

## Mastery of SAT Math

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 (646 topics + 462 additional topics)

- Arithmetic Readiness (57 topics)
  - Factors and Multiples (7 topics)
    - Prime numbers
    - Prime factorization
    - Greatest common factor of 2 numbers
    - Least common multiple of 2 numbers
    - Word problem involving the least common multiple of 2 numbers
    - Introduction to exponents
    - Power of 10: Positive exponent
  - Addition and Subtraction with Fractions (4 topics)
    - Simplifying a fraction
    - Finding the LCD of two fractions
    - Addition or subtraction of fractions with different denominators
    - Word problem involving addition or subtraction of fractions with different denominators
  - Multiplication and Division with Fractions (9 topics)
    - Product of a fraction and a whole number: Problem type 1
    - Fraction multiplication
    - Product of a fraction and a whole number: Problem type 2
    - Word problem involving fractions and multiplication
    - Multi-step word problem involving fractions and multiplication
    - The reciprocal of a number
    - Division involving a whole number and a fraction
    - Fraction division
    - Complex fraction without variables: Problem type 1
  - Mixed Numbers (1 topics)
    - Writing an improper fraction as a mixed number
  - Rounding, Ordering, and the Number Line (3 topics)
    - Decimal place value: Tenths and hundredths
    - Rounding decimals
    - Ordering decimals
  - Addition and Subtraction with Decimals (3 topics)
    - Addition of aligned decimals
    - Decimal subtraction: Basic
    - Word problem with addition or subtraction of 2 decimals
  - Multiplication and Division with Decimals (5 topics)
    - Multiplication of a decimal by a power of ten
    - Multiplying a decimal by a whole number
    - Word problem with multiple decimal operations: Problem type 1
    - Division of a decimal by a power of ten
    - Division of a decimal by a whole number
  - Converting Between Fractions and Decimals (1 topics)
    - Converting a fraction to a terminating decimal: Basic
  - Ratios and Unit Rates (6 topics)
    - Finding a unit price
    - Using tables to compare ratios
    - Computing unit prices to find the better buy
    - Word problem on unit rates associated with ratios of whole numbers: Decimal answers
    - Solving a word problem on proportions using a unit rate
    - Finding missing values in a table of equivalent ratios
  - Percents, Decimals, and Fractions (2 topics)
    - Converting between percentages and decimals
    - Converting a fraction to a percentage: Denominator of 20, 25, or 50

- Introduction to Percent Applications (3 topics)
  - Finding a percentage of a total amount: Real-world situations
  - Writing a ratio as a percentage
  - Finding the rate of a tax or commission
- Units of Measurement (6 topics)
  - U.S. Customary length conversion with whole number values
  - U.S. Customary volume conversion with whole number values
  - U.S. Customary weight conversions with whole number values
  - Time unit conversion with whole number values
  - Converting between metric and U.S. Customary unit systems
  - Conversions with currency
- Introduction to Perimeter and Area (7 topics)
  - Perimeter of a square or a rectangle
  - Finding the missing length in a figure
  - Perimeter of a piecewise rectangular figure
  - Area of a square or a rectangle
  - Word problem involving the area of a rectangle: Problem type 2
  - Area of a piecewise rectangular figure
  - Area between two rectangles
- Real Numbers (40 topics)
  - Plotting and Ordering (6 topics)
    - Plotting integers on a number line
    - Ordering integers
    - Square root of a perfect square
    - Ordering real numbers
    - Absolute value of a number
    - Finding all numbers with a given absolute value
  - Operations with Signed Numbers (11 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
    - Signed fraction addition or subtraction: Basic
    - Signed fraction multiplication: Basic
  - Exponents and Order of Operations (6 topics)
    - Order of operations with whole numbers
    - Order of operations with whole numbers and grouping symbols
    - Order of operations with whole numbers and exponents: Basic
    - Exponents and fractions
    - Exponents and integers: Problem type 1
    - Order of operations with integers
  - Evaluating Expressions (4 topics)
    - Evaluating an algebraic expression: Whole numbers with two operations
    - Evaluating a formula
    - Evaluating a linear expression: Integer multiplication with addition or subtraction
    - Evaluating a quadratic expression: Integers
  - Venn Diagrams and Sets of Real Numbers (2 topics)
    - Interpreting a Venn diagram with 2 sets for a real-world situation
    - Interpreting a Venn diagram with 3 sets for a real-world situation
  - Properties of Operations (11 topics)
    - Combining like terms: Whole number coefficients
    - Properties of addition
    - Combining like terms: Integer coefficients
    - Understanding the distributive property
    - Multiplying a constant and a linear monomial
    - Distributive property: Whole number coefficients
    - Distributive property: Integer coefficients
    - Properties of real numbers
    - Factoring a linear binomial
    - Using distribution and combining like terms to simplify: Univariate

- Combining like terms in a quadratic expression
- Linear Equations (71 topics)
  - One-Step Linear Equations (7 topics)
    - Additive property of equality with decimals
    - Additive property of equality with integers
    - Multiplicative property of equality with whole numbers
    - Multiplicative property of equality with fractions
    - Multiplicative property of equality with decimals
    - Multiplicative property of equality with integers
    - Multiplicative property of equality with signed fractions
  - Multi-Step Linear Equations (17 topics)
    - 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
    - Introduction to using substitution to solve a linear equation
    - Solving an equation to find the value of an expression
    - Introduction to solving an equation with parentheses
    - 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: Fractional forms with binomial numerators
    - Solving equations with zero, one, or infinitely many solutions
  - 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 Expressions and Equations (4 topics)
    - Writing a one-step expression for a real-world situation
    - Translating a phrase into a two-step expression
    - Translating a sentence into a one-step equation
    - Translating a sentence into a multi-step equation
  - Applications of Linear Equations (11 topics)
    - Solving a fraction word problem using a linear equation of the form  $Ax = B$
    - 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 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 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
    - Solving a word problem involving rates and time conversion
    - Word problem involving distance, rate, and time
    - Solving a distance, rate, time problem using a linear equation
  - Solving for a Variable and Dimensional Analysis (9 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 multiplication or division: Advanced
    - 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
    - Solving for a variable in terms of other variables in a linear equation with fractions
    - U.S. Customary length conversions involving dimensional analysis
    - Word problem involving U.S. Customary length conversions using dimensional analysis
    - Word problem involving conversion between compound units using dimensional analysis
  - Proportions (5 topics)
    - Solving a proportion of the form  $x/a = b/c$
    - Solving a proportion of the form  $(x+a)/b = c/d$
    - Solving a rational equation that simplifies to linear: Denominator  $x$
    - Word problem on proportions: Problem type 1
    - Word problem on proportions: Problem type 2

- More on Percents (12 topics)
  - Applying the percent equation: 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
  - 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 percentage increase or decrease: Basic
  - Finding the percentage increase or decrease: Advanced
  - Computing a percent mixture
  - Solving a percent mixture problem using a linear equation
  - Introduction to compound interest
- Personal Financial Literacy (3 topics)
  - Calculating income tax
  - Hourly gross pay with overtime
  - Gross pay with commission and salary
- Linear Inequalities (27 topics)
  - Writing and Graphing Inequalities (5 topics)
    - Translating a sentence by using an inequality symbol
    - Translating a sentence into a one-step inequality
    - Writing an inequality for a real-world situation
    - Graphing a linear inequality on the number line
    - Writing an inequality given a graph on the number line
  - One-Step Linear Inequalities (3 topics)
    - Identifying solutions to a one-step linear inequality
    - Additive property of inequality with integers
    - Multiplicative property of inequality with integers
  - Multi-Step Linear Inequalities (6 topics)
    - Identifying solutions to a two-step linear inequality in one variable
    - Solving a two-step linear inequality: Problem type 1
    - Solving a two-step linear inequality: Problem type 2
    - Solving a two-step linear inequality with a fractional coefficient
    - Solving a linear inequality with multiple occurrences of the variable: Problem type 1
    - Solving a linear inequality with multiple occurrences of the variable: Problem type 2
  - Applications (2 topics)
    - Translating a sentence into a multi-step inequality
    - Solving a decimal word problem using a two-step linear inequality
  - Sets (4 topics)
    - Constructing a Venn diagram with 2 sets
    - Interpreting Venn diagram cardinalities with 2 sets for a real-world situation
    - Constructing a Venn diagram with 3 sets
    - Interpreting Venn diagram cardinalities with 3 sets for a real-world situation
  - Compound Inequalities (3 topics)
    - Graphing a compound inequality on the number line
    - Writing a compound inequality given a graph on the number line
    - Solving a compound linear inequality: Graph solution, basic
  - Absolute Value Inequalities (4 topics)
    - Solving an absolute value inequality: Problem type 1
    - 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 3
- Functions and Lines (80 topics)
  - Ordered Pairs (5 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 the graph
    - Finding distances between points that share a common coordinate given their coordinates
  - Tables and Graphs of Lines (12 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
  - Interpreting a line graph
- Slope (5 topics)
    - Finding slope given the graph of a line on a grid
    - Finding slope given two points on a line
    - Finding the slopes of horizontal and vertical lines
    - Finding the coordinate that yields a given slope
    - Graphing a line given its slope and y-intercept
- Direct Variation (3 topics)
    - Identifying direct variation from ordered pairs and writing equations
    - Writing a direct variation equation
    - Word problem on direct variation
- Equations of Lines (11 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 the equation of a line given the y-intercept and another point
    - Writing the equation of a line through two given points
    - Identifying parallel and perpendicular lines
    - 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  $Ax + By = C$
    - Writing equations of lines parallel and perpendicular to a given line through a point
- Applications of Linear Equations with Two Variables (5 topics)
    - Writing and evaluating a function that models a real-world situation: Basic
    - Writing and evaluating a function that models a real-world situation: Advanced
    - Finding the intercepts and rate of change given a graph of a linear function
    - Interpreting the parameters of a linear function that models a real-world situation
    - Application problem with a linear function: Finding a coordinate given two points
- Scatter Plots and Lines of Best Fit (4 topics)
    - 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
- Introduction to Functions (7 topics)
    - Identifying functions from relations
    - 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
    - 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
- Arithmetic Sequences (7 topics)
    - Finding the first terms of an arithmetic sequence using an explicit rule
    - Finding the next terms of an arithmetic sequence with whole numbers
    - Finding patterns in shapes
    - 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
    - Writing an explicit rule for an arithmetic sequence
- Graphs of Functions (12 topics)
    - Finding an output of a function from its graph
    - Finding inputs and outputs of a function from its graph
    - Finding where a function is increasing, decreasing, or constant given the graph
    - 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 a parabola of the form  $y = ax^2$
- Graphing a parabola of the form  $y = ax^2 + c$
- Graphing a parabola of the form  $y = (x-h)^2 + k$
- Graphing a cubic function of the form  $y = ax^3$
- Finding the average rate of change of a function given its equation
- Finding the average rate of change of a function given its graph
  
- Transformations (9 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
  - Translating the graph of an absolute value function: One step
  - 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 (9 topics)
    - Identifying solutions to a system of linear equations
    - Identifying the solution of systems of linear equations from graphs
    - Graphically solving a system of linear equations
    - 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
    - Creating an inconsistent system of linear equations
  
  - Applications (8 topics)
    - Interpreting the graphs of two functions
    - Solving a word problem involving a sum and another basic relationship using a system of linear 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 value mixture problem using a system of linear equations
    - 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 word problem using a 3x3 system of linear equations: Problem type 1
  
  - Linear Inequalities with Two Variables (2 topics)
    - Identifying solutions to a linear inequality in two variables
    - Graphing a linear inequality in the plane: Slope-intercept form
  
  - Systems of Linear Inequalities (2 topics)
    - Graphing a system of two linear inequalities: Basic
    - Writing a multi-step inequality for a real-world situation
  
- Exponents (35 topics)
  - Product, Power, and Quotient Rules (14 topics)
    - Understanding the product rule of exponents
    - Introduction to the product rule of exponents
    - Product rule with positive exponents: Univariate
    - Ordering numbers with positive exponents
    - Understanding the power rules of exponents
    - 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
    - Power and product rules with positive exponents
    - Introduction to the quotient rule of exponents
    - Quotient of expressions involving exponents
    - Simplifying a ratio of multivariate monomials: Advanced
    - Power and quotient rules with positive exponents
  
  - Negative Exponents (8 topics)
    - Evaluating expressions with exponents of zero
    - Power of 10: Negative exponent
    - Evaluating an expression with a negative exponent: Whole number base
    - Evaluating an expression with a negative exponent: Positive fraction base
    - Ordering numbers with negative exponents

- Rewriting an algebraic expression without a negative exponent
- Introduction to the product rule with negative exponents
- Power of a power rule with negative exponents
- Introduction to Radicals (6 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
- Rational Exponents (4 topics)
  - Converting between radical form and exponent form
  - Rational exponents: Unit fraction exponents and whole number bases
  - Rational exponents: Product rule
  - Rational exponents: Power of a power rule
- Scientific Notation (3 topics)
  - Scientific notation with a positive exponent
  - Scientific notation with a negative exponent
  - Converting between scientific notation and standard form in a real-world situation
- Polynomials and Factoring (33 topics)
  - Polynomial Addition and Subtraction (2 topics)
    - Degree and leading coefficient of a univariate polynomial
    - Simplifying a sum or difference of two univariate polynomials
  - Polynomial Multiplication (9 topics)
    - Multiplying a univariate polynomial by a monomial with a positive coefficient
    - Multiplying a multivariate polynomial by a monomial
    - Multiplying binomials with leading coefficients of 1
    - Multiplying binomials with leading coefficients greater than 1
    - Multiplying conjugate binomials: Univariate
    - Multiplying conjugate binomials: Multivariate
    - Squaring a binomial: Univariate
    - Squaring a binomial: Multivariate
    - Multiplication involving binomials and trinomials in one variable
  - Factoring Using the GCF (4 topics)
    - Introduction to the GCF of two monomials
    - Greatest common factor of two multivariate monomials
    - Factoring out a monomial from a polynomial: Univariate
    - Factoring out a monomial from a polynomial: Multivariate
  - Factoring by Grouping (2 topics)
    - Factoring out a binomial from a polynomial: GCF factoring, basic
    - Factoring a univariate polynomial by grouping: Problem type 1
  - Factoring Quadratic Trinomials (4 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 Special Products (3 topics)
    - Factoring a perfect square trinomial with leading coefficient 1
    - Factoring a difference of squares in one variable: Basic
    - Factoring a difference of squares in one variable: Advanced
  - Polynomial Division (4 topics)
    - Dividing a polynomial by a monomial: Univariate
    - Dividing a polynomial by a monomial: Multivariate
    - Simplifying a ratio of factored polynomials: Linear factors
    - Polynomial long division: Problem type 1
  - Solving Quadratic Equations by Factoring (5 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

- Radicals (20 topics)
  - Radical Functions (2 topics)
    - Table for a square root function
    - Domain of a square root function: Basic
  - Operations with Radical Expressions (6 topics)
    - Square root addition or subtraction
    - Square root multiplication: Basic
    - Square root multiplication: Advanced
    - Introduction to simplifying a product involving square roots using the distributive property
    - 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 (5 topics)
    - Simplifying a quotient of square roots
    - Simplifying a quotient involving a sum or difference with a square root
    - 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 (7 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 quadratic equation: One radical, basic
    - Solving for a variable in terms of other variables in an equation involving radicals
    - Solving an equation with a root index greater than 2: Problem type 1
    - Solving an equation with exponent  $1/a$ : Problem type 1
- Rational Expressions (38 topics)
  - Simplifying Rational Expressions (6 topics)
    - Restriction on a variable in a denominator: Linear
    - Restriction on a variable in a denominator: Quadratic
    - Evaluating a rational function: Problem type 1
    - Variable expressions as inputs of functions: Problem type 2
    - Simplifying a ratio of polynomials by factoring a quadratic with leading coefficient 1
    - Simplifying a ratio of polynomials: Problem type 1
  - Multiplication and Division (3 topics)
    - Multiplying rational expressions involving linear expressions
    - Multiplying rational expressions involving quadratics with leading coefficients of 1
    - Dividing rational expressions involving linear expressions
  - Addition and Subtraction (8 topics)
    - Introduction to the LCM of two monomials
    - Finding the LCD of rational expressions with linear denominators: Relatively prime
    - 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 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
  - Complex Fractions (3 topics)
    - Complex fraction without variables: Problem type 2
    - Complex fraction involving univariate monomials
    - Complex fraction made of sums involving rational expressions: Problem type 1
  - Rational Equations and Applications (13 topics)
    - 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: 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 for a variable in terms of other variables in a rational equation: Problem type 1
    - 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
    - Word problem involving multiple rates
    - Solving a work problem using a rational equation
    - Solving a distance, rate, time problem using a rational equation

- Inverse Variation (5 topics)
  - Writing an inverse variation equation
  - Identifying direct and inverse variation from ordered pairs and writing equations
  - Word problem on inverse variation
  - Writing an equation that models variation
  - Word problem on combined variation
- Quadratic and Polynomial Functions (38 topics)
  - Quadratic Functions (11 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  $y = x^2 + bx + c$
    - 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
    - Solving a quadratic equation by graphing
    - Choosing a quadratic model and using it to make a prediction
  - Square Root Property (1 topics)
    - Solving an equation of the form  $x^2 = a$  using the square root property
  - Completing the Square and the Quadratic Formula (3 topics)
    - Solving a quadratic equation by completing the square: Decimal answers
    - Applying the quadratic formula: Exact answers
    - Solving a word problem using a quadratic equation with irrational roots
  - Complex Numbers (6 topics)
    - Using  $i$  to rewrite square roots of negative numbers
    - Adding or subtracting complex numbers
    - Multiplying complex numbers
    - Dividing complex numbers
    - Simplifying a power of  $i$
    - Solving a quadratic equation with complex roots
  - Odd Root Property (2 topics)
    - Solving an equation of the form  $x^3 = a$  using integers
    - Solving an equation using the odd-root property: Problem type 1
  - Nonlinear Systems (3 topics)
    - Graphically solving a system of linear and quadratic equations
    - Solving a system of linear and quadratic equations
    - Solving a system of nonlinear equations: Problem type 2
  - Polynomial Functions (7 topics)
    - Roots of a product of polynomials
    - 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
  - Nonlinear Inequalities (1 topics)
    - Solving a quadratic inequality written in factored form
  - Function Operations (4 topics)
    - Introduction to the composition of two functions
    - Composition of two functions: Basic
    - Composition of a function with itself
    - Expressing a function as a composition of two functions
- Exponential Functions (19 topics)
  - Graphs of Exponential Functions (2 topics)
    - Table for an exponential function
    - Graphing an exponential function:  $f(x) = b^x$
  - Applications (10 topics)
    - Using a calculator to evaluate exponential expressions

- Checking if a formula describes a pattern
  - Evaluating an exponential function that models a real-world situation
  - Finding a final amount in a word problem on exponential growth or decay
  - Finding the time to reach a limit in a word problem on exponential growth or decay
  - Finding the initial amount and rate of change given an exponential function
  - Writing an exponential function rule given a table of ordered pairs
  - Choosing an exponential model and using it to make a prediction
  - Finding the future value and interest for an investment earning compound interest
  - Solving an exponential equation by finding common bases: Linear exponents
- Geometric Sequences (7 topics)
    - Finding the first terms of a geometric sequence using an explicit rule
    - Finding the next terms of a geometric sequence with whole 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
    - Arithmetic and geometric sequences: Identifying and writing an explicit rule
- Lines, Angles, and Triangles (45 topics)
    - Lengths and Midpoints on a Number Line (6 topics)
      - Naming segments, rays, and lines
      - Introduction to segment addition
      - Finding a point on a number line given the length of a segment and another point
      - Midpoint of a number line segment: Integers
      - Using a segment's midpoint and endpoint to locate the other endpoint
      - Segment addition and midpoints
    - Lengths and Midpoints in the Coordinate Plane (5 topics)
      - Midpoint of a line segment in the plane
      - Finding an endpoint of a line segment given the other endpoint and the midpoint
      - Pythagorean Theorem
      - Using the Pythagorean Theorem to find distance on a grid
      - Distance between two points in the plane: Exact answers
    - Angles (9 topics)
      - Acute, obtuse, and right angles
      - Introduction to angle addition
      - Finding the complement or supplement of an angle given a figure
      - Solving an equation involving complementary or supplementary angles
      - Finding supplementary and complementary angles
      - Angle addition with relationships between angles
      - Identifying supplementary and vertical angles
      - Finding angle measures given two intersecting lines
      - Solving equations involving vertical angles
    - Parallel Lines and Transversals (4 topics)
      - Identifying corresponding and alternate angles
      - Finding angle measures given two parallel lines cut by a transversal
      - Solving equations involving angles and a pair of parallel lines
      - Solving equations involving angles and two pairs of parallel lines
    - Classifying Triangles and Finding Angles (7 topics)
      - Acute, obtuse, and right triangles
      - Identifying side lengths that give right triangles
      - Finding an angle measure of a triangle given two angles
      - Finding an angle measure for a triangle with an extended side
      - Finding an angle measure given extended triangles
      - Finding an angle measure given a triangle and parallel lines
      - Finding angle measures of a triangle given angles with variables
    - Properties of Triangles (6 topics)
      - Identifying congruent shapes on a grid
      - Finding side lengths and angle measures of isosceles and equilateral triangles
      - Finding an angle measure for a triangle sharing a side with another triangle
      - Using triangle inequality to determine if side lengths form a triangle
      - Using triangle inequality to determine possible lengths of a third side
      - Relationship between angle measures and side lengths in a triangle
    - Applying the Pythagorean Theorem (2 topics)
      - Word problem involving the Pythagorean Theorem
      - Using the Pythagorean Theorem repeatedly

- Similar Triangles (6 topics)
  - Finding a missing side length given two similar triangles
  - Similar polygons
  - Similar right triangles
  - Indirect measurement
  - Triangles and parallel lines
  - Special right triangles: Exact answers
- Polygons and Solids (61 topics)
  - Angles of Polygons (4 topics)
    - Sum of the angle measures of a quadrilateral
    - Finding the sum of the interior angle measures of a convex polygon given the number of sides
    - Finding a missing interior angle measure in a convex polygon
    - Finding the measures of an interior angle and an exterior angle of a regular polygon
  - Polygons and Quadrilaterals (7 topics)
    - Identifying parallelograms, rectangles, and squares
    - Properties of quadrilaterals
    - Finding a side length given the perimeter and side lengths with variables
    - Finding measures involving diagonals of parallelograms
    - Finding measures involving diagonals of rectangles
    - Drawing and identifying a polygon in the coordinate plane
    - Finding the coordinates of a point to make a parallelogram
  - Perimeters and Areas of Polygons (14 topics)
    - Finding side lengths of squares given an area and a perimeter
    - 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
    - Finding the perimeter or area of a rectangle given one of these values
    - Solving a word problem using a quadratic equation with rational roots
    - Using the Pythagorean Theorem and a quadratic equation to find side lengths of a right triangle
    - Finding the perimeter or area of a rectangle in the coordinate plane
    - Finding the perimeter of a triangle, trapezoid, or parallelogram in the coordinate plane
    - Area of a parallelogram
    - Area of a triangle
    - Finding the area of a triangle or parallelogram in the coordinate plane
    - Finding the area of a right triangle using the Pythagorean Theorem
    - Area of a trapezoid
    - Finding the area of a trapezoid, rhombus, or kite in the coordinate plane
  - Areas of Regular Polygons and Similar Polygons (4 topics)
    - Area of a regular polygon
    - Finding the area of a regular polygon using special right triangles
    - Side lengths, perimeters, and areas of similar polygons
    - Investigating the effects on the area for non-proportional and proportional figures
  - Circumferences and Areas of Circles (8 topics)
    - Circumference of a circle
    - Finding the radius or the diameter of a circle given its circumference
    - Circumference ratios
    - Circumference and area of a circle
    - Area between two concentric circles
    - Area involving inscribed figures
    - Area involving multiple inscribed figures
    - Circles inscribed in and circumscribed about regular polygons
  - Volumes of Solids (7 topics)
    - 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 piecewise rectangular prism
    - Volume of a cylinder
    - Ratio of volumes
    - Volume of a sphere
  - Surface Areas of Solids (4 topics)
    - Identifying solids generated by rotations of two-dimensional regions
    - Surface area of a cube or a rectangular prism
    - Word problem involving the surface area of a rectangular prism
    - Surface area of a cylinder
  - Similar Solids (2 topics)
    - Computing ratios of side lengths, surface areas, and volumes for similar solids

- Computing side length, surface area, and volume for similar solids
- Angle and Segment Relationships in Circles (8 topics)
  - Introduction to a circle: Diameter, radius, and chord
  - Tangents of a circle: Problem type 1
  - Tangents of a circle: Problem type 2
  - Naming and finding measures of central angles, inscribed angles, and arcs of a circle
  - Arc length
  - Area of a sector of a circle: Exact answer in terms of  $\pi$
  - Central angles and inscribed angles of a circle
  - Inscribed angles in relation to a diameter or a polygon inscribed in a circle
- Graphs and Equations of Circles (3 topics)
  - 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
  - Writing the equation of a circle centered at the origin given its radius or a point on the circle
- Trigonometry (19 topics)
  - Right Triangle Trigonometry (7 topics)
    - Sine, cosine, and tangent ratios: Variables for side lengths
    - Using a calculator to approximate sine, cosine, and tangent values
    - Using the Pythagorean Theorem to find a sine, cosine, or tangent ratio in a right triangle
    - Using the Pythagorean Theorem to find several trigonometric ratios in a right triangle
    - Relationship between the sines and cosines of complementary angles
    - 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
  - Radian Measures of Angles (3 topics)
    - Converting between degree and radian measure: Problem type 1
    - Sketching an angle with absolute value less than  $2\pi$  radians in standard position
    - Arc length and central angle measure
  - The Unit Circle (2 topics)
    - Finding coordinates on the unit circle for special angles
    - Trigonometric functions and special angles: Problem type 1
  - Trigonometric Functions of Angles (2 topics)
    - 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
  - Graphs of Sine and Cosine Functions (2 topics)
    - Sketching the graph of  $y = a \sin(x)$  or  $y = a \cos(x)$
    - Sketching the graph of  $y = \sin(bx)$  or  $y = \cos(bx)$
  - Identities and Equations (3 topics)
    - Simplifying trigonometric expressions
    - Verifying a trigonometric identity
    - Finding solutions in an interval for a basic trigonometric equation involving sine or cosine
- Data Analysis and Probability (42 topics)
  - Collecting Data (1 topics)
    - Introduction to expectation
  - Frequency Tables (5 topics)
    - Constructing a frequency distribution for grouped data
    - Constructing a two-way frequency table: Advanced
    - Computing a percentage from a table of values
    - Making an inference using a two-way frequency table
    - Calculating relative frequencies in a contingency table
  - Graphs of Data (9 topics)
    - Interpreting a bar graph
    - Making part-to-whole, part-to-part, and equivalence comparisons given a bar graph
    - Interpreting a double bar graph
    - Interpreting a stem-and-leaf display
    - Interpreting a circle graph or pie chart
    - Finding a percentage of a total amount in a circle graph
    - Making part-to-part and equivalence comparisons given a circle graph
    - Computations from a circle graph
    - Angle measure in a circle graph
  - Measures of Center and Spread (11 topics)

- Mode of a data set
- Range of a data set
- Mean of a data set
- 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
- Mean and median of a data set
- How changing a value affects the mean and median
- Approximating the mean of a data set given a histogram
- Percentage of data below a specified value
- Interpreting percentile ranks
- Comparing Data (3 topics)
  - 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
- Permutations and Combinations (3 topics)
  - Counting principle
  - Counting principle with repetition allowed
  - Factorial expressions
- Probability of Simple Events (5 topics)
  - Introduction to the probability of an event
  - Probability involving one die or choosing from  $n$  distinct objects
  - Probability involving choosing from objects that are not distinct
  - Probabilities of an event and its complement
  - Area as probability
- Probability of Compound Events (5 topics)
  - Probabilities involving two rolls of a die
  - Computing probability involving the addition rule using a two-way frequency table
  - Computing conditional probability using a sample space
  - Computing conditional probability to make an inference using a two-way frequency table
  - Computing conditional probability using a large two-way frequency table
- Other Topics Available(\*) (462 additional topics)
  - Arithmetic Readiness (29 topics)
    - Greatest common factor of 3 numbers
    - Least common multiple of 3 numbers
    - Word problem involving fractions and division
    - Writing a mixed number as an improper fraction
    - Addition or subtraction of mixed numbers with different denominators without renaming
    - Word problem involving addition or subtraction of mixed numbers with different denominators
    - Mixed number multiplication
    - Mixed number division
    - Plotting fractions on a number line
    - Using a common denominator to order fractions
    - Ordering fractions and decimals
    - Decimal subtraction: Advanced
    - Word problem with multiple decimal operations: Problem type 2
    - Converting a fraction to a repeating decimal: Basic
    - Converting a decimal to a proper fraction in simplest form: Basic
    - Using a table of equivalent ratios to find a missing quantity in a ratio
    - Converting a percentage to a fraction in simplest form
    - Finding a percentage of a whole number without a calculator: Basic
    - Finding a percentage of a total amount without a calculator: Sales tax, commission, discount
    - Estimating a tip without a calculator
    - U.S. Customary length conversions involving rounding decimals
    - Word problem involving a U.S. Customary length conversion
    - Metric distance conversion with whole number values
    - Metric distance conversion with decimal values
    - Simplifying a ratio of whole numbers: Problem type 2
    - Sides of polygons having the same perimeter
    - Area of a rectangle with fractional side lengths
    - Distinguishing between the area and perimeter of a rectangle
    - Areas of rectangles with the same perimeter
  - Real Numbers (26 topics)
    - Plotting rational numbers on a number line
    - Addition and subtraction with 3 integers
    - Word problem with addition or subtraction of integers

- Operations with absolute value: Problem type 2
  - Word problem with multiplication or division of integers
  - Signed fraction subtraction involving double negation
  - Signed fraction division
  - Signed decimal addition and subtraction
  - Order of operations with whole numbers and exponents: Advanced
  - Order of operations with fractions: Problem type 1
  - Order of operations with fractions: Problem type 2
  - Order of operations with decimals: Problem type 1
  - Order of operations with decimals: Problem type 2
  - Exponents and integers: Problem type 2
  - Exponents and signed fractions
  - Order of operations with integers and exponents
  - Evaluating an algebraic expression: Whole numbers with one operation and an exponent
  - Evaluating an algebraic expression: Whole number operations and exponents
  - Converting between temperatures in Fahrenheit and Celsius
  - Identifying numbers as integers or non-integers
  - Identifying numbers as rational or irrational
  - 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
  - Using distribution with double negation and combining like terms to simplify: Multivariate
- Linear Equations (20 topics)
    - Additive property of equality with signed fractions
    - Solving a two-step equation with signed decimals
    - Solving a linear equation with several occurrences of the variable: Variables on both sides and fractional coefficients
    - Solving an absolute value equation: Problem type 3
    - Solving an absolute value equation: Problem type 4
    - Solving an absolute value equation of the form  $|ax+b| = |cx+d|$
    - Solving a fraction word problem using a linear equation with the variable on both sides
    - Solving for a variable in terms of other variables using addition or subtraction: Advanced
    - Converting between compound units: Basic
    - Word problem involving a conversion between U.S. Customary units of weight and metric units of mass
    - Converting between compound units: Advanced
    - Solving a proportion of the form  $\frac{a}{x+b} = \frac{c}{x}$
    - Applying the percent equation: Problem type 2
    - Finding the total amount given the percentage of a partial amount
    - Finding the original price given the sale price and percent discount
    - 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
    - Comparing discounts
    - Gross pay with variable commission scale
    - Calculating and comparing simple interest and compound interest
- Linear Inequalities (9 topics)
    - Multiplicative property of inequality with signed fractions
    - Solving a linear inequality with multiple occurrences of the variable: Problem type 3
    - Solving a decimal word problem using a linear inequality with the variable on both sides
    - Constructing a Venn diagram with 2 sets to solve a word problem
    - Constructing a Venn diagram with 3 sets to solve a word problem
    - Translating a sentence into a compound inequality
    - Solving a compound linear inequality: Graph solution, advanced
    - Solving an absolute value inequality: Problem type 4
    - Solving an absolute value inequality: Problem type 5
- Functions and Lines (51 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
    - 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
    - Graphing a line through a given point with a given slope
    - Identifying direct variation equations
    - Interpreting direct variation from a graph
    - Identifying linear equations: Basic
    - 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 the equation of a line in point-slope form given the slope and a point
    - Writing the equation of a line in standard form given the slope and a point
    - Writing the equations of vertical and horizontal lines through a given point
    - Comparing linear functions to the parent function  $y = x$

- Identifying parallel and perpendicular lines from equations
  - Writing an equation and drawing its graph to model a real-world situation: Basic
  - Writing an equation and drawing its graph to model a real-world situation: Advanced
  - Finding the initial amount and rate of change given a table for a linear function
  - Comparing properties of linear functions given in different forms
  - Application problem with a linear function: Finding a coordinate given the slope and a point
  - Computing residuals
  - Linear relationship and the correlation coefficient
  - Vertical line test
  - Evaluating a piecewise-defined function
  - Domain and range of a linear function that models a real-world situation
  - Finding the next terms of an arithmetic sequence with integers
  - Finding a specified term of an arithmetic sequence given two terms of the sequence
  - Sum of the first  $n$  terms of an arithmetic sequence
  - Domain and range from the graph of a discrete relation
  - Finding domain and range from a linear graph in context
  - Finding intercepts of a nonlinear function given its graph
  - Finding local maxima and minima of a function given the graph
  - Set-builder and interval notation
  - Finding values and intervals where the graph of a function is zero, positive, or negative
  - Graphing a function of the form  $f(x) = ax + b$ : Fractional slope
  - Graphing an absolute value equation of the form  $y = |x|$
  - Graphing an absolute value equation in the plane: Basic
  - Graphing an absolute value equation in the plane: Advanced
  - Graphing a function of the form  $f(x) = ax^2$
  - Graphing a function of the form  $f(x) = ax^2 + c$
  - Graphing a piecewise-defined function: Problem type 1
  - Graphing a piecewise-defined function: Problem type 2
  - Word problem involving average rate of change
  - 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: Two steps
  - How the leading coefficient affects the graph of an absolute value function
  - 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 (16 topics)
    - Classifying systems of linear equations from graphs
    - Solving a system of linear equations with fractional coefficients
    - Solving a system of linear equations with decimal coefficients
    - Introduction to solving a 3x3 system of linear equations
    - Solving a 3x3 system of linear equations: Problem type 1
    - Solving a tax rate or interest rate problem using a system of linear equations
    - Scalar multiplication of a matrix
    - Addition or subtraction of matrices
    - Linear combination of matrices
    - Squaring and multiplying 2x2 matrices
    - Multiplication of matrices: Basic
    - Word problem involving multiplication of matrices
    - Graphing a linear inequality in the plane: Vertical or horizontal line
    - Graphing a linear inequality in the plane: Standard form
    - Graphing a system of two linear inequalities: Advanced
    - Graphing a system of three linear inequalities
- Exponents (20 topics)
    - Product rule with positive exponents: Multivariate
    - Evaluating an expression with a negative exponent: Negative integer base
    - Product rule with negative exponents
    - Quotient rule with negative exponents: Problem type 1
    - Quotient rule with negative exponents: Problem type 2
    - Power rules with negative exponents
    - Estimating a square root
    - Finding  $n^{\text{th}}$  roots of perfect  $n^{\text{th}}$  powers with signs
    - Rational exponents: Unit fraction exponents and bases involving signs
    - Rational exponents: Non-unit fraction exponent with a whole number base
    - Rational exponents: Negative exponents and fractional bases
    - Rational exponents: Quotient rule
    - Rational exponents: Products and quotients with negative exponents
    - Rational exponents: Powers of powers with negative exponents
    - Introduction to scientific notation with positive exponents
    - Introduction to scientific notation with negative exponents
    - Multiplying numbers written in scientific notation: Basic
    - Multiplying numbers written in decimal form or scientific notation in a real-world situation

- Dividing numbers written in scientific notation: Basic
- Finding the scale factor between numbers given in scientific notation in a real-world situation
- Polynomials and Factoring (22 topics)
  - Multiplying a univariate polynomial by a monomial with a negative coefficient
  - Multiplying binomials in two variables
  - Multiplying binomials with negative coefficients
  - Greatest common factor of three univariate monomials
  - Factoring a univariate 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 quadratic with a negative leading coefficient
  - Factoring a perfect square trinomial 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
  - Simplifying a ratio of polynomials using GCF factoring
  - Polynomial long division: Problem type 2
  - Synthetic division
  - Writing a quadratic equation given the roots and the leading coefficient
- Radicals (27 topics)
  - Introduction to simplifying a radical expression with an even exponent
  - Square root of a perfect square monomial
  - Domain of a square root function: Advanced
  - Graphing a square root function: Problem type 1
  - Graphing a square root function: Problem type 2
  - 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
  - Square root addition or subtraction with three terms
  - Introduction to simplifying a sum or difference of radical expressions: Univariate
  - Introduction to simplifying a product of radical expressions: Univariate
  - Simplifying a product of radical expressions: Univariate
  - Introduction to simplifying a product of higher roots
  - Simplifying a product of higher radical expressions
  - Special products of radical expressions: Conjugates and squaring
  - Rationalizing a denominator: Quotient involving a monomial
  - Rationalizing a denominator using conjugates: Square root in numerator
  - Simplifying products or quotients of higher radicals with different indices: Univariate
  - Solving a radical equation that simplifies to a linear equation: Two radicals
  - Solving a radical equation that simplifies to a quadratic equation: One radical, advanced
  - 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
  - Word problem involving radical equations: Basic
  - Word problem involving radical equations: Advanced
  - Solving an equation with a root index greater than 2: Problem type 2
  - Solving an equation with exponent  $1/a$ : Problem type 2
- Rational Expressions (22 topics)
  - Domain of a rational function: Excluded values
  - Multiplying rational expressions involving multivariate monomials
  - Dividing rational expressions involving multivariate monomials
  - Dividing rational expressions involving quadratics with leading coefficients of 1
  - Writing equivalent rational expressions with monomial denominators
  - Adding rational expressions with common denominators and GCF factoring
  - Adding rational expressions with denominators  $ax$  and  $bx$ : Advanced
  - Adding rational expressions with denominators  $ax^n$  and  $bx^m$
  - Complex fraction involving multivariate monomials
  - Complex fraction: GCF factoring
  - Complex fraction: Quadratic factoring
  - Complex fraction made of sums involving rational expressions: Problem type 2
  - Complex fraction made of sums involving rational expressions: Problem type 3
  - Solving a rational equation that simplifies to linear: Like binomial denominators
  - Ordering fractions with variables
  - Identifying direct and inverse variation equations
  - Word problem on inverse variation involving the completion of a task

- 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
- Even and odd functions: Problem type 1
- Quadratic and Polynomial Functions (30 topics)
  - Graphing a parabola of the form  $y = ax^2 + bx + c$ : Integer coefficients
  - Rewriting a quadratic function in standard form
  - Word problem involving the maximum or minimum of a quadratic function
  - Finding the domain and range from the graph of a parabola
  - Range of a quadratic function
  - Comparing properties of quadratic functions given in different forms
  - Classifying the graph of a function
  - 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 that can be written in quadratic form: Problem type 1
  - Solving a quadratic equation by completing the square: Exact answers
  - Applying the quadratic formula: Decimal answers
  - Discriminant of a quadratic equation
  - Discriminant of a quadratic equation with a parameter
  - Simplifying a product and quotient involving square roots of negative numbers
  - Solving an equation using the odd-root property: Problem type 2
  - Solving an equation with a positive rational exponent
  - Graphing a quadratic inequality: Problem type 1
  - Graphing a quadratic inequality: Problem type 2
  - Solving a system of nonlinear equations: Problem type 1
  - Identifying polynomial functions
  - Matching graphs with polynomial functions
  - Solving a quadratic inequality
  - Solving a polynomial inequality: Problem type 1
  - Sum, difference, and product of two functions
  - Quotient of two functions: Basic
  - Horizontal line test
  - 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
- Exponential Functions (16 topics)
  - Graphing an exponential function and its asymptote:  $f(x)=b^x$
  - Graphing an exponential function:  $f(x) = a(b)^x$
  - Finding domain and range from the graph of 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
  - Solving an exponential equation by finding common bases: Linear and quadratic exponents
  - Finding the first terms of a sequence using an explicit rule with multiple occurrences of  $n$
  - Finding the next terms of a geometric sequence with signed numbers
  - Finding a specified term of a geometric sequence given two terms of the sequence
  - Sum of the first  $n$  terms of a geometric sequence
  - Sum of an infinite geometric series
  - Converting between logarithmic and exponential equations
  - Evaluating logarithmic expressions
  - Solving an equation of the form  $\log_b a = c$
  - Basic properties of logarithms
  - Expanding a logarithmic expression: Problem type 1
- Lines, Angles, and Triangles (24 topics)
  - Negation of a statement
  - Conditional statements and negations
  - The converse, inverse, and contrapositive of a conditional statement
  - Writing the converse, inverse, and contrapositive of a conditional statement and determining their truth values
  - Writing a biconditional statement as a conditional statement and its converse and determining truth values
  - Conditional statements and deductive reasoning
  - Validity of an argument
  - Understanding quantifiers
  - Negation of a quantified statement
  - Finding a point that partitions a number line segment in a given fractional relationship
  - Introduction to the Pythagorean Theorem
  - Distance between two points in the plane: Decimal answers
  - Finding a point that partitions a segment in the plane in a given fractional relationship
  - Angle addition and angle bisectors
  - Classifying scalene, isosceles, and equilateral triangles by side lengths
  - Classifying scalene, isosceles, and equilateral triangles by side lengths or angles

- Identifying and naming congruent parts of congruent triangles
  - Identifying and naming congruent triangles
  - Finding angle measures of an isosceles triangle given angles with variables
  - Determining if a triangle is possible based on given angle measures
  - Relationship between angle measures and side lengths in two triangles
  - Identifying similar or congruent shapes on a grid
  - Finding angle measures of a triangle given two angles of a similar triangle
  - Identifying and naming similar triangles
- Polygons and Solids (85 topics)
- Finding the number of sides of a convex polygon given the sum of the measures of the interior angles
  - Finding the number of sides of a regular polygon given the measure of an interior angle
  - Classifying parallelograms
  - Conditions for parallelograms
  - Finding angle measures involving diagonals of a rhombus
  - Conditions for quadrilaterals
  - Finding coordinates of vertices of polygons
  - Congruence in the coordinate plane
  - Finding lengths using scale models
  - Finding a scale factor: Same units
  - Using a scale drawing to find actual area
  - Identifying transformations
  - Translating a point and giving its coordinates: Two steps
  - Translating a polygon
  - Using a translated point to find coordinates of other translated points
  - Reflecting a point across an axis and giving its coordinates
  - Finding the coordinates of a point reflected across an axis
  - Finding the coordinates of a point reflected across both axes
  - Reflecting a polygon across the x-axis or y-axis
  - Finding the coordinates of three points reflected over an axis
  - Finding the coordinates of a point reflected across an axis and translated
  - Rotating a point and giving its coordinates
  - Rotating a figure about the origin
  - Drawing lines of symmetry
  - Finding an angle of rotation
  - Identifying rotational symmetry and angles of rotation
  - Rotational and point symmetries
  - Dilating a segment and giving the coordinates of its endpoints
  - The effect of dilation on area
  - Dilating a figure
  - Word problem involving the area between two rectangles
  - Word problem on population density
  - Word problem on optimizing an area or perimeter
  - Computing an area using the Pythagorean Theorem
  - Area involving rectangles and triangles
  - Finding an area in terms of variables
  - Area of a rhombus
  - Finding the area of a rhombus using the Pythagorean Theorem
  - Finding counterexamples to conjectures
  - Perimeter involving rectangles and circles
  - Circumference and area of a circle: Exact answers in terms of pi
  - Distinguishing between the area and circumference of a circle
  - Area involving rectangles and circles
  - Word problem involving the area between two concentric circles
  - Volume of a rectangular prism made of unit cubes
  - Volume of a rectangular prism with fractional edge lengths
  - Finding the side length of a cube given its volume
  - Computations involving density, mass, and volume
  - Word problem on density involving the volume of a rectangular solid
  - Word problem involving the volume of a piecewise rectangular prism
  - Volume of a triangular prism
  - Word problem involving the volume of a triangular prism
  - Word problem involving the volume of a cylinder
  - Word problem involving the rate of filling or emptying a cylinder
  - Word problem on density involving the volume of a cylindrical solid
  - Volume of a pyramid
  - Volume of a cone
  - Word problem involving the volume of a cone
  - Word problem involving the volume of a sphere
  - Vertices, edges, and faces of a solid
  - Nets of solids
  - Nets of solids: Advanced
  - Identifying horizontal and vertical cross sections of solids
  - Surface area of a rectangular prism made of unit cubes

- Distinguishing between surface area and volume
- Surface area of a piecewise rectangular prism made of unit cubes
- Surface area of a triangular prism
- Word problem involving the surface area of a cylinder
- Word problem involving the surface area of rectangular prisms and cylinders
- Word problem involving the surface area of rectangular prisms and pyramids
- Surface area of a sphere
- Identifying similar solids
- Word problem involving volumes of similar solids
- Identifying chords, secants, and tangents of a circle
- Applying properties of radii, diameters, and chords
- Arc length and area of a sector of a circle
- Central angles and angles involving chords and tangents of a circle
- Inscribed angles and angles involving chords and tangents of a circle
- Angles of intersecting secants and tangents
- Lengths of chords, secants, and tangents
- Identifying the center and radius to graph a circle given its equation in general form: Advanced
- 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
- 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
  
- Trigonometry (27 topics)
  - Understanding trigonometric ratios through similar right triangles
  - Using similar right triangles to find trigonometric ratios
  - 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
  - Converting between degree and radian measure: Problem type 2
  - Coterminal angles
  - Finding values of trigonometric functions from a point on the unit circle
  - Trigonometric functions and special angles: Problem type 2
  - Reference angles: Problem type 1
  - 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 3
  - Finding values of trigonometric functions given information about an angle: Problem type 4
  - Solving a triangle with the law of sines: Problem type 1
  - Solving a word problem using the law of sines
  - Solving a triangle with the law of cosines
  - Solving a word problem using the law of cosines
  - Using trigonometry to find the area of a right triangle
  - Using trigonometry to find the area of a triangle
  - Sketching the graph of  $y = \sin(x) + d$  or  $y = \cos(x) + d$
  - Sketching the graph of  $y = \sin(x+c)$  or  $y = \cos(x+c)$
  - Amplitude and period of a sine or cosine function
  - 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
  - Finding the components of a vector given its graph
  - Solving a basic trigonometric equation involving sine or cosine
  
- Data Analysis and Probability (38 topics)
  - Choosing an appropriate method for gathering data: Problem type 1
  - Choosing an appropriate method for gathering data: Problem type 2
  - Constructing a frequency distribution for non-grouped data
  - Constructing a line plot
  - Constructing a bar graph for non-numerical data
  - Constructing a frequency distribution and a histogram
  - Interpreting a histogram
  - Rejecting unreasonable claims based on average statistics
  - Approximating the mean of a data set given a frequency distribution
  - Comparing standard deviations without calculation
  - Interpreting a tree diagram
  - Introduction to the counting principle
  - Computing permutations and combinations
  - Word problem involving permutations
  - Word problem involving combinations
  - Introduction to permutations and combinations
  - Permutations and combinations: Problem type 1
  - Permutations and combinations: Problem type 2
  - Permutations, combinations, and the multiplication principle for counting
  - Determining a sample space and outcomes for an event: Experiment involving a single selection
  - Probability of selecting one card from a standard deck
  - Experimental and theoretical probability

- 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
- Computing expected value in a game of chance
- Computing expected value in a business application
- Determining a sample space and outcomes for an event: Experiment involving multiple selections
- Outcomes and event probability
- Probability of independent events
- Probability of dependent events
- Probability of dependent events involving a survey
- Probabilities of draws with replacement
- Determining outcomes for unions, intersections, and complements of events
- Using a Venn diagram to understand the addition rule for probability
- Outcomes and event probability: Addition rule
- Probability of the union of two events
- Computing conditional probability using a two-way frequency table

**\*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.