Alta College Algebra with Corequisite Support: A Blended Approach is a one-semester course that interleaves developmental-level course content with a regular college-level College Algebra content at the chapter level to create a blended, cohesive course experience for students consistently throughout the semester.

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 Blended Approach has two instructional sequences for every learning objective, giving students multiple opportunities to learn new concepts. Alta College Algebra with Corequisite Support: A Blended Approach 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 and the Language of Algebra

1.1 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

1.2 Operations with 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
   - 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

1.3 Operations with 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

• 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

1.4 Decimals and Percents
• 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

1.5 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

• 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

1.6 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: Exponents and Polynomials
2.1 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

2.2 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
  • Quotient Properties of Exponents
    • 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

2.3 Multiply Polynomials
  • Multiplying Polynomials
    • Multiply monomials
    • Multiply a polynomial by a monomial
    • Multiply a binomial by a binomial
    • Multiply a trinomial by a binomial
  • 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

2.4 Divide Polynomials
  • Dividing Polynomials
    • Divide monomials
    • Divide a polynomial by a monomial
    • Divide a polynomial by a binomial using polynomial long division

2.5 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

2.6 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

2.7 Factor Quadratic Trinomials
• 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 $x^2+bx+c$ where $c$ is negative
• 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

2.8 Factor Special Products and a General Strategy for Factoring
• 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
• Choosing a Factoring Strategy
  ● Recognize and use the appropriate method to factor a polynomial completely

Chapter 3: Rational and Radical Expressions
3.1 Multiply and Divide 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
• Multiplying and Dividing Rational Expressions
  ● Find the product of rational expressions
  ● Find the quotient of rational expressions
  ● Multiply or divide a rational expression more than two rational expressions

3.2 Add and Subtract Rational Expressions
• 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
- 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

3.3 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

3.4 Simplify Square Roots
- Understanding Square Roots
  - Simplify expressions with square roots
  - Estimate square roots and approximate square roots
  - Simplify variable expressions with 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

3.5 Operations on Radical Expressions
- Adding and Subtracting Square Root Expressions
  - Add and subtract like square roots
  - Add and subtract square roots that need simplification
- Multiplying Square Root Expressions
  - Multiply square roots
  - Use polynomial multiplication to multiply square roots
  - Use special product formulas to multiply square roots
- Dividing Square Root Expressions and Rationalizing Denominators
  - Divide square roots
  - Rationalize a one-term denominator
  - Rationalize a two-term denominator

3.6 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

3.7 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
3.8 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

Chapter 4: Solving Linear Equations and Inequalities

4.1 Solve Equations Using the 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 require simplification using the subtraction and addition 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 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
  - 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

4.2 Use a General Strategy to Solve Linear Equations

- 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
- 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
4.3 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

4.4 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

4.5 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

4.6 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

4.7 Solve Mixture and Uniform Motion Applications

- **Solve Mixture Word Problems**
  - Solve coin word problems
  - Solve ticket and stamp word problems
  - Use the mixture model to solve word problems

- **Uniform Motion**
  - Solve uniform motion applications

4.8 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

4.9 Solve Linear Inequalities and Applications

- **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

Problem Solving with Linear Inequalities
- Solve one-step applications with linear inequalities
- Solve applications with linear inequalities

Solve Compound Inequalities and Absolute Value Equations and Inequalities
- Solve compound inequalities in one variable algebraically
- Solve absolute value equations
- Solve absolute value inequalities

Chapter 5: Graphs and Functions
5.1 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

5.2 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

5.3 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

5.4 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
5.5 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

5.6 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

5.7 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

5.8 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
- **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

5.9 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
5.10 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

5.11 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

5.12 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

- Graph an Absolute Value Functions
  - Graph an absolute value function

Chapter 6: Linear Functions and Modeling

6.1 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

6.2 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

6.3 Fitting Linear Models to Data

- Scatter Diagrams and Lines of Best Fit
  - Draw and interpret scatter diagrams
  - Distinguish between linear and nonlinear relations
Chapter 7: Polynomial Equations and Functions
7.1 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
7.2 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
7.3 Solve Quadratic Equations by Completing the Square
- Solving Quadratic Equations by Completing the Square
  - Complete the square of a binomial expression
  - Solve quadratic equations by completing the square
7.4 Solve Quadratic Equations Using the Quadratic Formula
- Solving Quadratic Equations with the Quadratic Formula
  - Use the discriminant to classify the solutions of a quadratic equation
  - Solve quadratic equations by using the quadratic formula
7.5 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
7.6 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
7.7 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

7.8 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

7.9 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

Chapter 8: Rational Equations and Functions

8.1 Solve Rational Equations and Applications

- **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

8.2 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
- Uniform Motion, Work, and Problem Solving
  - Solve uniform motion applications involving rational equations
  - Solve problems involving rates of work using rational equations

8.3 Solve Proportion and Similar Figure Applications
- Proportions and Problem Solving with Rational Equations
  - Solve proportions
  - Solve applications with proportions
  - Solve similar figure applications

8.4 Use Direct and Inverse Variation
- Variation and Problem Solving
  - Solve problems that involve direct variation
  - Solve problems that involve inverse variation

8.5 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 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

8.6 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 9: Inverse Functions and Radical Equations and Functions
9.1 Inverse Functions
- One-to-One Functions
  - Determine whether a function is one-to-one
  - Use the horizontal line test to identify one-to-one functions
- 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
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

9.2 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

9.3 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

9.4 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 10: Exponential and Logarithmic Functions
10.1 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
10.2 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

10.3 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

10.4 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

10.5 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

10.6 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
10.7 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 11: Systems of Equations and Inequalities
11.1 Systems of Linear Equations in Two Variables
- Systems of Two Linear Equations
  - Determine whether an ordered pair is a solution to a system of equations
  - Solve systems of equations in two variables by graphing
  - 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

11.2 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

11.3 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

11.4 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

11.5 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

11.6 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

11.7 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

11.8 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 12: Conic Sections
12.1 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

12.2 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

12.3 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 13: Sequences, Series, and Basic Probability
13.1 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

13.2 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

13.3 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

13.4 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

13.5 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

13.6 Binomial Theorem
  ● Binomial Expansion
    ● Find a binomial coefficient
    ● Expand a binomial using the binomial theorem
    ● Use the binomial theorem to find a single term

13.7 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