**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.*