ALEKS®

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 (465 topics + 533 additional topics)

- Algebra and Geometry Review (98 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 (9 topics)
    - Introduction to the product rule of exponents
    - Product rule with positive exponents: Univariate
    - 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

  - Polynomial Expressions (8 topics)
    - 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 binomials with leading coefficients of 1
    - Multiplying binomials with leading coefficients greater than 1
    - Multiplying conjugate binomials: Univariate
    - Squaring a binomial: Univariate
    - Multiplying binomials with negative coefficients

  - Factoring Polynomials (11 topics)
    - Greatest common factor of 2 numbers
    - Factoring a linear binomial
    - Introduction to the GCF of two monomials
    - Factoring out a monomial from a polynomial: Univariate
    - 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 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 (6 topics)**
  - Finding all square roots of a number
  - Square root of a rational perfect square
  - Square roots of perfect squares with signs
  - 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 (2 topics)**
  - Rational exponents: Unit fraction exponents and whole number bases
  - Rational exponents: Non-unit fraction exponent with a whole number base

- **Radical Expressions (15 topics)**
  - Simplifying the square root of a whole number less than 100
  - 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 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 (5 topics)**
  - Area of a triangle
  - Circumference of a circle
  - Circumference and area of a circle
  - Introduction to the Pythagorean Theorem
  - Pythagorean Theorem

- Equations and Inequalities (55 topics)

  - **Linear Equations and Applications (19 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 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

- 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 one-step word problem using the formula $d = rt$

- **Linear Inequalities and Applications (5 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

- **Rational Equations that Simplify to Linear (5 topics)**
  - Solving a rational equation that simplifies to linear: Denominator x
  - Solving a rational equation that simplifies to linear: Denominator x+a
  - 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
  - Word problem on proportions: Problem type 1

- **Complex Numbers (5 topics)**
  - Using i to rewrite square roots of negative numbers
  - Simplifying a product and quotient involving square roots of negative numbers
  - Adding or subtracting complex numbers
  - Multiplying complex numbers
  - Dividing complex numbers

- **Quadratic Equations (13 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 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
  - Applying the quadratic formula: Exact answers
  - Applying the quadratic formula: Decimal answers
  - 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 (1 topics)**
  - Restriction on a variable in a denominator: Quadratic

- **Radical Equations (7 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 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

- Graphs and Functions (101 topics)

  - **The Coordinate Plane, Distance, and Midpoint (8 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
    - Identifying solutions to a linear equation in two variables
    - Finding a solution to a linear equation in two variables

  - **Graphs of Equations (13 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
    - Graphing a line by first finding its x- and y-intercepts
    - Finding intercepts of a nonlinear function given its graph

- 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 $y = ax^3$

- Slope and Equations of Lines (9 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
  - 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
  - Writing the equation of a line given the y-intercept and another point
  - Writing the equation of a line through two given points

- Linear Applications (3 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

- Systems of Equations (3 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

- Circles (2 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

- Functions (18 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
  - 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 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

- Graphs of Functions (18 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
  - 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

- Transformations (12 topics)
  - Translating the graph of a parabola: One step
  - Translating the graph of a parabola: Two steps

- 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 (10 topics)
  - Introduction to the composition of two functions
  - Composition of two functions: Basic
  - 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

- Quadratic Functions (5 topics)
  - 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 maximum or minimum of a quadratic function
  - Word problem involving the maximum or minimum of a quadratic function

- Trigonometric Functions (48 topics)

  - Angles and Their Measure (12 topics)
    - Converting degrees-minutes-seconds to decimal degrees
    - Converting decimal degrees to degrees-minutes-seconds
    - 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 2π radians in standard position
    - Coterminal angles
    - Arc length and central angle measure
    - Relating an angle and an arc length in a real-world situation
    - Area of a sector of a circle
    - Using the area formula for a sector of a circle in a real-world situation
    - Angular and linear speed

  - The Unit Circle and Evaluating Trigonometric Functions (13 topics)
    - Finding coordinates on the unit circle for special angles
    - Finding a point on the unit circle given one coordinate and the quadrant
    - 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
    - Trigonometric functions and special angles: Problem type 3
    - 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 (11 topics)
    - Special right triangles: Exact answers
    - 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 2π radians, and also its reference angle
  - Reference angles in radians: Problem type 1
  - Sketching an angle with absolute value greater than 2π 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

- Trigonometric Graphs (29 topics)

  - 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 $y = \pm\sin(bx)$ or $y = \pm\cos(bx)$
    - Sketching the graph of $y = \sin(x) + d$ or $y = \cos(x) + d$
    - Using transformations to graph $y = \pm\sin(x) + d$ or $y = \pm\cos(x) + d$
    - Using transformations to graph $y = a \sin(x) + d$ or $y = a \cos(x) + d$
    - Using transformations to graph $y = \pm\sin(bx) + d$ or $y = \pm\cos(bx) + d$
    - 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

- Trigonometric Identities and Equations (64 topics)

  - Inverse Trigonometric Functions (9 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
    - Composition of trigonometric functions with variable expressions as inputs: Problem type 2
    - Using a calculator to approximate inverse trigonometric values

  - Verifying Trigonometric Identities (14 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
- Proving trigonometric identities using odd and even identities

- 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, and Product-to-Sum 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 (21 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
    - Using a graphing calculator to solve a trigonometric equation
    - 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 an angle multiplied by a constant
    - 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
    - Finding solutions in an interval for a trigonometric equation involving sine and cosine using sum and difference identities

- Triangles and Vectors (35 topics)

- Laws of Sines and Cosines (9 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
    - Using trigonometry to find the area of a right triangle
    - Using trigonometry to find the area of a triangle
    - Heron's formula

- 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
  - 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 Complex Numbers (22 topics)

  - 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

- Conic Sections (13 topics)

  - Parabolas (2 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

  - Ellipses (1 topics)
    - Graphing an ellipse given its equation in standard form

  - 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: Advanced
    - Addition and subtraction of 3 fractions involving signs
    - Signed fraction multiplication: Advanced
    - Operations with absolute value: Problem type 2
    - Exponents and integers: Problem type 2
    - Order of operations with integers and exponents
    - Converting between temperatures in Fahrenheit and Celsius
    - Properties of addition
    - Properties of real numbers
    - Identifying properties used to simplify an algebraic expression
    - Understanding the product rule of exponents
    - Product rule with positive exponents: Multivariate
    - Understanding the power rules of exponents
    - Power and product rules with positive exponents
    - Quotient of expressions involving exponents
    - Simplifying a ratio of multivariate monomials: Advanced
    - Power and quotient rules with positive 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
    - Product rule with negative exponents
    - Quotient rule with negative exponents: Problem type 1
    - Quotient rule with negative exponents: Problem type 2
    - Power of a power rule with negative exponents
    - Power rules with negative exponents
    - 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 a positive exponent
    - Scientific notation with a 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 and leading coefficient of a univariate polynomial
    - Degree of a multivariate polynomial
    - Simplifying a sum or difference of three univariate polynomials
    - Simplifying a sum or difference of multivariate polynomials
    - Multiplying a multivariate polynomial by a monomial
    - Multiplying binomials in two variables
    - Multiplying conjugate binomials: Multivariate
    - Squaring a binomial: Multivariate
    - Multiplication involving binomials and trinomials in one variable
    - Multiplication involving binomials and trinomials in two variables
    - Prime numbers
    - Prime factorization
    - Greatest common factor of three univariate monomials
    - Greatest common factor of two multivariate monomials
    - 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 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 quadratic with a negative leading coefficient
- 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 a product of a quadratic trinomial and a monomial
- 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 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
- 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 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
- Square roots of integers raised to even exponents
- Introduction to simplifying a radical expression with an even exponent
- Square root of a perfect square monomial
- Using absolute value to simplify square roots of perfect square monomials
- Finding the nth root of a perfect n^{th} power fraction
- Finding the nth root of a perfect n^{th} power monomial
- Using absolute value to simplify higher radical expressions
- Converting between radical form and exponent form
- Rational exponents: Unit fraction exponents and bases involving signs
- Rational exponents: Negative exponents and fractional bases
- 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
- 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 radical expression with two variables
- Introduction to simplifying a higher radical expression
- Simplifying a higher radical expression: Univariate
- Simplifying a higher radical expression: Multivariate
- 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 simplifying a product of radical expressions: Univariate
- 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 parallelogram
- Area of a trapezoid
- Perimeter involving rectangles and circles
- 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 rectangular prism
- 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
- Word problem involving the Pythagorean Theorem

- Equations and Inequalities (100 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 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 equations with zero, one, or infinitely many solutions
  - Translating a sentence into a multi-step equation
  - Solving a decimal word problem using a linear equation with the variable on both sides
  - Solving a fraction word problem using a linear equation with the variable on both sides
  - Solving a word problem with three unknowns using a linear equation
  - 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 distance, rate, time problem using a linear equation
  - Finding the perimeter or area of a rectangle given one of these values
  - Circumference ratios
  - Finding angle measures of a triangle given angles with variables
  - 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
  - Solving an absolute value equation: Problem type 1
  - Solving an absolute value equation: Problem type 2
  - 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

- Writing sets of integers using set-builder and roster forms
- 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 1
- 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: 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 3
- Word problem on proportions: Problem type 2
- Similar polygons
- Similar right triangles
- Indirect measurement
- Word problem involving multiple rates
- Solving a work problem using a rational equation
- Solving a distance, rate, time problem using a rational equation
- Simplifying a power of i
- 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
- Using the Pythagorean Theorem and a quadratic equation to find side lengths of a right triangle
- Solving a quadratic equation by completing the square: Exact answers
- Solving a quadratic equation with complex roots
- Discriminant of a quadratic equation
- Discriminant of a quadratic equation with a parameter
- Solving a quadratic inequality written in factored form
- Solving a quadratic inequality
- Solving a rational equation that simplifies to linear: Factorable quadratic denominator
- Solving a rational equation that simplifies to quadratic: Proportional form, basic
- 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
- 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 that simplifies to a quadratic equation: One radical, basic
- Solving a radical equation that simplifies to a quadratic equation: One radical, 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 a positive rational exponent
- Solving an equation with a negative rational exponent
- Solving an equation that can be written in quadratic form: Problem type 1
- Solving an equation that can be written in quadratic form: Problem type 2

- Graphs and Functions (112 topics)
  - Finding the area of a triangle or parallelogram in the coordinate plane
  - Distance between two points in the plane: Decimal answers
  - Identifying scalene, isosceles, and equilateral triangles given coordinates of their vertices
  - Midpoint of a line segment in the plane
  - Finding an endpoint of a line segment given the other endpoint and the midpoint
  - Finding x- and y-intercepts of a line given the equation: Advanced

- Graphing a line given its x- and y-intercepts
- Finding x- and y-intercepts of the graph of a nonlinear equation
- Determining if graphs have symmetry with respect to the x-axis, y-axis, or origin
- 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 given its slope and y-intercept
- 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
- Finding the slope and a point on a line given its equation in point-slope form
- Graphing 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 in standard form given the slope and a point
- Writing the equations of vertical and horizontal lines through a given point
- Comparing linear functions to the parent function y = x
- 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
- Identifying parallel and perpendicular lines from equations
- Writing equations of lines parallel and perpendicular to a given line through a point
- 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
- Interpreting the parameters of a linear function that models a real-world situation
- Application problem with a linear function: Finding a coordinate given the slope and a point
- Application problem with a linear function: Finding a coordinate given two points
- 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
- Solving a system of linear equations using elimination with addition
- Solving a system of linear equations using elimination with multiplication and addition
- Solving a word problem involving a sum and another basic relationship using a system of linear equations
- 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 and identifying points that lie on the circle
- Writing an equation of a circle given its center and radius or diameter
- Deriving the equation of a circle using the Pythagorean Theorem
- 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
- Evaluating a cube root function
- Evaluating functions: Absolute value, rational, radical
- Table for an exponential function
- Evaluating a piecewise-defined function
- Domains of higher root functions
- 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
- 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
- Finding a difference quotient for a linear or quadratic function
- Finding a difference quotient for a rational function
- Domain and range from the graph of a discrete relation
- Finding domain and range from a linear graph in context
- Domain and range from the graph of a piecewise function
- 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
- Graphing an exponential function and its asymptote: $f(x)=b^x$
- 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
- Writing the equation of a secant line
- How the leading coefficient affects the shape of a parabola
- How the leading coefficient affects the graph of an absolute value function
- Sum, difference, and product of two functions
- Quotient of two functions: Basic
- Quotient of two functions: Advanced
- Combining functions: Advanced
- Composition of a function with itself
- Expressing a function as a composition of two functions
- Composition of two functions: Domain and range
- Composition of two functions: Advanced
- Composition of two rational functions
- Word problem involving composition of two functions
- Finding the vertex, intercepts, and axis of symmetry from the graph of a parabola
- Graphing a parabola of the form $y = ax^2 + bx + c$: Rational 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 in standard form
- Rewriting a quadratic function to find its vertex and sketch its graph
- 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
- Finding zeros of a polynomial function written in factored form
- Finding x- and y-intercepts given a polynomial function
- Using a graphing calculator to find local extrema of a polynomial function
- Using a graphing calculator to find zeros of a polynomial function

- Trigonometric Functions (27 topics)
  - Sketching an approximation of an angle given in radians
  - Sketching an angle in standard position given in degrees and finding a coterminal angle
  - Sketching an angle in standard position given in radians and finding a coterminal angle
  - Sketching an angle with absolute value greater than 360 degrees in standard position
  - Sketching an angle with absolute value greater than 2π radians in standard position
  - Sketching an angle with absolute value greater than 360 degrees and finding coterminal angles
  - Sketching an angle with absolute value greater than 2π radians and finding coterminal angles
  - Drawing an arc to find a central angle or an arc length on the unit circle
  - Drawing an arc to find a central angle or an arc length on a non-unit circle
  - Relating two angle measures in a real-world situation that involves interlocking gears
  - Using the coordinates of points on the unit circle to define sine and cosine for all real numbers
  - Drawing a reference triangle on the unit circle and using it to derive values of trigonometric functions: Degrees
  - Using symmetries on the unit circle to understand trigonometric identities: Problem type 1
  - Using the unit circle to understand that sine and cosine are periodic
  - Using the coordinates of points on the unit circle to define trigonometric functions for all real numbers
  - Using symmetries on the unit circle to understand trigonometric identities: Problem type 2
  - Using the unit circle to understand the odd and even identities for sine and cosine
  - Simplifying a trigonometric expression: Rationalizing the denominator using conjugates
  - Using a calculator to approximate cosecant, secant, and cotangent values
  - 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
  - Word problem involving a triangle whose side lengths change with time: Problem type 1
  - Word problem involving a triangle whose side lengths change with time: Problem type 2
  - Using trigonometry to find lengths in a figure involving two right triangles
  - Sketching an angle with absolute value greater than 360 degrees, and also its reference angle

- Trigonometric Graphs (5 topics)
  - Using graphing to solve a trigonometric equation involving sine or cosine
  - Average rate of change involving a sinusoidal function
  - Understanding how changes to the amplitude, period, phase shift, and vertical shift affect a sinusoidal graph
  - Sketching the graph of a sinusoidal function that models a real-world situation and using the graph to approximate solutions to an equation
  - Sketching a graph of a damped sine or cosine function

- Trigonometric Identities and Equations (12 topics)
  - Proving an identity using fundamental trigonometric identities: Problem type 8
  - Using a double-angle identity to find the exact value of a composition of trigonometric functions
  - Double-angle identities: Problem type 3

- Proving trigonometric identities using sum-to-product identities: Problem type 1
- Proving trigonometric identities using sum-to-product identities: Problem type 2
- Using a Pythagorean identity to find solutions in an interval for a trigonometric equation involving sine and cosine: Problem type 2
- Using a Pythagorean identity to find solutions in an interval for a trigonometric equation: Problem type 2
- Using a graphing calculator to solve a trigonometric inequality
- Solving a trigonometric equation involving more than one function
- 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

- **Triangles and Vectors (7 topics)**
  - Proving the law of sines
  - Proving the law of cosines
  - Expressing the area of a triangle in terms of the sine of one of its angles
  - 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

- **Polar Coordinates and Complex Numbers (2 topics)**
  - Converting rectangular coordinates to polar coordinates: Decimal answers
  - Identifying symmetries of graphs given their polar equations

- **Conic Sections (24 topics)**
  - 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
  - Deriving the equation of a parabola given its focus and 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
  - 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
  - Writing an equation of an ellipse given the foci and the major axis length
  - Word problem involving an ellipse
  - 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
  - Writing an equation of a hyperbola given the foci and the asymptotes: Advanced
  - Classifying conics given their equations

- **Exponential and Logarithmic Functions (62 topics)**
  - 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
  - Finding domain and range from 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: $f(x) = a(e)^{x-b} + c$
  - 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
  - Calculating and comparing simple interest and 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
  - 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
  - Comparing linear, polynomial, and exponential functions
  - 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
- Graphing a logarithmic function: Advanced
- 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
- Expanding a logarithmic expression: Problem type 3
- Writing an expression as a single logarithm
- Change of base for logarithms: Problem type 1
- Change of base for logarithms: Problem type 2
- 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 finding common bases: Linear and quadratic 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
- Solving an exponential equation by using substitution and quadratic factoring
- Using a graphing calculator to solve an exponential or logarithmic equation
  Finding solutions in an interval for an equation involving a trigonometric expression and either exponentials or
- logarithms
- 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 final amount in a word problem on continuous exponential growth or decay
- Finding the initial amount in a word problem on continuous compound interest
- 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
- Proving identities involving trigonometric functions and logarithmic functions

*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.