Corequisite Support for College Algebra
Chapter 1: Foundations

1.1 Introduction to Whole Numbers
- Place Values and Rounding
  - Identify the place value of a digit and write a whole number using words or digits
  - Round whole numbers
- Prime Factorization and Least Common Multiples
  - Identify multiples and apply divisibility tests
  - Find the prime factorization of a number
  - Find the least common multiple of two numbers

1.2 Use the Language of Algebra
- Use Variables and Algebraic Symbols
  - Translate algebraic expressions, equations, and inequalities into English and recognize expressions and equations
  - Evaluate a whole number raised to a power and understand the terminology
- Order of Operations and Simplifying Expressions
  - Simplify an expression using order of operations
  - Evaluate an expression
  - Identify coefficients and identify and combine like terms
- Rewrite English Phrases into Algebraic Expressions
  - Translate an English phrase to an algebraic expression
  - Translate English phrases from applications into algebraic expressions

1.3 Add and Subtract Integers
- Introduction to Integers and Absolute Value
  - Order integers using inequality symbols and determine the opposite of integers or variables
  - Evaluate an absolute value expression
  - Simplify an expression involving absolute value using order of operations
- Adding and Subtracting Integers
  - Add integers
  - Subtract integers
  - Add and subtract integers using order of operations

1.4 Multiply and Divide Integers
- Multiplying and Dividing Integers
  - Multiply integers (40)
  - Divide integers (40)
  - Divide whole numbers using long division where there may be a remainder (20)
- Simplifying Expressions with Integers
  - Simplify expressions with integers using order of operations
  - Evaluate a variable expression with integers
1.5 Visualize Fractions
- Simplifying Fractions
  - Identify when fractions are equivalent
  - Simplify a fraction
- Multiplying and Dividing Fractions
  - Multiply fractions
  - Divide fractions
  - Simplify complex fractions
- Understanding Expressions with Fractions
  - Simplify expressions written with a fraction bar
  - Translate an English phrase to an expression with fractions

1.6 Add and Subtract Fractions
- Adding and Subtracting Fractions
  - Add or subtract fractions with a common denominator
  - Add or subtract fractions with different denominators
- Algebraic Expressions with Fractions
  - Use the order of operations to simplify complex fractions and expressions with multiple operations
  - Evaluate variable expressions with fractions

1.7 Decimals
- Understanding and Rounding Decimals
  - Name and write decimals
  - Round decimals
- Operations with Decimals
  - Add and subtract decimals
  - Multiply decimals
  - Divide decimals
- Decimals, Fractions, and Percents
  - Convert between fractions and decimals
  - Simplify expressions with fractions and decimals
  - Convert between decimals and percents

1.8 Square Roots and the Real Number System
- Square Roots and the Real Number System
  - Evaluate a square root
  - Identify rational and irrational numbers
  - Identify real numbers
- Fractions and Decimals on the Number Line
  - Locate fractions on a number line and write inequality statements involving fractions
  - Locate decimals on a number line and write inequality statements involving decimals
1.9 Properties of Real Numbers
- Properties of the Real Number System
  - Use the commutative and associative properties
  - Identify additive and multiplicative inverses of a number
  - Understand the multiplication and division properties of zero
  - Simplify expressions using properties of identities, inverses, and zero
- The Distributive Property
  - Simplify expressions using the distributive property
  - Simplify expressions by distributing a negative number

1.10 Systems of Measurements
- Unit Conversion in the US System
  - Make unit conversions in the US system
  - Use mixed units of measurement in the US system
- Unit Conversion in the Metric System
  - Make unit conversions in the metric system
  - Use mixed units of measurement in the metric system
- Unit Conversion Between Systems
  - Convert between the US and metric systems of measurement
  - Convert between Fahrenheit and Celsius temperatures

Chapter 2: Solving Linear Equations and Inequalities
2.1 Solve Equations Using the Subtraction and Addition Properties of Equality
- Solve Equations with the Subtraction and Addition Properties of Equality
  - Verify a solution of an equation
  - Solve an equation using the subtraction and addition properties of equality
  - Solve an equation involving fractions or decimals using the subtraction and addition properties of equality
  - Solve an equation that requires simplification using the subtraction and addition properties of equality
- Application Problems and the Subtraction and Addition Properties of Equality
  - Translate an English sentence to an algebraic equation and solve using the subtraction and addition properties of equality
  - Use the subtraction and addition properties of equality to solve application problems

2.2 Solve Equations Using the Division and Multiplication Properties of Equality
- Solve Equations with the Division and Multiplication Properties of Equality
  - Solve an equation using the division and multiplication properties of equality
  - Solve an equation involving fractions or decimals using the division and multiplication properties of equality
  - Solve an equation that require simplification using the division and multiplication properties of equality
• Application Problems and the Division and Multiplication Properties of Equality
  • Translate an English sentence to an algebraic equation and solve using the division and multiplication properties of equality
  • Use the division and multiplication properties of equality to solve application problems

2.3 Solve Equations with Variables and Constants on Both Sides
• Solving Linear Equations
  • Solve an equation with constants on both sides
  • Solve an equation with variables on both sides
  • Solve an equation with constants and variables on both sides

2.4 Use a General Strategy to Solve Linear Equations
• General Strategies for Solving Linear Equations
  • Solve an equation using the distributive property with variables on one side
  • Solve an equation using the distributive property with variables on both sides
  • Classify equations as conditional, identity, or a contradiction

2.5 Solve Equations with Fractions or Decimals
• Solving Linear Equations with Fractions
  • Solve an equation involving fractions with variables on both sides
  • Solve an equation involving fractions by eliminating the fractions
  • Solve an equation involving fractions by eliminating the fractions and other steps
• Solve Linear Equations with Decimals
  • Solve an equation involving decimals with variables on both sides
  • Solve an equation involving decimals by clearing the decimals

2.6 Solve a Formula for a Specific Variable
• Distance, Rate, and Time and Literal Equations
  • Use the distance, rate, and time formula
  • Solve a formula for a specific variable

2.7 Solve Linear Inequalities
• Inequalities, the Number Line, and Interval Notation
  • Graph an inequality on the number line
  • Express an inequality using interval notation
• Solving One-Step Linear Inequalities
  • Solve an inequality using the subtraction and addition properties of inequality
  • Solve an inequality using the division and multiplication properties of inequality
• Solving Linear Inequalities
  • Solve an inequality that requires simplification
  • Classify an inequality as conditional, identity, or contradiction
  • Translate an English sentence into an inequality and solve
Chapter 3: Math Models

3.1 Use a Problem-Solving Strategy
   ● An Introduction to Problem Solving
     ○ Use a problem-solving strategy for word problems
     ○ Solve a number problem
     ○ Solve a number problem involving consecutive integers

3.2 Solve Percent Applications
   ● Percent Problems and Percent Increase and Decrease
     ○ Translate and solve basic percent equations
     ○ Solve basic applications of percent
     ○ Find percent increase or percent decrease
   ● Simple Interest and Discounts
     ○ Solve applications involving the simple interest formula
     ○ Solve applications with discount or mark-up

3.3 Solve Mixture Applications
   ● Solve Mixture Word Problems
     ○ Solve coin word problems
     ○ Solve ticket and stamp word problems
     ○ Use the mixture model to solve word problems

3.4 Solve Geometry Applications - Triangles, Rectangles, and the Pythagorean Theorem
   ● Triangles and the Pythagorean Theorem
     ○ Solve problems involving the perimeter, area, and interior angles of triangles
     ○ Solve triangle problems where angles or sides are given in terms of other angles or sides
     ○ Solve triangle problems using the Pythagorean Theorem
   ● Area and Perimeter of Rectangles
     ○ Solve problems involving the perimeter and area of rectangles
     ○ Solve rectangle problems when the width is given in terms of the length

3.5 Solve Uniform Motion Applications
   ● Uniform Motion
     ○ Solve uniform motion applications

3.6 Solve Applications with Linear Inequalities
   ● Problem Solving with Linear Inequalities
     ○ Solve one-step applications with linear inequalities
     ○ Solve applications with linear inequalities

Chapter 4: Graphs

4.1 Use the Rectangular Coordinate System
   ● Reading Graphs and the Rectangular Coordinate System
     ○ Plot points on a rectangular coordinate system
     ○ Verify the solution to an equation in two variables
     ○ Complete a table of solutions to a linear equation in two variables
     ○ Find solutions to a linear equation
4.2 Graph Linear Equations in Two Variables
   - Graphing Linear Equations
     - Recognize the relationship between the solutions of an equation and its graph
     - Graph a linear equation by plotting points
     - Graph a linear equation in standard form by plotting points
     - Graph vertical and horizontal lines

4.3 Graph with Intercepts
   - Intercepts on the Coordinate Plane
     - Identify the x- and y-intercepts on a graph
     - Find the x- and y-intercepts from an equation of a line
     - Graph a line using the x- and y-intercepts

4.4 Understand Slope of a Line
   - Understanding Slope
     - Use a geoboard to model slope
     - Use the relationship between rise and run to find the slope of a line from its graph
     - Find the slope of horizontal and vertical lines
   - The Slope Formula
     - Use the slope formula to find the slope of a line between two points
     - Graph a line given a point and the slope
     - Determine the slope in applications

4.5 Use the Slope-Intercept Form of an Equation of a Line
   - Slope-Intercept Form
     - Identify the slope and y-intercept from an equation of a line and relate a graph to the equation
     - Graph a line given its equation using its slope and y-intercept
     - Graph lines using a variety of methods
     - Graph and interpret applications of slope-intercept
   - Parallel and Perpendicular Lines
     - Use slopes to identify parallel lines
     - Use slopes to identify perpendicular lines

4.6 Find the Equation of a Line
   - Equations of Lines
     - Find an equation of the line given the slope and y-intercept
     - Find an equation of the line given the slope and a point
     - Find an equation of the line given two points
   - Equations of Parallel and Perpendicular Lines
     - Find an equation of a line parallel to a given line
     - Find an equation of a line perpendicular to a given line

4.7 Graphs of Linear Inequalities
   - Graphing Linear Inequalities
     - Verify solutions to an inequality in two variables
     - Recognize the relationship between the solutions of an inequality and its graph
     - Graph a linear inequality
Chapter 5: Systems of Linear Equations

5.1 Solve Systems of Equations by Graphing
  ● Solving Systems of Linear Equations by Graphing
    ● Determine whether an ordered pair is a solution of a system of linear equations
    ● Solve a system of linear equations by graphing
    ● Determine the number of solutions of a linear system
    ● Solve applications of systems of linear equations by graphing

5.2 Solve Systems of Equations by Substitution
  ● Solving Systems of Linear Equations by Substitution
    ● Solve a system of linear equations by substitution
    ● Solve applications of systems of linear equations by substitution

5.3 Solve Systems of Equations by Elimination
  ● Solving Systems of Linear Equations by Elimination
    ● Solve a system of linear equations by elimination
    ● Solve applications of systems of equations by elimination
    ● Solve a system of linear equations using a variety of methods

5.4 Solve Applications with Systems of Equations
  ● Systems of Linear Equations and Problem Solving
    ● Translate a word problem to a system of equations
    ● Solve a word problem using a system of equations
    ● Solve an application in geometry using a system of equations
    ● Solve uniform motion applications using a system of equations

5.5 Solve Mixture Applications with Systems of Equations
  ● Mixture Problems and Systems of Equations
    ● Solve mixture applications involving tickets or money with a system of equations
    ● Solve mixture applications involving concentrations using a system of equations
    ● Solve interest applications using a system of equations

5.6 Graphing Systems of Linear Inequalities
  ● Solving Systems of Linear Inequalities
    ● Determine whether an ordered pair is a solution of a system of linear inequalities
    ● Solve a system of linear inequalities by graphing
    ● Solve applications of systems of linear inequalities

Chapter 6: Polynomials

6.1 Add and Subtract Polynomials
  ● Adding and Subtracting Polynomials
    ● Identify the types and degrees of polynomials
    ● Add and subtract monomials
    ● Perform addition and subtraction on polynomials
    ● Evaluate a polynomial for a given value
6.2 Use Multiplication Properties of Exponents
- Product Properties of Exponents
  - Simplify numerical expressions containing exponents
  - Simplify expressions using the product property for exponents
  - Simplify expressions using the power property for exponents or the product to a power
  - Simplify expressions by applying several properties

6.3 Multiply Polynomials
- Multiplying Polynomials
  - Multiply monomials
  - Multiply a polynomial by a monomial
  - Multiply a binomial by a binomial
  - Multiply a trinomial by a binomial

6.4 Special Products
- Special Products of Binomials
  - Square a binomial using the binomial squares pattern
  - Multiply conjugates using the product of conjugates pattern
  - Recognize and use the appropriate special product pattern

6.5 Divide Monomials
- Quotient Properties of Exponents and Dividing Monomials
  - Simplify expressions using the quotient property for exponents and the exponent of zero
  - Simplify expressions using the quotient to a power property
  - Simplify expressions by applying several quotient properties of exponents
  - Divide monomials

6.6 Divide Polynomials
- Dividing Polynomials
  - Divide a polynomial by a monomial
  - Divide a polynomial by a binomial using polynomial long division

6.7 Integer Exponents and Scientific Notation
- Negative Exponents
  - Use the definition of a negative exponent
  - Simplify expressions with integer exponents
- Scientific Notation
  - Convert from decimal notation to scientific notation
  - Convert from scientific notation to decimal notation
  - Multiply and divide using scientific notation

Chapter 7: Factoring
7.1 Greatest Common Factor and Factor by Grouping
- The Greatest Common Factor and Factoring by Grouping
  - Find the greatest common factor of two or more expressions
  - Factor the greatest common factor from a polynomial
  - Factor a polynomial by grouping
7.2 Factor Quadratic Trinomials with Leading Coefficient 1
   ● Factoring Trinomials with a Leading Coefficient of 1
     ● Factor a trinomial of the form $x^2+bx+c$ where $c$ is positive
     ● Factor a trinomial of the form $x^2+bx+c$ where $c$ is negative
     ● Factor a trinomial of the form $x^2+bxy+cy^2$

7.3 Factor Quadratic Trinomials with Leading Coefficient Other than 1
   ● Factoring Trinomials with a Leading Coefficient Other than 1
     ● Factor a trinomial of the form $ax^2+bx+c$ with a GCF
     ● Factor a trinomial using trial and error
     ● Factor a trinomial using the 'ac' method

7.4 Factor Special Products
   ● Factoring Special Products
     ● Express a perfect square trinomial in factored form
     ● Express a difference of squares in factored form
     ● Factor sums and differences of cubes

7.5 General Strategy for Factoring Polynomials
   ● Choosing a Factoring Strategy
     ● Recognize and use the appropriate method to factor a polynomial completely

7.6 Quadratic Equations
   ● Solving Quadratic Equations by Factoring
     ● Solve a factored quadratic equation using the zero product property
     ● Solve a quadratic equation by factoring
     ● Solve applications modeled by quadratic equations

Chapter 8: Rational Expressions and Equations
8.1 Simplify Rational Expressions
   ● Domain of Rational Expressions and Simplifying Rational Expressions
     ● Determine the values for which a rational expression is undefined
     ● Evaluate a rational expression
     ● Simplify a rational expression
     ● Simplify a rational expression with opposite factors

8.2 Multiply and Divide Rational Expressions
   ● Multiplying and Dividing Rational Expressions
     ● Find the product of rational expressions
     ● Find the quotient of rational expressions
     ● Multiply or divide more than two rational expressions

8.3 Add and Subtract Rational Expressions with a Common Denominator
   ● Adding and Subtracting Rational Expressions with a Common Denominator
     ● Add rational expressions with a common denominator
     ● Subtract rational expressions with a common denominator
     ● Add and subtract rational expressions whose denominators are opposites
8.4 Add and Subtract Rational Expressions with Unlike Denominators
   - Adding and Subtracting Rational Expressions with Unlike Denominators
     - Find the least common denominator of rational expressions
     - Find equivalent rational expressions
     - Add rational expressions with different denominators
     - Subtract rational expressions with different denominators
8.5 Simplify Complex Rational Expressions
   - Simplifying Complex Fractions
     - Simplify a complex rational expression by writing it as division
     - Simplify a complex rational expression by using the LCD
8.6 Solve Rational Equations
   - Solving Rational Equations
     - Solve a rational equation that results in a linear equation
     - Solve a rational equation that results in a quadratic equation
     - Solve a rational equation for a specific variable
8.7 Solve Proportion and Similar Figure Applications
   - Proportions and Problem Solving with Rational Equations
     - Solve proportions
     - Solve applications with proportions
     - Solve similar figure applications
8.8 Solve Uniform Motion and Work Applications
   - Uniform Motion, Work, and Problem Solving
     - Solve uniform motion applications involving rational equations
     - Solve problems involving rates of work using rational equations
8.9 Use Direct and Inverse Variation
   - Variation and Problem Solving
     - Solve problems that involve direct variation
     - Solve problems that involve inverse variation

Chapter 9: Roots and Radicals
9.1 Simplify and Use Square Roots
   - Understanding Square Roots
     - Simplify expressions with square roots
     - Estimate square roots and approximate square roots
     - Simplify variable expressions with square roots
9.2 Simplify Square Roots
   - Simplifying Square Root Expressions
     - Use the product property to simplify square roots
     - Use the quotient property to simplify a perfect square fraction
     - Use the quotient property to simplify square roots
9.3 Add and Subtract Square Roots
- Adding and Subtracting Square Root Expressions
  - Add and subtract like square roots
  - Add and subtract square roots that need simplification

9.4 Multiply Square Roots
- Multiplying Square Root Expressions
  - Multiply square roots
  - Use polynomial multiplication to multiply square roots
  - Use special product formulas to multiply square roots

9.5 Divide Square Roots
- Dividing Square Root Expressions and Rationalizing Denominators
  - Divide square roots
  - Rationalize a one-term denominator
  - Rationalize a two-term denominator

9.6 Solve Equations with Square Roots
- Solving Radical Equations
  - Solve a square root equation with a single radical
  - Solve a square root equation with two radicals
  - Use square roots in applications

9.7 Higher Roots
- Understanding Higher Roots
  - Simplify numerical expressions with higher roots
  - Simplify expressions with higher roots
- Simplifying Higher Roots and Operations on Higher Roots
  - Use the product property to simplify expressions with higher roots
  - Use the quotient property to simplify expressions with higher roots
  - Add and subtract higher roots

9.8 Rational Exponents
- Simplifying Expressions with Rational Exponents
  - Simplify expressions with rational exponents and a numerator of 1
  - Simplify expressions with rational exponents and a numerator greater than 1
  - Use the laws of exponents to simplify expressions with rational exponents

9.9 Use Radicals in Functions
- Radical Functions
  - Evaluate a radical function (20)
  - Find the domain of a radical function
  - Graph a radical function by plotting points and determine its range

Chapter 10: Quadratic Equations
10.1 Solve Quadratic Equations Using the Square Root Property
- Solving Quadratic Equations Using the Square Root Property
  - Solve a quadratic equation using the square root property
- Solve a quadratic equation with a binomial as the quadratic term using the square root property
- Solve a quadratic equation where factoring results in a perfect square binomial

10.2 Solve Quadratic Equations by Completing the Square
- Solving Quadratic Equations by Completing the Square
  - Complete the square of a binomial expression
  - Solve a quadratic equation with a leading coefficient of 1 by completing the square
  - Solve a quadratic equation with a leading coefficient greater than 1 by completing the square

10.3 Solve Quadratic Equations Using the Quadratic Formula
- Solving Quadratic Equations with the Quadratic Formula
  - Solve a quadratic equation using the quadratic formula with 2 real solutions
  - Solve a quadratic equation using the quadratic formula with 1 or 0 real solutions
  - Use the discriminant to predict the number of solutions of a quadratic equation

10.4 Solve Applications Modeled by Quadratic Equations
- Problem Solving with Quadratic Equations
  - Solve applications modeled by quadratic equations that may require the quadratic formula (5)
  - Solve geometric applications that may require the quadratic formula

10.5 Graphing Quadratic Equations
- Parabolas and Their Properties
  - Graph a quadratic equation by plotting points and recognize the direction a parabola opens
  - Find the axis of symmetry and vertex of a parabola
  - Find the intercepts of a parabola
- Graphing Quadratic Equations
  - Graph a quadratic equation in two variables by using key points
  - Find the maximum or minimum of a quadratic equation and use it in applications

10.6 - Graph Quadratic Functions Using Transformations
- Transformations of Parabolas
  - Graph a quadratic function using a vertical translation
  - Graph a quadratic function using a horizontal translation
  - Graph a quadratic function by compression, stretching, or reflecting

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
- 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
  - Find the power of a quotient
  - Simplify exponential expressions
- Scientific Notation
  - Convert between standard and scientific notation
  - Multiply and divide numbers in scientific notation

1.3 Radicals and Rational Exponents
- Simplify Radicals
  - Evaluate square roots
  - Use the product rule to simplify square roots
  - Use the quotient rule to simplify square roots
- Operations with Radicals
  - Add and subtract square roots
  - Rationalize denominators with a monomial denominator
  - Rationalize denominators using the conjugate
- Radicals
  - Simplify nth roots
  - 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
- Multiply and Divide Rational Expressions
  - Simplify rational expressions
  - Multiply rational expressions
  - Divide rational expressions
- Add and Subtract Rational Expressions and Simplify Complex Rational Expressions
  - Add and subtract rational expressions
  - Simplify complex rational expressions

Chapter 2: Equations and Inequalities
2.1 The Rectangular Coordinate Systems and Graphs
- Cartesian Coordinates and Distances
  - Plot ordered pairs in a Cartesian coordinate system
  - 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
• 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
- 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
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
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
- 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
● 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
• 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
- 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
7.7 Determinants of Matrices and the Inverse Matrix

- Finding Determinants of Matrices
  - Find the determinant of a 2x2 matrix
  - Find the determinant of a 3x3 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 2x2 matrix
  - Find the inverse of a 3x3 matrix

- Solving Systems with Inverses
  - Solve a system of linear equations using the inverse of a 2x2 matrix
  - Solve a system of linear equations using the inverse of a 3x3 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
● 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
• Applications of Geometric Sequences
  ● Write an explicit formula for the nth 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