probability of dependent events involving a survey
  - Probabilities of draws without replacement
  - Outcomes and event probability: Addition rule
  - Probability of the union of two events
  - Computing probability involving the addition rule using a two-way frequency table

- Probability of the union and intersection of independent events
- Using a Venn diagram to understand the multiplication rule for probability
- Identifying independent events given values of probabilities
- Using a random number table to simulate a simple event
- Generating a random number table with technology to simulate a simple event
- Identifying outcomes in a random number table used to simulate a compound event
- Using a random number table to simulate a compound event
- Generating a random number table with technology to simulate a compound event

- Sequences and Conics (77 topics)
  - Finding the first terms of an arithmetic sequence using an explicit rule
  - Finding the first terms of a geometric sequence using an explicit rule
  - Finding the first terms of a sequence using an explicit rule with multiple occurrences of n
  - Finding the next terms of an arithmetic sequence with whole numbers
  - Finding the next terms of an arithmetic sequence with integers
  - Finding the first terms of a sequence using a recursive rule
  - Identifying arithmetic sequences and finding the common difference
  - Finding a specified term of an arithmetic sequence given the first terms
  - Finding a specified term of an arithmetic sequence given the common difference and first term
  - Finding a specified term of an arithmetic sequence given two terms of the sequence
  - Writing an explicit rule for an arithmetic sequence
  - Writing a recursive rule for an arithmetic sequence
  - Sum of the first n terms of an arithmetic sequence
  - Finding the next terms of a geometric sequence with whole numbers
  - Finding the next terms of a geometric sequence with signed numbers
  - Identifying arithmetic and geometric sequences
  - Identifying geometric sequences and finding the common ratio
  - Finding a specified term of a geometric sequence given the first terms
  - Finding a specified term of a geometric sequence given the common ratio and first term
  - Finding a specified term of a geometric sequence given two terms of the sequence
  - Arithmetic and geometric sequences: Identifying and writing an explicit rule
  - Writing recursive rules for arithmetic and geometric sequences
  - Sum of the first n terms of a geometric sequence
  - Sum of an infinite geometric series
  - Identifying linear, quadratic, and exponential functions given ordered pairs
  - Distance between two points in the plane: Exact answers
  - Distance between two points in the plane: Decimal answers
  - Identifying scalene, isosceles, and equilateral triangles given coordinates of their vertices
  - Midpoint of a line segment in the plane
  - Finding an endpoint of a line segment given the other endpoint and the midpoint
  - Graphing a parabola of the form $y^2 = ax$ or $x^2 = ay$
  - Graphing a parabola of the form $x=a(y-k)^2+h$ or $y=a(x-h)^2+k$
  - Graphing a parabola of the form $ay^2 + by + cx + d = 0$ or $ax^2 + bx + cy + d = 0$
  - Writing an equation of a parabola given the vertex and the focus
  - Writing an equation of a parabola given the focus and the directrix
  - Deriving the equation of a parabola given its focus and directrix
  - Finding the vertex, focus, directrix, and axis of symmetry of a parabola
  - Finding the focus of a parabola of the form $ay^2 + by + cx + d = 0$ or $ax^2 + bx + cy + d = 0$
  - Writing an equation of a parabola given its graph
  - Word problem involving a parabola
  - Identifying the center and radius to graph a circle given its equation in standard form
  - Identifying the center and radius to graph a circle given its equation in general form: Basic
  - Identifying the center and radius to graph a circle given its equation in general form: Advanced
  - Writing the equation of a circle centered at the origin given its radius or a point on the circle
  - Writing an equation of a circle and identifying points that lie on the circle
  - Writing an equation of a circle given its center and radius or diameter
  - Deriving the equation of a circle using the Pythagorean Theorem
  - Writing an equation of a circle given its center and a point on the circle

- Writing an equation of a circle given the endpoints of a diameter
- Graphing an ellipse given its equation in standard form
- Graphing an ellipse centered at the origin: $Ax^2 + By^2 = C$
- Graphing an ellipse given its equation in general form
- Finding the center, vertices, and foci of an ellipse
- Finding the foci of an ellipse given its equation in general form
- Writing an equation of an ellipse given the center, an endpoint of an axis, and the length of the other axis
- Word problem involving an ellipse
- Graphing a hyperbola given its equation in standard form
- Graphing a hyperbola centered at the origin: $Ax^2 + By^2 = C$
- Graphing a hyperbola given its equation in general form
- Finding the center, vertices, foci, and asymptotes of a hyperbola
- Finding the foci of a hyperbola given its equation in general form
- Writing an equation of a hyperbola given the foci and the vertices
- Writing an equation of a hyperbola given the foci and the asymptotes: Basic
- Classifying conics given their equations
- Graphically solving a system of linear and quadratic equations
- Using a graphing calculator to solve a system of linear and quadratic equations: Basic
- Using a graphing calculator to solve a system of equations
- Solving a system of linear and quadratic equations
- Solving a system of nonlinear equations: Problem type 1
- Solving a system of nonlinear equations: Problem type 2
- Solving a word problem involving geometry using a system of nonlinear equations
- Graphing an inequality involving a circle
- Graphing a system of nonlinear inequalities: Problem type 1
- Graphing a system of nonlinear inequalities: Problem type 2
- Completing a table and choosing a graph given a pair of parametric equations
- Writing the equation of a line and sketching its graph given its parametric equations
- Writing the equation of a parabola and sketching its graph given its parametric equations

- Trigonometry (120 topics)
  - Sine, cosine, and tangent ratios: Numbers for side lengths
  - Sine, cosine, and tangent ratios: Variables for side lengths
  - Using the Pythagorean Theorem to find a trigonometric ratio
  - Finding trigonometric ratios given a right triangle
  - Using a calculator to approximate sine, cosine, and tangent values
  - Understanding trigonometric ratios through similar right triangles
  - Relationship between the sines and cosines of complementary angles
  - Using similar right triangles to find trigonometric ratios
  - Using a trigonometric ratio to find a side length in a right triangle
  - Using trigonometry to find a length in a word problem with one right triangle
  - Using a trigonometric ratio to find an angle measure in a right triangle
  - Using trigonometry to find angles of elevation or depression in a word problem
  - Solving a right triangle
  - Using trigonometry to find a length in a word problem with two right triangles
  - Special right triangles: Decimal answers
  - Special right triangles: Exact answers
  - Converting degrees-minutes-seconds to decimal degrees
  - Converting a decimal degree to degrees-minutes-seconds
  - Converting between degree and radian measure: Problem type 1
  - Converting between degree and radian measure: Problem type 2
  - Sketching an angle in standard position
  - Coterminal angles
  - Arc length and central angle measure
  - Area of a sector of a circle
  - Finding coordinates on the unit circle for special angles
  - Trigonometric functions and special angles: Problem type 1
  - Finding trigonometric ratios from a point on the unit circle

- Trigonometric functions and special angles: Problem type 2
- Trigonometric functions and special angles: Problem type 3
- Evaluating expressions involving sine and cosine
- Even and odd properties of trigonometric functions
- Using a calculator to approximate cosecant, secant, and cotangent values
- Evaluating a sinusoidal function that models a real-world situation
- Reference angles: Problem type 1
- Reference angles: Problem type 2
- Determining the location of a terminal point given the signs of trigonometric values
- Finding values of trigonometric functions given information about an angle: Problem type 1
- Finding values of trigonometric functions given information about an angle: Problem type 2
- Finding values of trigonometric functions given information about an angle: Problem type 3
- Finding values of trigonometric functions given information about an angle: Problem type 4
- Values of inverse trigonometric functions
- Solving a triangle with the law of sines: Problem type 1
- Solving a triangle with the law of sines: Problem type 2
- Solving a word problem using the law of sines
- Proving the law of sines
- Solving a triangle with the law of cosines
- Proving the law of cosines
- Solving a word problem using the law of cosines
- Using trigonometry to find the area of a right triangle
- Finding the area of a triangle using trigonometry
- Expressing the area of a triangle in terms of the sine of one of its angles
- Heron's formula
- Sketching the graph of $y= a \sin(x)$ or $y= a \cos(x)$
- Sketching the graph of $y= \sin(bx)$ or $y= \cos(bx)$
- Sketching the graph of $y= \sin(x)+ d$ or $y= \cos(x)+ d$
- Sketching the graph of $y= \sin(x+c)$ or $y= \cos(x+c)$
- Sketching the graph of $y= a \sin(x+c)$ or $y= a \cos(x+c)$
- Sketching the graph of $y= a \sin(bx)$ or $y= a \cos(bx)$
- Sketching the graph of $y= a \sin(bx+c)$ or $y= a \cos(bx+c)$
- Sketching the graph of $y= a \sin(bx)+ d$ or $y= a \cos(bx)+ d$
- Amplitude and period of sine and cosine functions
- Amplitude, period, and phase shift of sine and cosine functions
- Writing the equation of a sine or cosine function given its graph: Problem type 1
- Writing the equation of a sine or cosine function given its graph: Problem type 2
- Word problem involving a sine or cosine function: Problem type 1
- Word problem involving a sine or cosine function: Problem type 2
- Domains and ranges of trigonometric functions
- Matching graphs and equations for secant, cosecant, tangent, and cotangent functions
- Sketching the graph of a secant or cosecant function: Problem type 1
- Sketching the graph of a secant or cosecant function: Problem type 2
- Sketching the graph of a tangent or cotangent function: Problem type 1
- Sketching the graph of a tangent or cotangent function: Problem type 2
- Simplifying trigonometric expressions
- Using cofunction identities
- Verifying a trigonometric identity
- Proving trigonometric identities: Problem type 1
- Proving trigonometric identities: Problem type 2
- Proving trigonometric identities: Problem type 3
- Proving trigonometric identities: Problem type 4
- Proving trigonometric identities using odd and even properties
- Sum and difference identities: Problem type 1
- Sum and difference identities: Problem type 2
- Sum and difference identities: Problem type 3
- Proving trigonometric identities using sum and difference properties: Problem type 1
- Proving trigonometric identities using sum and difference properties: Problem type 2

- Double-angle identities: Problem type 1
- Double-angle identities: Problem type 2
- Half-angle identities: Problem type 1
- Half-angle identities: Problem type 2
- Proving trigonometric identities using double-angle properties
- Finding solutions in an interval for a basic equation involving sine or cosine
- Finding solutions in an interval for a basic tangent, cotangent, secant, or cosecant equation
- Using a calculator to approximate inverse trigonometric values
- Solving a basic trigonometric equation using a calculator
- Solving a basic trigonometric equation involving sine or cosine
- Solving a basic trigonometric equation involving tangent, cotangent, secant, or cosecant
- Finding solutions in an interval for a trigonometric equation in factored form
- Finding solutions in an interval for a trigonometric equation with a squared function: Problem type 1
- Finding solutions in an interval for a trigonometric equation with a squared function: Problem type 2
- Finding solutions in an interval for a trigonometric equation using Pythagorean identities: Problem type 1
- Finding solutions in an interval for a trigonometric equation using Pythagorean identities: Problem type 2
- Finding solutions in an interval for an equation with sine and cosine using double-angle identities
- Solving a trigonometric equation modeling a real-world situation
- Using a graphing calculator to solve a trigonometric equation
- Solving a trigonometric equation involving a squared function: Problem type 1
- Solving a trigonometric equation involving a squared function: Problem type 2
- Solving a trigonometric equation involving more than one function
- Solving a trigonometric equation using double-angle identities
- Writing a vector in component form given its initial and terminal points
- Magnitude of a vector given in component form
- Vector addition and scalar multiplication: Component form
- Linear combination of vectors: Component form
- Multiplication of a vector by a scalar: Geometric approach
- Vector addition: Geometric approach
- Vector subtraction: Geometric approach
- Finding the magnitude and direction of a vector given its graph
- Finding the components of a vector given its graph
- Dot product of vectors given in component form
- Finding the angle between two vectors given in component form
- Using the dot product to find perpendicular vectors

***Other Topics Available** By default, these topics are NOT included in the course, but can be added using the content editor in the Teacher Module.