

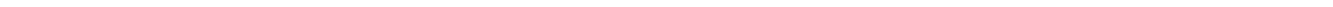


Foundations of Mathematics

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Alta Foundations of Mathematics was developed to meet the scope and sequence of a typical one-semester foundations course. To develop the course, Knewton used three main sources of content: Openstax, videos created by a Math Professor we have partnered with, and a team of internal and external Subject Matter Experts. The SMEs come from diverse backgrounds and are all academics in the field of mathematics.

Alta Foundations of Mathematics has two instructional sequences for every learning objective, giving students multiple opportunities to learn new concepts. Between our instructional texts, videos, and a network of SMEs, we were able to solicit ideas from math instructors and students. Alta Foundations of Mathematics combines material from Prealgebra, Elementary Algebra, and Intermediate Algebra to allow for flexible combinations of content in varied types of early or developmental math programs, and also provides the necessary depth to ensure the course is manageable and engaging for instructors and students alike.

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 - 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

16.3 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

16.4 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

16.5 Divide Square Roots

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

16.6 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

16.7 Higher Roots

- Understanding Higher Roots
 - Simplify numerical expressions with higher roots
 - Simplify expressions with higher roots
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- 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

16.8 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

16.9 Use Radicals in Functions

- Radical Functions
 - Evaluate a radical function
 - Find the domain of a radical function
 - Graph a radical function by plotting points and determine its range (*23)

16.10 Use the Complex Number System

- Introduction to Complex Numbers
 - Evaluate the square root of a negative number and understand the complex number system
 - Add or subtract complex numbers
- Multiplying and Dividing Complex Numbers and Powers of i
 - Multiply complex numbers
 - Multiply two complex conjugates
 - Divide complex numbers
 - Simplify powers of i

Chapter 17: Quadratic Equations

17.1 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

17.2 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

17.3 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
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17.4 Solve Quadratic Equations in Quadratic Form

- Solving Equations by Using Quadratic Methods
 - Solve an equation in quadratic form by using substitution
 - Solve an equation in quadratic form with rational or negative exponents by using substitution

17.5 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

17.6 Graph Quadratic Functions Using Properties

- Parabolas and Their Properties
 - Graph a quadratic function by plotting points and determine the direction a parabola opens (*21)
 - Determine the axis of symmetry and vertex of a parabola given a function
 - Determine the intercepts of a parabola given a function
- Graphing Quadratic Functions
 - Graph a quadratic function by finding key points (*42)
 - Determine the minimum or maximum of a quadratic function and use it in applications

17.7 Graph Quadratic Functions Using Transformations

- Transformations of Parabolas
 - Graph a quadratic function using a vertical translation (*22)
 - Graph a quadratic function using a horizontal translation (*23)
 - Graph a quadratic function by compression, stretching, or reflecting (*22)
- Graphing Quadratic Functions Using Transformations
 - Rewrite a quadratic in vertex form and graph it using transformations (*11)
 - Find a quadratic function given its graph

17.8 Solve Quadratic Inequalities

- Solving Quadratic Inequalities
 - Solve a quadratic inequality graphically
 - Solve a quadratic inequality algebraically

Chapter 18: Exponential and Logarithmic Functions

18.1 Finding Composite and Inverse Functions

- Composite Functions
 - Perform a composition of functions
 - Evaluate a composition of functions for a specific value
 - One-to-One Functions
 - Determine whether a function is one-to-one given a set of ordered pairs
 - Use the horizontal line test to determine whether a graph represents a one-to-one function
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- Inverse Functions
 - Find the inverse of a function given a set of ordered pairs or a graph
 - Verify that two functions are inverses of each other
 - Find the inverse of a function algebraically

18.2 Evaluate and Graph Exponential Functions

- Graphing Exponential Functions
 - Graph an exponential function and understand its properties (*14)
 - Graph an exponential function using transformations (*22)
 - Evaluate an exponential function with base e and understand the natural base
- Applications with Exponential Functions
 - Use the one-to-one property of exponential equations to solve an exponential equation
 - Use the compound interest formula to find the new value of an account
 - Use the continuously compounding interest formula to find the new value of an account
 - Calculate resultant values using exponential growth and decay models

18.3 Evaluate and Graph Logarithmic Functions

- Introduction to Logarithms
 - Convert between exponential and logarithmic form
 - Evaluate a logarithmic function
- Logarithmic Functions and Applications
 - Graph a logarithmic function and understand its properties (*15)
 - Solve a logarithmic equation by rewriting the equation in exponential form
 - Use logarithmic models in applications

18.4 Use the Properties of Logarithms

- Understanding the Properties of Logarithms
 - Use basic properties of logarithms and the inverse properties of logarithms
 - Use the product, quotient, and power properties of logarithms
- Using the Properties of Logarithms
 - Use the properties of logarithms to expand a logarithmic expression
 - Use the properties of logarithms to condense a logarithmic expression
 - Use the change-of-base formula for logarithms

18.5 Solve Exponential and Logarithmic Equations

- Solving Logarithmic Equations
 - Use the one-to-one property of logarithmic equations to solve logarithmic equations
 - Use the properties of logarithms to solve logarithmic equations
 - Solving Exponential Equations and Applications
 - Solve exponential equations using logarithms
 - Solve for amounts other than a new balance with the compound or continuously compounding interest formula
 - Use the exponential growth and decay models to find values other than the resultant value
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Chapter 19: Conics

19.1 Distance and Midpoint Formulas and Circles

- The Distance and Midpoint Formulas
 - Use the distance formula to find the distance between two points
 - Use the midpoint formula to find the midpoint between two points (*10)
- The Equation of Circles
 - Write the standard form of the equation of a circle given its center and radius
 - Write the standard form of the equation of a circle given its center and a point on the circle
 - Graph a circle given its equation in standard form (*21)
 - Rewrite the equation of a circle given in general form by completing the square (*11)

19.2 Parabolas

- Parabolas as Conic Sections and Applications
 - Graph a vertical parabola given the equation in general or standard form (*24)
 - Graph a horizontal parabola given the equation in general form (*12)
 - Graph a horizontal parabola given the equation in standard form (*21)
 - Solve applications with parabolas

19.3 Ellipses

- Ellipses with Centers at the Origin
 - Graph an ellipse with its center at the origin (*23)
 - Find the equation of an ellipse with its center at the origin
- Ellipses with Centers Not at the Origin and Applications
 - Graph an ellipse with its center not at the origin (*22)
 - Rewrite the equation of an ellipse given in general form by completing the square (*11)
 - Solve applications with ellipses

19.4 Hyperbolas

- Hyperbolas as Conic Sections
 - Graph a hyperbola with its center at the origin (*23)
 - Graph a hyperbola with its center not at the origin (*22)
 - Rewrite the equation of a hyperbola given in general form by completing the square (*11)
- Identifying Conic Sections by Their Equations
 - Identify conic sections by their equations

19.5 Solve Systems of Nonlinear Equations

- Solving Systems of Nonlinear Equations
 - Solve a system of nonlinear equations by graphing
 - Solve a system of nonlinear equations using substitution
 - Solve a system of nonlinear equations using elimination
- Problem Solving with Systems of Nonlinear Equations
 - Use a system of nonlinear equations to solve applications

Chapter 20: Sequences, Series, and the Binomial Theorem

20.1 Sequences

- Introduction to Sequences
 - Write the first few terms of a sequence
 - Find a formula for the general term of a sequence
- Factorial Notation and Sigma Notation
 - Use factorial notation
 - Find the partial sum
 - Use summation notation to write a sum

20.2 Arithmetic Sequences and Series

- Arithmetic Sequences and Series
 - Determine if a sequence is arithmetic and write the first few terms of an arithmetic sequence
 - Find the general term of an arithmetic sequence
 - Find the sum of the first n terms of an arithmetic sequence

20.3 Geometric Sequences and Series

- Geometric Sequences
 - Determine if a sequence is geometric and write the first few terms of a geometric sequence
 - Find the general term of a geometric sequence
- Finite and Infinite Geometric Series and Applications
 - Find the sum of the first n terms of a geometric sequence
 - Find the sum of an infinite geometric series and use infinite geometric series to write a repeating decimal as a fraction
 - Use geometric sequences and series to solve monetary applications including annuities

20.4 Binomial Theorem

- The Binomial Theorem
 - Use Pascal's Triangle to expand a binomial
 - Evaluate a binomial coefficient
 - Use the binomial theorem to expand a binomial
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