

## *Prep for Calculus*

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

- Real Numbers
  - ◆ Fractions
    - ◇ Simplifying a fraction
    - ◇ Ordering fractions
    - ◇ Addition or subtraction of fractions with different denominators
    - ◇ Fraction multiplication
    - ◇ Fraction division
    - ◇ Fractional part of a circle
  - ◆ Proportion and Percent
    - ◇ Converting a fraction to a percentage
    - ◇ Converting a percentage to a fraction
    - ◇ Converting between percentages and decimals
    - ◇ Percentage of a whole number
    - ◇ Word problem on percentage: Problem type 1
    - ◇ Word problem on percentage: Problem type 2
    - ◇ Word problem on percentage: Problem type 3
    - ◇ Basic word problem on rates
    - ◇ Solving a proportion: Basic
    - ◇ Word problem on proportions: Problem type 1
  - ◆ Integers and Signed Numbers
    - ◇ Absolute value of a number
    - ◇ Operations with absolute value
    - ◇ Integer addition: Problem type 2
    - ◇ Integer subtraction
    - ◇ Integer multiplication and division
    - ◇ Signed fraction multiplication
    - ◇ Signed fraction addition
    - ◇ Signed decimal addition
    - ◇ Evaluating expressions with exponents: Problem type 1
    - ◇ Exponents and order of operations
  - ◆ Number Systems
    - ◇ Integers and rational numbers
    - ◇ Rational and irrational numbers
    - ◇ Properties of addition
    - ◇ Properties of real numbers
- Equations and Inequalities
  - ◆ Linear Equations
    - ◇ Evaluation of a linear expression in two variables
    - ◇ Additive property of equality: Problem type 2
    - ◇ Multiplicative property of equality: Problem type 2

- ◇ Solving a linear equation: Problem type 1
- ◇ Solving a linear equation: Problem type 2
- ◇ Solving a linear equation: Problem type 3
- ◇ Solving a linear equation with several occurrences of the variable: Problem type 1
- ◇ Solving a linear equation with several occurrences of the variable: Problem type 2
- ◇ Solving a linear equation with several occurrences of the variable: Problem type 3
- ◇ Solving a linear equation with several occurrences of the variable: Problem type 4
- ◇ Solving a linear equation with several occurrences of the variable: Problem type 5
- ◇ Solving a word problem using a linear equation: Problem type 1
- ◇ Solving a word problem using a linear equation: Problem type 2
- ◇ Solving a word problem using a linear equation: Problem type 3
- ◇ Solving a word problem using a linear equation: Problem type 4
- ◆ Linear Inequalities and Absolute Values
  - ◇ Solving a linear inequality: Problem type 2
  - ◇ Solving a linear inequality: Problem type 3
  - ◇ Solving a linear inequality: Problem type 4
  - ◇ Solving an equation involving absolute value: Basic
  - ◇ Solving an equation involving absolute value: Advanced
  - ◇ Solving an inequality involving absolute value: Basic
- ◆ Systems of Linear Equations
  - ◇ Solving a system of linear equations
- ◆ Quadratic Equations
  - ◇ Solving equations 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
  - ◇ Writing a quadratic equation given the roots and the leading coefficient
  - ◇ Solving a quadratic equation using the quadratic formula
  - ◇ Solving a word problem using a quadratic equation with rational roots
  - ◇ Solving a word problem using a quadratic equation with irrational roots
- Linear and Quadratic Functions
  - ◆ Graphs and Functions
    - ◇ Set builder and interval notation
    - ◇ Union and intersection of intervals
    - ◇ Reading a point in the coordinate plane
    - ◇ Plotting a point in the coordinate plane
    - ◇ Introduction to functions: Notation and graphs
    - ◇ Sum, difference, and product of two functions
    - ◇ Domain and range: Problem type 1
    - ◇ Domain and range: Problem type 2
    - ◇ Domain and range: Problem type 3
    - ◇ Range of a real-valued function
    - ◇ Vertical translation of the graph of a function
    - ◇ Vertical and horizontal translations of the graph of a function
    - ◇ Classifying the graph of a function
    - ◇ Computing outputs for piecewise-defined functions
    - ◇ Graphing piecewise-defined functions
  - ◆ Linear Functions
    - ◇ Solutions to a linear equation in two variables: Problem type 1
    - ◇ Solutions to a linear equation in two variables: Problem type 2
    - ◇ Y-intercept of a line
    - ◇ X- and y-intercepts of a line given the equation in standard form

- ◇ Finding the slope of a line given its equation
- ◇ Determining the slope of a line given its graph
- ◇ Graphing a line given the  $x$ - and  $y$ -intercepts
- ◇ Graphing a line given its equation in slope–intercept form
- ◇ Graphing a line given its equation in standard form
- ◇ Graphing a vertical or horizontal line
- ◇ Graphing a line through a given point with a given slope
- ◇ Graphing an equation involving absolute value in the plane
- ◇ Writing an equation of a line given the  $y$ -intercept and a point
- ◇ Writing the equation of a line given the slope and a point on the line
- ◇ Writing the equations of vertical and horizontal lines through a given point
- ◇ Writing the equation of the line through two given points
- ◇ Slopes of parallel and perpendicular lines: Problem type 1
- ◇ Slopes of parallel and perpendicular lines: Problem type 2
- ◇ Writing equations and drawing graphs to fit a narrative
- ◇ Application problem with a linear function: Problem type 1
- ◇ Application problem with a linear function: Problem type 2
- ◇ Interpreting the graphs of two functions
- ◆ Parabolas
  - ◇ Finding the  $x$ -intercept(s) and the vertex of a parabola
  - ◇ Graphing a parabola: Problem type 1
  - ◇ Graphing a parabola: Problem type 2
  - ◇ Graphing a parabola: Problem type 3
- Exponents and Polynomials
  - ◆ Integer Exponents
    - ◇ Product rule of exponents
    - ◇ Product rule of exponents in a multivariate monomial
    - ◇ Quotients of expressions involving exponents
    - ◇ Multiplying monomials
    - ◇ Power rule: Positive exponents
    - ◇ Ordering numbers with positive exponents
    - ◇ Writing a positive number without a negative exponent
    - ◇ Writing a negative number without a negative exponent
    - ◇ Power rule: Negative exponents
    - ◇ Ordering numbers with negative exponents
  - ◆ Polynomial Arithmetic
    - ◇ Evaluation of a polynomial in one variable
    - ◇ Simplifying a polynomial expression
    - ◇ Degree of a multivariate polynomial
    - ◇ Multiplying two binomials
    - ◇ Squaring a binomial
    - ◇ Multiplying polynomials
    - ◇ Polynomial long division: Problem type 1
  - ◆ Factoring
    - ◇ Greatest common factor of two monomials
    - ◇ Least common multiple of two monomials
    - ◇ Factoring a quadratic with leading coefficient 1
    - ◇ Factoring a quadratic with leading coefficient greater than 1
    - ◇ Factoring a difference of squares
    - ◇ Factoring with repeated use of the difference of squares formula
    - ◇ Factoring a sum or difference of two cubes
    - ◇ Factoring a product of a quadratic trinomial and a monomial

- ◇ Completing the square
- ◆ Polynomial Equations and Functions
  - ◇ Graphing a simple cubic function
  - ◇ Inferring properties of a polynomial function from its graph
  - ◇ Solving a word problem involving a polynomial of degree 3
  - ◇ Solving a word problem by finding a local extremum of a polynomial function
- Rational Expressions
  - ◆ Rational Expressions
    - ◇ Ordering fractions with variables
    - ◇ Ratio of multivariate polynomials
    - ◇ Simplifying a ratio of polynomials: Problem type 1
    - ◇ Simplifying a ratio of polynomials: Problem type 2
    - ◇ Multiplying rational expressions: Problem type 1
    - ◇ Multiplying rational expressions: Problem type 2
    - ◇ Dividing rational expressions
    - ◇ Complex fraction: Problem type 1
    - ◇ Adding rational expressions with common denominator
    - ◇ Adding rational expressions
    - ◇ Adding rational expressions with different denominators
    - ◇ Adding and subtracting rational expressions: Problem type 1
    - ◇ Partial fraction decomposition
  - ◆ Rational Equations
    - ◇ Solving a rational equation that simplifies to a linear equation: Problem type 1
    - ◇ Solving a rational equation that simplifies to a linear equation: Problem type 2
    - ◇ Solving a rational equation that simplifies to a linear equation: Problem type 3
    - ◇ Solving a rational equation that simplifies to a quadratic equation: Problem type 1
    - ◇ Solving a rational equation that simplifies to a quadratic equation: Problem type 2
    - ◇ Solving a rational equation that simplifies to a quadratic equation: Problem type 3
  - ◆ Applications of Rational Expressions
    - ◇ Algebraic symbol manipulation
    - ◇ Word problem on direct variation
    - ◇ Word problem on inverse variation
    - ◇ Word problem on inverse proportions
    - ◇ Word problem involving multiple rates
  - ◆ Rational Functions
    - ◇ Quotient of two functions
    - ◇ Sketching the graph of a rational function: Problem type 1
    - ◇ Sketching the graph of a rational function: Problem type 2
- Radical Expressions
  - ◆ Radical Expressions
    - ◇ Square root of a perfect square
    - ◇ Square root of a rational perfect square
    - ◇ Square root simplification
    - ◇ Square root addition
    - ◇ Square root multiplication
    - ◇ Simplifying a radical expression: Problem type 1
    - ◇ Simplifying a radical expression: Problem type 2
    - ◇ Simplifying a product of radical expressions
    - ◇ Simplifying a product of radical expressions using the distributive property
    - ◇ Rationalizing the denominator of a radical expression
    - ◇ Rationalizing the denominator of a radical expression using conjugates

- ◇ Solving an equation with radicals: Problem type 1
- ◇ Solving an equation with radicals: Problem type 2
- ◇ Domain of a square root function
- ◆ Higher Roots and Rational Exponents
  - ◇ Cube root of an integer
  - ◇ Converting between radical form and exponent form
  - ◇ Rational exponents: Basic
  - ◇ Rational exponents: Negative exponents and fractional bases
  - ◇ Rational exponents: Powers of powers
  - ◇ Even root property
  - ◇ Odd root property
- Exponentials and Logarithms
  - ◆ Function Compositions and Inverse Functions
    - ◇ Composition of two functions: Basic
    - ◇ Composition of two functions: Advanced
    - ◇ Inverse functions: Basic
    - ◇ Inverse functions: Advanced
  - ◆ Properties of Logarithms
    - ◇ Exponential and logarithmic equations
    - ◇ Evaluating a logarithmic expression
    - ◇ Basic properties of logarithms
    - ◇ Change of base for logarithms: Problem type 1
    - ◇ Change of base for logarithms: Problem type 2
  - ◆ Exponential and Logarithmic Equations
    - ◇ Solving an exponential equation: Problem type 1
    - ◇ Solving an exponential equation: Problem type 2
    - ◇ Solving a logarithmic equation: Problem type 1
    - ◇ Solving a logarithmic equation: Problem type 2
    - ◇ Solving a word problem using an exponential equation: Problem type 1
    - ◇ Solving a word problem using an exponential equation: Problem type 2
    - ◇ Solving a word problem using an exponential equation: Problem type 3
    - ◇ Solving a word problem using an exponential equation: Problem type 4
  - ◆ Exponential and Logarithmic Functions
    - ◇ Sketching the graph of an exponential function: Basic
    - ◇ Sketching the graph of an exponential function: Advanced
    - ◇ Sketching the graph of a logarithmic function
    - ◇ Translating the graph of a logarithmic or exponential function
- Geometry and Trigonometry
  - ◆ Perimeter, Area, and Volume
    - ◇ Perimeter of a square or a rectangle
    - ◇ Area of a square or a rectangle
    - ◇ Area of a piecewise rectangular figure
    - ◇ Finding the side length of a rectangle given its perimeter or area
    - ◇ Area and perimeter of a rectangle
    - ◇ Circumference and area of a circle
    - ◇ Perimeter involving rectangles and circles
    - ◇ Circumference ratios
    - ◇ Area between two concentric circles
    - ◇ Arc length and area of a sector of a circle
    - ◇ Area involving rectangles and circles: Advanced problem
    - ◇ Volume of a cube or a rectangular prism

- ◇ Volume of a cylinder
- ◇ Volume of a cone
- ◇ Volume of a sphere
- ◇ Rate of filling of a solid
- ◇ Ratio of volumes
- ◇ Surface area of a cube or a rectangular prism
- ◇ Surface area of a cylinder
- ◆ Coordinate Geometry
  - ◇ Pythagorean Theorem
  - ◇ Distance between two points in the plane
  - ◇ Midpoint of a line segment in the plane
  - ◇ Graphing a circle given its equation in standard form
  - ◇ Graphing a circle given its equation in general form
- ◆ Right Angle Trigonometry
  - ◇ Converting between degree and radian measure
  - ◇ Coterminal angles
  - ◇ Sketching an angle in standard position
  - ◇ Sine, cosine, and tangent ratios
  - ◇ Using a trigonometric ratio to find a side length in a right triangle
  - ◇ Using a trigonometric ratio to find an angle measure in a right triangle
  - ◇ Finding trigonometric ratios given a right triangle
  - ◇ Common angles and trigonometric functions
  - ◇ Finding values of trigonometric functions given information about an angle: Problem type 1
  - ◇ Finding values of trigonometric functions given information about an angle: Problem type 2
  - ◇ Finding values of trigonometric functions given information about an angle: Problem type 3
- ◆ Trigonometric Functions
  - ◇ Sketching the graph of a sine or cosine function: Problem type 1
  - ◇ Sketching the graph of a sine or cosine function: Problem type 2
  - ◇ Values of inverse trigonometric functions
  - ◇ Composition of a trigonometric function and an inverse trigonometric function: Problem type 1
  - ◇ Composition of a trigonometric function and an inverse trigonometric function: Problem type 2
  - ◇ Composition of a trigonometric function and an inverse trigonometric function: Problem type 3
- ◆ Trigonometric Identities and Equations
  - ◇ Cofunction identities
  - ◇ Double-angle identities
  - ◇ Product-to-sum and sum-to-product identities
  - ◇ Solving a basic trigonometric equation involving sine or cosine
  - ◇ Solving a basic trigonometric equation involving tangent, cotangent, secant, or cosecant
- ◆ Polar Coordinates
  - ◇ Plotting a point in polar coordinates
  - ◇ Converting rectangular coordinates to polar coordinates
  - ◇ Converting polar coordinates to rectangular coordinates
  - ◇ Converting an equation written in rectangular coordinates to one written in polar form
  - ◇ Converting an equation written in polar form to one written in rectangular coordinates
- Limits and Continuity
  - ◆ Introduction to Limits
    - ◇ Estimating a limit numerically
    - ◇ Finding limits from a graph
  - ◆ Computing Limits Algebraically
    - ◇ Finding limits for a piecewise-defined function
    - ◇ Finding a limit by using the limit laws: Problem type 1
    - ◇ Finding a limit by using the limit laws: Problem type 2

- ◇ Finding a limit by using the limit laws: Problem type 3
- ◇ Squeeze Theorem
- ◆ Continuity
  - ◇ Determining points of discontinuity from a graph
  - ◇ Determining a parameter to make a function continuous
- ◆ Limits Involving Infinity
  - ◇ Limits at infinity and graphs
  - ◇ Limits at infinity and rational functions
  - ◇ Infinite limits and graphs
  - ◇ Infinite limits and rational functions
- ◆ Limits of Trigonometric Functions
  - ◇ Finding a limit of a trigonometric function by using continuity
  - ◇ Finding a limit by using special trigonometric limits