Prep for PreCalculus

This course covers the topics outlined below. You can customize the scope and sequence of this course to meet your curricular needs.

Curriculum (246 topics + 58 additional topics)

- Real Numbers (30 topics)
  - Fractions (5 topics)
    ◊ Simplifying a fraction
    ◊ Using a common denominator to order fractions
    ◊ Addition or subtraction of fractions with different denominators
    ◊ Fraction multiplication
    ◊ Fraction division
- Percents and Proportions (8 topics)
  ◊ Converting between percentages and decimals
  ◊ Applying the percent equation
  ◊ Finding the sale price without a calculator given the original price and percent discount
  ◊ Finding the original price given the sale price and percent discount
  ◊ Finding simple interest without a calculator
  ◊ Solving a proportion of the form x/a = b/c
  ◊ Word problem on proportions: Problem type 1
  ◊ Word problem on proportions: Problem type 2
- Signed Numbers (15 topics)
  ◊ Integer addition: Problem type 2
  ◊ Integer subtraction: Problem type 3
  ◊ Signed fraction addition or subtraction: Basic
  ◊ Signed fraction addition or subtraction: Advanced
  ◊ Signed decimal addition and subtraction with 3 numbers
  ◊ Integer multiplication and division
  ◊ Signed fraction multiplication: Basic
  ◊ Signed fraction multiplication: Advanced
  ◊ Exponents and integers: Problem type 1
  ◊ Exponents and signed fractions
  ◊ Order of operations with integers and exponents
  ◊ Evaluating a linear expression: Integer multiplication with addition or subtraction
  ◊ Evaluating a quadratic expression: Integers
  ◊ Absolute value of a number
  ◊ Operations with absolute value: Problem type 2
- Properties of Real Numbers (2 topics)
  ◊ Identifying numbers as integers or non-integers
  ◊ Identifying numbers as rational or irrational
- Equations and Inequalities (32 topics)
  - Linear Equations (20 topics)
    ◊ Additive property of equality with integers
    ◊ Multiplicative property of equality with signed fractions
    ◊ Solving a two-step equation with integers
◊ Solving a two-step equation with signed fractions
◊ 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 fractional coefficients
◊ 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 a linear equation with several occurrences of the variable: Fractional forms with binomial numerators
◊ Solving equations with zero, one, or infinitely many solutions
◊ Algebraic symbol manipulation: Problem type 1
◊ Algebraic symbol manipulation: Problem type 2
◊ 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
◊ 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 value mixture problem using a linear equation
◊ Solving a percent mixture problem using a linear equation
◊ Solving a distance, rate, time problem using a linear equation

♦ Linear Inequalities (9 topics)
◊ Graphing a linear inequality on the number line
◊ Graphing a compound inequality on the number line
◊ Solving a linear inequality: Problem type 1
◊ Solving a linear inequality: Problem type 2
◊ Solving a linear inequality: Problem type 3
◊ Solving a linear inequality: Problem type 4
◊ Solving a compound linear inequality: Graph solution, basic
◊ Solving a compound linear inequality: Interval notation
◊ Solving a decimal word problem using a two-step linear inequality

♦ Absolute Value Equations and Inequalities (3 topics)
◊ Solving an absolute value equation of the form $a|x| = b$ or $|x| + a = b$
◊ Solving an absolute value equation of the form $|ax + b| = c$
◊ Solving an absolute value inequality: Basic

• Exponents and Polynomials (44 topics)
♦ Properties of Exponents (13 topics)
◊ Evaluating an expression with a negative exponent: Positive fraction base
◊ Evaluating an expression with a negative exponent: Negative integer base
◊ Rewriting an algebraic expression without a negative exponent
◊ Introduction to the product rule of exponents
◊ Product rule with positive exponents: Multivariate
◊ Product rule with negative exponents
◊ Quotient of expressions involving exponents
◊ Quotient rule with negative exponents: Problem type 1
◊ Introduction to the power rules of exponents
◊ Power rules with positive exponents
◊ Power of a power rule with negative exponents
◊ Power rules with negative exponents
◊ Power and product rules with positive exponents

♦ Scientific Notation (2 topics)
◊ Scientific notation with positive exponent
Scientific notation with negative exponent

Polynomial Expressions (9 topics)
- Degree and leading coefficient of a univariate polynomial
- Combining like terms: Advanced
- Simplifying a sum or difference of two univariate polynomials
- 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 conjugate binomials: Univariate
- Squaring a binomial: Univariate
- Multiplication involving binomials and trinomials in two variables

Factoring (9 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 a quadratic with leading coefficient 1
- Factoring a quadratic with leading coefficient greater than 1
- Factoring a product of a quadratic trinomial and a monomial
- Factoring a difference of squares
- Factoring a polynomial by grouping: Problem type 1

Quadratic Equations (11 topics)
- Solving an equation written in factored form
- 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
- Solving a quadratic equation using the square root property: Exact answers, basic
- Completing the square
- Applying the quadratic formula: Exact answers
- Discriminant of a quadratic equation
- Solving a word problem using a quadratic equation with rational roots
- Solving a word problem using a quadratic equation with irrational roots
- Solving a quadratic inequality written in factored form

Lines and Systems (33 topics)
- Ordered Pairs (3 topics)
  - Plotting a point in the coordinate plane
  - Finding a solution to a linear equation in two variables
  - Determining whether given points lie on one, both, or neither of 2 lines given equations
- Graphing Lines (5 topics)
  - Graphing a line given its x– and y–intercepts
  - Graphing a line given its equation in slope–intercept form
  - Graphing a line given its equation in standard form
  - Graphing a line through a given point with a given slope
  - Graphing a vertical or horizontal line
- Equations of Lines (13 topics)
  - Finding the y–intercept of a line given its equation
  - Finding x– and y–intercepts of a line given the equation: Advanced
  - Finding slope given the graph of a line on a grid
  - Finding slope given two points on the line
  - Finding the slope of a line given its equation
  - Writing an equation of a line given the y–intercept and another point
  - Writing the equation of a line given the slope and a point on the line
  - Writing the equation of the line through two given points
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

Writing an equation and drawing its graph to model a real-world situation: Advanced

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

- Graphing Linear Inequalities (3 topics)
  - Graphing a linear inequality in the plane: Standard form
  - Graphing a linear inequality in the plane: Vertical or horizontal line
  - Graphing a linear inequality in the plane: Slope–intercept form

- Systems of Linear Equations (9 topics)
  - Graphically solving a system of linear equations
  - Solving a system of linear equations using substitution
  - 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 value mixture problem using a system of linear equations
  - Solving a distance, rate, time problem using a system of linear equations
  - Solving a percent mixture problem using a system of linear equations
  - Interpreting the graphs of two functions
  - Graphing a system of two linear inequalities: Basic

- Functions and Graphs (29 topics)
  - Sets, Relations, and Functions (9 topics)
    - Union and intersection of finite sets
    - Set builder and interval notation
    - Identifying functions from relations
    - Vertical line test
    - Evaluating functions: Linear and quadratic or cubic
    - Evaluating functions: Absolute value, rational, radical
    - Evaluating a piecewise–defined function
    - Variable expressions as inputs of functions: Problem type 1
    - Domain and range from ordered pairs

  - Graphs and Transformations (16 topics)
    - Finding intercepts of a nonlinear function given its graph
    - Finding local maxima and minima of a function given the graph
    - Finding zeros of a polynomial function written in factored form
    - Domain and range from the graph of a continuous function
    - Writing an equation for a function after a vertical translation
    - Writing an equation for a function after a vertical and horizontal translation
    - Translating the graph of a function: One step
    - Translating the graph of a function: Two steps
    - Transforming the graph of a function by reflecting over an axis
    - Transforming the graph of a function by shrinking or stretching
    - Finding the $x$–intercept(s) and the vertex of a parabola
    - Graphing a parabola of the form $y = ax^2$
    - Graphing a parabola of the form $y = (x-h)^2 + k$
    - Graphing a parabola of the form $y = ax^2 + bx + c$: Integer coefficients
    - Graphing a cubic function of the form $y = ax^3$
    - Graphing an absolute value equation in the plane: Advanced

  - Combining Functions; Composite Functions; Inverse Functions (4 topics)
    - Sum, difference, and product of two functions
    - Quotient of two functions: Basic
    - Composition of two functions: Basic
    - Inverse functions: Linear, discrete
- **Rational Expressions (27 topics)**
  - **Rational Expressions (19 topics)**
    - Domain of a rational function: Excluded values
    - Simplifying a ratio of polynomials: Problem type 1
    - Simplifying a ratio of polynomials: Problem type 2
    - Simplifying a ratio of multivariate polynomials
    - Multiplying rational expressions involving multivariate monomials
    - Multiplying rational expressions involving quadratics with leading coefficients of 1
    - Dividing rational expressions involving multivariate monomials
    - Introduction to the LCM of two monomials
    - Adding rational expressions with common denominators and binomial numerators
    - Adding rational expressions with different denominators: ax, bx
    - Adding rational expressions with different denominators: x+a, x+b
    - Complex fraction without variables: Problem type 1
    - Complex fraction without variables: Problem type 2
    - Complex fraction involving multivariate monomials
    - Complex fraction: GCF and quadratic factoring
    - Complex fraction made of sums involving rational expressions
    - Dividing a polynomial by a monomial: Univariate
    - Polynomial long division: Problem type 1
    - Polynomial long division: Problem type 2
  - **Rational Equations (6 topics)**
    - Solving a rational equation that simplifies to linear: Denominator x
    - Solving a rational equation that simplifies to linear: Denominator x+a
    - Solving a rational equation that simplifies to linear: Unlike binomial denominators
    - Solving a rational equation that simplifies to linear: Denominators a, x, or ax
    - Solving a rational equation that simplifies to quadratic: Binomial denominators, constant numerators
    - Solving a rational equation that simplifies to quadratic: Binomial denominators and numerators
  - **Variation (2 topics)**
    - Word problem on direct variation
    - Word problem on inverse variation

- **Radical Expressions (26 topics)**
  - **Radical Functions (2 topics)**
    - Domain of a square root function: Advanced
    - Graphing a square root function
  - **Radical Expressions (16 topics)**
    - Square root of a rational perfect square
    - Cube root of an integer
    - Simplifying the square root of a whole number less than 100
    - Square root of a perfect square monomial
    - Simplifying a radical expression with an even exponent
    - Simplifying a radical expression with two variables
    - Simplifying a higher root of a whole number
    - Simplifying a higher radical expression: Multivariate
    - Square root addition or subtraction
    - Simplifying a sum or difference of radical expressions: Multivariate
    - Square root multiplication: Advanced
    - Simplifying a product of radical expressions: Multivariate
    - Simplifying a product involving square roots using the distributive property: Advanced
    - Special products of radical expressions: Conjugates and squaring
    - Rationalizing the denominator of a radical expression
    - Rationalizing the denominator of a radical expression using conjugates

- **Rational Exponents (5 topics)**
Converting between radical form and exponent form
Rational exponents: Non-unit fraction exponent with a whole number base
Rational exponents: Negative exponents and fractional bases
Rational exponents: Products and quotients with negative exponents
Rational exponents: Powers of powers with negative exponents

Radical Equations (3 topics)
Solving a radical equation that simplifies to a linear equation: One radical, basic
Solving a radical equation that simplifies to a linear equation: Two radicals
Solving a radical equation that simplifies to a quadratic equation: One radical

Geometry (25 topics)
Perimeter, Area, and Volume (17 topics)
Perimeter of a square or a rectangle
Area of a square or a rectangle
Area of a piecewise rectangular figure
Finding a side length given the perimeter and side lengths with variables
Finding the side length of a rectangle given its perimeter or area
Finding the perimeter or area of a rectangle given one of these values
Area of a parallelogram
Area of a triangle
Circumference and area of a circle
Perimeter involving rectangles and circles
Area involving inscribed figures
Volume of a rectangular prism
Volume of a cylinder
Surface area of a cube or a rectangular prism
Surface area of a cylinder: Exact answers in terms of pi
Similar polygons
Indirect measurement

Angles (3 topics)
Solving equations involving vertical angles
Finding an angle measure of a triangle given two angles
Finding an angle measure for a triangle with an extended side

Coordinate Geometry (5 topics)
Pythagorean Theorem
Distance between two points in the plane: Exact answers
Graphing a circle given its equation in standard form
Graphing a circle given its equation in general form
Writing an equation of a circle given its center and a point on the circle

Other Topics Available(*) (58 additional topics)
Real Numbers (6 topics)
Fractional part of a circle
Finding the percentage increase or decrease: Advanced
Word problem on unit rates associated with ratios of whole numbers: Decimal answers
Exponents and integers: Problem type 2
Properties of addition
Properties of real numbers

Equations and Inequalities (6 topics)
Solving an equation to find the value of an expression
Solving a decimal word problem using a linear equation with the variable on both sides
Solving a fraction word problem using a linear equation with the variable on both sides
Solving a word problem with three unknowns using a linear equation
◊ Writing a multi-step inequality for a real-world situation
◊ Solving a decimal word problem using a linear inequality with the variable on both sides

♦ Exponents and Polynomials (13 topics)
  ◊ Evaluating expressions with exponents of zero
  ◊ Ordering numbers with positive exponents
  ◊ Ordering numbers with negative exponents
  ◊ Power, product, and quotient rules with negative exponents
  ◊ Multiplying and dividing numbers written in scientific notation
  ◊ Degree of a multivariate polynomial
  ◊ Simplifying a sum or difference of three univariate polynomials
  ◊ Factoring with repeated use of the difference of squares formula
  ◊ Factoring a sum or difference of two cubes
  ◊ Solving an equation that can be written in quadratic form: Problem type 1
  ◊ Solving a quadratic equation using the square root property: Exact answers, advanced
  ◊ Solving a quadratic equation by completing the square: Exact answers
  ◊ Solving a quadratic inequality

♦ Lines and Systems (5 topics)
  ◊ Writing the equations of vertical and horizontal lines through a given point
  ◊ Solving a 3x3 system of linear equations: Problem type 1
  ◊ Solving a 2x2 system of linear equations that is inconsistent or consistent dependent
  ◊ Solving a tax rate or interest rate problem using a system of linear equations
  ◊ Solving a word problem using a 3x3 system of linear equations: Problem type 1

♦ Functions and Graphs (6 topics)
  ◊ Set builder notation
  ◊ Finding inputs and outputs of a function from its graph
  ◊ Finding where a function is increasing, decreasing, or constant given the graph: Interval notation
  ◊ Classifying the graph of a function
  ◊ Horizontal line test
  ◊ Determining whether two functions are inverses of each other

♦ Rational Expressions (6 topics)
  ◊ Ordering fractions with variables
  ◊ Dividing rational expressions involving quadratics with leading coefficients of 1
  ◊ Least common multiple of two monomials
  ◊ Adding rational expressions with multivariate monomial denominators: Advanced
  ◊ Writing an equation that models variation
  ◊ Word problem on combined variation

♦ Radical Expressions (8 topics)
  ◊ Rationalizing a denominator: Quotient involving higher radicals and monomials
  ◊ Using i to rewrite square roots of negative numbers
  ◊ Simplifying a product and quotient involving square roots of negative numbers
  ◊ Adding or subtracting complex numbers
  ◊ Multiplying complex numbers
  ◊ Dividing complex numbers
  ◊ Simplifying a power of i
  ◊ Solving a quadratic equation with complex roots

♦ Geometry (8 topics)
  ◊ Areas of rectangles with the same perimeter
  ◊ Finding the radius or the diameter of a circle given its circumference
  ◊ Circumference ratios
  ◊ Area involving rectangles and circles
  ◊ Word problem involving the area between two concentric circles
  ◊ Word problem involving the rate of filling or emptying a cylinder
  ◊ Midpoint of a line segment in the plane
◊ Writing an equation of a circle given the endpoints of a diameter

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.