



## *Liberal Arts Mathematics*

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 Show All (551 topics + 581 additional topics)

- Review of Essential Skills and Problem Solving (83 topics)
  - ◆ Place Value and Rounding (8 topics)
    - ◇ Whole number place value: Problem type 1
    - ◇ Whole number place value: Problem type 2
    - ◇ Rounding to tens or hundreds
    - ◇ Rounding to hundreds or thousands
    - ◇ Decimal place value: Tenths and hundredths
    - ◇ Converting a fraction with a denominator of 10 or 100 to a decimal
    - ◇ Rounding decimals
    - ◇ Using a calculator to convert a fraction to a rounded decimal
  - ◆ Operations with Decimals (7 topics)
    - ◇ Decimal addition with 2 numbers
    - ◇ Multiplying a decimal by a whole number
    - ◇ Multiplication of a decimal by a power of ten
    - ◇ Multiplication of a decimal by a power of 0.1
    - ◇ Division of a decimal by a whole number
    - ◇ Division of a decimal by a 1–digit decimal: Problem type 1
    - ◇ Division of a decimal by a power of ten
  - ◆ Integers (7 topics)
    - ◇ Ordering integers
    - ◇ 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
    - ◇ Integer multiplication and division
  - ◆ Order of Operations and Evaluating Expressions (12 topics)
    - ◇ Writing expressions using exponents
    - ◇ Introduction to exponents
    - ◇ Power of 10: Positive exponent
    - ◇ Introduction to parentheses
    - ◇ Introduction to order of operations
    - ◇ Order of operations with whole numbers
    - ◇ Order of operations with whole numbers and grouping symbols
    - ◇ Order of operations with whole numbers and exponents: Basic
    - ◇ Evaluating an algebraic expression: Whole numbers with two operations
    - ◇ Evaluating an algebraic expression: Whole numbers with one operation and an exponent
    - ◇ Evaluating a formula
    - ◇ Evaluating a linear expression: Integer multiplication with addition or subtraction

- ◆ Review of Basic Algebra (19 topics)
  - ◇ Combining like terms: Whole number coefficients
  - ◇ Combining like terms: Integer coefficients
  - ◇ Multiplying a constant and a linear monomial
  - ◇ Distributive property: Whole number coefficients
  - ◇ Distributive property: Integer coefficients
  - ◇ Using distribution and combining like terms to simplify: Univariate
  - ◇ Additive property of equality with integers
  - ◇ Multiplicative property of equality with integers
  - ◇ Introduction to solving an equation with variables on the same side
  - ◇ Identifying solutions to a linear equation in one variable: Two-step equations
  - ◇ Using two steps to solve an equation with whole numbers
  - ◇ Solving a two-step equation with integers
  - ◇ Introduction to solving an equation with parentheses
  - ◇ Writing a one-step expression for a real-world situation
  - ◇ Translating a phrase into a one-step expression
  - ◇ Translating a sentence into a one-step equation
  - ◇ Translating a sentence by using an inequality symbol
  - ◇ Reading a point in the coordinate plane
  - ◇ Plotting a point in the coordinate plane
- ◆ Problem Solving (10 topics)
  - ◇ Word problem with multiplication and addition or subtraction of whole numbers
  - ◇ Word problem with addition or subtraction of 2 decimals
  - ◇ Word problem with multiplication of a decimal and a whole number
  - ◇ Word problem with decimal addition and multiplication
  - ◇ Word problem with division of a decimal and a whole number
  - ◇ Word problem with decimal subtraction and division
  - ◇ Finding a unit price
  - ◇ Using tables to compare ratios
  - ◇ Computing unit prices to find the better buy
  - ◇ Solving a word problem on proportions using a unit rate
- ◆ Introduction to Perimeter and Area (2 topics)
  - ◇ Perimeter of a square or a rectangle
  - ◇ Area of a square or a rectangle
- ◆ Introduction to Percentages (14 topics)
  - ◇ Converting a fraction with a denominator of 100 to a percentage
  - ◇ Converting a percentage to a fraction with a denominator of 100
  - ◇ Converting between percentages and decimals
  - ◇ Equivalent fractions
  - ◇ Converting a fraction to a percentage: Denominator of 4, 5, or 10
  - ◇ Converting a fraction to a percentage: Denominator of 20, 25, or 50
  - ◇ Using a calculator to convert a fraction to a rounded percentage
  - ◇ Finding a percentage of a whole number
  - ◇ Finding a percentage of a total amount: Real-world situations
  - ◇ Finding a percentage of a total amount without a calculator: Sales tax, commission, discount
  - ◇ 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
- ◆ Interpreting Graphs (4 topics)
  - ◇ Constructing a bar graph for non-numerical data
  - ◇ Interpreting a bar graph
  - ◇ Interpreting a double bar graph

- ◇ Interpreting a line graph
- Sets (30 topics)
  - ◆ Introduction to Sets (5 topics)
    - ◇ Identifying elements of sets for a real world situation
    - ◇ Writing sets of numbers using descriptive and roster forms
    - ◇ Writing sets of natural numbers using set-builder and roster forms
    - ◇ Membership and cardinality of sets
    - ◇ Identifying equivalent and equal sets for a real-world situation
  - ◆ Subsets (6 topics)
    - ◇ Identifying true statements involving subsets and proper subsets
    - ◇ Identifying true statements about set membership and subsets
    - ◇ Writing subsets
    - ◇ Writing subsets for a real-world situation
    - ◇ Determining the total number of subsets of a set
    - ◇ Determining the number of subsets for a real-world situation
  - ◆ Operations with Sets (6 topics)
    - ◇ Finding sets and complements of sets
    - ◇ Finding sets and complements of sets for a real-world situation
    - ◇ Union and intersection of finite sets
    - ◇ Unions, intersections, and complements involving 2 sets
    - ◇ Unions and intersections involving the empty set or universal set
    - ◇ Unions, intersections, and complements involving 3 sets
  - ◆ Venn Diagrams (13 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
    - ◇ Interpreting Venn diagram cardinalities with 2 sets for a real-world situation
    - ◇ Constructing a Venn diagram with 2 sets
    - ◇ Constructing a Venn diagram with 2 sets to solve a word problem
    - ◇ Interpreting Venn diagram cardinalities with 3 sets for a real-world situation
    - ◇ Constructing a Venn diagram with 3 sets
    - ◇ Shading a Venn diagram with 2 sets: Unions, intersections, and complements
    - ◇ Shading Venn diagrams to determine if sets are equal
    - ◇ Venn diagram with 2 sets: Unions, intersections, and complements
    - ◇ Venn diagram with 2 sets: Unions, intersections, and complements for a real-world situation
    - ◇ Shading a Venn diagram with 3 sets: Unions, intersections, and complements
    - ◇ Venn diagram with 3 sets: Unions, intersections, and complements
- Logic (30 topics)
  - ◆ Logical Statements (5 topics)
    - ◇ Identifying statements
    - ◇ Identifying simple and compound statements
    - ◇ Negation of a statement
    - ◇ Understanding quantifiers
    - ◇ Negation of a quantified statement
  - ◆ Conjunctions and Disjunctions (7 topics)
    - ◇ Symbolic translation of negations, conjunctions, and disjunctions: Basic
    - ◇ Symbolic translation of negations, conjunctions, and disjunctions: Advanced
    - ◇ Introduction to truth tables with negations, conjunctions, or disjunctions
    - ◇ Truth tables with conjunctions or disjunctions
    - ◇ Using logic to test a claim: Conjunction or disjunction
    - ◇ Using De Morgan's Laws to identify negations and equivalent statements
    - ◇ Completing rows of truth tables: Conjunctions and disjunctions
  - ◆ Conditional Statements (12 topics)
    - ◇ Symbolic translation of conditional and biconditional statements: Basic

- ◇ Symbolic translation involving three statements
- ◇ Introduction to truth tables with conditional statements
- ◇ Using logic to test a claim: Conditional statement, basic
- ◇ Truth tables with conjunctions, disjunctions, and conditional statements
- ◇ The converse, inverse, and contrapositive of a conditional statement
- ◇ Writing the converse, inverse, and contrapositive of a conditional statement and determining their truth values
- ◇ Identifying equivalent statements and negations of a conditional statement
- ◇ Introduction to truth tables with biconditional statements
- ◇ Writing a biconditional statement as a conditional statement and its converse and determining truth values
- ◇ Completing rows of truth tables: Conjunctions, disjunctions, and conditional statements
- ◇ Using logic to test a claim: Conditional statement, advanced
- ◆ Logical Arguments (6 topics)
  - ◇ Determining if a statement is a tautology, contradiction, or neither
  - ◇ Determining if statements are logically equivalent
  - ◇ Using truth tables to determine the validity of an argument
  - ◇ Conditional statements and deductive reasoning
  - ◇ Validity of an argument
  - ◇ Translating an argument and determining its validity
- Numeration Systems (13 topics)
  - ◆ Expanded Form with Powers of Ten (2 topics)
    - ◇ Expanded forms of numbers less than 10,000 using powers of ten
    - ◇ Expanded forms of numbers greater than 10,000 using powers of ten
  - ◆ Base Number Systems (7 topics)
    - ◇ Converting from base two to base ten
    - ◇ Converting from a base less than ten to base ten
    - ◇ Converting from base ten to base two
    - ◇ Converting from base ten to a base less than ten: Basic
    - ◇ Converting from base ten to a base less than ten: Advanced
    - ◇ Counting in bases less than ten
    - ◇ Converting between base two and base eight
  - ◆ Operations in Base Number Systems (4 topics)
    - ◇ Adding numbers in bases less than ten
    - ◇ Subtracting numbers in bases less than ten
    - ◇ Multiplying numbers in bases less than ten: Single-digit times multi-digit
    - ◇ Division in a base less than ten: One-digit divisor
- Number Theory and the Real Number System (54 topics)
  - ◆ Divisibility, Prime Numbers, and Prime Factorization (6 topics)
    - ◇ Divisibility rules for 2, 5, and 10
    - ◇ Factors
    - ◇ Prime numbers
    - ◇ Prime factorization
    - ◇ Greatest common factor of 2 numbers
    - ◇ Least common multiple of 2 numbers
  - ◆ More on Integers and Order of Operations (5 topics)
    - ◇ Addition and subtraction with 3 integers
    - ◇ Multiplication of 3 or 4 integers
    - ◇ Absolute value of a number
    - ◇ Exponents and integers: Problem type 1
    - ◇ Order of operations with integers
  - ◆ Fractions (14 topics)
    - ◇ Introduction to simplifying a fraction

- ◇ Simplifying a fraction
- ◇ Product of a fraction and a whole number: Problem type 1
- ◇ Introduction to fraction multiplication
- ◇ Fraction multiplication
- ◇ Product of a fraction and a whole number: Problem type 2
- ◇ Multiplication of 3 fractions
- ◇ Signed fraction multiplication: Basic
- ◇ Addition or subtraction of fractions with the same denominator and simplification
- ◇ Finding the LCD of two fractions
- ◇ Writing fractions with a common denominator to add or subtract
- ◇ Addition or subtraction of fractions with different denominators
- ◇ Signed fraction addition or subtraction: Basic
- ◇ Exponents and fractions
- ◆ Converting Between Fractions and Decimals (4 topics)
  - ◇ Converting a decimal to a proper fraction without simplifying: Basic
  - ◇ Converting a decimal to a proper fraction in simplest form: Basic
  - ◇ Converting a fraction to a terminating decimal: Basic
  - ◇ Converting a fraction to a repeating decimal: Basic
- ◆ Real Numbers (9 topics)
  - ◇ Identifying numbers as integers or non-integers
  - ◇ Identifying numbers as rational or irrational
  - ◇ Constructing a Venn diagram to classify real numbers
  - ◇ Constructing a Venn diagram to describe relationships between sets of real numbers
  - ◇ Square roots of perfect squares with signs
  - ◇ Using a calculator to approximate a square root
  - ◇ Square root of a rational perfect square
  - ◇ Introduction to square root addition or subtraction
  - ◇ Introduction to square root multiplication
- ◆ Product, Power, and Quotient Rules of Exponents (9 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
  - ◇ Introduction to the quotient rule of exponents
  - ◇ Simplifying a ratio of univariate monomials
- ◆ Negative Exponents (4 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
  - ◇ Rewriting an algebraic expression without a negative exponent
- ◆ 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
- Algebraic Equations and Inequalities (53 topics)
  - ◆ Algebraic Expressions (3 topics)
    - ◇ Evaluating a quadratic expression: Integers
    - ◇ Table for a linear equation
    - ◇ Combining like terms in a quadratic expression
  - ◆ One-Step Linear Equations (5 topics)

- ◇ Additive property of equality with decimals
- ◇ Additive property of equality with signed fractions
- ◇ Multiplicative property of equality with fractions
- ◇ Multiplicative property of equality with decimals
- ◇ Multiplicative property of equality with signed fractions
- ◆ Multi-Step Linear Equations (8 topics)
  - ◇ Solving a multi-step equation given in fractional form
  - ◇ Solving a linear equation with several occurrences of the variable: Variables on the same side
  - ◇ Introduction to solving a linear equation with a variable on each 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
  - ◇ Solving equations with zero, one, or infinitely many solutions
- ◆ Solving Formulas for a Variable (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 multiplication or division: Advanced
  - ◇ Solving for a variable in terms of other variables using addition or subtraction with division
- ◆ Applications of Linear Equations (6 topics)
  - ◇ Translating a phrase into a two-step expression
  - ◇ Translating a sentence into a multi-step equation
  - ◇ Writing an equation to represent a proportional relationship
  - ◇ Solving a word problem with two unknowns using a linear equation
  - ◇ Solving a decimal word problem using a linear equation of the form  $Ax + B = C$
  - ◇ Solving a one-step word problem using the formula  $d = rt$
- ◆ Ratio and Proportion (6 topics)
  - ◇ Solving a proportion of the form  $x/a=b/c$ : Basic
  - ◇ Solving a proportion of the form  $x/a = b/c$
  - ◇ Introduction to solving a rational equation
  - ◇ Word problem on proportions: Problem type 1
  - ◇ Word problem on proportions: Problem type 2
  - ◇ Finding lengths using scale models
- ◆ Linear Inequalities (6 topics)
  - ◇ Additive property of inequality with integers
  - ◇ Multiplicative property of inequality with integers
  - ◇ Multiplicative property of inequality with signed fractions
  - ◇ Solving a two-step linear inequality: Problem type 1
  - ◇ Solving a two-step linear inequality: Problem type 2
  - ◇ Graphing a linear inequality on the number line
- ◆ Applications of Linear Inequalities (3 topics)
  - ◇ Translating a sentence into a one-step inequality
  - ◇ Writing an inequality for a real-world situation
  - ◇ Solving a decimal word problem using a two-step linear inequality
- ◆ Adding, Multiplying, and Factoring Polynomials (8 topics)
  - ◇ Simplifying a sum or difference of two univariate polynomials
  - ◇ Multiplying binomials with leading coefficients of 1
  - ◇ Multiplying binomials with leading coefficients greater than 1
  - ◇ Squaring a binomial: Univariate
  - ◇ Factoring a linear binomial

- ◇ Factoring a quadratic with leading coefficient 1
- ◇ Factoring a quadratic with leading coefficient greater than 1: Problem type 1
- ◇ Factoring a perfect square trinomial with leading coefficient 1
- ◆ Quadratic Equations (4 topics)
  - ◇ Solving an equation written in factored form
  - ◇ Finding the roots of a quadratic equation with leading coefficient 1
  - ◇ Applying the quadratic formula: Exact answers
  - ◇ Solving a word problem using a quadratic equation with irrational roots
- Graphs, Functions, and Systems (43 topics)
  - ◆ Graphing and Intercepts (9 topics)
    - ◇ Identifying solutions 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 (5 topics)
    - ◇ Classifying slopes given graphs of lines
    - ◇ 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
    - ◇ Graphing a line given its slope and  $y$ -intercept
  - ◆ Equations of Lines (10 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  $Ax + By = C$
    - ◇ 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
    - ◇ 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
    - ◇ Interpreting the parameters of a linear function that models a real–world situation
  - ◆ Systems of Linear Equations (10 topics)
    - ◇ Identifying solutions to a system of linear equations
    - ◇ Classifying 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 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 value mixture problem using a system of linear equations
  - ◆ Functions (5 topics)
    - ◇ Vertical line test
    - ◇ Table for a linear function
    - ◇ Evaluating functions: Linear and quadratic or cubic

- ◇ 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
- ◆ Exponential Functions (4 topics)
  - ◇ Using a calculator to evaluate exponential expressions
  - ◇ Evaluating an exponential function that models a real-world situation
  - ◇ Introduction to compound interest
  - ◇ Finding a final amount in a word problem on exponential growth or decay
- Consumer Mathematics (38 topics)
  - ◆ Applications Involving Percentages (11 topics)
    - ◇ Writing a ratio as a percentage
    - ◇ Computing a percentage from a table of values
    - ◇ Finding the rate of a tax or commission
    - ◇ Comparing discounts
    - ◇ Finding the total amount given the percentage of a partial amount
    - ◇ 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
  - ◆ Gross Pay and FICA (5 topics)
    - ◇ Hourly gross pay with overtime
    - ◇ Gross pay with commission and salary
    - ◇ Gross pay with variable commission scale
    - ◇ Calculating income tax
    - ◇ Calculating income tax using a tax bracket table
  - ◆ Simple Interest (5 topics)
    - ◇ Finding the interest and future value of a simple interest loan or investment
    - ◇ Computing the total cost and interest for a loan
    - ◇ 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
  - ◆ Compound Interest (2 topics)
    - ◇ Calculating and comparing simple interest and compound interest
    - ◇ Finding the future value and interest for an investment earning compound interest
  - ◆ Present Values and Annuities (4 topics)
    - ◇ Finding the present value of an investment earning compound interest
    - ◇ Finding the future value of an annuity
    - ◇ Computing the value of an annuity for its first few years
    - ◇ Finding the periodic payment needed to meet an investment goal
  - ◆ Installment Buying (5 topics)
    - ◇ Finding the monthly payment, total payment, and interest for a loan
    - ◇ Finding the effective annual interest rate of a loan or investment
    - ◇ Computing the unpaid balance for a credit card statement
    - ◇ Mean of a data set
    - ◇ Computing the average daily balance, interest, and balance for a credit card statement
  - ◆ Mortgages (4 topics)
    - ◇ Finding the down payment, loan amount, and monthly payment for a loan
    - ◇ Comparing monthly payments and total costs of two loans
    - ◇ Finding the interest paid, principal reduction, and new balance after a mortgage payment



- ◇ Completing a few rows of an amortization table
- ◆ Stocks and Bonds (2 topics)
  - ◇ Reading stock quotations
  - ◇ Calculating return on stock investment
- Measurement (39 topics)
  - ◆ U.S. Customary Units of Length (7 topics)
    - ◇ Choosing U.S. Customary measurement units
    - ◇ U.S. Customary length conversion with whole number values
    - ◇ Conversions involving measurements in feet and inches
    - ◇ U.S. Customary length conversions involving rounding decimals
    - ◇ Word problem involving a U.S. Customary length conversion
    - ◇ U.S. Customary length conversions involving dimensional analysis
    - ◇ Word problem involving U.S. Customary length conversions using dimensional analysis
  - ◆ Perimeter, Area, and Volume (10 topics)
    - ◇ Finding the missing length in a figure
    - ◇ Perimeter of a piecewise rectangular figure
    - ◇ Word problem involving the area of a rectangle: Problem type 2
    - ◇ Area of a piecewise rectangular figure
    - ◇ Area between two rectangles
    - ◇ Volume of a rectangular prism
    - ◇ Volume of a rectangular prism made of unit cubes
    - ◇ Word problem involving the volume of a rectangular prism
    - ◇ Surface area of a cube or a rectangular prism
    - ◇ Word problem involving the surface area of a rectangular prism
  - ◆ U.S. Customary Units of Area and Volume (4 topics)
    - ◇ Word problem on area involving conversions of U.S. Customary units: Problem type 1
    - ◇ Word problem on area involving conversions of U.S. Customary units: Problem type 2
    - ◇ Word problem on volume involving conversions of U.S. Customary units
    - ◇ Word problem involving U.S. Customary conversions, surface area, and cost
  - ◆ U.S. Customary Units of Weight and Volume (3 topics)
    - ◇ U.S. Customary weight conversions with whole number values
    - ◇ U.S. Customary volume conversion with whole number values
    - ◇ U.S. Customary unit conversion with whole number values: Two–step conversion
  - ◆ Metric Units of Measurement (7 topics)
    - ◇ Choosing metric measurement units
    - ◇ Metric distance conversion with whole number values
    - ◇ Metric distance conversion with decimal values
    - ◇ Metric mass or volume conversion with whole numbers
    - ◇ Metric conversion with decimal values: Two–step problem
    - ◇ Metric area unit conversion with decimal values
    - ◇ Converting between metric units of volume and capacity
  - ◆ Converting Between Measurement Systems (8 topics)
    - ◇ Converting between metric and U.S. Customary unit systems
    - ◇ Word problem on area involving conversions between systems
    - ◇ Word problem involving a conversion between U.S. Customary units of weight and metric units of mass
    - ◇ Converting between compound units: Basic
    - ◇ Converting between compound units: Advanced
    - ◇ Conversions with currency
    - ◇ Word problem involving conversion between compound units using dimensional analysis
    - ◇ Converting between temperatures in Fahrenheit and Celsius
- Geometry (43 topics)
  - ◆ Lines and Angles (7 topics)

- ◇ Acute, obtuse, and right angles
- ◇ Finding supplementary and complementary angles
- ◇ Finding the complement or supplement of an angle given a figure
- ◇ Identifying supplementary and vertical angles
- ◇ Finding angle measures given two intersecting lines
- ◇ Identifying corresponding and alternate angles
- ◇ Finding angle measures given two parallel lines cut by a transversal
- ◆ Triangles (7 topics)
  - ◇ Acute, obtuse, and right triangles
  - ◇ Classifying scalene, isosceles, and equilateral triangles by side lengths or angles
  - ◇ 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 a triangle and parallel lines
  - ◇ Pythagorean Theorem
  - ◇ Word problem involving the Pythagorean Theorem
- ◆ Perimeter and Angles of Polygons (3 topics)
  - ◇ Sum of the angle measures of a quadrilateral
  - ◇ Identifying parallelograms, rectangles, and squares
  - ◇ Properties of quadrilaterals
- ◆ Area of Polygons (4 topics)
  - ◇ Area of a triangle
  - ◇ Area involving rectangles and triangles
  - ◇ Area of a parallelogram
  - ◇ Area of a trapezoid
- ◆ Circumference and Area of Circles (4 topics)
  - ◇ Circumference of a circle
  - ◇ Perimeter involving rectangles and circles
  - ◇ Area of a circle
  - ◇ Area involving rectangles and circles
- ◆ Volume (7 topics)
  - ◇ Classifying solids
  - ◇ Vertices, edges, and faces of a solid
  - ◇ Volume of a triangular prism
  - ◇ Volume of a pyramid
  - ◇ Volume of a cylinder
  - ◇ Volume of a cone
  - ◇ Volume of a sphere
- ◆ Surface Area (2 topics)
  - ◇ Surface area of a cylinder
  - ◇ Surface area of a sphere
- ◆ Congruent and Similar Figures (3 topics)
  - ◇ Similar polygons
  - ◇ Similar right triangles
  - ◇ Indirect measurement
- ◆ Right Triangle Trigonometry (6 topics)
  - ◇ Sine, cosine, and tangent ratios: Numbers for side lengths
  - ◇ Using a calculator to approximate sine, cosine, and tangent values
  - ◇ 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
- Counting and Probability (36 topics)
  - ◆ Fundamental Counting Principle (6 topics)

- ◇ Interpreting a tree diagram
- ◇ Introduction to the counting principle
- ◇ Counting principle
- ◇ Counting principle with repetition allowed
- ◇ Counting principle involving a specified arrangement
- ◇ Counting arrangements of objects that are not all distinct
- ◆ Permutations and Combinations (7 topics)
  - ◇ Factorial expressions
  - ◇ Computing permutations and combinations
  - ◇ Introduction to permutations and combinations
  - ◇ Permutations and combinations: Problem type 1
  - ◇ Permutations and combinations: Problem type 2
  - ◇ Permutations and combinations: Problem type 3
  - ◇ Counting using combinations and addition
- ◆ Probability and Odds of an Event (11 topics)
  - ◇ Determining a sample space and outcomes for an event: Experiment involving a single selection
  - ◇ Determining a sample space and outcomes for an event: Experiment involving multiple selections
  - ◇ 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
  - ◇ Probability of selecting one card from a standard deck
  - ◇ Probabilities of an event and its complement
  - ◇ Outcomes and event probability
  - ◇ Experimental and theoretical probability
  - ◇ Finding the odds in favor and against
  - ◇ Converting between probability and odds
- ◆ Expected Value (2 topics)
  - ◇ Introduction to expectation
  - ◇ Computing expected value in a game of chance
- ◆ Probability of Independent and Dependent Events (8 topics)
  - ◇ Probability of independent events: Decimal answers
  - ◇ Probability of dependent events: Decimal answers
  - ◇ Probabilities involving two rolls of a die: Decimal answers
  - ◇ Probability of independent events involving a standard deck of cards
  - ◇ Probabilities of draws without replacement
  - ◇ Determining outcomes for unions, intersections, and complements of events
  - ◇ Computing conditional probability using a sample space
  - ◇ Conditional probability: Basic
- ◆ Probability Involving a Union of Events (2 topics)
  - ◇ Word problem involving the probability of a union
  - ◇ Computing probability involving the addition rule using a two-way frequency table
- Statistics (46 topics)
  - ◆ Interpreting and Displaying Data (13 topics)
    - ◇ Choosing an appropriate method for gathering data: Problem type 2
    - ◇ Classifying samples
    - ◇ Finding a percentage of a total amount in a circle graph
    - ◇ Computations from pie charts
    - ◇ Constructing a frequency distribution for non-grouped data
    - ◇ Constructing a frequency distribution for grouped data
    - ◇ Constructing a frequency distribution and a histogram
    - ◇ Constructing a relative frequency distribution for grouped data
    - ◇ Histograms for grouped data
    - ◇ Interpreting a histogram

- ◇ Constructing a frequency distribution and a frequency polygon
- ◇ Frequency polygons for grouped data
- ◇ Interpreting a stem-and-leaf display
- ◆ Measures of Average (13 topics)
  - ◇ 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: Tabular data
  - ◇ Introduction to summation notation
  - ◇ Approximating the mean of a data set given a frequency distribution
  - ◇ Approximating the mean of a data set given a histogram
  - ◇ Median of a data set
  - ◇ Mode of a data set
  - ◇ Mean, median, and mode: Computations
  - ◇ How changing a value affects the mean and median
  - ◇ Finding outliers in a data set
  - ◇ Choosing the best measure to describe data
  - ◇ Mean, median, and mode: Comparisons
- ◆ Measures of Variation (3 topics)
  - ◇ Range of a data set
  - ◇ Comparing measures of center and variation
  - ◇ Population standard deviation
- ◆ Measures of Position (5 topics)
  - ◇ Percentage of data below a specified value
  - ◇ Percentiles
  - ◇ Interpreting percentile ranks
  - ◇ Five-number summary and interquartile range
  - ◇ Constructing a box-and-whisker plot
- ◆ The Normal Distribution (6 topics)
  - ◇ Using the graph of a distribution to find probabilities: Basic
  - ◇ 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
- ◆ Correlation and Regression (6 topics)
  - ◇ 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
  - ◇ Linear relationship and the correlation coefficient
- Voting and Apportionment (22 topics)
  - ◆ Voting Methods (6 topics)
    - ◇ Interpreting a preference table
    - ◇ Plurality method
    - ◇ Borda count method
    - ◇ Plurality-with-elimination method: One elimination
    - ◇ Pairwise comparison method
    - ◇ Comparing voting methods
  - ◆ Flaws of Voting Methods (4 topics)
    - ◇ Borda count method and the majority criterion
    - ◇ Plurality method and the head-to-head criterion
    - ◇ Plurality-with-elimination and the monotonicity criterion

- ◇ Pairwise comparison and the irrelevant alternatives criterion
- ◆ Apportionment Methods (8 topics)
  - ◇ Standard divisor and standard quota
  - ◇ Lower and upper quotas
  - ◇ Hamilton's method
  - ◇ Jefferson's method
  - ◇ Adams' method
  - ◇ Webster's method
  - ◇ Geometric mean of two whole numbers
  - ◇ Huntington–Hill method
- ◆ Flaws of Apportionment Methods (4 topics)
  - ◇ Hamilton's method and the Alabama paradox
  - ◇ Hamilton's method and the population paradox
  - ◇ Hamilton's method and the new states paradox
  - ◇ Jefferson's, Adams', and Webster's methods and the quota rule
- Graph Theory (21 topics)
  - ◆ Graphs, Paths, and Circuits (7 topics)
    - ◇ Counting vertices, edges, and loops
    - ◇ Degree of a vertex, even and odd vertices, and adjacent vertices
    - ◇ Drawing a graph
    - ◇ Drawing an equivalent graph
    - ◇ Drawing a graph to represent a figure
    - ◇ Paths and circuits
    - ◇ Connected, disconnected, and bridges: Interpreting
  - ◆ Euler Paths and Euler Circuits (4 topics)
    - ◇ Euler paths and Euler circuits
    - ◇ Euler's theorem
    - ◇ Fleury's algorithm
    - ◇ Fleury's algorithm in context
  - ◆ Hamilton Paths and Hamilton Circuits (6 topics)
    - ◇ Hamilton paths and circuits
    - ◇ Drawing a complete graph
    - ◇ Number of Hamilton circuits in a complete graph
    - ◇ Weighted graphs
    - ◇ Using the brute force method to find an optimal Hamilton circuit
    - ◇ Using the nearest neighbor method to approximate an optimal Hamilton circuit
  - ◆ Trees (4 topics)
    - ◇ Drawing a tree
    - ◇ Properties of trees
    - ◇ Spanning trees
    - ◇ Using Kruskal's algorithm to find a minimum spanning tree
- Other Topics Available(\*) (581 additional topics)
  - ◆ Review of Essential Skills and Problem Solving (43 topics)
    - ◇ Expanded form: 2 and 3–digit numbers
    - ◇ Expanded form: 4 and 5–digit numbers
    - ◇ Expanded form with zeros
    - ◇ Rounding to thousands, ten thousands, or hundred thousands
    - ◇ Decimal place value: Hundreds to ten thousandths
    - ◇ Introduction to non–unit fractions
    - ◇ Converting a fraction with a denominator of 100 or 1000 to a decimal
    - ◇ Decimal multiplication: Problem type 1

- ◇ Whole number division with decimal answers
- ◇ Division of a decimal by a 2–digit decimal
- ◇ Plotting integers on a number line
- ◇ Evaluating an algebraic expression: Whole number addition or subtraction
- ◇ Evaluating an algebraic expression: Whole number multiplication or division
- ◇ Identifying like terms
- ◇ Understanding the distributive property
- ◇ Additive property of equality with whole numbers
- ◇ Multiplicative property of equality with whole numbers
- ◇ Introduction to the product rule with positive exponents: Whole number base
- ◇ Finding the next terms of an arithmetic sequence with whole numbers
- ◇ Finding the next terms of a geometric sequence with whole numbers
- ◇ Finding patterns in shapes
- ◇ Examining a savings plan for college
- ◇ Calculations involving paying for college
- ◇ Balancing a check register
- ◇ Word problem with multiplication of two decimals
- ◇ Comparing costs of checking accounts
- ◇ Word problem on unit rates associated with ratios of whole numbers: Decimal answers
- ◇ Perimeter of a polygon
- ◇ Word problem on finding the perimeter of a rectangle
- ◇ Area of a rectangle on a grid
- ◇ Introduction to converting a percentage to a decimal
- ◇ Introduction to converting a decimal to a percentage
- ◇ Converting between percentages and decimals in a real–world situation
- ◇ Converting a fraction to a percentage in a real–world situation
- ◇ Applying the percent equation: Problem type 2
- ◇ Estimating a sum of whole numbers: Problem type 2
- ◇ Estimating a difference of whole numbers: Problem type 2
- ◇ Estimating a product or quotient of whole numbers
- ◇ Estimating a decimal sum or difference
- ◇ Estimating a product of decimals
- ◇ Interpreting a tally table
- ◇ Interpreting a pie chart
- ◇ Interpreting the graphs of two functions
- ◆ Sets (9 topics)
  - ◇ Writing sets for a real–world situation using descriptive and roster forms
  - ◇ Writing sets of integers using set–builder and roster forms
  - ◇ Identifying well defined sets
  - ◇ Identifying infinite sets and determining cardinalities of finite sets
  - ◇ Identifying equivalent and equal sets
  - ◇ Constructing a Venn diagram with 3 sets to solve a word problem
  - ◇ Introduction to shading a Venn diagram with 2 sets
  - ◇ Introduction to shading a Venn diagram with 3 sets
  - ◇ Venn diagram with 3 sets: Unions, intersections, and complements for a real–world situation
- ◆ Logic (2 topics)
  - ◇ Symbolic translation of conditional and biconditional statements: Advanced
  - ◇ Completing rows of truth tables: Conjunctions, disjunctions, conditional and biconditional statements
- ◆ Numeration Systems (8 topics)
  - ◇ Converting from a base greater than ten to base ten
  - ◇ Counting in bases greater than ten
  - ◇ Converting from base ten to a base greater than ten
  - ◇ Converting between base two and base sixteen

- ◇ Congruence in a modular arithmetic system
- ◇ Addition, subtraction, and multiplication in a modular arithmetic system
- ◇ Negative numbers and subtraction in a modular arithmetic system
- ◇ Word problem involving a modular arithmetic system
- ◆ Number Theory and the Real Number System (96 topics)
  - ◇ Divisibility rules for 3 and 9
  - ◇ Greatest common factor of 3 numbers
  - ◇ Least common multiple of 3 numbers
  - ◇ Word problem involving the least common multiple of 2 numbers
  - ◇ Word problem with common multiples
  - ◇ Reading the temperature from a thermometer
  - ◇ Writing a signed number for a real-world situation
  - ◇ Word problem with addition or subtraction of integers
  - ◇ Operations with absolute value: Problem type 1
  - ◇ Order of operations with whole numbers and exponents: Advanced
  - ◇ Exponents and integers: Problem type 2
  - ◇ Order of operations with integers and exponents
  - ◇ Fractional position on a number line
  - ◇ Plotting fractions on a number line
  - ◇ Using a common denominator to order fractions
  - ◇ Product of a unit fraction and a whole number
  - ◇ Word problem involving fractions and multiplication
  - ◇ Multi-step word problem involving fractions and multiplication
  - ◇ The reciprocal of a number
  - ◇ Fraction division
  - ◇ Signed fraction division
  - ◇ Word problem involving fractions and division
  - ◇ Addition or subtraction of fractions with the same denominator
  - ◇ Addition or subtraction of unit fractions
  - ◇ Addition and subtraction of 3 fractions with different denominators
  - ◇ Signed fraction subtraction involving double negation
  - ◇ Addition and subtraction of 3 fractions involving signs
  - ◇ Word problem involving addition or subtraction of fractions with different denominators
  - ◇ Fractional part of a circle
  - ◇ Order of operations with fractions: Problem type 1
  - ◇ Order of operations with fractions: Problem type 2
  - ◇ Order of operations with fractions: Problem type 3
  - ◇ Complex fraction without variables: Problem type 1
  - ◇ Exponents and signed fractions
  - ◇ Writing an improper fraction as a mixed number
  - ◇ Writing a mixed number as an improper fraction
  - ◇ Mixed number addition with the same denominator and renaming
  - ◇ Mixed number subtraction with the same denominator and renaming
  - ◇ Addition or subtraction of mixed numbers with different denominators without renaming
  - ◇ Addition of mixed numbers with different denominators and renaming
  - ◇ Subtraction of mixed numbers with different denominators and renaming
  - ◇ Addition and subtraction of 3 mixed numbers with different denominators
  - ◇ Word problem involving addition or subtraction of mixed numbers with different denominators
  - ◇ Mixed number multiplication
  - ◇ Multiplication of a mixed number and a whole number
  - ◇ Division with a mixed number and a whole number
  - ◇ Mixed number division
  - ◇ Word problem involving multiplication or division with mixed numbers

- ◇ Converting a decimal to a proper fraction without simplifying: Advanced
- ◇ Converting a decimal to a proper fraction in simplest form: Advanced
- ◇ Converting a decimal to a mixed number and an improper fraction without simplifying
- ◇ Converting a decimal to a mixed number and an improper fraction in simplest form: Basic
- ◇ Converting a fraction to a terminating decimal: Advanced
- ◇ Converting a fraction to a repeating decimal: Advanced
- ◇ Multiplicative property of equality with whole numbers: Fractional answers
- ◇ Converting a repeating decimal to a fraction
- ◇ Square root of a perfect square
- ◇ Constructing a Venn diagram to classify rational numbers
- ◇ Constructing a Venn diagram to describe relationships between sets of rational numbers
- ◇ Introduction to properties of addition
- ◇ Properties of addition
- ◇ Introduction to properties of multiplication
- ◇ Properties of real numbers
- ◇ Estimating a square root
- ◇ Simplifying the square root of a whole number less than 100
- ◇ Simplifying the square root of a whole number greater than 100
- ◇ Square root addition or subtraction
- ◇ Square root addition or subtraction with three terms
- ◇ Square root multiplication: Basic
- ◇ Rationalizing a denominator: Quotient involving square roots
- ◇ Rationalizing a denominator: Square root of a fraction
- ◇ Cube root of an integer
- ◇ Finding  $n^{\text{th}}$  roots of perfect  $n^{\text{th}}$  powers with signs
- ◇ Understanding the product rule of exponents
- ◇ Introduction to the power of a power rule with positive exponents: Whole number base
- ◇ Understanding the power rules of exponents
- ◇ Introduction to the quotient rule with positive exponents: Whole number base
- ◇ Quotient of expressions involving exponents
- ◇ Power of 10: Negative exponent
- ◇ Evaluating an expression with a negative exponent: Negative integer base
- ◇ Introduction to the product rule with negative exponents: Whole number base
- ◇ Introduction to the product rule with negative exponents
- ◇ Introduction to the quotient rule with negative exponents: Whole number base
- ◇ Quotient rule with negative exponents: Problem type 1
- ◇ Introduction to the power of a power rule with negative exponents: Whole number base
- ◇ Product rule with negative exponents
- ◇ Quotient rule with negative exponents: Problem type 2
- ◇ Power of a power rule 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 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 the scale factor between numbers given in scientific notation in a real–world situation
- ◆ Algebraic Equations and Inequalities (96 topics)
  - ◇ Evaluating an algebraic expression: Whole number operations and exponents
  - ◇ 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



- ◇ Function tables with two-step rules
- ◇ Additive property of equality with fractions and mixed numbers
- ◇ Additive property of equality with a negative coefficient
- ◇ Introduction to using substitution to solve a linear equation
- ◇ Solving a two-step equation with signed decimals
- ◇ 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
- ◇ Introduction to solving an absolute value equation
- ◇ Solving an absolute value equation: Problem type 1
- ◇ Solving for a variable in terms of other variables using addition or subtraction: Advanced
- ◇ 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
- ◇ Solving a fraction word problem using a linear equation of the form  $Ax = B$
- ◇ 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
- ◇ Solving a distance, rate, time problem using a linear equation
- ◇ Solving a percent mixture problem using a linear equation
- ◇ Finding the dimensions of a rectangle given its perimeter and a relationship between sides
- ◇ Writing ratios using different notations
- ◇ Writing ratios for real-world situations
- ◇ Simplifying a ratio of whole numbers: Problem type 1
- ◇ Simplifying a ratio of decimals
- ◇ Solving a proportion of the form  $(x+a)/b = c/d$
- ◇ Solving a rational equation that simplifies to linear: Denominator  $x$
- ◇ Finding a scale factor: Same units
- ◇ Using a scale drawing to find actual area
- ◇ Reproducing a scale drawing at a different scale
- ◇ Identifying direct variation equations
- ◇ Writing a direct variation equation
- ◇ Word problem on direct variation
- ◇ Writing an inverse variation equation
- ◇ Identifying direct and inverse variation equations
- ◇ Word problem on inverse variation
- ◇ Word problem on inverse variation involving the completion of a task
- ◇ Writing an equation that models variation
- ◇ Word problem on combined variation
- ◇ Additive property of inequality with whole numbers
- ◇ Additive property of inequality with signed fractions
- ◇ Additive property of inequality with signed decimals
- ◇ Multiplicative property of inequality with whole numbers
- ◇ Solving a two-step linear inequality with whole numbers
- ◇ 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

- ◇ Writing an inequality given a graph on the number line
- ◇ Graphing a compound inequality on the number line
- ◇ Set-builder and interval notation
- ◇ Solving a compound linear inequality: Graph solution, basic
- ◇ Solving an absolute value inequality: Problem type 1
- ◇ Translating a sentence into a compound inequality
- ◇ Solving a word problem using a one-step linear inequality
- ◇ Translating a sentence into a multi-step inequality
- ◇ Solving a word problem using a two-step linear inequality
- ◇ Solving a decimal word problem using a linear inequality with the variable on both sides
- ◇ Simplifying a sum or difference of three univariate polynomials
- ◇ Multiplying a univariate polynomial by a monomial with a positive coefficient
- ◇ Multiplying conjugate binomials: Univariate
- ◇ Multiplying binomials with negative coefficients
- ◇ Multiplication involving binomials and trinomials in one variable
- ◇ Introduction to the GCF of two monomials
- ◇ Greatest common factor of three univariate monomials
- ◇ Factoring out a monomial from a polynomial: Univariate
- ◇ Factoring out a constant before factoring a quadratic
- ◇ Factoring a quadratic with leading coefficient greater than 1: Problem type 2
- ◇ Factoring a quadratic with leading coefficient greater than 1: Problem type 3
- ◇ Factoring a quadratic with a negative leading coefficient
- ◇ 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
- ◇ Factoring a product of a quadratic trinomial and a monomial
- ◇ Finding the roots of a quadratic equation of the form  $ax^2 + bx = 0$
- ◇ Finding the roots of a quadratic equation with leading coefficient greater than 1
- ◇ Solving a quadratic equation needing simplification
- ◇ Solving a word problem using a quadratic equation with rational roots
- ◇ 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
- ◇ Applying the quadratic formula: Decimal answers
- ◇ Discriminant of a quadratic equation
- ◇ Completing the square
- ◇ Solving a quadratic equation by completing the square: Exact answers
- ◇ Introduction to solving a radical equation
- ◇ Solving a radical equation that simplifies to a linear equation: One radical, basic
- ◇ Word problem involving radical equations: Basic
- ◇ Solving an equation of the form  $x^3 = a$  using integers
- ◇ Solving an equation using the odd-root property: Problem type 1
- ◆ Graphs, Functions, and Systems (153 topics)
  - ◇ Finding x- and y-intercepts of a line given the equation: Advanced
  - ◇ Graphing a line given its x- and y-intercepts
  - ◇ Finding the coordinate that yields a given slope
  - ◇ Graphing a line through a given point with a given slope
  - ◇ Graphing a line by first finding its slope and y-intercept
  - ◇ 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
  - ◇ Graphing a line given its equation in point-slope form
  - ◇ Writing the equations of vertical and horizontal lines through a given point
  - ◇ Writing and evaluating a function that models a real-world situation: Basic

- ◇ Writing an equation and drawing its graph to model a real–world situation: Basic
- ◇ 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
- ◇ 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 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  $Ax + By = C$
- ◇ 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 the solution of systems of linear equations from graphs
- ◇ Graphically solving a system of linear equations both of the form  $y=mx+b$
- ◇ 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 systems of linear equations with 0, 1, or infinitely many solutions
- ◇ Identifying the operations used to create equivalent systems of equations
- ◇ Introduction to solving a  $3 \times 3$  system of linear equations
- ◇ Solving a  $3 \times 3$  system of linear equations: Problem type 1
- ◇ Writing and solving a system of two linear equations given a table of values
- ◇ 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
- ◇ Solving a word problem using a  $3 \times 3$  system of linear equations: Problem type 1
- ◇ Solving a word problem using a  $3 \times 3$  system of linear equations: Problem type 2
- ◇ Scalar multiplication of a matrix
- ◇ Addition or subtraction of matrices
- ◇ Linear combination of matrices
- ◇ Multiplication of matrices: Basic
- ◇ Squaring and multiplying  $2 \times 2$  matrices
- ◇ Word problem involving multiplication of matrices
- ◇ Completing Gauss–Jordan elimination with a  $2 \times 2$  matrix
- ◇ Gauss–Jordan elimination with a  $2 \times 2$  matrix
- ◇ 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
- ◇ Graphing a system of two linear inequalities: Basic
- ◇ Graphing a system of two linear inequalities: Advanced
- ◇ Graphing a system of three linear inequalities
- ◇ Writing a multi–step inequality for a real–world situation
- ◇ Writing a linear inequality in two variables given a table of values
- ◇ Solving a word problem using a system of linear inequalities: Problem type 1
- ◇ Solving a word problem using a system of linear inequalities: Problem type 2
- ◇ Linear programming
- ◇ Solving a word problem using linear programming
- ◇ Identifying functions from relations
- ◇ Domain and range from ordered pairs
- ◇ Finding outputs of a one–step function that models a real–world situation: Function notation
- ◇ Domain and range of a linear function that models a real–world situation
- ◇ 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
- ◇ Finding local maxima and minima of a function given the graph
- ◇ Choosing a graph to fit a narrative: Basic
- ◇ Choosing a graph to fit a narrative: Advanced
- ◇ Domain and range from the graph of a continuous function
- ◇ Graphing a function of the form  $f(x) = ax + b$ : Integer slope
- ◇ Graphing a function of the form  $f(x) = ax + b$ : Fractional slope
- ◇ Graphing a function of the form  $f(x) = ax^2$
- ◇ Graphing a function of the form  $f(x) = ax^2 + c$
- ◇ Finding the vertex, intercepts, and axis of symmetry from the graph of a parabola
- ◇ Graphing a parabola of the form  $y = ax^2$
- ◇ Graphing a parabola of the form  $y = ax^2 + c$
- ◇ Translating the graph of a parabola: One step
- ◇ Graphing a parabola of the form  $y = (x-h)^2 + k$
- ◇ Graphing a parabola of the form  $y = a(x-h)^2 + k$
- ◇ Graphing a parabola of the form  $y = x^2 + bx + c$
- ◇ Graphing a parabola of the form  $y = ax^2 + bx + c$ : Integer coefficients
- ◇ Graphing a parabola of the form  $y = ax^2 + bx + c$ : Rational coefficients
- ◇ Finding the x-intercept(s) and the vertex of a parabola
- ◇ Finding the maximum or minimum of a quadratic function
- ◇ Word problem involving the maximum or minimum of a quadratic function
- ◇ Rewriting a quadratic function to find its vertex and sketch its graph
- ◇ Finding the domain and range from the graph of a parabola
- ◇ Range of a quadratic function
- ◇ Classifying the graph of a function
- ◇ How the leading coefficient affects the shape of a parabola
- ◇ Table for an exponential function
- ◇ Using a calculator to evaluate exponential expressions involving base e
- ◇ Evaluating an exponential function with base e that models a real-world situation
- ◇ 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 equation that models exponential growth or decay
- ◇ Solving an exponential equation by finding common bases: Linear exponents
- ◇ Graphing an exponential function:  $f(x) = b^x$
- ◇ Graphing an exponential function:  $f(x) = a(b)^x$
- ◇ 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  $f(x) = -b^x$  or  $f(x) = -b^{-x}$
- ◇ Writing an exponential function rule given a table of ordered pairs
- ◇ Finding the initial amount and asymptote given a graph of an exponential function
- ◇ Finding domain and range from the graph of an exponential function
- ◇ Comparing linear, polynomial, and exponential functions
- ◇ Converting between radical form and exponent form
- ◇ Rational exponents: Unit fraction exponents and whole number bases
- ◇ 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
- ◇ 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
- ◇ Basic properties of logarithms
- ◇ Using properties of logarithms to evaluate expressions
- ◇ Expanding a logarithmic expression: Problem type 1
- ◇ Expanding a logarithmic expression: Problem type 2
- ◇ Expanding a logarithmic expression: Problem type 3
- ◇ Writing an expression as a single logarithm
- ◇ Change of base for logarithms: Problem type 1
- ◇ 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 a multi-step equation involving natural logarithms
- ◇ 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 using logarithms: Decimal answers, basic
- ◇ Solving an exponential equation by using natural logarithms: Decimal answers
- ◇ 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 exponential growth or decay
- ◇ 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 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
- ◇ 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
- ◇ Identifying linear, quadratic, and exponential functions given ordered pairs
- ◆ Consumer Mathematics (21 topics)
  - ◇ Converting a mixed number percentage to a decimal
  - ◇ Converting a percentage to a fraction in simplest form
  - ◇ Converting a decimal percentage to a fraction
  - ◇ Calculating relative frequencies in a contingency table
  - ◇ Finding the absolute error and percent error of a measurement
  - ◇ FICA with no ceiling
  - ◇ FICA with ceiling
  - ◇ The U. S. Rule: Making partial note payments before due date
  - ◇ Finding the final amount of a loan or investment earning continuous compound interest
  - ◇ Finding the initial amount of an investment earning continuous compound interest
  - ◇ Finding the time required for an investment earning compound interest
  - ◇ Finding the rate or time in a word problem on continuous exponential growth or decay
  - ◇ Finding half-life or doubling time
  - ◇ Annuity due
  - ◇ Sinking funds

- ◇ Using an annual percentage rate table to find the APR for an installment purchase
- ◇ Comparing monthly payments for subsidized and unsubsidized student loans
- ◇ Stock yield, earnings per share, and price–earnings ratio
- ◇ Stock dividends
- ◇ Net asset value of a mutual fund
- ◇ Calculating bond yields
- ◆ Measurement (9 topics)
  - ◇ Perimeter of a rectangle on a grid
  - ◇ Computations involving density, mass, and volume
  - ◇ Word problem on density involving the volume of a rectangular solid
  - ◇ Surface area of a rectangular prism made of unit cubes
  - ◇ Unit conversions involving acres and hectares
  - ◇ Converting between U.S. Customary units of volume: Problem type 1
  - ◇ U.S. Customary unit conversion with mixed number values: One–step conversion
  - ◇ U.S. Customary unit conversion with mixed number values: Two–step conversion
  - ◇ Metric distance conversions between the base unit m and dm, dam, hm
- ◆ Geometry (74 topics)
  - ◇ Naming segments, rays, and lines
  - ◇ Measuring an angle with the protractor
  - ◇ Drawing an angle with the protractor
  - ◇ Solving an equation involving complementary or supplementary angles
  - ◇ Solving equations involving vertical angles
  - ◇ Solving equations involving angles and a pair of parallel lines
  - ◇ Classifying scalene, isosceles, and equilateral triangles by side lengths
  - ◇ Finding an angle measure given extended triangles
  - ◇ Finding angle measures of a triangle given angles with variables
  - ◇ Introduction to the Pythagorean Theorem
  - ◇ Using the Pythagorean Theorem and a quadratic equation to find side lengths of a right triangle
  - ◇ Sides of polygons having the same perimeter
  - ◇ Finding a side length given the perimeter and side lengths with variables
  - ◇ Naming polygons
  - ◇ 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
  - ◇ Classifying parallelograms
  - ◇ Area of a rectangle involving mixed numbers and fractions
  - ◇ Distinguishing between the area and perimeter of a rectangle
  - ◇ Areas of rectangles with the same perimeter
  - ◇ Word problem involving the area between two rectangles
  - ◇ Solving a word problem involving area using a one–step linear inequality: Area and lengths
  - ◇ Finding the radius or the diameter of a circle given its circumference
  - ◇ Circumference ratios
  - ◇ Circumference and area of a circle
  - ◇ Distinguishing between the area and circumference of a circle
  - ◇ Area between two concentric circles
  - ◇ Word problem involving the area between two concentric circles
  - ◇ Area involving inscribed figures
  - ◇ Word problem involving the rate of filling or emptying a rectangular prism
  - ◇ Volume of a piecewise rectangular prism
  - ◇ Word problem involving the volume of a piecewise rectangular 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

- ◇ Word problem involving the volume of a cone
- ◇ Word problem involving the volume of a sphere
- ◇ Ratio of volumes
- ◇ 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
- ◇ Identifying congruent shapes on a grid
- ◇ Identifying and naming congruent parts of congruent triangles
- ◇ Identifying and naming congruent triangles
- ◇ Identifying similar or congruent shapes on a grid
- ◇ Triangles and parallel lines
- ◇ Computing ratios of side lengths, surface areas, and volumes for similar solids
- ◇ Identifying transformations
- ◇ Translating a polygon
- ◇ Reflecting a polygon over a vertical or horizontal line
- ◇ Drawing lines of symmetry
- ◇ Rotating a figure about the origin
- ◇ Finding an angle of rotation
- ◇ Dilating a figure
- ◇ Special right triangles: Exact answers
- ◇ Sine, cosine, and tangent ratios: Variables for side lengths
- ◇ 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
- ◇ Understanding trigonometric ratios through similar right triangles
- ◇ Relationship between the sines and cosines of complementary angles
- ◇ Solving a right triangle
- ◇ Using trigonometry to find a length in a word problem with two right triangles
- ◇ Simplifying trigonometric expressions
- ◇ 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
- ◇ Heron's formula
- ◆ Counting and Probability (30 topics)
  - ◇ Counting using combinations and a complement
  - ◇ Counting five-card hands from a standard deck
  - ◇ Understanding likelihood
  - ◇ Experimental and theoretical probability for compound events
  - ◇ Probabilities of a permutation and a combination
  - ◇ Area as probability
  - ◇ Finding odds in favor and against drawing a card from a standard deck
  - ◇ Computing expected value in a business application
  - ◇ Making reasonable inferences based on proportion statistics
  - ◇ Identifying independent events given descriptions of experiments
  - ◇ Probability of dependent events involving a standard deck of cards
  - ◇ Probability of dependent events involving a survey
  - ◇ Probabilities of draws with replacement
  - ◇ Probability of five-card hands

- ◇ Using a Venn diagram to understand the multiplication rule for probability
- ◇ Outcomes and event probability: Conditional probability
- ◇ Identifying independent events given values of probabilities
- ◇ Computing conditional probability using a two-way frequency table
- ◇ Computing conditional probability to make an inference using a two-way frequency table
- ◇ Tree diagrams for conditional probabilities
- ◇ Outcomes and event probability: Addition rule
- ◇ Using a Venn diagram to understand the addition rule for probability
- ◇ Probability of intersection or union: Word problems
- ◇ Computing conditional probability using a large two-way frequency table
- ◇ Probability of the union of two events
- ◇ Intersection and conditional probability
- ◇ Law of total probabilities
- ◇ Bayes' theorem
- ◇ Using the binomial formula to solve a word problem: Problem type 1
- ◇ Using the binomial formula to solve a word problem: Problem type 2
- ◆ Statistics (30 topics)
  - ◇ Choosing an appropriate method for gathering data: Problem type 1
  - ◇ Classification of variables
  - ◇ Angle measure in a circle graph
  - ◇ Discrete versus continuous variables
  - ◇ Using a model to find the mean
  - ◇ Understanding the mean graphically: Two bars
  - ◇ Understanding the mean graphically: Four or more bars
  - ◇ Rejecting unreasonable claims based on average statistics
  - ◇ Summation of indexed data
  - ◇ Comparing means without calculation
  - ◇ Using back-to-back stem-and-leaf displays to compare data sets
  - ◇ Comparing standard deviations without calculation
  - ◇ Sample standard deviation
  - ◇ Using box-and-whisker plots to compare data sets
  - ◇ Using the graph of a distribution to find probabilities: Advanced
  - ◇ Normal versus standard normal curves
  - ◇ Finding a probability given a normal distribution: Advanced
  - ◇ Discrete probability distribution: Basic
  - ◇ Standard normal values: Basic
  - ◇ Standard normal values: Advanced
  - ◇ Finding a raw score given a normal distribution
  - ◇ Chebyshev's theorem and the empirical rule
  - ◇ Central limit theorem: Sample mean
  - ◇ Identifying independent and dependent variables from equations or real-world situations
  - ◇ Classifying linear and nonlinear relationships from scatter plots
  - ◇ Computing residuals
  - ◇ Interpreting residual plots
  - ◇ Identifying correlation and causation
  - ◇ Choosing a quadratic model and using it to make a prediction
  - ◇ Choosing an exponential model and using it to make a prediction
- ◆ Voting and Apportionment (4 topics)
  - ◇ Creating a preference table from ballots
  - ◇ Plurality-with-elimination method: Two eliminations
  - ◇ Interpreting an approval table
  - ◇ Approval voting
- ◆ Graph Theory (6 topics)



- ◇ Coloring and chromatic number
- ◇ Coloring a graph in context
- ◇ Drawing a graph to represent relationships
- ◇ Application of graph coloring
- ◇ Connected, disconnected, and bridges: Drawing
- ◇ Using the cheapest link method to approximate an optimal Hamilton circuit

**\*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.*