



College Algebra with Corequisite Support: A Targeted Review | Table of Contents

Corequisite Support for College Algebra

Chapter 1: Foundations

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- Application Problems and the Division and Multiplication Properties of Equality
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College Algebra

Chapter 1: Prerequisites

1.1 Algebra Essentials

- Properties of Real Numbers and Order of Operations
 - Distinguish between natural numbers, whole numbers, and integers
 - Distinguish between rational and irrational numbers
 - Perform calculations using order of operations
 - Use the inverse and identity properties of real numbers
 - Use the commutative, associative, and distributive properties of real numbers
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- Evaluate and Simplify Algebraic Expressions
 - Evaluate algebraic expressions with a single variable
 - Evaluate algebraic expressions with two variables
 - Identify constants and variables
 - Use a formula
 - Simplify algebraic expressions

1.2 Exponents and Scientific Notation

- Product, Quotient, and Power Properties of Exponents
 - Understand exponent notation
 - Use the product rule of exponents
 - Use the quotient rule of exponents
 - Use the power rule of exponents
- Negative Exponents and Simplifying Exponential Expressions
 - Use the negative and zero exponent rule
 - Find the power of a product
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- Scientific Notation
 - Convert between standard and scientific notation
 - Multiply and divide numbers in scientific notation

1.3 Radicals and Rational Exponents

- Simplify Radicals
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 - Use the quotient rule to simplify square roots
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 - Rationalize denominators with a monomial denominator
 - Rationalize denominators using the conjugate
- Radicals
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 - Operations with nth roots
 - Switch between radical and rational exponent form
 - Evaluate expressions with rational exponents

1.4 Polynomials

- Properties of Polynomials
 - Identify the degree and leading coefficient of a polynomial
 - Identify monomials, binomials, and trinomials
 - Operations on Polynomials
 - Add and subtract polynomials
 - Multiply binomials together
 - Multiply polynomials together
 - Perform operations with polynomials of several variables
-

1.5 Factoring Polynomials

- Factor Quadratics
 - Factor the greatest common factor of a polynomial
 - Factor a trinomial
 - Factor a trinomial by grouping
- Factor Quadratics with Special Products
 - Factor a perfect square trinomial
 - Factor a difference of squares
- Factor Cubics
 - Factor a cubic by grouping
 - Factor the sum and difference of cubes
- Factor Expressions with Fractional or Negative Exponents
 - Factor expressions using fractional or negative exponents
 - Factor expressions using greatest common factor and other technique

1.6 Rational Expressions

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 - Divide rational expressions
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Chapter 2: Equations and Inequalities

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 - Graph equations by plotting points
 - Use the distance formula, given two points
 - Use the midpoint formula

2.2 Linear and Rational Equations in One Variable

- Solve Linear Equations in One Variable
 - Identify identity, conditional, and inconsistent equations
 - Solve equations in one variable algebraically, variable just on one side
 - Solve equations in one variable algebraically, variable on both sides
 - Solve Rational Equations
 - Solve a rational equation, monomials in denominator
 - Solve a rational equation, binomials in denominator
 - Solve a rational equation, requires factoring to find least common denominator
 - Identify Slopes and Intercepts
 - Find the slope of a line given two points
 - Understand the relationship between the slope and y-intercept of a line and its equation
 - Find x -intercepts and y -intercepts
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- Find Linear Equations
 - Find equation of a line, in slope-intercept form, given slope and one point (point-slope formula)
 - Find equation, in slope-intercept form, of a line passing through two given points
 - Given slope and intercept, find the equation of a line and write it in standard form
 - Find the equation of vertical and horizontal lines
- Parallel and Perpendicular Lines
 - Given the equations of two lines, determine whether their graphs are parallel or perpendicular
 - Write the equation of a line parallel to a given line
 - Write the equation of a line perpendicular to a given line

2.3 Models and Applications

- Word Problems with Linear Equations
 - Set up a linear equation to solve a real-world application
 - Translate verbal expressions into mathematical expressions
 - Use a formula to solve a real-world application

2.4 Complex Numbers

- Basics of Complex Numbers
 - Express the square root of a negative number as a multiple of i
 - Simplify powers of i
- Operations on Complex Numbers
 - Add and subtract complex numbers
 - Multiply a complex number by a real number
 - Multiply two complex numbers
 - Divide two complex numbers

2.5 Quadratic Equations

- Solve Quadratic Equations by Factoring
 - Solve quadratic equations by factoring, leading coefficient 1
 - Solve quadratic equations by factoring, leading coefficient > 1
- Complete the Square
 - Solve quadratic equations by the square root property
 - Solve quadratic equations by completing the square
- Quadratic Formula
 - Use the discriminant to classify the solutions of a quadratic equation
 - Solve quadratic equations by using the quadratic formula

2.6 Other Types of Equations

- Solve Higher Order Equations with Factoring
 - Solve equations by factoring out the greatest common factor
 - Solve equations by factoring with grouping
 - Solve Equations Quadratic in Form by Factoring
 - Solve fourth-degree equation in quadratic form
 - Solve quadratic with binomial
 - Solve Radical Equations
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- Solve radical equations with a single radical
- Solve radical equations with two radicals
- Solve Other Types of Equations
 - Solve equations using reciprocal exponents
 - Solve equations involving rational exponents by factoring out the greatest common factor
 - Solve rational equation which leads to a quadratic

2.7 Linear Inequalities and Absolute Value Inequalities

- Interval Notation and Inequalities
 - Use interval notation
 - Use properties of inequalities
 - Solve simple inequalities in one variable algebraically
 - Solve compound inequalities in one variable algebraically
- Absolute Value Equations and Inequalities
 - Solve absolute value equations
 - Solve absolute value inequalities

2.8 Inequalities Requiring Factoring

- Rational and Quadratic Inequalities
 - Solve quadratic inequalities in one variable, graph the solution set, and express the solution set using interval notation
 - Solve inequalities that involve rational expressions, graph the solution sets, and express the solution set using interval notation

Chapter 3: Functions

3.1 Functions and Function Notation

- Relations and Functions
 - Identify domain and range from a set of ordered pairs
 - Determine whether a relation represents a function
 - Use the vertical line test to identify functions
- One-to-One Functions
 - Determine whether a function is one-to-one
 - Use the horizontal line test to identify one-to-one functions
- Function Notation
 - Evaluate a function using function notation
 - Solve a function using function notation
 - Evaluate or solve a function from a table
 - Evaluate or solve a function from a graph

3.2 Domain and Range

- Domain and Range of Functions
 - Find the domain of a function defined by an equation
 - Find the domain and range of a function defined by a graph
 - Piecewise Functions
 - Graph piecewise-defined functions
 - Evaluate piecewise-defined functions
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3.3 Rates of Change and Behavior of Graphs

- Graphical Properties of Functions
 - Find the average rate of change of a function
 - Use a graph to determine intervals of increase and decrease and local extrema
 - Use a graph to locate the absolute maximum and absolute minimum
- Difference Quotients
 - Determine the difference quotient

3.4 Composition of Functions

- Combinations of Functions
 - Combine functions using algebraic operations
 - Create a new function by composition of functions
- Evaluate Composite Functions
 - Evaluate composite functions given a table of values
 - Evaluate composite functions given the graph of functions
 - Evaluate composite functions given explicit functions
- Properties of Composite Functions
 - Find the domain of a composite function
 - Decompose a composite function into its component functions

3.5 Function Graphs and Transformations

- Transformations of Functions
 - Graph functions using vertical and horizontal shifts
 - Graph functions using reflections about the x-axis and the y-axis
 - Graph functions using compressions and stretches
 - Combine transformations
- Even and Odd Functions
 - Determine whether a function is even, odd, or neither from its graph
 - Determine whether a function is even, odd, or neither given algebraically

3.6 Absolute Value Functions

- Graph Absolute Value Functions
 - Graph an absolute value function

3.7 Inverse Functions

- Inverse Function Values
 - Verify inverse function ordered pairs
 - Given graph of a function, find value of inverse function
 - Given table of values of a function, find value of inverse function
 - Find Inverse Functions
 - Verify inverse function pairs algebraically
 - Determine the domain and range of an inverse function, and restrict the domain of a function to make it one-to-one
 - Given function, find the inverse function
 - Use the graph of a one-to-one function to graph its inverse function on the same axes
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Chapter 4: Linear Functions and Modeling

4.1 Linear Functions

- Interpretations of Linear Functions
 - Represent a linear function in table form
 - Determine whether a linear function is increasing, decreasing, or constant
 - Interpret slope as a rate of change
 - Represent a real-world application as a linear function
 - Graph linear functions

4.2 Modeling with Linear Functions

- Application of Linear Functions
 - Build linear models from verbal descriptions, given a y-intercept
 - Build linear models from verbal descriptions, given inputs and outputs
 - Use a diagram to build a model
 - Model a set of data with a linear function

4.3 Fitting Linear Models to Data

- Scatter Diagrams and Lines of Best Fit
 - Draw and interpret scatter diagrams
 - Distinguish between linear and nonlinear relations

Chapter 5: Polynomial and Rational Functions

5.1 Quadratic Functions

- Characteristics of Parabolas
 - Determine axis of symmetry and vertex of parabolas from a graph
 - Determine x- and y-intercepts of parabolas from a graph
 - Find the direction a parabola opens and its axis of symmetry and vertex from the general form of its equation
 - Identify the axis of symmetry and vertex of a parabola from its equation in standard form
- Graphs of Quadratic Functions
 - Write the equation of a quadratic function given vertex and a point on a graph
 - Write the equation of a quadratic function given intercepts on a graph
 - Write the equation of a quadratic function in standard form given the equation in general form
- Applications of Quadratic Functions
 - Find the domain and range of a quadratic function
 - Determine the maximum and minimum values of quadratic functions
 - Find the x- and y-intercepts of a quadratic function
 - Use a quadratic function to model projectile motion

5.2 Graphs of Polynomial and Power Functions

- End Behavior of Polynomial Functions
 - Identify power functions and polynomial functions
 - Identify if a graph is a polynomial function
 - Determine end behavior
 - Local Behavior of Polynomial Functions
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- Identify intercepts of polynomial functions in factored form
- Understand the relationship between degree, turning points, and x-intercepts
- Understand the intermediate value theorem
- Use factoring to find zeros of polynomial functions
- Identify zeros and their multiplicities from an equation or a graph
- Write and Graph Polynomial Functions
 - Draw conclusions about a polynomial function from a graph
 - Graph polynomial functions
 - Write a formula for a polynomial function from a graph
 - Determine equation of a polynomial given key information

5.3 Dividing Polynomials

- Long Division of Polynomials
 - Use long division to divide polynomials
 - Use polynomial division to solve application problems
- Synthetic Division and Remainder Theorem
 - Use synthetic division to divide polynomials
 - Evaluate a polynomial using the remainder theorem

5.4 Zeros of Polynomial Functions

- Rational Zeros of Polynomial Functions
 - Use the factor theorem to solve a polynomial equation
 - Use the rational zero theorem to find rational zeros
 - Solve real-world applications of polynomial equations
- Complex Zeros of Polynomial Functions
 - Find zeros of polynomial functions with complex zeros
 - Use the linear factorization theorem to find polynomials with given zeros
 - Use Descartes' rule of signs

5.5 Rational Functions

- Asymptotic Behavior of Rational Functions
 - Use arrow notation to describe local behavior and end behavior of rational functions
 - Identify vertical asymptotes and removable discontinuities of rational functions
 - Identify horizontal and slant asymptotes of rational functions
- Graphs and Applications of Rational Functions
 - Solve applied problems involving rational functions
 - Find the intercepts of a rational function
 - Graph rational functions
 - Find the equation of a rational function from a graph

5.6 Inverses and Radical Functions

- Inverses of Polynomial Functions
 - Find the inverse of an invertible polynomial function
 - Restrict the domain to find the inverse of a polynomial function
 - Solve an application with the inverse of a function
 - Inverses of Radical and Rational Functions
 - Find the inverse of a radical function
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- Find the domain of a radical function composed with a rational function
- Find the inverse of a rational function

5.7 Modeling Using Variation

- Direct and Inverse Variation
 - Solve direct variation problems
 - Solve inverse variation problems
 - Solve problems involving joint variation

5.8 Circles

- Graphs of Circles
 - Given the equation of a circle not in standard form, determine the standard form by completing the square
 - Determine the center and radius of a circle from the standard equation of a circle and sketch its graph

Chapter 6: Exponential and Logarithmic Functions

6.1 Exponential Functions

- Evaluate and Write Exponential Functions
 - Identify exponential functions
 - Evaluate exponential functions
 - Find the equation of an exponential function given the initial value and a point
 - Find the equation of an exponential function when the initial value is not known
- Applications of Exponential Functions and Base e
 - Find the equation of an exponential function in a word problem context
 - Calculate compound interest
 - Evaluate exponential functions with base e
 - Calculate continuous growth and decay

6.2 Graphs of Exponential Functions

- Exponential Function Graphs
 - Graph exponential functions
 - Graph exponential functions using transformations
 - Find the equation of an exponential function given a graph
 - Write an exponential function from a description

6.3 Logarithmic Functions

- Relate Logarithms and Exponents
 - Convert from logarithmic to exponential form
 - Convert from exponential to logarithmic form
- Evaluate Logarithmic Expressions
 - Evaluate logarithms with positive integer solutions
 - Evaluate logarithms with negative integer solutions
 - Use common logarithms
 - Use natural logarithms

6.4 Graphs of Logarithmic Functions

- Logarithmic Function Graphs
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- Identify the domain of a logarithmic function
- Graph logarithmic functions
- Graph transformations of logarithmic functions
- Write a logarithmic function from a description

6.5 Logarithmic Properties

- Basic Properties of Logarithms
 - Understand the basic properties of logarithms
 - Use the product rule for logarithms
 - Use the quotient rule for logarithms
 - Use the power rule for logarithms
- Rewrite Logarithmic Expressions Using Properties
 - Expand logarithmic expressions
 - Condense logarithmic expressions
 - Use the change-of-base formula for logarithms

6.6 Exponential and Logarithmic Equations

- Solve Exponential Equations
 - Use like bases to solve exponential equations
 - Rewrite equations so all powers have the same base and solve exponential equations
 - Use logarithms to solve exponential equations
 - Solve an equation with a base e using natural logarithms
- Solve Logarithmic Equations
 - Use the definition of a logarithm to solve logarithmic equations
 - Use logarithm properties and the definition of the logarithm to solve logarithmic equations
 - Use the one-to-one property of logarithms to solve logarithmic equations

6.7 Exponential and Logarithmic Models

- Applications of Exponential and Logarithmic Functions
 - Model exponential growth
 - Model exponential decay
 - Applied logarithmic models
 - Choose an appropriate model for data
 - Express an exponential model in base e

Chapter 7: Systems of Equations and Inequalities

7.1 Systems of Linear Equations in Two Variables

- Graphing Systems of Linear Equations
 - Determine whether an ordered pair is a solution to a system of equations
 - Solve systems of equations in two variables by graphing
 - Solving Systems of Linear Equations
 - Solve systems of equations in two variables by substitution
 - Solve systems of equations in two variables by addition
 - Identify inconsistent and dependent systems of equations containing two variables, and express the solution of dependent equations
 - Applications of Systems of Linear Equations
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- Use systems of equations to investigate profits
- Write and solve a system of equations in two variables from a word problem
- Linear Inequalities in Two Variables
 - Solve a linear inequality in two variables by graphing
 - Solve a linear system of inequalities by graphing

7.2 Systems of Linear Equations in Three Variables

- Systems of Linear Equations in Three Variables
 - Determine whether an ordered triple is a solution to a system
 - Solve systems of three equations in three variables
 - Identify inconsistent and dependent systems of equations containing three variables, and express the solution of a system of dependent equations

7.3 Systems of Nonlinear Equations in Two Variables

- Systems of Two Nonlinear Equations
 - Solve a system of nonlinear equations representing a parabola and a line
 - Solve a system of nonlinear equations representing a circle and a line
 - Solve a system of nonlinear equations in two variables using elimination
- Graphing Nonlinear Inequalities and Systems of Inequalities
 - Graph a nonlinear inequality
 - Graph a system of nonlinear inequalities

7.4 Partial Fractions

- Partial Fraction Decomposition with Linear Factors
 - Decompose a rational expression where the denominator has only nonrepeated linear factors
 - Decompose a rational expression where the denominator has repeated linear factors
- Partial Fraction Decomposition with Quadratic Factors
 - Decompose a rational expression where the denominator has a nonrepeated irreducible quadratic factor
 - Decompose a rational expression where the denominator has a repeated irreducible quadratic factor

7.5 Matrices and Matrix Operations

- Introduction to Matrices
 - Determine the order of a matrix and describe elements within a matrix
 - Add or subtract matrices
- Matrix Multiplication
 - Multiply a matrix by a scalar
 - Find the sum or difference of scalar multiples
 - Multiply two matrices

7.6 Augmented Matrices and Gaussian Elimination

- Solving Systems with Gaussian Eliminations
 - Convert between a system of equations and its corresponding augmented matrix
 - Use row operations to solve a system of linear equations in two variables
 - Use row operations to solve a system of linear equations in three variables
 - Use matrices to solve applications of systems of linear equations
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7.7 Determinants of Matrices and the Inverse Matrix

- Finding Determinants of Matrices
 - Find the determinant of a 2×2 matrix
 - Find the determinant of a 3×3 matrix
- Inverse and Identity Matrices
 - Understand the identity matrix and how it relates to the inverse matrix
 - Determine if a matrix is invertible using the determinant
 - Find the inverse of a 2×2 matrix
 - Find the inverse of a 3×3 matrix
- Solving Systems with Inverses
 - Solve a system of linear equations using the inverse of a 2×2 matrix
 - Solve a system of linear equations using the inverse of a 3×3 matrix

7.8 Cramer's Rule

- Solving Systems with Cramer's Rule
 - Use Cramer's rule to solve a system of two equations in two variables
 - Use Cramer's rule to solve a system of three equations in three variables
 - Use Cramer's rule to solve inconsistent or dependent systems

Chapter 8: Conic Sections

8.1 Ellipses

- Ellipses Centered at the Origin
 - Identify key points and axes of ellipses from a graph
 - Identify key points and axes of ellipses from an equation
 - Write the equation in standard form of an ellipse centered at the origin
 - Graph an ellipse centered at the origin from an equation in standard form
- Ellipses Not Centered at the Origin
 - Identify key points and axes of ellipses not centered at the origin
 - Write the equation in standard form of an ellipse not centered at the origin
 - Graph an ellipse not centered at the origin
- Ellipses Not in Standard Form and Applications of Ellipses
 - Convert an equation of an ellipse into standard form
 - Graph an ellipse where the equation is not given in standard form
 - Use ellipses in applications

8.2 Hyperbolas

- Hyperbolas Centered at the Origin
 - Locate the vertices and foci of a hyperbola from a graph
 - Identify vertices, foci, and asymptotes of a hyperbola from an equation
 - Write the equation of a hyperbola centered at the origin in standard form
 - Graph a hyperbola centered at the origin from an equation in standard form
 - Hyperbolas Not Centered at the Origin
 - Identify vertices, foci, and asymptotes of a hyperbola not centered at the origin
 - Write the equation of a hyperbola not centered at the origin
 - Graph a hyperbola not centered at the origin from an equation in standard form
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- Hyperbolas Not in Standard Form and Applications of Hyperbolas
 - Convert an equation of a hyperbola into standard form
 - Graph a hyperbola from an equation given in general form
 - Use hyperbolas in applications

8.3 Parabolas

- Parabolas Centered at the Origin
 - Identify key components of a parabola from a graph
 - Identify key components of a parabola from an equation
 - Graph a parabola centered at the origin
 - Write the equation of a parabola centered at the origin in standard form
- Parabolas Not Centered at the Origin
 - Identify key components of a parabola not centered at the origin
 - Graph a parabola not centered at the origin
 - Write the equation of a parabola not centered at the origin in standard form
- Parabolas Not in Standard Form and Applications of Parabolas
 - Convert an equation of a parabola into standard form
 - Graph a parabola from an equation given in general form
 - Use parabolas in applications

Chapter 9: Sequences and Series

9.1 Sequences

- Introduction to Sequences
 - Write the terms of a sequence defined by an explicit formula
 - Write the terms of a sequence defined by a piecewise explicit formula
- Recursive Sequences
 - Write the terms of a sequence defined by a recursive formula
 - Write the terms of a sequence defined by a recursive formula with more than one initial term

9.2 Arithmetic Sequences

- Arithmetic Sequences
 - Find the common difference of an arithmetic sequence
 - Write terms of an arithmetic sequence
 - Write a recursive formula for an arithmetic sequence
 - Write an explicit formula for an arithmetic sequence
- Applications of Arithmetic Sequences
 - Find specific terms of an arithmetic sequence given other terms
 - Solve application problems with arithmetic sequences

9.3 Geometric Sequences

- Geometric Sequences
 - Find the common ratio of a geometric sequence
 - Write terms of a geometric sequence
 - Write a recursive formula for a geometric sequence
 - Write an explicit formula for a geometric sequence
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- Applications of Geometric Sequences
 - Write an explicit formula for the n th term of a sequence
 - Solve application problems with geometric sequences
 - Solve geometric sequence problems

9.4 Series

- Summation Notation and Arithmetic Series
 - Evaluate expressions using summation notation
 - Find the sum of a finite arithmetic series
- Finite and Infinite Geometric Series
 - Find the sum of a finite geometric series
 - Determine if the sum of an infinite series is defined
 - Find the sum of an infinite geometric series
- Applications of Series
 - Solve application problems with arithmetic series
 - Solve application problems with geometric series
 - Find the equivalent fraction for a repeating decimal
 - Solve an annuity problem

9.5 Counting Theory

- The Addition and Multiplication Principles
 - Solve counting problems using the addition principle
 - Solve counting problems using the multiplication principle
 - Evaluate an expression with factorials
- Permutations
 - Find the number of permutations of n distinct objects using the multiplication principle
 - Find the number of permutations of n distinct objects using a formula
 - Find the number of permutations of n non-distinct objects
- Combinations
 - Find the number of combinations using the formula
 - Find the number of subsets of a set

9.6 Binomial Theorem

- Binomial Expansion
 - Find a binomial coefficient
 - Expand a binomial using the binomial theorem
 - Use the binomial theorem to find a single term

9.7 Probability

- Basic Probability
 - Compute the probability of equally likely outcomes
 - Compute the probability of the union of two events
 - Use the complement rule to compute probabilities
 - Compute probability using counting theory
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