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)
<table>
<thead>
<tr>
<th>Topic</th>
<th>Subtopics</th>
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<tbody>
<tr>
<td>Converting between radical form and exponent form</td>
<td>◦ Rational exponents: Non–unit fraction exponent with a whole number base</td>
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<td>◦ Rational exponents: Negative exponents and fractional bases</td>
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<td>◦ Rational exponents: Products and quotients with negative exponents</td>
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<td>◦ Rational exponents: Powers of powers with negative exponents</td>
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<td>◦ Radical Equations (3 topics)</td>
<td>◦ Solving a radical equation that simplifies to a linear equation: One radical, basic</td>
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<td>◦ Solving a radical equation that simplifies to a linear equation: Two radicals</td>
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<td>◦ Solving a radical equation that simplifies to a quadratic equation: One radical</td>
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<td>◦ Geometry (25 topics)</td>
<td>◦ Perimeter, Area, and Volume (17 topics)</td>
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<td>◦ Perimeter of a square or a rectangle</td>
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<td>◦ Area of a square or a rectangle</td>
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<td>◦ Area of a piecewise rectangular figure</td>
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<td>◦ Finding a side length given the perimeter and side lengths with variables</td>
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<td>◦ Finding the side length of a rectangle given its perimeter or area</td>
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<td>◦ Finding the perimeter or area of a rectangle given one of these values</td>
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<td>◦ Area of a parallelogram</td>
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<td>◦ Area of a triangle</td>
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<td>◦ Circumference and area of a circle</td>
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<td>◦ Perimeter involving rectangles and circles</td>
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<td>◦ Area involving inscribed figures</td>
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<td>◦ Volume of a rectangular prism</td>
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<td>◦ Volume of a cylinder</td>
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<td>◦ Surface area of a cube or a rectangular prism</td>
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<td>◦ Surface area of a cylinder: Exact answers in terms of pi</td>
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<td>◦ Similar polygons</td>
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<td>◦ Indirect measurement</td>
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<td>◦ Angles (3 topics)</td>
<td>◦ Solving equations involving vertical angles</td>
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<td>◦ Finding an angle measure of a triangle given two angles</td>
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<td>◦ Finding an angle measure for a triangle with an extended side</td>
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<td>◦ Coordinate Geometry (5 topics)</td>
<td>◦ Pythagorean Theorem</td>
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<td>◦ Distance between two points in the plane: Exact answers</td>
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<td>◦ Graphing a circle given its equation in standard form</td>
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<td>◦ Graphing a circle given its equation in general form</td>
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<td>◦ Writing an equation of a circle given its center and a point on the circle</td>
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<td>◦ Other Topics Available(*) (58 additional topics)</td>
<td>◦ Real Numbers (6 topics)</td>
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<td>◦ Fractional part of a circle</td>
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<td>◦ Finding the percentage increase or decrease: Advanced</td>
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<td>◦ Word problem on unit rates associated with ratios of whole numbers: Decimal answers</td>
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<td>◦ Exponents and integers: Problem type 2</td>
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<td>◦ Properties of addition</td>
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<td>◦ Properties of real numbers</td>
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<td>◦ Equations and Inequalities (6 topics)</td>
<td>◦ Solving an equation to find the value of an expression</td>
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<td>◦ Solving a decimal word problem using a linear equation with the variable on both sides</td>
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<td>◦ Solving a fraction word problem using a linear equation with the variable on both sides</td>
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<td>◦ Solving a word problem with three unknowns using a linear equation</td>
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◊ 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.