STEM PreCalculus

This course covers the topics outlined below and is available for use with integrated, interactive eBooks. You can customize the scope and sequence of this course to meet your curricular needs.

Curriculum (637 topics + 533 additional topics)

- Algebra and Geometry Review (104 topics)
  - Real Numbers and Algebraic Expressions (8 topics)
    - Signed fraction subtraction involving double negation
    - Signed fraction multiplication: Basic
    - Signed fraction division
    - Exponents and signed fractions
    - Order of operations with integers
    - Evaluating a quadratic expression: Integers
    - Using distribution and combining like terms to simplify: Univariate
    - Using distribution with double negation and combining like terms to simplify: Multivariate
  - Exponents (19 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
    - Quotient of expressions involving exponents
    - 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
    - Evaluating an expression with a negative exponent: Negative integer base
    - Rewriting an algebraic expression without a negative exponent
    - Introduction to the product rule with negative exponents
    - Quotient rule with negative exponents: Problem type 1
    - Power of a power rule with negative exponents
    - Power rules with negative exponents
- Polynomial Expressions (13 topics)
  - Degree and leading coefficient of a univariate polynomial
  - 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 binomials with leading coefficients greater than 1
  - Multiplying binomials in two variables
  - Multiplying conjugate binomials: Univariate
  - Squaring a binomial: Univariate
  - Squaring a binomial: Multivariate
Multiplying binomials with negative coefficients
Multiplication involving binomials and trinomials in one variable
Multiplication involving binomials and trinomials in two variables

Factoring Polynomials (16 topics)
- Factoring a linear binomial
- 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 out a binomial from a polynomial: GCF factoring, basic
- Factoring a univariate polynomial by grouping: Problem type 1
- Factoring a quadratic with leading coefficient 1
- Factoring out a constant before factoring a quadratic
- Factoring a quadratic with leading coefficient greater than 1: Problem type 1
- Factoring a quadratic with leading coefficient greater than 1: Problem type 2
- Factoring a quadratic with a negative leading coefficient
- Factoring a perfect square trinomial with leading coefficient 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

Rational Expressions (20 topics)
- Restriction on a variable in a denominator: Linear
- Simplifying a ratio of factored polynomials: Linear factors
- Simplifying a ratio of polynomials using GCF factoring
- Simplifying a ratio of polynomials by factoring a quadratic with leading coefficient 1
- Simplifying a ratio of polynomials: Problem type 1
- Multiplying rational expressions made up of linear expressions
- Multiplying rational expressions involving quadratics with leading coefficients of 1
- Dividing rational expressions involving linear expressions
- Dividing rational expressions involving quadratics with leading coefficients of 1
- Introduction to the LCM of two monomials
- Finding the LCD of rational expressions with linear denominators: Relatively prime
- Writing equivalent rational expressions with polynomial denominators
- Adding rational expressions with different denominators and a single occurrence of a variable
- Adding rational expressions with denominators ax and bx: Basic
- Adding rational expressions with denominators ax and bx: Advanced
- Adding rational expressions with linear denominators without common factors: Basic
- Complex fraction without variables: Problem type 2
- Complex fraction involving univariate monomials
- Complex fraction: GCF factoring
- Complex fraction made of sums involving rational expressions: Problem type 1

Perfect Squares and nth Roots (6 topics)
- Square root of a rational perfect square
- Square roots of perfect squares with signs
- Square root of a perfect square monomial
- Introduction to solving an absolute value equation
- Cube root of an integer
- Finding $n^{th}$ roots of perfect $n^{th}$ powers with signs

Rational Exponents (4 topics)
- Converting between radical form and exponent form
- Rational exponents: Unit fraction exponents and whole number bases
- Rational exponents: Non–unit fraction exponent with a whole number base
- Rational exponents: Negative exponents and fractional bases
Radical Expressions (15 topics)
- Simplifying the square root of a whole number less than 100
- Simplifying a radical expression with an even exponent
- Simplifying a higher root of a whole number
- Square root addition or subtraction
- Square root multiplication: Basic
- Square root multiplication: Advanced
- Introduction to simplifying a product of radical expressions: Univariate
- Introduction to simplifying a product involving square roots using the distributive property
- Simplifying a product involving square roots using the distributive property: Basic
- Simplifying a product involving square roots using the distributive property: Advanced
- Simplifying a quotient of square roots
- Simplifying a quotient involving a sum or difference with a square root
- Rationalizing a denominator: Quotient involving square roots
- Rationalizing a denominator: Square root of a fraction
- Rationalizing a denominator using conjugates: Integer numerator

Geometry (3 topics)
- Circumference of a circle
- Volume of a rectangular prism
- Pythagorean Theorem

Equations and Inequalities (74 topics)

Linear Equations and Applications (21 topics)
- Additive property of equality with signed fractions
- Multiplicative property of equality with signed fractions
- Solving a multi-step equation given in fractional form
- 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 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
- Solving a proportion of the form \((x+a)/b = c/d\)
- 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 inside parentheses in terms of other variables
- Solving for a variable in terms of other variables in a linear equation with fractions
- Translating a sentence into a one-step equation
- Translating a sentence into a multi-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 word problem with three unknowns using a linear equation
- Finding the perimeter or area of a rectangle given one of these values

Absolute Value Equations (2 topics)
- Solving an absolute value equation: Problem type 1
- Solving an absolute value equation: Problem type 2

Linear Inequalities and Applications (6 topics)
- Graphing a linear inequality on the number line
Graphing a compound inequality on the number line
◊ Set–builder and interval notation
◊ Solving a two–step linear inequality: Problem type 1
◊ Solving a two–step linear inequality: Problem type 2
◊ Solving a linear inequality with multiple occurrences of the variable: Problem type 1

♦ Rational Equations that Simplify to Linear (6 topics)
◊ Solving a rational equation that simplifies to linear: Denominator x+a
◊ Solving a rational equation that simplifies to linear: Denominators a, x, or ax
◊ Solving a rational equation that simplifies to linear: Like binomial denominators
◊ Solving a rational equation that simplifies to linear: Unlike binomial denominators
◊ Solving for a variable in terms of other variables in a rational equation: Problem type 1
◊ Solving for a variable in terms of other variables in a rational equation: Problem type 2

♦ Complex Numbers (4 topics)
◊ Using i to rewrite square roots of negative numbers
◊ Adding or subtracting complex numbers
◊ Multiplying complex numbers
◊ Dividing complex numbers

♦ Quadratic Equations (20 topics)
◊ Solving an equation written in factored form
◊ Finding the roots of a quadratic equation of the form ax^2 + bx = 0
◊ 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
◊ Roots of a product of polynomials
◊ Writing a quadratic equation given the roots and the leading coefficient
◊ 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
◊ Completing the square
◊ Solving a quadratic equation by completing the square: Exact answers
◊ Applying the quadratic formula: Exact answers
◊ Applying the quadratic formula: Decimal answers
◊ Solving a quadratic equation with complex roots
◊ Discriminant of a quadratic equation
◊ Solving a word problem using a quadratic equation with irrational roots
◊ Solving an equation using the odd–root property: Problem type 1
◊ Solving an equation using the odd–root property: Problem type 2

♦ Rational Equations that Simplify to Quadratic (5 topics)
◊ Restriction on a variable in a denominator: Quadratic
◊ Solving a rational equation that simplifies to linear: Factorable quadratic denominator
◊ Solving a rational equation that simplifies to quadratic: Denominator x
◊ Solving a rational equation that simplifies to quadratic: Denominator constant denominators, constant numerators
◊ Solving a rational equation that simplifies to quadratic: Binomial denominators and numerators

♦ Radical Equations (10 topics)
◊ Introduction to solving a radical equation
◊ Solving a radical equation that simplifies to a linear equation: One radical, basic
◊ Solving a radical equation that simplifies to a linear equation: One radical, advanced
◊ Solving a radical equation that simplifies to a linear equation: Two radicals
◊ Solving a radical equation that simplifies to a quadratic equation: One radical, basic
◊ Solving a radical equation that simplifies to a quadratic equation: One radical, advanced
◊ Algebraic symbol manipulation with radicals
◊ Solving an equation with a root index greater than 2: Problem type 1
Solving an equation with a root index greater than 2: Problem type 2
Solving an equation that can be written in quadratic form: Problem type 1

- Graphs and Functions (136 topics)
  - The Coordinate Plane, Distance, and Midpoint (5 topics)
    - Naming the quadrant or axis of a point given its coordinates
    - Naming the quadrant or axis of a point given the signs of its coordinates
    - Distance between two points in the plane: Exact answers
    - Midpoint of a line segment in the plane
    - Finding a solution to a linear equation in two variables
  - Graphs of Equations (14 topics)
    - 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 of a line given the equation: Basic
    - Graphing a line by first finding its $x$– and $y$–intercepts
    - Finding intercepts of a nonlinear function given its graph
    - Finding $x$– and $y$–intercepts of the graph of a nonlinear equation
    - Graphing an absolute value equation of the form $y = A|x|
    - Graphing a parabola of the form $y = ax^2$
    - Graphing a parabola of the form $y = ax^2 + c$
    - Graphing a cubic function of the form $y = ax^3$
    - Determining if graphs have symmetry with respect to the $x$–axis, $y$–axis, or origin
  - Slope and Equations of Lines (16 topics)
    - Finding slope given the graph of a line on a grid
    - Finding slope given two points on the line
    - Finding the slope of horizontal and vertical lines
    - Graphing a line given its slope and $y$–intercept
    - 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
    - Finding the slope and a point on a line given its equation in point–slope form
    - Writing an equation in point–slope form given the slope and a point
    - Writing an equation of a line given the $y$–intercept and another point
    - Writing the equation of the line through two given points
    - Writing the equations of vertical and horizontal lines through a given point
    - 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 $Ax + By = C$
    - Writing equations of lines parallel and perpendicular to a given line through a point
  - Linear Applications (5 topics)
    - 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 initial amount and rate of change given a graph of a linear function
    - Interpreting the parameters of a linear function that models a real–world situation
    - Application problem with a linear function: Finding a coordinate given two points
  - Review of Systems of Linear Equations (5 topics)
    - Graphically solving a system of linear equations
    - Using a graphing calculator to solve a system of linear equations: Basic
    - 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
Circles (7 topics)
- Identifying the center and radius to graph a circle given its equation in standard form
- Identifying the center and radius to graph a circle given its equation in general form: Basic
- Identifying the center and radius to graph a circle given its equation in general form: Advanced
- Writing the equation of a circle centered at the origin given its radius or a point on the circle
- Writing an equation of a circle given its center and radius or diameter
- Writing an equation of a circle given its center and a point on the circle
- Writing an equation of a circle given the endpoints of a diameter

Functions (25 topics)
- Identifying functions from relations
- Vertical line test
- Table for a linear function
- Evaluating functions: Linear and quadratic or cubic
- Evaluating a rational function: Problem type 1
- Evaluating a rational function: Problem type 2
- Table for a square root function
- Evaluating a cube root function
- Evaluating functions: Absolute value, rational, radical
- Evaluating a piecewise-defined function
- Variable expressions as inputs of functions: Problem type 1
- Variable expressions as inputs of functions: Problem type 2
- Variable expressions as inputs of functions: Problem type 3
- Domain and range from ordered pairs
- Domain of a rational function: Excluded values
- Domain of a rational function: Interval notation
- Domain of a square root function: Basic
- Domain of a square root function: Advanced
- Finding the domain of a fractional function involving radicals
- Determining whether an equation defines a function: Basic
- Determining whether an equation defines a function: Advanced
- 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
- Finding a difference quotient for a linear or quadratic function
- Finding a difference quotient for a rational function

Graphs of Functions (27 topics)
- Finding an output of a function from its graph
- Finding inputs and outputs of a function from its graph
- Domain and range from the graph of a continuous function
- Domain and range from the graph of a piecewise function
- Finding where a function is increasing, decreasing, or constant given the graph
- Finding where a function is increasing, decreasing, or constant given the graph: Interval notation
- Finding local maxima and minima of a function given the graph
- Finding the absolute maximum and minimum of a function given the graph
- Finding values and intervals where the graph of a function is zero, positive, or negative
- 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 an absolute value equation in the plane: Basic
- Graphing an absolute value equation in the plane: Advanced
- Graphing a function of the form \( f(x) = ax^2 \)
- Graphing a function of the form \( f(x) = ax^2 + c \)
- Graphing a parabola of the form \( y = (x-h)^2 + k \)
Graphing a square root function: Problem type 1
Graphing a square root function: Problem type 2
Matching parent graphs with their equations
Graphing a piecewise-defined function: Problem type 1
Graphing a piecewise-defined function: Problem type 2
Graphing a piecewise-defined function: Problem type 3
Even and odd functions: Problem type 1
Even and odd functions: Problem type 2
Finding the average rate of change of a function
Finding the average rate of change of a function given its graph
Word problem involving average rate of change

Transformations (13 topics)
Translating the graph of a parabola: One step
Translating the graph of a parabola: Two steps
How the leading coefficient affects the shape of a parabola
Translating the graph of an absolute value function: One step
Translating the graph of an absolute value function: Two steps
Writing an equation for a function after a vertical 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
Transforming the graph of a function using more than one transformation
Transforming the graph of a quadratic, cubic, square root, or absolute value function
Writing an equation for a function after a vertical and horizontal translation

Combining Functions; Composite Functions; Inverse Functions (19 topics)
Sum, difference, and product of two functions
Quotient of two functions: Basic
Quotient of two functions: Advanced
Combining functions: Advanced
Introduction to the composition of two functions
Composition of two functions: Basic
Composition of a function with itself
Expressing a function as a composition of two functions
Composition of two functions: Advanced
Composition of two rational functions
Word problem involving composition of two functions
Horizontal line test
Determining whether two functions are inverses of each other
Inverse functions: Linear, discrete
Inverse functions: Quadratic, square root
Inverse functions: Cubic, cube root
Inverse functions: Rational
Graphing the inverse of a function given its graph
Finding, evaluating, and interpreting an inverse function for a given linear relationship

Polynomial and Rational Functions (64 topics)
Quadratic Functions (16 topics)
Finding the vertex, intercepts, and axis of symmetry from the graph of a parabola
Graphing a parabola of the form \( y = x^2 + bx + c \)
Graphing a parabola of the form \( y = a(x-h)^2 + k \)
Graphing a parabola of the form \( y = ax^2 + bx + c \): Integer coefficients
Finding the zeros of a quadratic function given its equation
Using a graphing calculator to find the zeros of a quadratic function
◊ Writing a quadratic function given its zeros
◊ Finding the x−intercept(s) and the vertex of a parabola
◊ Using a graphing calculator to find the x−intercept(s) and vertex of a quadratic function
◊ Rewriting a quadratic function to find its vertex and sketch its graph
◊ Finding the maximum or minimum of a quadratic function
◊ Word problem involving the maximum or minimum of a quadratic function
◊ Word problem involving optimizing area by using a quadratic function
◊ Domain and range from the graph of a quadratic function
◊ Range of a quadratic function
◊ Writing the equation of a quadratic function given its graph

♦ Polynomial Functions (10 topics)
◊ Finding zeros of a polynomial function written in factored form
◊ Finding zeros and their multiplicities given a polynomial function written in factored form
◊ Finding a polynomial of a given degree with given zeros: Real zeros
◊ Finding x− and y−intercepts given a polynomial function
◊ Determining the end behavior of the graph of a polynomial function
◊ Determining end behavior and intercepts to graph a polynomial function
◊ Matching graphs with polynomial functions
◊ Inferring properties of a polynomial function from its graph
◊ Using a graphing calculator to find local extrema of a polynomial function
◊ Using a graphing calculator to solve a word problem involving a local extremum of a polynomial function

♦ Division of Polynomials; Remainder and Factor Theorems (6 topics)
◊ Polynomial long division: Problem type 1
◊ Polynomial long division: Problem type 2
◊ Polynomial long division: Problem type 3
◊ Synthetic division
◊ Using the remainder theorem to evaluate a polynomial
◊ The Factor Theorem

♦ Real Zeros of Polynomial Functions (7 topics)
◊ Using a given zero to write a polynomial as a product of linear factors: Real zeros
◊ Finding all possible rational zeros using the rational zeros theorem: Problem type 1
◊ Finding all possible rational zeros using the rational zeros theorem: Problem type 2
◊ Using the rational zeros theorem to find all zeros of a polynomial: Rational zeros
◊ Using the rational zeros theorem to find all zeros of a polynomial: Irrational zeros
◊ Using a graphing calculator to find zeros of a polynomial function
◊ Using a graphing calculator to solve a word problem involving a polynomial of degree 3

♦ Complex Zeros of Polynomials Functions (4 topics)
◊ Multiplying expressions involving complex conjugates
◊ Finding a polynomial of a given degree with given zeros: Complex zeros
◊ Using a given zero to write a polynomial as a product of linear factors: Complex zeros
◊ Using the rational zeros theorem to find all zeros of a polynomial: Complex zeros

♦ Rational Functions (13 topics)
◊ Finding the intercepts, asymptotes, domain, and range from the graph of a rational function
◊ Finding the asymptotes of a rational function: Constant over linear
◊ Finding the asymptotes of a rational function: Linear over linear
◊ Finding horizontal and vertical asymptotes of a rational function: Quadratic numerator or denominator
◊ Finding the asymptotes of a rational function: Quadratic over linear
◊ Graphing a rational function: Constant over linear
◊ Graphing a rational function: Linear over linear
◊ Transforming the graph of a rational function
◊ Graphing a rational function: Quadratic over linear
Graphing rational functions with holes
Matching graphs with rational functions: Two vertical asymptotes
Graphing a rational function with more than one vertical asymptote
Using a graphing calculator to solve a word problem involving a local extremum of a rational function

- Polynomial and Rational Inequalities (8 topics)
  - Solving a quadratic inequality written in factored form
  - Solving a quadratic inequality
  - Solving a polynomial inequality: Problem type 1
  - Solving a polynomial inequality: Problem type 2
  - Solving a polynomial inequality: Problem type 3
  - Solving a polynomial inequality: Problem type 4
  - Solving a rational inequality: Problem type 1
  - Solving a rational inequality: Problem type 2

- Exponential and Logarithmic Functions (50 topics)
  - Graphing Exponential Functions (8 topics)
    - Table for an exponential function
    - 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 \( f(x) = -b^{ax} \)
    - Translating the graph of an exponential function
    - The graph, domain, and range of an exponential function
    - Transforming the graph of a natural exponential function
    - Graphing an exponential function and its asymptote: \( f(x) = a(e)^{x-b} + c \)
  - Applications of Exponential Functions (7 topics)
    - Using a calculator to evaluate exponential expressions
    - Evaluating an exponential function that models a real-world situation
    - Using a calculator to evaluate exponential expressions involving base e
    - Evaluating an exponential function with base e that models a real-world situation
    - Introduction to compound interest
    - Finding a final amount in a word problem on exponential growth or decay
    - Finding the final amount in a word problem on compound interest
  - Logarithmic Functions (9 topics)
    - 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 \( \log_b a = c \)
    - Translating the graph of a logarithmic function
    - Graphing a logarithmic function: Basic
    - The graph, domain, and range of a logarithmic function
    - Domain of a logarithmic function: Advanced
  - Properties of Logarithms (6 topics)
    - 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
    - Writing an expression as a single logarithm
    - Change of base for logarithms: Problem type 1
  - Logarithmic and Exponential Equations (10 topics)
    - 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 finding common bases: Linear exponents
◊ Solving an exponential equation by using logarithms: Decimal answers, basic
◊ Solving an exponential equation by using natural logarithms: Decimal answers
◊ Solving an exponential equation by using logarithms: Decimal answers, advanced
◊ Solving an exponential equation by using logarithms: Exact answers in logarithmic form

♦ Applications (10 topics)
◊ Finding the time to reach a limit in a word problem on exponential growth or decay
◊ Finding the time in a word problem on compound interest
◊ 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 compound interest
◊ Finding the initial amount in a word problem on continuous compound interest
◊ Finding the final amount in a word problem on continuous exponential growth or decay
◊ Finding the rate or time in a word problem on continuous exponential growth or decay
◊ Finding half-life or doubling time
◊ Writing and evaluating a function modeling continuous exponential growth or decay given doubling time or half-life
◊ Writing and evaluating a function modeling continuous exponential growth or decay given two outputs

♦ Trigonometric Functions (58 topics)

◊ Angles and Their Measure (5 topics)
◊ Converting between degree and radian measure: Problem type 1
◊ Converting between degree and radian measure: Problem type 2
◊ Sketching an angle in standard position
◊ Coterminal angles
◊ Arc length and central angle measure

◊ The Unit Circle and Evaluating Trigonometric Functions (9 topics)
◊ Finding coordinates on the unit circle for special angles
◊ Trigonometric functions and special angles: Problem type 1
◊ Finding trigonometric ratios from a point on the unit circle
◊ Trigonometric functions and special angles: Problem type 2
◊ Trigonometric functions and special angles: Problem type 3
◊ Evaluating expressions involving sine and cosine
◊ Even and odd properties of trigonometric functions
◊ Using a calculator to approximate sine, cosine, and tangent values
◊ Evaluating a sinusoidal function that models a real-world situation

◊ Right Triangle Trigonometry (9 topics)
◊ Sine, cosine, and tangent ratios: Variables for side lengths
◊ Using the Pythagorean Theorem to find a trigonometric ratio
◊ Finding trigonometric ratios given a right triangle
◊ 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
◊ Solving a right triangle
◊ Using trigonometry to find a length in a word problem with two right triangles

◊ Trigonometric Functions of Angles (7 topics)
◊ Reference angles: Problem type 1
◊ Reference angles: Problem type 2
◊ Determining the location of a terminal point given the signs of trigonometric values
◊ 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
Finding values of trigonometric functions given information about an angle: Problem type 4

- Graphs of Sine and Cosine Functions (14 topics)
  - Sketching the graph of \( y = a \sin(x) \) or \( y = a \cos(x) \)
  - Sketching the graph of \( y = \sin(bx) \) or \( y = \cos(bx) \)
  - Sketching the graph of \( y = \sin(x) + d \) or \( y = \cos(x) + d \)
  - Sketching the graph of \( y = \sin(x+c) \) or \( y = \cos(x+c) \)
  - Sketching the graph of \( y = a \sin(x+c) \) or \( y = a \cos(x+c) \)
  - Sketching the graph of \( y = a \sin(bx) \) or \( y = a \cos(bx) \)
  - Sketching the graph of \( y = a \sin(bx+c) \) or \( y = a \cos(bx+c) \)
  - Sketching the graph of \( y = a \sin(bx) + d \) or \( y = a \cos(bx) + d \)
  - Amplitude and period of sine and cosine functions
  - Amplitude, period, and phase shift of sine and cosine functions
  - Writing the equation of a sine or cosine function given its graph: Problem type 1
  - Writing the equation of a sine or cosine function given its graph: Problem type 2
  - Word problem involving a sine or cosine function: Problem type 1
  - Word problem involving a sine or cosine function: Problem type 2

- Graphs of Other Trigonometric Functions (6 topics)
  - Domains and ranges of trigonometric functions
  - Matching graphs and equations for secant, cosecant, tangent, and cotangent functions
  - Sketching the graph of a secant or cosecant function: Problem type 1
  - Sketching the graph of a secant or cosecant function: Problem type 2
  - Sketching the graph of a tangent or cotangent function: Problem type 1
  - Sketching the graph of a tangent or cotangent function: Problem type 2

- Inverse Trigonometric Functions (8 topics)
  - Values of inverse trigonometric functions
  - Composition of a trigonometric function with its inverse trigonometric function: Problem type 1
  - Composition of a trigonometric function with its inverse trigonometric function: Problem type 2
  - Composition of a trigonometric function with the inverse of another trigonometric function: Problem type 1
  - Composition of a trigonometric function with the inverse of another trigonometric function: Problem type 2
  - Composition of a trigonometric function with the inverse of another trigonometric function: Problem type 3
  - Composition of trigonometric functions with variable expressions as inputs: Problem type 1
  - Using a calculator to approximate inverse trigonometric values

- Trigonometric Identities and Equations (32 topics)
  - Verifying Trigonometric Identities (6 topics)
    - Simplifying trigonometric expressions
    - Using cofunction identities
    - Verifying a trigonometric identity
    - Proving trigonometric identities: Problem type 1
    - Proving trigonometric identities: Problem type 2
    - Proving trigonometric identities: Problem type 3
  - Sum and Difference Formulas (6 topics)
    - Sum and difference identities: Problem type 1
    - Sum and difference identities: Problem type 2
    - Sum and difference identities: Problem type 3
    - Sum and difference identities: Problem type 4
    - Proving trigonometric identities using sum and difference properties: Problem type 1
    - Proving trigonometric identities using sum and difference properties: Problem type 2
  - Double–Angle, Half–Angle, Product–to–Sum, and Power Reducing Formulas (8 topics)
    - Double–angle identities: Problem type 1
Double−angle identities: Problem type 2
◊ Power−reducing identities
◊ Half−angle identities: Problem type 1
◊ Half−angle identities: Problem type 2
◊ Product−to−sum and sum−to−product identities: Problem type 1
◊ Product−to−sum and sum−to−product identities: Problem type 2
◊ Proving trigonometric identities using double−angle properties

• Trigonometric Equations (12 topics)
  ◊ Finding solutions in an interval for a basic equation involving sine or cosine
  ◊ Finding solutions in an interval for a basic tangent, cotangent, secant, or cosecant equation
  ◊ Solving a basic trigonometric equation using a calculator
  ◊ Solving a basic trigonometric equation involving sine or cosine
  ◊ Solving a basic trigonometric equation involving tangent, cotangent, secant, or cosecant
  ◊ Finding solutions in an interval for a trigonometric equation in factored form
  ◊ Finding solutions in an interval for a trigonometric equation with a squared function: Problem type 1
  ◊ Finding solutions in an interval for a trigonometric equation with a squared function: Problem type 2
  ◊ Finding solutions in an interval for a trigonometric equation using Pythagorean identities: Problem type 1
  ◊ Finding solutions in an interval for an equation with sine and cosine using double−angle identities
  ◊ Solving a trigonometric equation modeling a real−world situation
  ◊ Finding solutions in an interval for a trigonometric equation with an angle multiplied by a constant

• Additional Topics in Trigonometry (53 topics)
  ◆ Laws of Sines and Cosines (5 topics)
    ◊ Solving a triangle with the law of sines: Problem type 1
    ◊ Solving a triangle with the law of sines: Problem type 2
    ◊ 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
  ◆ Vectors (19 topics)
    ◊ Writing a position vector in ai+bj form given its graph
    ◊ Writing a vector in ai+bj form given its initial and terminal points
    ◊ Writing a vector in component form given its initial and terminal points
    ◊ Magnitude of a vector given in ai+bj form
    ◊ Magnitude of a vector given in component form
    ◊ Vector addition and scalar multiplication: ai+bj form
    ◊ Linear combination of vectors: ai+bj form
    ◊ Vector addition and scalar multiplication: Component form
    ◊ Linear combination of vectors: Component form
    ◊ Unit vectors
    ◊ Multiplication of a vector by a scalar: Geometric approach
    ◊ Vector addition: Geometric approach
    ◊ Vector subtraction: Geometric approach
    ◊ Finding the magnitude and direction of a vector given its graph
    ◊ Finding the components of a vector given its graph
    ◊ Finding the direction angle of a vector given in ai+bj form
    ◊ Writing a vector given its magnitude and direction angle
    ◊ Writing a vector to represent a force pushing or pulling an object
    ◊ Finding the magnitude and direction angle of the resultant force of two vectors
  ◆ The Dot Product (7 topics)
    ◊ Dot product of vectors given in ai+bj form
    ◊ Dot product of vectors given in component form
    ◊ Finding the angle between two vectors given in component form
    ◊ Classifying vector relationships by finding the angle between two vectors given in ai + bj form

Copyright © 2020 UC Regents and ALEKS Corporation. ALEKS is a registered trademark of ALEKS Corporation. 12/25
Decomposing a vector into two orthogonal vectors
Finding the amount of work done given a force vector and a distance
Finding magnitudes of forces related to an object on a ramp

Polar Coordinates and Equations (7 topics)
- Plotting points in polar coordinates
- Multiple representations of polar coordinates
- Converting rectangular coordinates to polar coordinates: Special angles
- Converting polar coordinates to rectangular coordinates
- Converting an equation written in rectangular form to one written in polar form
- Converting an equation written in polar form to one written in rectangular form: Problem type 1
- Converting an equation written in polar form to one written in rectangular form: Problem type 2

Graphs of Polar Equations (6 topics)
- Graphing a polar equation: Basic
- Graphing a polar equation: Circle
- Graphing a polar equation: Limacon
- Graphing a polar equation: Rose
- Graphing a polar equation: Lemniscate
- Matching polar equations with their graphs

Complex Numbers and De Moivre's Theorem (9 topics)
- Plotting complex numbers
- Writing a complex number in standard form given its trigonometric form
- Writing a complex number in trigonometric form: Special angles
- Writing a complex number in trigonometric form: Decimal answers
- Multiplying and dividing complex numbers in trigonometric form
- De Moivre's Theorem: Answers in trigonometric form
- De Moivre’s Theorem: Answers in standard form
- Finding the nth roots of a number: Problem type 1
- Finding the nth roots of a number: Problem type 2

Systems of Equations and Matrices (32 topics)

Systems of Linear Equations in Two Variables (2 topics)
- Solving a system of linear equations with fractional coefficients
- Solving a 2x2 system of linear equations that is inconsistent or consistent dependent

Applications of Systems of Linear Equations in Two Variables (4 topics)
- Interpreting the graphs of two functions
- 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

Systems of Linear Equations in Three Variables (4 topics)
- Introduction to solving a 3x3 system of linear equations
- Solving a 3x3 system of linear equations: Problem type 1
- Solving a 3x3 system of linear equations: Problem type 2
- Solving a word problem using a 3x3 system of linear equations: Problem type 1

Operations with Matrices (10 topics)
- Scalar multiplication of a matrix
- Addition or subtraction of matrices
- Linear combination of matrices
- Squaring and multiplying 2x2 matrices
- Multiplication of matrices: Basic
- Word problem involving multiplication of matrices
- Finding the inverse of a 2x2 matrix
- Finding the inverse of a 3x3 matrix
- Finding the determinant of a 2x2 matrix
Finding the determinant of a 3x3 matrix

Using Matrices to Solve Systems of Equations (7 topics)
- Completing Gauss–Jordan elimination with a 2x2 matrix
- Gauss–Jordan elimination with a 2x2 matrix
- Writing solutions to 3x3 systems of linear equations from augmented matrices
- Completing Gauss–Jordan elimination with a 3x3 matrix
- Finding the inverse of a matrix to solve a 2x2 system of linear equations
- Using Cramer's rule to solve a 2x2 system of linear equations
- Using Cramer's rule to solve a 3x3 system of linear equations

Partial Fraction Decomposition (5 topics)
- Introduction to partial fraction decomposition with distinct linear factors
- Partial fraction decomposition with distinct linear factors
- Partial fraction decomposition with repeated linear factors
- Partial fraction decomposition with an irreducible quadratic factor
- Partial fraction decomposition with repeated, irreducible quadratic factors

Conic Sections (34 topics)

Parabolas (9 topics)
- Graphing a parabola of the form $y^2 = ax$ or $x^2 = ay$
- Graphing a parabola of the form $x = a(y-k)^2 + h$ or $y = a(x-h)^2 + k$
- Graphing a parabola of the form $ay^2 + by + cx + d = 0$ or $ax^2 + bx + cy + d = 0$
- Writing an equation of a parabola given the vertex and the focus
- Writing an equation of a parabola given the focus and the directrix
- Finding the vertex, focus, directrix, and axis of symmetry of a parabola
- Finding the focus of a parabola of the form $ay^2 + by + cx + d = 0$ or $ax^2 + bx + cy + d = 0$
- Writing an equation of a parabola given its graph
- Word problem involving a parabola

Ellipses (7 topics)
- Graphing an ellipse given its equation in standard form
- Graphing an ellipse centered at the origin: $Ax^2 + By^2 = C$
- Graphing an ellipse given its equation in general form
- Finding the center, vertices, and foci of an ellipse
- Finding the foci of an ellipse given its equation in general form
- Writing an equation of an ellipse given the center, an endpoint of an axis, and the length of the other axis
- Word problem involving an ellipse

Hyperbolas (8 topics)
- Graphing a hyperbola given its equation in standard form
- Graphing a hyperbola centered at the origin: $Ax^2 + By^2 = C$
- Graphing a hyperbola given its equation in general form
- Finding the center, vertices, foci, and asymptotes of a hyperbola
- Finding the foci of a hyperbola given its equation in general form
- Writing an equation of a hyperbola given the foci and the vertices
- Writing an equation of a hyperbola given the foci and the asymptotes: Basic
- Classifying conics given their equations

Parametric Equations (10 topics)
- Completing a table and choosing a graph given a pair of parametric equations
- Writing the equation of a line and sketching its graph given its parametric equations
- Writing the equation of a parabola and sketching its graph given its parametric equations
- Writing the equation of a circle or ellipse and sketching its graph given its parametric equations
- Graphing a pair of parametric equations with a restricted domain: Line or parabola
- Graphing a pair of parametric equations with a restricted domain: Circle
- Graphing a pair of parametric equations with a restricted domain: Ellipse
- Completing pairs of parametric equations
Word problem involving parametric equations for projectile motion: Problem type 1
Word problem involving parametric equations for projectile motion: Problem type 2

Other Topics Available(*) (533 additional topics)
- Algebra and Geometry Review (182 topics)
  - Fractional position on a number line
  - Plotting rational numbers on a number line
  - Ordering integers
  - Estimating a square root
  - Ordering real numbers
  - Identifying numbers as integers or non–integers
  - Identifying numbers as rational or irrational
  - Signed fraction addition or subtraction: Basic
  - Signed fraction addition or subtraction: Advanced
  - Addition and subtraction of 3 fractions involving signs
  - Signed fraction multiplication: Advanced
  - Operations with absolute value: Problem type 2
  - Computing the distance between two integers on a number line
  - Exponents and integers: Problem type 1
  - Exponents and integers: Problem type 2
  - Order of operations with integers and exponents
  - Evaluating a linear expression: Integer multiplication with addition or subtraction
  - Evaluating a linear expression: Signed fraction multiplication with addition or subtraction
  - Converting between temperatures in Fahrenheit and Celsius
  - Properties of addition
  - Properties of real numbers
  - Distributive property: Integer coefficients
  - Identifying properties used to simplify an algebraic expression
  - Understanding the product rule of exponents
  - Ordering numbers with positive exponents
  - Understanding the power rules of exponents
  - Power and product rules with positive exponents
  - Simplifying a ratio of multivariate monomials: Basic
  - Simplifying a ratio of multivariate monomials: Advanced
  - Power and quotient rules with positive exponents
  - Ordering numbers with negative exponents
  - Product rule with negative exponents
  - Quotient rule with negative exponents: Problem type 2
  - Power and quotient rules with negative exponents: Problem type 1
  - Power and quotient rules with negative exponents: Problem type 2
  - Power, product, and quotient rules with negative exponents
  - Scientific notation with positive exponent
  - Scientific notation with negative exponent
  - Converting between scientific notation and standard form in a real–world situation
  - 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
  - Degree of a multivariate polynomial
  - Simplifying a sum or difference of three univariate polynomials
◊ Simplifying a sum or difference of multivariate polynomials
◊ Multiplying a univariate polynomial by a monomial with a negative coefficient
◊ Multiplying conjugate binomials: Multivariate
◊ Prime numbers
◊ Prime factorization
◊ Greatest common factor of 2 numbers
◊ Greatest common factor of three univariate monomials
◊ Factoring a univariate polynomial by grouping: Problem type 2
◊ Factoring a multivariate polynomial by grouping: Problem type 1
◊ Factoring a multivariate polynomial by grouping: Problem type 2
◊ Factoring a quadratic in two variables with leading coefficient 1
◊ Factoring a quadratic with leading coefficient greater than 1: Problem type 3
◊ Factoring a quadratic by the ac–method
◊ Factoring a quadratic in two variables with leading coefficient greater than 1
◊ Factoring a perfect square trinomial with leading coefficient greater than 1
◊ Factoring a perfect square trinomial in two variables
◊ Factoring a difference of squares in two variables
◊ Factoring a polynomial involving a GCF and a difference of squares: Univariate
◊ Factoring a polynomial involving a GCF and a difference of squares: Multivariate
◊ Factoring with repeated use of the difference of squares formula
◊ Factoring a sum or difference of two cubes
◊ Factoring out binomials from a polynomial: GCF factoring, advanced
◊ Using substitution to factor polynomials
◊ Simplifying a ratio of factored polynomials: Factors with exponents
◊ Simplifying a ratio of linear polynomials: 1, −1, and no simplification
◊ Simplifying a ratio of polynomials: Problem type 2
◊ Simplifying a ratio of polynomials: Problem type 3
◊ Simplifying a ratio of multivariate polynomials
◊ Multiplying rational expressions involving multivariate monomials
◊ Multiplying rational expressions involving quadratics with leading coefficients greater than 1
◊ Multiplying rational expressions involving multivariate quadratics
◊ Dividing rational expressions involving multivariate monomials
◊ Dividing rational expressions involving quadratics with leading coefficients greater than 1
◊ Dividing rational expressions involving multivariate quadratics
◊ Multiplication and division of 3 rational expressions
◊ Least common multiple of 2 numbers
◊ Least common multiple of 3 numbers
◊ Least common multiple of two monomials
◊ Finding the LCD of rational expressions with linear denominators: Common factors
◊ Finding the LCD of rational expressions with quadratic denominators
◊ Writing equivalent rational expressions with monomial denominators
◊ Writing equivalent rational expressions involving opposite factors
◊ Introduction to adding fractions with variables and common denominators
◊ Adding rational expressions with common denominators and monomial numerators
◊ Adding rational expressions with common denominators and binomial numerators
◊ Adding rational expressions with common denominators and GCF factoring
◊ Adding rational expressions with common denominators and quadratic factoring
◊ Adding rational expressions with denominators ax^n and bx^m
◊ Adding rational expressions with multivariate monomial denominators: Basic
◊ Adding rational expressions with multivariate monomial denominators: Advanced
◊ Adding rational expressions with linear denominators without common factors: Advanced
◊ Adding rational expressions with linear denominators with common factors: Basic
◊ Adding rational expressions with linear denominators with common factors: Advanced
Adding rational expressions with denominators ax−b and b−ax
Adding rational expressions involving different quadratic denominators
Adding 3 rational expressions with different quadratic denominators
Complex fraction without variables: Problem type 1
Complex fraction involving multivariate monomials
Complex fraction: Quadratic factoring
Complex fraction made of sums involving rational expressions: Problem type 2
Complex fraction made of sums involving rational expressions: Problem type 3
Complex fraction made of sums involving rational expressions: Problem type 4
Complex fraction made of sums involving rational expressions: Problem type 5
Complex fraction made of sums involving rational expressions: Problem type 6
Complex fraction made of sums involving rational expressions: Multivariate
Complex fraction with negative exponents: Problem type 1
Complex fraction with negative exponents: Problem type 2
Complex fraction that contains a complex fraction
Finding all square roots of a number
Square roots of integers raised to even exponents
Introduction to simplifying a radical expression with an even exponent
Using absolute value to simplify square roots of perfect square monomials
Finding the n\textsuperscript{th} root of a perfect n\textsuperscript{th} power fraction
Finding the n\textsuperscript{th} root of a perfect n\textsuperscript{th} power monomial
Using absolute value to simplify higher radical expressions
Rational exponents: Unit fraction exponents and bases involving signs
Rational exponents: Product rule
Rational exponents: Quotient rule
Rational exponents: Products and quotients with negative exponents
Rational exponents: Power of a power rule
Rational exponents: Powers of powers with negative exponents
Simplifying the square root of a whole number greater than 100
Introduction to simplifying a radical expression with an odd exponent
Simplifying a radical expression with an odd exponent
Simplifying a radical expression with two variables
Introduction to simplifying a higher radical expression
Simplifying a higher radical expression: Univariate
Simplifying a higher radical expression: Multivariate
Introduction to square root addition or subtraction
Square root addition or subtraction with three terms
Introduction to simplifying a sum or difference of radical expressions: Univariate
Simplifying a sum or difference of radical expressions: Univariate
Simplifying a sum or difference of radical expressions: Multivariate
Simplifying a sum or difference of higher roots
Simplifying a sum or difference of higher radical expressions
Introduction to square root multiplication
Simplifying a product of radical expressions: Univariate
Simplifying a product of radical expressions: Multivariate
Simplifying a product of radical expressions: Multivariate, fractional expressions
Introduction to simplifying a product of higher roots
Simplifying a product of higher radical expressions
Special products of radical expressions: Conjugates and squaring
Classifying sums and products as rational or irrational
Rationalizing a denominator: Quotient involving a monomial
Rationalizing a denominator using conjugates: Square root in numerator
Rationalizing a denominator using conjugates: Variable in denominator
Rationalizing a denominator: Quotient involving a higher radical
Rationalizing a denominator: Quotient involving higher radicals and monomials
Simplifying products or quotients of higher radicals with different indices: Univariate
Simplifying products or quotients of higher radicals with different indices: Multivariate
Area of a piecewise rectangular figure
Word problem involving the area between two rectangles
Area of a triangle
Area of a parallelogram
Area of a trapezoid
Perimeter involving rectangles and circles
Circumference and area of a circle
Circumference and area of a circle: Exact answers in terms of pi
Area involving rectangles and circles
Word problem involving the area between two concentric circles
Area involving inscribed figures
Volume of a triangular prism
Volume of a pyramid
Volume of a cylinder
Word problem involving the rate of filling or emptying a cylinder
Volume of a cone
Volume of a cone: Exact answers in terms of pi
Volume of a sphere
Surface area of a cube or a rectangular prism
Surface area of a triangular prism
Surface area of a cylinder
Surface area of a cylinder: Exact answers in terms of pi
Surface area of a sphere
Introduction to the Pythagorean Theorem
Word problem involving the Pythagorean Theorem

Equations and Inequalities (85 topics)
Identifying properties used to solve a linear equation
Solving a linear equation with several occurrences of the variable: Fractional forms with monomial numerators
Solving equations with zero, one, or infinitely many solutions
Solving for a variable in terms of other variables using addition or subtraction: Advanced
Solving for a variable in terms of other variables using multiplication or division: Advanced
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 involving consecutive integers
Writing a multi-step equation for a real-world situation
Solving a value mixture problem using a linear equation
Solving a one-step word problem using the formula \( d = rt \)
Solving a distance, rate, time problem using a linear equation
Finding a side length given the perimeter and side lengths with variables
Circumference ratios
Solving equations involving vertical angles
Finding angle measures of a triangle given angles with variables
Finding the value for a new score that will yield a given mean
Finding the multiplier to give a final amount after a percentage increase or decrease
Finding the sale price given the original price and percent discount
Finding the total cost including tax or markup
Finding the original price given the sale price and percent discount
Computing a percent mixture
Solving a percent mixture problem using a linear equation
Finding simple interest without a calculator
Converting a repeating decimal to a fraction
Solving an absolute value equation: Problem type 3
Solving an absolute value equation: Problem type 4
Solving an absolute value equation of the form |ax+b| = |cx+d|
Translating a sentence into a one-step inequality
Translating a sentence into a multi-step inequality
Writing an inequality for a real-world situation
Writing an inequality given a graph on the number line
Translating a sentence into a compound inequality
Writing a compound inequality given a graph on the number line
Set-builder notation
Union and intersection of finite sets
Union and intersection of intervals
Identifying solutions to a two-step linear inequality in one variable
Additive property of inequality with signed fractions
Multiplicative property of inequality with signed fractions
Solving a two-step linear inequality with a fractional coefficient
Solving a linear inequality with multiple occurrences of the variable: Problem type 2
Solving a linear inequality with multiple occurrences of the variable: Problem type 3
Solving inequalities with no solution or all real numbers as solutions
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
Solving a decimal word problem using a linear inequality with the variable on both sides
Solving an absolute value inequality: Problem type 1
Writing an absolute value inequality given a graph on the number line
Solving an absolute value inequality: Problem type 2
Solving an absolute value inequality: Problem type 3
Solving an absolute value inequality: Problem type 4
Solving an absolute value inequality: Problem type 5
Solving a proportion of the form a/(x+b) = c/x
Solving a rational equation that simplifies to linear: Denominator x
Solving a rational equation that simplifies to linear: Denominators ax and bx
Solving for a variable in terms of other variables in a rational equation: Problem type 3
Word problem on proportions: Problem type 1
Word problem on proportions: Problem type 2
Similar polygons
Similar right triangles
Indirect measurement
Ratio of volumes
Word problem involving multiple rates
Solving a work problem using a rational equation
Solving a distance, rate, time problem using a rational equation
Ordering fractions with variables
Simplifying a product and quotient involving square roots of negative numbers
Simplifying a power of i
Using the Pythagorean Theorem and a quadratic equation to find side lengths of a right triangle
Discriminant of a quadratic equation with parameter
Solving a rational equation that simplifies to quadratic: Proportional form, basic
Solving a rational equation that simplifies to quadratic: Factorable quadratic denominator
Solving a rational equation that simplifies to quadratic: Proportional form, advanced
◊ Solving a radical equation with a quadratic expression under the radical
◊ Solving a radical equation with two radicals that simplifies to $\sqrt{x} = a$
◊ Solving a radical equation that simplifies to a quadratic equation: Two radicals
◊ Word problem involving radical equations: Basic
◊ Word problem involving radical equations: Advanced
◊ Solving an equation with exponent $1/a$: Problem type 1
◊ Solving an equation with exponent $1/a$: Problem type 2
◊ Solving an equation with positive rational exponent
◊ Solving an equation with negative rational exponent
◊ Solving an equation that can be written in quadratic form: Problem type 2

♦ Graphs and Functions (63 topics)
◊ Reading a point in the coordinate plane
◊ Plotting a point in the coordinate plane
◊ Finding the area of a triangle or parallelogram in the coordinate plane
◊ Table for a linear equation
◊ Distance between two points in the plane: Decimal answers
◊ Identifying scalene, isosceles, and equilateral triangles given coordinates of their vertices
◊ Finding an endpoint of a line segment given the other endpoint and the midpoint
◊ Identifying solutions to a linear equation in two variables
◊ 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: Advanced
◊ Graphing a line given its $x$– and $y$–intercepts
◊ Testing an equation for symmetry about the axes and origin
◊ Classifying slopes given graphs of lines
◊ Finding the coordinate that yields a given slope
◊ Graphing a line through a given point with a given slope
◊ Identifying linear equations: Advanced
◊ Identifying linear functions given ordered pairs
◊ Rewriting a linear equation in the form $Ax + By = C$
◊ 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 an equation in standard form given the slope and a point
◊ Comparing linear functions to the parent function $y=x$
◊ Identifying parallel and perpendicular lines from equations
◊ Identifying parallel and perpendicular lines from coordinates
◊ Identifying coordinates that give right triangles
◊ Graphing ordered pairs and writing an equation from a table of values in context
◊ 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
◊ Comparing properties of linear functions given in different forms
◊ Application problem with a linear function: Finding a coordinate given the slope and a point
◊ Solving a linear equation by graphing
◊ 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
◊ Computing residuals
◊ Interpreting residual plots
◊ Classifying linear and nonlinear relationships from scatter plots
◊ Linear relationship and the correlation coefficient
Identifying outliers and clustering in scatter plots
Finding outliers in a data set
Identifying solutions to a system of linear equations
Using a graphing calculator to solve a system of linear equations: Advanced
Writing a system of linear equations given its graph
Writing an equation of a circle and identifying points that lie on the circle
Deriving the equation of a circle using the Pythagorean Theorem
Domains of higher root functions
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
Rewriting a multivariate function as a univariate function given a relationship between its variables
Domain and range from the graph of a discrete relation
Finding domain and range from a linear graph in context
Choosing a graph to fit a narrative: Basic
Choosing a graph to fit a narrative: Advanced
Graphing an integer function and finding its range for a given domain
Graphing a square root function: Problem type 3
Graphing a cube root function
Writing the equation of a secant line
How the leading coefficient affects the graph of an absolute value function
Composition of two functions: Domain and range

Polynomial and Rational Functions (27 topics)
Graphing a parabola of the form $y = ax^2 + bx + c$: Rational coefficients
Rewriting a quadratic function in standard form
Solving a quadratic equation by graphing
Comparing properties of quadratic functions given in different forms
Classifying the graph of a function
Choosing a quadratic model and using it to make a prediction
Identifying polynomial functions
Dividing a polynomial by a monomial: Univariate
Dividing a polynomial by a monomial: Multivariate
Remainder theorem: Advanced
Closure properties of integers and polynomials
Descartes' Rule of Signs
Using the conjugate zeros theorem to find all zeros of a polynomial
Linear factors theorem and conjugate zeros theorem
Writing the equation of a rational function given its graph
Identifying direct variation equations
Identifying direct variation from ordered pairs and writing equations
Writing a direct variation equation
Word problem on direct variation
Interpreting direct variation from a graph
Writing an inverse variation equation
Identifying direct and inverse variation equations
Identifying direct and inverse variation from ordered pairs and writing equations
Word problem on inverse variation
Word problem on inverse proportions
Writing an equation that models variation
Word problem on combined variation

Exponential and Logarithmic Functions (12 topics)
Finding domain and range from the graph of an exponential function
Calculating and comparing simple interest and compound interest
Finding the initial amount and rate of change given an exponential function
◊ Writing an equation that models exponential growth or decay
◊ Writing an exponential function rule given a table of ordered pairs
◊ Choosing an exponential model and using it to make a prediction
◊ Comparing linear, polynomial, and exponential functions
◊ Graphing a logarithmic function: Advanced
◊ Expanding a logarithmic expression: Problem type 3
◊ Change of base for logarithms: Problem type 2
◊ Solving an exponential equation by finding common bases: Linear and quadratic exponents
◊ Solving an exponential equation by using substitution and quadratic factoring

♦ Trigonometric Functions (13 topics)
◊ Converting degrees–minutes–seconds to decimal degrees
◊ Converting a decimal degree to degrees–minutes–seconds
◊ Area of a sector of a circle
◊ Angular and linear speed
◊ Finding a point on the unit circle given one coordinate
◊ Using a calculator to approximate cosecant, secant, and cotangent values
◊ Special right triangles: Exact answers
◊ Sine, cosine, and tangent ratios: Numbers for side lengths
◊ Understanding trigonometric ratios through similar right triangles
◊ Relationship between the sines and cosines of complementary angles
◊ Using similar right triangles to find trigonometric ratios
◊ Sketching a graph of a damped sine or cosine function
◊ Composition of trigonometric functions with variable expressions as inputs: Problem type 2

♦ Trigonometric Identities and Equations (15 topics)
◊ Proving trigonometric identities: Problem type 4
◊ Proving trigonometric identities using odd and even properties
◊ Double–angle identities: Problem type 3
◊ Proving trigonometric identities using sum–to–product formulas
◊ Finding solutions in an interval for a trigonometric equation using Pythagorean identities: Problem type 2
◊ Using a graphing calculator to solve a trigonometric equation
◊ Using a graphing calculator to solve a trigonometric inequality
◊ Solving a trigonometric equation involving a squared function: Problem type 1
◊ Solving a trigonometric equation involving a squared function: Problem type 2
◊ Solving a trigonometric equation involving more than one function
◊ Solving a trigonometric equation involving an angle multiplied by a constant
◊ Finding solutions in an interval for an equation with sine and cosine using sum and difference identities
◊ Solving a trigonometric equation using sum and difference identities
◊ Solving a trigonometric equation using double–angle identities
◊ Solving a trigonometric equation using half–angle identities

♦ Additional Topics in Trigonometry (12 topics)
◊ Proving the law of sines
◊ Proving the law of cosines
◊ Using trigonometry to find the area of a right triangle
◊ Finding the area of a triangle using trigonometry
◊ Expressing the area of a triangle in terms of the sine of one of its angles
◊ Heron's formula
◊ Finding magnitudes of forces related to a sum of three vectors
◊ Finding magnitudes of forces related to an object suspended by cables
◊ Using the dot product to find perpendicular vectors
◊ Finding the component of a vector along another vector
◊ Converting rectangular coordinates to polar coordinates: Decimal answers
Identifying symmetries of graphs given their polar equations

**Systems of Equations and Matrices (40 topics)**
- Classifying systems of linear equations from graphs
- Solving a system of linear equations with decimal coefficients
- Creating an inconsistent system of linear equations
- Identifying the operations used to create equivalent systems of equations
- Consistency and independence of a system of linear equations
- 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 3x3 system of linear equations that is inconsistent or consistent dependent
- Solving a word problem using a 3x3 system of linear equations: Problem type 2
- Multiplication of matrices: Advanced
- Solving a system of linear equations given its augmented matrix
- Using the inverse of a matrix to solve a 3x3 system of linear equations
- Graphically solving a system of linear and quadratic equations
- Using a graphing calculator to solve a system of linear and quadratic equations: Basic
- Using a graphing calculator to solve a system of equations
- Using a graphing calculator to solve an exponential or logarithmic equation
- Solving a system of linear and quadratic equations
- Solving a system of nonlinear equations: Problem type 1
- Solving a system of nonlinear equations: Problem type 2
- Solving a word problem involving geometry using a system of nonlinear equations
- 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
- Writing an inequality given its graph in the plane: Horizontal or vertical boundary line
- Writing an inequality given its graph in the plane: Slanted boundary line
- Graphing a quadratic inequality: Problem type 1
- Graphing a quadratic inequality: Problem type 2
- Graphing an inequality involving a circle
- Graphing a system of two linear inequalities: Basic
- Graphing a system of two linear inequalities: Advanced
- Graphing a system of three linear inequalities
- Graphing a system of nonlinear inequalities: Problem type 1
- Writing a multi–step inequality for a real–world situation
- 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

**Conic Sections (4 topics)**
- Deriving the equation of a parabola given its focus and directrix
- Writing an equation of an ellipse given the foci and the major axis length
- Graphing a system of nonlinear inequalities: Problem type 2
- Writing an equation of a hyperbola given the foci and the asymptotes: Advanced

**Sequences, Series, and Probability (65 topics)**
- 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
Sum of the first n terms of 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
Sum of the first n terms of a geometric sequence
Sum of an infinite geometric series
Identifying linear, quadratic, and exponential functions given ordered pairs
Factorial expressions
Interpreting a tree diagram
Introduction to the counting principle
Counting principle
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
Binomial formula
Determining a sample space and outcomes for a simple event
Determining a sample space and outcomes for a compound event
Probability of an event
Experimental and theoretical probability
Outcomes and event probability
Probabilities of a permutation and a combination
Area as probability
Probability of independent events: Decimal answers
Probability of dependent events
Probabilities of draws with replacement
Probabilities of draws without replacement
Interpreting a Venn diagram of 2 sets
Interpreting a Venn diagram of 3 sets
Venn diagrams: Two events
Shading a Venn diagram with 3 sets to represent a group
Probabilities involving two rolls of a die
Determining outcomes for compound events and complements of events
Using a Venn diagram to understand the addition rule for probability
Outcomes and event probability: Addition rule
Word problem involving the probability of a union or an intersection
Identifying independent events given values of probabilities
Probability of the union and intersection of independent events
Probability of the union of mutually exclusive events and independent events
Using a Venn diagram to understand the multiplication rule for probability
Outcomes and event probability: Conditional probability
◊ Computing conditional probability using a two-way frequency table
◊ Computing conditional probability to make an inference using a two-way frequency table
◊ Conditional probability: Basic
◊ Intersection and conditional probability
◊ Binomial problems: Basic
◊ Binomial problems: Advanced
◊ Using a random number table to make a fair decision

♦ Limits and Continuity (15 topics)
  ◊ Estimating a limit numerically
  ◊ Finding limits from a graph
  ◊ Finding a limit by using the limit laws: Problem type 1
  ◊ Finding limits for a piecewise-defined function
  ◊ Finding a limit by using the limit laws: Problem type 2
  ◊ Finding a limit by using the limit laws: Problem type 3
  ◊ Squeeze Theorem
  ◊ Determining points of discontinuity from a graph
  ◊ Determining a parameter to make a function continuous
  ◊ Infinite limits and graphs
  ◊ Limits at infinity and graphs
  ◊ Limits at infinity and rational functions
  ◊ Infinite limits and rational functions
  ◊ Finding a limit of a trigonometric function by using continuity
  ◊ Finding a limit by using special trigonometric limits

*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.