ALEKS®

College Algebra with Trigonometry

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 Show All (597 topics)

- Algebra and Geometry Review (126 topics)
  - ♦ Real Numbers and Algebraic Expressions (14 topics)
    - ◊ Signed fraction addition or subtraction: Basic
    - ◊ Signed fraction subtraction involving double negation
    - ◊ Signed fraction multiplication: Basic
    - ◊ Signed fraction division
    - ◊ Computing the distance between two integers on a number line
    - ◊ Exponents and integers: Problem type 1
    - ◊ Exponents and signed fractions
    - ◊ Order of operations with integers
    - ◊ Evaluating a linear expression: Integer multiplication with addition or subtraction
    - ◊ Evaluating a quadratic expression: Integers
    - ◊ Evaluating a linear expression: Signed fraction multiplication with addition or subtraction
    - ◊ Distributive property: Integer coefficients
    - ◊ Using distribution and combining like terms to simplify: Univariate
    - ◊ Using distribution with double negation and combining like terms to simplify: Multivariate
  - ♦ Exponents (20 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
    - ◊ Simplifying a ratio of multivariate monomials: Basic
    - ◊ 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 (14 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 univariate polynomial by a monomial with a negative 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)

- ◊ Greatest common factor of 2 numbers
- ◊ 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

♦ Rational Expressions (28 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 involving 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
- ◊ Least common multiple of 2 numbers
- ◊ Least common multiple of 3 numbers
- ◊ 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
- ◊ 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 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 1
- ◊ 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 (7 topics)

- ◊ Square root of a rational perfect square
- ◊ Square roots of perfect squares with signs
- ◊ Introduction to simplifying a radical expression with an even exponent
- ◊ 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 (19 topics)

- ◊ Simplifying the square root of a whole number less than 100
- ◊ Simplifying a radical expression with an even exponent
- ◊ Introduction to simplifying a radical expression with an odd exponent
- ◊ Simplifying a radical expression with an odd exponent
- ◊ Simplifying a higher root of a whole number
- ◊ Introduction to square root addition or subtraction
- ◊ Square root addition or subtraction
- ◊ Introduction to square root multiplication
- ◊ 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 (4 topics)

- ◊ Circumference of a circle
- ◊ Volume of a rectangular prism
- ◊ Introduction to the Pythagorean Theorem
- ◊ Pythagorean Theorem

• Equations and Inequalities (83 topics)

♦ Linear Equations and Applications (27 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 linear equation with several occurrences of the variable: Fractional forms with monomial numerators
- ◊ 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 addition or subtraction: Advanced
- ◊ Solving for a variable in terms of other variables using multiplication or division: Basic
- ◊ Solving for a variable in terms of other variables using multiplication or division: Advanced
- ◊ Solving for a variable in terms of other variables using addition or subtraction with division
- ◊ 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
- ◊ Solving a one−step word problem using the formula d = rt
- ◊ Solving a distance, rate, time problem using a linear equation
- ◊ Finding the perimeter or area of a rectangle given one of these values
- ◊ Finding the sale price given the original price and percent discount

♦ 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 (7 topics)
- ◊ Graphing a linear inequality on the number line
- ◊ Graphing a compound inequality on the number line
- ◊ Set−builder and interval notation
- ◊ Identifying solutions to a two−step linear inequality in one variable
- ◊ 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 (8 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: Denominators a, x, or ax
- ◊ Solving a rational equation that simplifies to linear: Denominators ax and bx
- ◊ 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: Binomial 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
- ◊ Solving for a variable in terms of other variables in an equation involving 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 (139 topics)

♦ The Coordinate Plane, Distance, and Midpoint (9 topics)

- ◊ Reading a point in the coordinate plane
- ◊ Plotting a point in the coordinate plane
- ◊ 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
- ◊ Table for a linear equation
- ◊ Distance between two points in the plane: Exact answers
- ◊ Midpoint of a line segment in the plane
- ◊ Identifying solutions to a linear equation in two variables
- ◊ Finding a solution to a linear equation in two variables

♦ Graphs of Equations (16 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 given the graph of a line on a grid
- ◊ Finding x− and y−intercepts of a line given the equation: Basic
- ◊ Finding x− and y−intercepts of a line given the equation: Advanced
- ◊ 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 (17 topics)

- ◊ Finding slope given the graph of a line on a grid
- ◊ Finding slope given two points on a line
- ◊ Finding the slopes 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 $Ax + By = C$
- ◊ Graphing a line by first finding its slope and y−intercept
- ◊ 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 the equation of a line in point−slope form given the slope and a point
- ◊ Writing the equation of a line given the y−intercept and another point
- ◊ Writing the equation of a 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 intercepts 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

♦ Circles (6 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
- ◊ 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 (26 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 one−step function that models a real−world situation: Function notation
- ◊ 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 (28 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
- ◊ Introduction to graphing a piecewise−defined function involving lines with non−zero slope
- ◊ 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 $f(x) = -b^x$ or $f(x) = -b^{-x}$
- ◊ Translating the graph of an exponential function
- ◊ Graphing an exponential function and finding its domain and range
- ◊ Transforming the graph of a natural exponential function and finding its domain and range
- ◊ 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
- ◊ Graphing a logarithmic function and finding its domain and range
- ◊ 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 (80 topics)

♦ Angles and Their Measure (6 topics)

- ◊ Converting degrees to radians and radians to degrees: Problem type 1
- ◊ Converting degrees to radians and radians to degrees: Problem type 2
- ◊ Sketching an angle with absolute value less than 360 degrees in standard position
- ◊ Sketching an angle with absolute value less than 2 radians in standard position
- ◊ Coterminal angles
- ◊ Arc length and central angle measure

♦ The Unit Circle and Evaluating Trigonometric Functions (15 topics)

- ◊ Finding coordinates on the unit circle for special angles
- ◊ Using the coordinates of points on the unit circle to define sine and cosine for all real numbers
- ◊ Special triangles with a hypotenuse of length 1
- ◊ Drawing a reference triangle on the unit circle and using it to derive values of trigonometric functions: Radians
- ◊ Trigonometric functions and special angles: Problem type 1: Degrees
- ◊ Trigonometric functions and special angles: Problem type 1: Radians
- ◊ Finding values of trigonometric functions from a point on the unit circle
- ◊ Trigonometric functions and special angles: Problem type 2
- ◊ Using the coordinates of points on the unit circle to define trigonometric functions for all real numbers
- ◊ Trigonometric functions and special angles: Problem type 3
- ◊ Using the unit circle to understand the odd and even identities for sine and cosine
- ◊ Evaluating expressions involving sine or cosine
- ◊ Odd and even identities for 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 (10 topics)

- ◊ Sine, cosine, and tangent ratios: Variables for side lengths
- ◊ Using the Pythagorean Theorem to find a sine, cosine, or tangent ratio in a right triangle
- ◊ Using the Pythagorean Theorem to find several trigonometric ratios in 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 trigonometric functions and the formula d = rt in a real−world situation
- ◊ 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 (12 topics)

- ◊ Sketching an angle with absolute value less than 360 degrees, and also its reference angle
- ◊ Reference angles in degrees: Problem type 1
- ◊ Reference angles in degrees: Problem type 2
- ◊ Sketching an angle with absolute value less than 2 radians, and also its reference angle
- ◊ Reference angles in radians: Problem type 1
- ◊ Sketching an angle with absolute value greater than 2 radians, and also its reference angle
- ◊ Reference angles in radians: 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 (23 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)
  - ◊ Using transformations to graph y = sin(bx) or y = cos(bx)
  - ◊ Sketching the graph of y = sin(x) + d or y = cos(x) + d
  - ◊ Using transformations to graph y = sin(x) + d or y = cos(x) + d
  - ◊ Using transformations to graph y = a sin(x) + d or y = a cos(x) + d
  - ◊ Using transformations to graph y = sin(bx) + d or y = cos(bx) + 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)
  - ◊ Using transformations to graph y = a sin(x+c) + d or y = a cos(x+c) + d
  - ◊ Sketching the graph of y = a sin(bx) or y = a cos(bx)
  - ◊ Using transformations to graph y = sin(bx+c) or y = cos(bx+c)
  - ◊ 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
  - ◊ Using transformations to graph y = a sin(bx+c) + d or y = a cos(bx+c) + d
  - ◊ Amplitude and period of a sine or cosine function
  - ◊ Amplitude, period, and phase shift of a sine or cosine function
  - ◊ Interpreting the graph of a sinusoidal function that models a real−world situation
  - ◊ 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
  - ◊ Developing a sinusoidal model for a real−world situation
  - ◊ 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 2
  - ◊ Sketching the graph of a tangent or cotangent function: Problem type 1
- ♦ 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 (49 topics)
- ♦ Verifying Trigonometric Identities (13 topics)
  - ◊ Using reciprocal and quotient identities to simplify a trigonometric expression
  - ◊ Using Pythagorean identities to simplify a trigonometric expression
  - ◊ Using cofunction identities
  - ◊ Verifying a trigonometric identity: Problem type 1
  - ◊ Verifying a trigonometric identity: Problem type 2
  - ◊ Verifying a trigonometric identity: Problem type 3
  - ◊ Proving an identity using fundamental trigonometric identities: Problem type 1

- ◊ Proving an identity using fundamental trigonometric identities: Problem type 2
- ◊ Proving an identity using fundamental trigonometric identities: Problem type 3
- ◊ Proving an identity using fundamental trigonometric identities: Problem type 4
- ◊ Proving an identity using fundamental trigonometric identities: Problem type 5
- ◊ Proving an identity using fundamental trigonometric identities: Problem type 6
- ◊ Proving an identity using fundamental trigonometric identities: Problem type 7

♦ Sum and Difference Formulas (9 topics)

- ◊ Sum and difference identities: Problem type 1: Degrees
- ◊ Sum and difference identities: Problem type 1: Radians
- ◊ Sum and difference identities: Problem type 2: Degrees
- ◊ Sum and difference identities: Problem type 2: Radians
- ◊ Sum and difference identities: Problem type 3
- ◊ Sum and difference identities: Problem type 4
- ◊ Proving trigonometric identities using sum and difference identities: Problem type 1
- ◊ Proving trigonometric identities using sum and difference identities: Problem type 2
- ◊ Proving trigonometric identities using sum and difference identities: Problem type 3

♦ Double−Angle, Half−Angle, Product−to−Sum, and Power Reducing Formulas (11 topics)

- ◊ Double−angle identities: Problem type 1
- ◊ Double−angle identities: Problem type 2
- ◊ Power−reducing identities
- ◊ Half−angle identities: Problem type 1: Degrees
- ◊ Half−angle identities: Problem type 1: Radians
- ◊ Half−angle identities: Problem type 2
- ◊ Product−to−sum and sum−to−product identities: Problem type 1: Degrees
- ◊ Product−to−sum and sum−to−product identities: Problem type 1: Radians
- ◊ Product−to−sum and sum−to−product identities: Problem type 2
- ◊ Proving trigonometric identities using double−angle identities: Problem type 1
- ◊ Proving trigonometric identities using double−angle identities: Problem type 2

♦ Trigonometric Equations (16 topics)

- ◊ Finding solutions in an interval for a basic trigonometric equation involving sine or cosine
- ◊ Finding solutions in an interval for a basic trigonometric equation involving tangent, cotangent, secant, or cosecant
- ◊ Finding solutions in an interval for 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 involving sine and cosine and written in factored form
- ◊ Finding solutions in an interval for a trigonometric equation written in factored form
- ◊ Finding solutions in an interval for a trigonometric equation involving a squared function: Problem type 1
- ◊ Factoring to find solutions in an interval for a trigonometric equation involving sine or cosine
- ◊ Factoring to find solutions in an interval for a trigonometric equation
- ◊ Using a Pythagorean identity to find solutions in an interval for a trigonometric equation involving sine and cosine: Problem type 1
- ◊ Using a Pythagorean identity to find solutions in an interval for a trigonometric equation: Problem type 1
- ◊ Finding solutions in an interval for a trigonometric equation involving sine and/or cosine using double−angle identities
- ◊ Solving a trigonometric equation modeling a real−world situation
- ◊ Finding solutions in an interval for a trigonometric equation involving sine or cosine and an angle multiplied by a constant
- ◊ Finding solutions in an interval for a trigonometric equation involving an angle multiplied by a constant

- Additional Topics in Trigonometry (6 topics)
  - ♦ Laws of Sines and Cosines (6 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
    - ◊ Solving a word problem using the law of sines and the law of cosines

