



Elementary & Intermediate Algebra

978-1-63545-036-1



To learn more about all our offerings
Visit [Knewton.com/highered](https://www.knewton.com/highered)



Source	Author(s) (Text or Video)	Title(s)	Link (where applicable)
OpenStax	Lynn Marecek, Santa Ana College MaryAnne Anthony-Smith, Formerly of Santa Ana College	Prealgebra	OpenStax
Flatworld	John Redden	Elementary Algebra	Elementary Algebra: FlatWorld
Flatworld	John Redden	Intermediate Algebra	Intermediate Algebra: FlatWorld
Mathispower4u	James Sousa	MathIsPower4U	Mathispower4u Videos

Knewton Elementary and Intermediate Algebra combines material from Knewton Intermediate and Knewton Elementary Algebra courses to allow for more flexible curricula in a variety of math programs. 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 Subject Matter Experts. The SMEs come from diverse backgrounds and are all academics in the field of Mathematics.

Knewton Elementary and Intermediate Algebra has two instructional sequences for every learning objective, giving students multiple opportunities to learn new concepts. Between our OpenStax, Video, and Knewton SMEs, we were able to solicit ideas from math instructors and students at all levels of higher education. Knewton Elementary and Intermediate Algebra covers the typical breadth of algebra topics and also provides the necessary depth to ensure the course is manageable and engaging for instructors and students alike.



Knewton Elementary and Intermediate Algebra | Table of Contents

Chapter 1: Real Numbers and Their Operations

Whole Numbers and Integers

- Number Lines and Absolute Value
 - Identify points on the number line
 - Use the number line to order and compare real numbers
 - Understand opposites and evaluate absolute value
- Operations with Whole Numbers
 - Perform addition with whole numbers
 - Perform subtraction with whole numbers
 - Perform multiplication with whole numbers
 - Divide whole numbers
- Operations with Integers
 - Add integers
 - Subtract integers
 - Multiply and divide integers
 - Factor a number into primes

Fractions

- Multiply and Divide Fractions
 - Perform multiplication with fractions
 - Find reciprocal fractions
 - Perform division with fractions
- Add and Subtract Fractions
 - Add and subtract fractions with like denominators
 - Add and subtract fractions with unlike denominators
- Equivalent Fractions
 - Find equivalent fractions by reducing to lowest terms
 - Convert between mixed numbers and improper fractions

Decimals and Percents

- Understand and Manipulate Decimals
 - Convert between fractions and decimals
 - Perform operations with decimals
 - Compare round and order decimals
- Understand and Manipulate Percents
 - Define percents
 - Convert between percents and decimals
 - Convert between percents and fractions

Exponents and Square Roots

- Understand and Evaluate Exponents and Square Roots
 - Understand exponential notation and evaluate exponents
 - Determine the square root of a real number
-



Chapter 2: Linear Equations and Inequalities

Simplifying Algebraic Expressions

- Distribute and Combine Like Terms
 - Simplify expressions using order of operations
 - Simplify expressions with distribution
 - Simplify expressions by combining like terms

Linear Equations

- Solve Linear Equations with Integers
 - Determine if a given value is a solution to a linear equation
 - Solve linear equations in one step
 - Solve linear equations in two steps
- Solve Linear Equations with Fractions and Decimals
 - Solve equations involving fractions
 - Solve equations involving decimals

Solve a Formula for a Specific Variable

- Solve Literal Equations
 - Solve a formula for a given variable

Linear Inequalities

- Solve Single Variable Inequalities
 - Use interval notation and number line graphs to model linear inequalities in one variable
 - Solve a linear inequality in one variable
 - Solve a compound linear inequality in one variable

Chapter 3: Graphing and Introduction to Functions

The Rectangular Coordinate System

- Introduction to Graphing
 - Plot and identify points on 4 quadrants
 - Determine if a point is a solution to an equation with two variables

Graphing Linear Equations

- Graph Linear Equations by Plotting Points and Intercepts
 - Graph linear equations by plotting points
 - Use intercepts to graph linear equations

Slope and Rate of Change

- Graph Linear Equations Using Slope
 - Find the slope given a line or given two points
 - Graph linear equations using slope-intercept form
 - Graph linear equations using point-slope form
 - Graph parallel and perpendicular lines

Linear Inequalities

- Solve and Graph Linear Inequalities
 - Solve linear inequalities in two variables
 - Graph a solution set for linear inequalities in two variables
-



Relations and Functions

- The Definition of a Function
 - Representing relations on a Cartesian coordinate plane
 - Determine the domain and range from a graph
 - Determine if a relation is a function given ordered pairs
 - Determine if a relation is a function given a graph
- Function Notation
 - Use function notation with a numerical argument
 - Use function notation with an algebraic argument
 - Evaluate a function from a graph
 - Find the input from the output in function notation

Chapter 4: Systems of Linear Equations

Graphing Systems of Linear Equations

- Graphing Linear Systems of Equations with Two Variables
 - Determine if an ordered pair is a solution to a system of linear equations
 - Solve systems of linear equations in two variables by graphing
 - Identify inconsistent and dependent systems of linear equations graphically, and express the solution of dependent equations

Solving Systems of Linear Equations

- Solving Linear Systems with Two Variables
 - Solve systems of linear equations in two variables by substitution
 - Solve systems of linear equations in two variables by elimination
 - Choose a method to solve a system of linear equations

Systems of Linear Equations in Applications

- Applications of Linear Systems with Two Variables
 - Write and solve a system of linear equations in two variables in word problems
 - Write and solve mixture problems
 - Write and solve distance problems

Solving Systems of Linear Equations in Three Variables

- Solving Linear Systems with Three Variables
 - Check solutions to linear systems with three variables
 - Solve linear systems with three variables by elimination
 - Identify dependent and inconsistent linear systems with three variables
 - Solve applications involving three unknowns

Chapter 5: Exponents and Polynomials

Exponents

- Exponent Rules and Scientific Notation
 - Use the product rule to multiply exponents
 - Use integer exponents
 - Write numbers in scientific notation
-



- Operations with Exponents
 - Use operations with scientific notation
 - Use the quotient rule to divide exponents
 - Use the power rule for exponents

Polynomials

- Addition and Subtraction of Polynomials
 - Perform addition and subtraction with polynomials
- Multiplication of Polynomials
 - Use the distributive property to multiply monomials by polynomials
 - Multiply binomials using FOIL
 - Multiply trinomials or higher
- Division of Polynomials
 - Divide polynomials by monomials
 - Divide polynomials using long division
 - Use synthetic division to divide polynomials

Chapter 6: Factoring Polynomials

Factoring Greatest Common Factors and Special Polynomials

- Factoring with a Greatest Common Factor
 - Determine the greatest common factor of monomials
 - Factor polynomials using the greatest common factor
 - Use grouping to factor polynomials
- Factoring Special Polynomials
 - Factor the difference of squares
 - Factor the sum and difference of cubes
 - Factor special polynomials with multiple steps

Factoring Trinomials

- Factoring Quadratic Trinomials
 - Factor a quadratic trinomial with a leading coefficient of 1
 - Factor a quadratic trinomial with a leading coefficient of 1 and multiple variables
- Factoring Trinomials Quadratic in Form
 - Factor a trinomial with a higher degree with a leading coefficient of 1
 - Factor a quadratic trinomial with a leading coefficient greater than 1
 - Use multiple strategies to factor polynomials

Chapter 7: Rational Expressions and Equations

Rational Expressions

- Evaluate and Simplify Rational Expressions
 - Evaluate rational expressions
 - Simplify a rational expression
 - Multiply and Divide Rational Expressions
 - Perform multiplication with rational expressions
 - Perform division with rational expressions
-

- Add and Subtract Rational Expressions and Complex Fractions
 - Add and subtract rational expressions with like denominators
 - Add and subtract rational expressions with unlike denominators
 - Simplify complex fractions containing variables

Rational Equations

- Solve Rational Equations
 - Solve rational equations, no extraneous solutions
 - Solve rational equations with extraneous solutions or no solution
- Direct and Inverse Variation
 - Solve problems that involve direct variation
 - Solve problems that involve inverse variation

Chapter 8: Graphing Functions

Linear Functions and Their Graphs

- Graphs of Linear Functions
 - Identify and graph linear functions
 - Determine a linear function given a graph
- Horizontal and Vertical Lines and Graphical Interpretations of Equations and Inequalities
 - Understand properties of horizontal and vertical lines
 - Represent linear equations and inequalities graphically

Modeling Linear Functions

- Equations of Lines
 - Determine a linear function using point-slope form
 - Find a function that passes through a point and is parallel to another function
 - Find a function that passes through a point and is perpendicular to another function
- Modeling Linear Applications
 - Write a linear mathematical model
 - Use a linear model for interpolation and extrapolation
 - Use functions to represent revenue, cost and profit

Graphing the Basic Functions

- Piecewise Functions and Graphs of Basic Functions
 - Define and graph seven basic functions
 - Graph piecewise-defined functions
 - Evaluate piecewise-defined functions

Using Transformations to Graph Functions

- Transformations of Functions
 - Graph functions using vertical and horizontal translations
 - Graph functions using reflections about the x- and y- axes
 - Graph functions using dilations
-

Chapter 9: Inequalities and Absolute Value

Solving Absolute Value Equations and Inequalities

- Absolute Value Equations
 - Understand the concept of absolute value
 - Solve absolute value equations with one absolute value expression
 - Solve absolute value equations with two absolute value expressions
- Absolute Value Inequalities
 - Solve absolute value inequalities involving less than
 - Solve absolute value inequalities involving greater than

Solving Inequalities and Systems of Inequalities with Two Variables

- Solve Linear Inequalities
 - Determine if an ordered pair is in a solution set of a linear inequality with two variables
 - Graph the solution set of a linear inequality with two variables
- Solve Systems of Linear Inequalities
 - Solve a system of linear inequalities in two variables

Chapter 10: Rational Exponents, Radicals, and Complex Numbers

Radical Expressions

- Evaluate nth Roots
 - Identify and evaluate square and cube roots
 - Identify and evaluate nth roots
 - Simplify radicals with numerical radicands
 - Simplify Radical Expressions
 - Understand even and odd indices when simplifying radicals with variable radicands
 - Simplify radical expressions with square and cube roots
 - Simplify radical expressions with nth roots
 - Add and Subtract Radical Expressions
 - Perform addition and subtraction with like radicals
 - Add and subtract radical expressions with numerical radicands
 - Add and subtract radical expressions with variable radicands
 - The Distance Formula and Applications
 - Use the distance formula
 - Determine if three given points form a right triangle
 - Determine the perimeter of a triangle given three points
 - Multiply Radical Expressions
 - Multiply radical expressions with numerical radicands
 - Multiply radical expressions with variable radicands
 - Multiply two binomials that contain radical expressions
 - Divide Radical Expressions
 - Divide radical expressions with the quotient rule for radicals
 - Rationalize a denominator with a monomial square root expression in the denominator
 - Rationalize a denominator with a monomial higher index radical expression in the denominator
 - Rationalize a denominator with a binomial in the denominator
-



Rules of Exponents and Rational Exponents

- Rules of Exponents
 - Simplify expressions using the product and quotient rules of exponents
 - Simplify expressions using the power rule of exponents
 - Simplify expressions with negative exponents
- Rational Exponents
 - Rewrite an expression with a rational exponent as a radical
 - Rewrite a radical expression as an expression with rational exponents
 - Evaluate expressions with a rational exponent that have a negative base
 - Simplify expressions including rational exponents
 - Simplify radical expressions with different indices

Radical Equations

- Solve Radical Equations
 - Solve equations including one square root
 - Solve equations including two square roots
 - Solve equations including cube roots

Complex Numbers

- Introduction to Complex Numbers
 - Rewrite the square root of a negative number as an imaginary number
 - Add and subtract complex numbers
- Multiply and Divide Complex Numbers
 - Perform multiplication with complex numbers
 - Divide complex numbers
 - Multiply the square root of negative numbers

Chapter 11: Quadratic Equations and Inequalities

Extracting Square Roots and Completing the Square

- The Square Root Property
 - Solve a quadratic equation using the square root property
 - Solve a quadratic equation with a perfect square binomial using the square root property
- Completing the Square
 - Convert a quadratic in standard form to a quadratic with a perfect square binomial
 - Solve a quadratic equation by completing the square
 - Solve a quadratic equation by completing the square with an odd coefficient of x

Solving Equations with the Quadratic Formula

- The Quadratic Formula
 - Solve a quadratic equation using the quadratic formula
 - Solve a quadratic equation not given in standard form using the quadratic formula
 - Determine the type and number of solutions of a quadratic equation
-



Solving Equations by Using Quadratic Methods

- Solve Equations Quadratic in Form
 - Solve an equation with rational or negative exponents by writing in quadratic form
 - Solve other equations by writing in quadratic form
 - Solve a cubic polynomial and understand the fundamental theorem of algebra

Polynomial and Rational Inequalities

- Find the Solution Set of a Quadratic Inequality
 - Determine the solution set of a quadratic inequality from a graph
 - Solve a quadratic inequality in one variable by factoring
 - Solve a quadratic inequality in one variable with the quadratic formula
 - Find the domain of a radical function with a quadratic radicand
- Solve Polynomial Inequalities
 - Solve a polynomial inequality given in factored form
 - Solve a polynomial inequality requiring factoring to solve
- Solve Rational Inequalities
 - Solve a rational inequality with only one rational expression
 - Solve a rational inequality with two rational expressions

Quadratic Functions and Their Graphs

- Quadratic Functions and the Parabola
 - Determine the x and y intercepts of a parabola
 - Find the vertex and the axis of symmetry of a parabola
 - Graph a parabola from a quadratic function given in standard form
 - Find the maximum or minimum of a quadratic function
- Vertex Form of a Quadratic Function
 - Find the vertex and graph a parabola from a quadratic function given in vertex form
 - Write a quadratic function in vertex form by completing the square

Chapter 12: Exponential and Logarithmic Functions

Composite Functions

- Composite Functions
 - Perform a composition of functions with two functions
 - Compose a function with itself

Inverse Functions

- Inverse Functions
 - Verify that two functions are inverses of each other
 - Determine if a function is a one-to-one function
 - Find the inverse of a linear or quadratic function algebraically
 - Find the inverse of other types of functions algebraically

Exponential Functions

- Graphs of Exponential Functions
 - Determine the domain and range of an exponential function and recognize its graph
 - Graph an exponential function with fractional bases or involving reflections
 - Graph an exponential function with the natural base
-



- Compound Interest
 - Use the compound interest formula
 - Use the continuously compounding interest formula

Logarithmic Functions

- Definition of the Logarithm
 - Understand the definition of the logarithm and convert between exponential and logarithmic form
 - Evaluate common or natural logarithms without the use of a calculator
 - Solve a simple common or natural logarithmic equation by rewriting in exponential form
- Graphs of Logarithmic Functions
 - Determine the domain and range of a logarithmic function with a base greater than 1 and recognize its graph
 - Graph a logarithmic function with a fractional base

Properties of the Logarithm

- The Inverse Properties of Logarithms
 - Apply the inverse properties of the logarithm
 - Apply the product or quotient property of logarithms to simplify a logarithmic expression
 - Apply the power property of logarithms to simplify a logarithmic expression
- Expanding and Contracting Logarithms
 - Use the properties of logarithms to expand a logarithmic expression
 - Use the properties of logarithms to condense a logarithmic expression

Exponential and Logarithmic Equations

- Solving Exponential Equations and the Change of Base Formula
 - Solve an exponential equation with the one-to-one property of exponential functions
 - Solve an exponential equation with logarithms
 - Evaluate a logarithm using the change of base formula
- Solving Logarithmic Equations
 - Solve a logarithmic equation with the one-to-one property of logarithmic functions
 - Solve a logarithmic equation requiring the properties of logarithms
 - Find the inverse of a logarithmic function

Applications of Exponential and Logarithmic Functions

- Exponential Growth for Investments
 - Use the compound interest formula to determine the time for an investment to yield a given amount
 - Use the continuous compound interest formula to determine the time for an investment to yield a given amount
 - Other Applications of Exponential Growth and Decay
 - Use the exponential growth formula to investigate population growth and other applications
 - Use the exponential decay formula to investigate radioactive decay and other applications
-

Chapter 13: Conic Sections and Nonlinear Systems

The Parabola and the Circle

- Parabolas
 - Convert the equation of a parabola from general form to standard form and find the vertex of a parabola
 - Use both general and standard forms of a quadratic equation to graph and find key points of a parabola
 - Graph a parabola that opens to the left or the right
 - Use the distance and midpoint formulas to find the center and radius of circles
- Circles in Standard Form
 - Graph a circle and determine the radius and center given the equation in standard form
 - Find the intercepts of a circle given the equation in standard form
 - Write the equation of a circle in standard form given the center and radius or points on the circle
- Circles in General Form
 - Write the equation of a circle given in general form as an equation in standard form
 - Graph a circle given the equation in general form

The Ellipse and the Hyperbola

- Ellipses in Standard Form
 - Write the equation for an ellipse in standard form given key points
 - Graph an ellipse given an equation in standard form
 - Find the intercepts of an ellipse given an equation in standard form
- Ellipses in General Form
 - Write the equation of an ellipse given in general form as an equation in standard form
 - Graph an ellipse given an equation in general form
- Hyperbolas in Standard Form
 - Write the equation for a hyperbola in standard form given key points
 - Graph a hyperbola given an equation in standard form
 - Find the intercepts of a hyperbola given an equation in standard form
- Hyperbolas in General Form
 - Graph a hyperbola given an equation in general form
 - Identify a conic section given its equation in general form

Systems of Equations with Conic Sections

- Nonlinear Systems of Equations
 - Solve a nonlinear system of equations given a circle and a line
 - Solve a nonlinear system of equations given a circle and a parabola

Chapter 14: The Binomial Theorem and Sequences and Series

Sequences

- Introduction to Sequences and Series
 - Find terms of a sequence given the general term of a sequence
 - Find terms of a sequence given a recurrence relation
-

Arithmetic and Geometric Sequences

- Arithmetic Sequences
 - Find an equation for the general term of an arithmetic sequence
 - Find a term or an equation for an arithmetic sequence given two terms in the sequence
- Geometric Sequences
 - Find an equation for the general term of a geometric sequence
 - Find a term or an equation for a geometric sequence given two terms in the sequence

Series

- Introduction to Series
 - Determine the partial sum of a sequence
 - Write an infinite series in expanded form

Partial Sums of Arithmetic and Geometric Sequences

- Arithmetic Series
 - Find a partial sum of an arithmetic sequence
 - Use the partial sum of an arithmetic sequence in applications
- Geometric Series
 - Find a partial sum of a finite geometric sequence
 - Find the sum of an infinite geometric series
 - Write a repeating decimal as a fraction using infinite series or use geometric series in applications

The Binomial Theorem

- Factorials and the Binomial Theorem
 - Evaluate an expression involving factorials
 - Calculate a binomial coefficient
 - Expanding Binomials
 - Expand powers of binomials using the binomial theorem or Pascal's triangle
 - Expand powers of binomials with negative terms or a coefficient greater than 1
-