ALEKS®

Prep for PreCalculus

This course covers the topics shown below; **new topics** have been highlighted.
Students navigate learning paths based on their level of readiness.
Institutional users may customize the scope and sequence to meet curricular needs.

Curriculum (246 topics + 58 additional topics)

- Real Numbers (30 topics)
  - ♦ Fractions (5 topics)
    - ◊ Simplifying a fraction
    - ◊ Ordering fractions
    - ◊ Addition or subtraction of fractions with different denominators
    - ◊ Fraction multiplication
    - ◊ Fraction division
  - ♦ Percents and Proportions (8 topics)
    - ◊ Converting between percentages and decimals
    - ◊ **Applying the percent equation**
    - ◊ Finding the sale price given the original price and percent discount
    - ◊ Finding the original price given the sale price and percent discount
    - ◊ **Simple interest**
    - ◊ Solving a proportion of the form x/a = b/c
    - ◊ Word problem on proportions: Problem type 1
    - ◊ **Word problem on proportions: Problem type 2**
  - ♦ Signed Numbers (15 topics)
    - ◊ Integer addition: Problem type 2
    - ◊ Integer subtraction: Problem type 3
    - ◊ **Signed fraction addition: Basic**
    - ◊ Signed fraction addition: Advanced
    - ◊ Signed decimal addition with three numbers
    - ◊ Integer multiplication and division
    - ◊ **Signed fraction multiplication: Basic**
    - ◊ Signed fraction multiplication: Advanced
    - ◊ Exponents and integers: Problem type 1
    - ◊ Exponents and signed fractions
    - ◊ Exponents and order of operations
    - ◊ Evaluating a linear expression in two variables
    - ◊ Evaluating a quadratic expression in one variable
    - ◊ Absolute value of a number
    - ◊ Operations with absolute value
  - ♦ Properties of Real Numbers (2 topics)
    - ◊ Integers and rational numbers
    - ◊ Rational and irrational numbers
- Equations and Inequalities (32 topics)
  - ♦ Linear Equations (20 topics)
    - ◊ Additive property of equality with integers
    - ◊ Multiplicative property of equality with signed fractions

Copyright © 2013 UC Regents and ALEKS Corporation. ALEKS is a registered trademark of ALEKS Corporation.

- ◊ Solving a two−step equation with integers
- ◊ Solving a two−step equation with signed fractions
- ◊ Solving a linear equation with several occurrences of the variable: Variables on the same side and distribution
- ◊ Solving a linear equation with several occurrences of the variable: Variables on both sides and fractional coefficients
- ◊ Solving a linear equation with several occurrences of the variable: Variables on both sides and distribution
- ◊ Solving a linear equation with several occurrences of the variable: Variables on both sides and two distributions
- ◊ Solving a linear equation with several occurrences of the variable: Fractional forms with binomial numerators
- ◊ **Solving equations with zero, one, or infinitely many solutions**
- ◊ **Algebraic symbol manipulation: Problem type 1**
- ◊ Algebraic symbol manipulation: Problem type 2
- ◊ Writing a simple variable expression for a real−world situation
- ◊ **Translating a sentence into a two−step expression**
- ◊ Translating a sentence into a one−step equation
- ◊ Solving a word problem with two unknowns using a linear equation
- ◊ Solving a decimal word problem using a linear equation of the form Ax + B = C
- ◊ **Solving a value mixture problem using a linear equation**
- ◊ **Solving a percent mixture problem using a linear equation**
- ◊ **Solving a distance, rate, time problem using a linear equation**

♦ Linear Inequalities (9 topics)

- ◊ Graphing a linear inequality on the number line
- ◊ Graphing a compound linear inequality on the number line
- ◊ Solving a linear inequality: Problem type 1
- ◊ Solving a linear inequality: Problem type 2
- ◊ Solving a linear inequality: Problem type 3
- ◊ Solving a linear inequality: Problem type 4
- ◊ **Solving a compound linear inequality: Problem type 1**
- ◊ **Solving a compound linear inequality: Problem type 2**
- ◊ **Word problem with linear inequalities: Problem type 1**

♦ Absolute Value Equations and Inequalities (3 topics)

- ◊ **Simple absolute value equation**
- ◊ Solving an equation involving absolute value: Basic
- ◊ Solving an inequality involving absolute value: Basic

• Exponents and Polynomials (44 topics)

♦ Properties of Exponents (13 topics)

- ◊ Writing a positive number without a negative exponent
- ◊ Writing a negative number without a negative exponent
- ◊ **Writing a simple algebraic expression without negative exponents**
- ◊ Introduction to the product rule of exponents
- ◊ Product rule with positive exponents
- ◊ Product rule with negative exponents
- ◊ Quotients of expressions involving exponents
- ◊ **Quotient rule with negative exponents: Problem type 1**
- ◊ **Introduction to the power rule of exponents**
- ◊ Power rule with positive exponents
- ◊ Power rule with negative exponents: Problem type 1
- ◊ **Power rule with negative exponents: Problem type 2**
- ◊ **Using the power and product rules to simplify expressions with positive exponents**

♦ Scientific Notation (2 topics)

Copyright © 2013 UC Regents and ALEKS Corporation. ALEKS is a registered trademark of ALEKS Corporation.

- ◊ Scientific notation with positive exponent
- ◊ Scientific notation with negative exponent

♦ Polynomial Expressions (9 topics)

- ◊ **Degree and leading coefficient of a polynomial in one variable**
- ◊ **Combining like terms: Advanced**
- ◊ **Simplifying a sum or difference of two univariate polynomials**
- ◊ **Multiplying a monomial and a polynomial: Univariate with positive leading coefficients**
- ◊ **Multiplying a monomial and a polynomial: Multivariate**
- ◊ Multiplying binomials with leading coefficients of 1
- ◊ **Multiplying conjugate binomials: Univariate**
- ◊ Squaring a binomial: Univariate
- ◊ Multiplication involving binomials and trinomials in two variables

♦ Factoring (9 topics)

- ◊ **Introduction to the GCF of two monomials**
- ◊ Greatest common factor of two multivariate monomials
- ◊ **Factoring out a monomial from a polynomial: Univariate**
- ◊ **Factoring out a monomial from a polynomial: Multivariate**
- ◊ Factoring a quadratic with leading coefficient 1
- ◊ Factoring a quadratic with leading coefficient greater than 1
- ◊ Factoring a product of a quadratic trinomial and a monomial
- ◊ Factoring a difference of squares
- ◊ **Factoring a polynomial by grouping: Problem type 1**

♦ Quadratic Equations (11 topics)

- ◊ Solving equations written in factored form
- ◊ Finding the roots of a quadratic equation with leading coefficient 1
- ◊ Finding the roots of a quadratic equation with leading coefficient greater than 1
- ◊ Solving a quadratic equation needing simplification
- ◊ Solving a quadratic equation using the square root property: Problem type 1
- ◊ Completing the square
- ◊ Applying the quadratic formula: Exact answers
- ◊ Discriminant of a quadratic equation
- ◊ Solving a word problem using a quadratic equation with rational roots
- ◊ Solving a word problem using a quadratic equation with irrational roots
- ◊ **Solving a quadratic inequality written in factored form**

• Lines and Systems (33 topics)

♦ Ordered Pairs (3 topics)

- ◊ Plotting a point in the coordinate plane
- ◊ Finding a solution to a linear equation in two variables
- ◊ Identifying solutions to linear equations in two variables

♦ Graphing Lines (5 topics)

- ◊ Graphing a line given the x− and y−intercepts
- ◊ Graphing a line given its equation in slope−intercept form
- ◊ Graphing a line given its equation in standard form
- ◊ Graphing a line through a given point with a given slope
- ◊ Graphing a vertical or horizontal line

♦ Equations of Lines (13 topics)

- ◊ Y−intercept of a line
- ◊ Finding x− and y−intercepts of a line given the equation: Advanced
- ◊ **Finding slope given the graph of a line on a grid**
- ◊ Finding slope given two points on the line
- ◊ Finding the slope of a line given its equation
- ◊ Writing an equation of a line given the y−intercept and another point
- ◊ Writing the equation of a line given the slope and a point on the line

Copyright © 2013 UC Regents and ALEKS Corporation. ALEKS is a registered trademark of ALEKS Corporation.

- ◊ Writing the equation of the line through two given points
- ◊ Slopes of parallel and perpendicular lines: Problem type 1
- ◊ Slopes of parallel and perpendicular lines: Problem type 2
- ◊ Writing an equation and drawing its graph to model a real−world situation
- ◊ Application problem with a linear function: Problem type 1
- ◊ Application problem with a linear function: Problem type 2

♦ Graphing Linear Inequalities (3 topics)

- ◊ Graphing a linear inequality in the plane: Standard form
- ◊ Graphing a linear inequality in the plane: Vertical or horizontal lines
- ◊ Graphing a linear inequality in the plane: Slope−intercept form

♦ Systems of Linear Equations (9 topics)

- ◊ Graphically solving a system of linear equations
- ◊ **Solving a simple system using substitution**
- ◊ Solving a system of linear equations using elimination with multiplication and addition
- ◊ Solving a word problem involving a sum and another simple relationship using a system of linear equations
- ◊ Solving a value mixture problem using a system of linear equations
- ◊ **Solving a distance, rate, time problem using a system of linear equations**
- ◊ **Solving a percent mixture problem using a system of linear equations**
- ◊ Interpreting the graphs of two functions
- ◊ Graphing a system of linear inequalities

• Functions and Graphs (29 topics)

♦ Sets, Relations, and Functions (9 topics)

- ◊ Union and intersection of finite sets
- ◊ Set builder and interval notation
- ◊ **Identifying functions from relations**
- ◊ Vertical line test
- ◊ **Evaluating functions: Problem type 1**
- ◊ **Evaluating functions: Problem type 2**
- ◊ **Evaluating a piecewise−defined function**
- ◊ **Variable expressions as inputs of functions**
- ◊ Domain and range from ordered pairs

♦ Graphs and Transformations (16 topics)

- ◊ **Finding intercepts and zeros of a function given the graph**
- ◊ **Finding local maxima and minima of a function given the graph**
- ◊ **Finding zeros of a polynomial function written in factored form**
- ◊ Domain and range from the graph of a continuous function
- ◊ Writing an equation for a function after a vertical translation
- ◊ Writing an equation for a function after a vertical and horizontal translation
- ◊ **Translating the graph of a function: One step**
- ◊ **Translating the graph of a function: Two steps**
- ◊ **Transforming the graph of a function by reflecting over an axis**
- ◊ **Transforming the graph of a function by shrinking or stretching**
- ◊ Finding the x−intercept(s) and the vertex of a parabola
- ◊ Graphing a parabola of the form $y = ax^2$
- ◊ Graphing a parabola of the form $y = (x-a)^2 + c$
- ◊ **Graphing a parabola of the form $y = ax^2 + bx + c$: Integer coefficients**
- ◊ **Graphing a simple cubic function**
- ◊ Graphing an equation involving absolute value in the plane: Advanced

♦ Combining Functions; Composite Functions; Inverse Functions (4 topics)

- ◊ Sum, difference, and product of two functions
- ◊ **Quotient of two functions**
- ◊ Composition of two functions: Basic

Copyright © 2013 UC Regents and ALEKS Corporation. ALEKS is a registered trademark of ALEKS Corporation.

- ◊ Inverse functions: Problem type 1

- Rational Expressions (27 topics)
  - ♦ Rational Expressions (19 topics)
    - ◊ Domain of a rational function
    - ◊ Simplifying a ratio of polynomials: Problem type 1
    - ◊ Simplifying a ratio of polynomials: Problem type 2
    - ◊ Ratio of multivariate polynomials
    - ◊ Multiplying rational expressions: Problem type 1
    - ◊ Multiplying rational expressions: Problem type 2
    - ◊ Dividing rational expressions: Problem type 1
    - ◊ **Introduction to the LCM of two monomials**
    - ◊ Adding rational expressions with common denominators
    - ◊ Adding rational expressions with different denominators: ax, bx
    - ◊ Adding rational expressions with different denominators: x+a, x+b
    - ◊ **Complex fractions without variables: Problem type 1**
    - ◊ **Complex fractions without variables: Problem type 2**
    - ◊ Complex fraction: Problem type 1
    - ◊ **Complex fraction: Problem type 3**
    - ◊ **Complex fraction: Problem type 4**
    - ◊ **Dividing a polynomial by a monomial: Univariate**
    - ◊ **Polynomial long division: Problem type 1**
    - ◊ Polynomial long division: Problem type 2
  - ♦ Rational Equations (6 topics)
    - ◊ Solving a rational equation that simplifies to a linear equation: Problem type 1
    - ◊ Solving a rational equation that simplifies to a linear equation: Problem type 2
    - ◊ Solving a rational equation that simplifies to a linear equation: Problem type 3
    - ◊ **Solving a rational equation that simplifies to a linear equation: Problem type 4**
    - ◊ Solving a rational equation that simplifies to a quadratic equation: Problem type 1
    - ◊ Solving a rational equation that simplifies to a quadratic equation: Problem type 2
  - ♦ Variation (2 topics)
    - ◊ Word problem on direct variation
    - ◊ Word problem on inverse variation

- Radical Expressions (26 topics)
  - ♦ Radical Functions (2 topics)
    - ◊ Domain of a square root function
    - ◊ **Graphing a function involving a square root**
  - ♦ Radical Expressions (16 topics)
    - ◊ Square root of a rational perfect square
    - ◊ Cube root of an integer
    - ◊ Square root simplification
    - ◊ **Square root of a perfect square monomial**
    - ◊ Simplifying a radical expression: Problem type 1
    - ◊ Simplifying a radical expression: Problem type 2
    - ◊ Simplifying a higher radical: Problem type 1
    - ◊ Simplifying a higher radical: Problem type 2
    - ◊ Square root addition
    - ◊ Simplifying a sum of radical expressions
    - ◊ Square root multiplication
    - ◊ Simplifying a product of radical expressions
    - ◊ Simplifying a product of radical expressions using the distributive property
    - ◊ **Special products with square roots: Conjugates and squaring**
    - ◊ Rationalizing the denominator of a radical expression
    - ◊ Rationalizing the denominator of a radical expression using conjugates

Copyright © 2013 UC Regents and ALEKS Corporation. ALEKS is a registered trademark of ALEKS Corporation.

- ♦ Rational Exponents (5 topics)
  - ◊ Converting between radical form and exponent form
  - ◊ Rational exponents: Basic
  - ◊ Rational exponents: Negative exponents and fractional bases
  - ◊ **Rational exponents: Products and quotients**
  - ◊ Rational exponents: Powers of powers
- ♦ Radical Equations (3 topics)
  - ◊ Solving a radical equation that simplifies to a linear equation: One radical
  - ◊ Solving a radical equation that simplifies to a linear equation: Two radicals
  - ◊ Solving a radical equation that simplifies to a quadratic equation: One radical

- Geometry (25 topics)
  - ♦ Perimeter, Area, and Volume (17 topics)
    - ◊ Perimeter of a square or a rectangle
    - ◊ Area of a square or a rectangle
    - ◊ Area of a piecewise rectangular figure
    - ◊ **Finding a side length given the perimeter and side lengths with variables**
    - ◊ Finding the side length of a rectangle given its perimeter or area
    - ◊ Finding the perimeter or area of a rectangle given one of these values
    - ◊ **Area of a parallelogram**
    - ◊ **Area of a triangle**
    - ◊ Circumference and area of a circle
    - ◊ Perimeter involving rectangles and circles
    - ◊ Area involving inscribed figures
    - ◊ Volume of a rectangular prism
    - ◊ Volume of a cylinder
    - ◊ Surface area of a cube or a rectangular prism
    - ◊ Surface area of a cylinder
    - ◊ **Similar polygons**
    - ◊ **Indirect measurement**
  - ♦ Angles (3 topics)
    - ◊ **Solving equations involving vertical angles**
    - ◊ **Sum of the angle measures of a triangle**
    - ◊ **Finding an angle measure for a triangle with an extended side**
  - ♦ Coordinate Geometry (5 topics)
    - ◊ Pythagorean Theorem
    - ◊ Distance between two points in the plane
    - ◊ Graphing a circle given its equation in standard form
    - ◊ Graphing a circle given its equation in general form
    - ◊ Writing an equation of a circle given its center and a point on the circle

- Other Topics Available(*) (58 additional topics)
  - ♦ Real Numbers (6 topics)
    - ◊ Fractional part of a circle
    - ◊ Finding the percentage increase or decrease
    - ◊ Finding unit rates
    - ◊ **Exponents and integers: Problem type 2**
    - ◊ Properties of addition
    - ◊ Properties of real numbers
  - ♦ Equations and Inequalities (6 topics)
    - ◊ Solving an equation to find the value of an expression
    - ◊ 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

Copyright © 2013 UC Regents and ALEKS Corporation. ALEKS is a registered trademark of ALEKS Corporation.

◊ **Solving a word problem with three unknowns using a linear equation**
◊ Writing a multi−step inequality for a real−world situation
◊ **Word problem with linear inequalities: Problem type 2**

♦ Exponents and Polynomials (13 topics)
◊ **Evaluating expressions with exponents of zero**
◊ Ordering numbers with positive exponents
◊ Ordering numbers with negative exponents
◊ **Using the power, product, and quotient rules to simplify expressions with negative exponents**
◊ Multiplying and dividing numbers written in scientific notation
◊ Degree of a multivariate polynomial
◊ Simplifying a sum or difference of three univariate polynomials
◊ Factoring with repeated use of the difference of squares formula
◊ Factoring a sum or difference of two cubes
◊ **Solving equations that can be written in quadratic form: Problem type 1**
◊ **Solving a quadratic equation using the square root property: Problem type 2**
◊ **Solving a quadratic equation by completing the square**
◊ Solving a quadratic inequality

♦ Lines and Systems (5 topics)
◊ Writing the equations of vertical and horizontal lines through a given point
◊ **Solving a system of 3 equations in 3 unknowns**
◊ **Solving a system that is inconsistent or consistent dependent**
◊ **Solving a tax rate or interest rate problem using a system of linear equations**
◊ **Solving a word problem using a 3 by 3 system of linear equations**

♦ Functions and Graphs (6 topics)
◊ Set builder notation
◊ Finding inputs and outputs of a function from its graph
◊ **Finding where a function is increasing, decreasing, or constant given the graph**
◊ Classifying the graph of a function
◊ Horizontal line test
◊ **Determining whether two functions are inverses of each other**

♦ Rational Expressions (6 topics)
◊ Ordering fractions with variables
◊ **Dividing rational expressions: Problem type 2**
◊ Least common multiple of two monomials
◊ Adding rational expressions with different denominators: Multivariate
◊ **Writing an equation that models variation**
◊ **Word problem on combined variation**

♦ Radical Expressions (8 topics)
◊ **Rationalizing the denominator of a higher index radical with variables**
◊ **Using *i* to rewrite square roots of negative numbers**
◊ **Simplifying a product or quotient involving roots of negative numbers**
◊ Adding and subtracting complex numbers
◊ Multiplying complex numbers
◊ Dividing complex numbers
◊ Simplifying a power of *i*
◊ Solving a quadratic equation with complex roots

♦ Geometry (8 topics)
◊ Areas of rectangles with the same perimeter
◊ Finding the radius or the diameter of a circle given its circumference
◊ Circumference ratios
◊ **Area involving rectangles and circles**
◊ Area between two concentric circles
◊ Rate of filling of a solid

Copyright © 2013 UC Regents and ALEKS Corporation. ALEKS is a registered trademark of ALEKS Corporation.

◊ Midpoint of a line segment in the plane
◊ Writing an equation of a circle given the endpoints of a diameter

(*) Other Topics Available

By default, these topics are NOT included in the course, but can be added using the content editor in the Teacher Module.

Copyright © 2013 UC Regents and ALEKS Corporation. ALEKS is a registered trademark of ALEKS Corporation.