Alta College Algebra with Corequisite Support: A Compressed Approach is a one-semester course that employs an early review/scaffolding period in the first several weeks of the course to prepare enrolled students for the college-level College Algebra work ahead. In this course, students will spend the first 3-5 weeks working on developmental-level or preparatory content, before moving on to college-level work for the balance of 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 Compressed Approach has two instructional sequences for every learning objective, giving students multiple opportunities to learn new concepts. Alta College Algebra with Corequisite Support: A Compressed 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

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: Solving Linear Equations and Inequalities
2.1 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

2.2 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

2.3 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
2.4 Solve an Equation Involving Decimals
- Solve an equation involving decimals with variables on both sides
- Solve an equation involving decimals by clearing the decimals

2.4 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

2.5 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

2.6 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

2.7 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

2.8 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

2.9 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 3: Graphs
3.1 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

3.2 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

3.3 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

3.4 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

3.5 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

3.6 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

3.7 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 4: Exponents and Polynomials

4.1 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

4.2 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

4.3 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

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

4.5 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

Chapter 5: Factoring
5.1 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

5.2 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 \( x^2+bxy+cy^2 \)
- 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

5.3 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
5.4 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 6: Rational Expressions and Equations
6.1 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 more than two rational expressions

6.2 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

6.3 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

6.4 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
- Uniform Motion, Work, and Problem Solving
  - Solve uniform motion applications involving rational equations
  - Solve problems involving rates of work using rational equations

6.5 Solve Proportion and Similar Figure Applications
- Proportions and Problem Solving with Rational Equations
  - Solve proportions
  - Solve applications with proportions
  - Solve similar figure applications
6.6 Use Direct and Inverse Variation
- Variation and Problem Solving
  - Solve problems that involve direct variation
  - Solve problems that involve inverse variation

Chapter 7: Roots and Radicals
7.1 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

7.2 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

7.3 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

7.4 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
7.5 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

7.6 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 8: Quadratic Equations and Other Factorable Equations
8.1 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

8.2 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

8.3 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

8.4 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

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: Functions
9.1 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
- 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

9.2 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

9.3 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

9.4 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

9.5 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
- Graph an Absolute Value Functions
  - Graph an absolute value function

9.6 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
- 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 10: Linear Functions and Modeling
10.1 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

10.2 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
10.3 Fitting Linear Models to Data
- Scatter Diagrams and Lines of Best Fit
  - Draw and interpret scatter diagrams
  - Distinguish between linear and nonlinear relations

Chapter 11: Polynomial and Rational Functions
11.1 Quadratic Functions
- Characteristics of Parabolas
  - Determine axis of symmetry and vertex of parabolas from a graph
  - Determine x- and y-intercepts of parabolas from a graph
  - Find the direction a parabola opens and its axis of symmetry and vertex from the general form of its equation
  - Identify the axis of symmetry and vertex of a parabola from its equation in standard form
- Graphs of Quadratic Functions
  - Write the equation of a quadratic function given vertex and a point on a graph
  - Write the equation of a quadratic function given intercepts on a graph
  - Write the equation of a quadratic function in standard form given the equation in general form
- Applications of Quadratic Functions
  - Find the domain and range of a quadratic function
  - Determine the maximum and minimum values of quadratic functions
  - Find the x- and y-intercepts of a quadratic function
  - Use a quadratic function to model projectile motion
11.2 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
11.3 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

11.4 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

11.5 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

11.6 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

11.7 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 12: Exponential and Logarithmic Functions
12.1 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

12.2 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

12.3 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

12.4 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

12.5 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

12.6 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

12.7 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 13: Systems of Equations and Inequalities
13.1 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

13.2 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

13.3 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
13.4 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

13.5 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

13.6 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

13.7 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

13.8 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 14: Conic Sections

14.1 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

14.2 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

14.3 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 15: Sequences, Series, and Basic Probability

15.1 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

15.2 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

15.3 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

15.4 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
15.5 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

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

15.7 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