Alta College Algebra with Corequisite Support: A Targeted Review is a one-semester course that hinges on the college-level outcomes for College Algebra, but also offers the opportunity for targeted, discrete review assignments at a lower level to help prepare some students for the college-level material that constitutes their ultimate objective in College Algebra.

To develop the course, Knewton used four main sources of content: OpenStax, videos created by a Math Professor we have partnered with, the Open Textbook Library, and a team of Subject Matter Experts (SMEs). The SMEs come from diverse backgrounds and are all accomplished academics in the field of Mathematics.

Alta College Algebra with Corequisite Support: A Targeted Review has two instructional sequences for every learning objective, giving students multiple opportunities to learn new concepts. Alta College Algebra with Corequisite Support: A Targeted Review covers the typical breadth of college algebra topics, and also provides the necessary depth to ensure the course is manageable and engaging for instructors and students alike.
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
  - Divide integers
- Simplifying Expressions with Integers
  - Simplify expressions with integers using order of operations
  - Evaluate a variable expression with integers
- Algebraic Expressions and Applications with Integers
  - Translate an English phrase to an algebraic expression with integers
  - Use integers in applications
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
- Solving 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 property for exponents
  - 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 \(x^2+bx+y^2\)
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

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
  - 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

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
- Con
  - 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