Elementary Algebra | Table of Contents

Chapter 1: Foundations
1.1 Introduction to Whole Numbers
   - Place Values and Rounding
     - Identify the place value of a digit and write a whole number using words or digits
     - Round whole numbers
   - Prime Factorization and Least Common Multiples
     - Identify multiples and apply divisibility tests
     - Find the prime factorization of a number
     - Find the least common multiple of two numbers
1.2 Use the Language of Algebra
   - Use Variables and Algebraic Symbols
     - Translate algebraic expressions, equations, and inequalities into English and recognize expressions and equations
     - Evaluate a whole number raised to a power and understand the terminology
   - Order of Operations and Simplifying Expressions
     - Simplify an expression using order of operations
     - Evaluate an expression
     - Identify coefficients and identify and combine like terms
   - Rewrite English Phrases into Algebraic Expressions
     - Translate an English phrase to an algebraic expression
     - Translate English phrases from applications into algebraic expressions
1.3 Add and Subtract Integers
   - Introduction to Integers and Absolute Value
     - Order integers using inequality symbols and determine the opposite of integers or variables
     - Evaluate an absolute value expression
     - Simplify an expression involving absolute value using order of operations
   - Adding and Subtracting Integers
     - Add integers
     - Subtract integers
     - Add and subtract integers using order of operations
1.4 Multiply and Divide Integers
   - Multiplying and Dividing Integers
     - Multiply integers
     - Divide integers
   - Simplifying Expressions with Integers
     - Simplify expressions with integers using order of operations
     - Evaluate a variable expression with integers
   - Algebraic Expressions and Applications with Integers
     - Translate an English phrase to an algebraic expression with integers
     - Use integers in applications
1.5 Visualize Fractions
- Simplifying Fractions
  - Identify when fractions are equivalent
  - Simplify a fraction
- Multiplying and Dividing Fractions
  - Multiply fractions
  - Divide fractions
  - Simplify complex fractions
- Understanding Expressions with Fractions
  - Simplify expressions written with a fraction bar
  - Translate an English phrase to an expression with fractions

1.6 Add and Subtract Fractions
- Adding and Subtracting Fractions
  - Add or subtract fractions with a common denominator
  - Add or subtract fractions with different denominators
- Algebraic Expressions with Fractions
  - Use the order of operations to simplify complex fractions and expressions with multiple operations
  - Evaluate variable expressions with fractions

1.7 Decimals
- Understanding and Rounding Decimals
  - Name and write decimals
  - Round decimals
- Operations with Decimals
  - Add and subtract decimals
  - Multiply decimals
  - Divide decimals
- Decimals, Fractions, and Percents
  - Convert between fractions and decimals
  - Simplify expressions with fractions and decimals
  - Convert between decimals and percents

1.8 Square Roots and the Real Number System
- Square Roots and the Real Number System
  - Evaluate a square root
  - Identify rational and irrational numbers
  - Identify real numbers
- Fractions and Decimals on the Number Line
  - Locate fractions on a number line and write inequality statements involving fractions (*11)
  - Locate decimals on a number line and write inequality statements involving decimals (*11)

1.9 Properties of Real Numbers
- Properties of the Real Number System
  - Use the commutative and associative properties
  - Identify additive and multiplicative inverses of a number
Understand the multiplication and division properties of zero
Simplify expressions using properties of identities, inverses, and zero

The Distributive Property
Simplify expressions using the distributive property
Simplify expressions by distributing a negative number

1.10 Systems of Measurements

Unit Conversion in the US System
Make unit conversions in the US system
Use mixed units of measurement in the US system

Unit Conversion in the Metric System
Make unit conversions in the metric system
Use mixed units of measurement in the metric system

Unit Conversion Between Systems
Convert between the US and metric systems of measurement
Convert between Fahrenheit and Celsius temperatures

Chapter 2: Solving Linear Equations and Inequalities

2.1 Solve Equations Using the Subtraction and Addition Properties of Equality

Solve Equations with the Subtraction and Addition Properties of Equality
Verify a solution of an equation
Solve an equation using the subtraction and addition properties of equality
Solve an equation involving fractions or decimals using the subtraction and addition properties of equality
Solve an equation that require simplification using the subtraction and addition properties of equality
Application Problems and the Subtraction and Addition Properties of Equality
Translate an English sentence to an algebraic equation and solve using the subtraction and addition properties of equality
Use the subtraction and addition properties of equality to solve application problems

2.2 Solve Equations Using the Division and Multiplication Properties of Equality

Solve Equations with the Division and Multiplication Properties of Equality
Solve an equation using the division and multiplication properties of equality
Solve an equation involving fractions or decimals using the division and multiplication properties of equality
Solve an equation that requires simplification using the division and multiplication properties of equality
Application Problems and the Division and Multiplication Properties of Equality
Translate an English sentence to an algebraic equation and solve using the division and multiplication properties of equality
Use the division and multiplication properties of equality to solve application problems
2.3 Solve Equations with Variables and Constants on Both Sides
   ● Solving Linear Equations
     ● Solve an equation with constants on both sides
     ● Solve an equation with variables on both sides
     ● Solve an equation with constants and variables on both sides

2.4 Use a General Strategy to Solve Linear Equations
   ● General Strategies for Solving Linear Equations
     ● Solve an equation using the distributive property with variables on one side
     ● Solve an equation using the distributive property with variables on both sides
     ● Classify equations as conditional, identity, or a contradiction

2.5 Solve Equations with Fractions or Decimals
   ● Solving Linear Equations with Fractions
     ● Solve an equation involving fractions with variables on both sides
     ● Solve an equation involving fractions by eliminating the fractions
     ● Solve an equation involving fractions by eliminating the fractions and other steps
   ● Solve Linear Equations with Decimals
     ● Solve an equation involving decimals with variables on both sides
     ● Solve an equation involving decimals by clearing the decimals

2.6 Solve a Formula for a Specific Variable
   ● Distance, Rate, and Time and Literal Equations
     ● Use the distance, rate, and time formula
     ● Solve a formula for a specific variable

2.7 Solve Linear Inequalities
   ● Inequalities, the Number Line, and Interval Notation
     ● Graph an inequality on the number line
     ● Express an inequality using interval notation
   ● Solving One-Step Linear Inequalities
     ● Solve an inequality using the subtraction and addition properties of inequality
     ● Solve an inequality using the division and multiplication properties of inequality
   ● Solving Linear Inequalities
     ● Solve an inequality that requires simplification
     ● Classify an inequality as conditional, identity, or contradiction
     ● Translate an English sentence into an inequality and solve

Chapter 3: Math Models
3.1 Use a Problem-Solving Strategy
   ● An Introduction to Problem Solving
     ● Use a problem-solving strategy for word problems
     ● Solve a number problem
     ● Solve a number problem involving consecutive integers
3.2 Solve Percent Applications
   ● Percent Problems and Percent Increase and Decrease
     ● Translate and solve basic percent equations
     ● Solve basic applications of percent
     ● Find percent increase or percent decrease
   ● Simple Interest and Discounts
     ● Solve applications involving the simple interest formula
     ● Solve applications with discount or mark-up
3.3 Solve Mixture Applications
   ● Solve Mixture Word Problems
     ● Solve coin word problems
     ● Solve ticket and stamp word problems
     ● Use the mixture model to solve word problems
3.4 Solve Geometry Applications - Triangles, Rectangles, and the Pythagorean Theorem
   ● Triangles and the Pythagorean Theorem
     ● Solve problems involving the perimeter, area, and interior angles of triangles
     ● Solve triangle problems where angles or sides are given in terms of other angles or sides
     ● Solve triangle problems using the Pythagorean Theorem
   ● Area and Perimeter of Rectangles
     ● Solve problems involving the perimeter and area of rectangles
     ● Solve rectangle problems when the width is given in terms of the length
3.5 Solve Uniform Motion Applications
   ● Uniform Motion
     ● Solve uniform motion applications
3.6 Solve Applications with Linear Inequalities
   ● Problem Solving with Linear Inequalities
     ● Solve one-step applications with linear inequalities
     ● Solve applications with linear inequalities

Chapter 4: Graphs
4.1 Use the Rectangular Coordinate System
   ● Reading Graphs and the Rectangular Coordinate System
     ● Plot points on a rectangular coordinate system (*22)
     ● Verify the solution to an equation in two variables
     ● Complete a table of solutions to a linear equation in two variables
     ● Find solutions to a linear equation
4.2 Graph Linear Equations in Two Variables
   ● Graphing Linear Equations
     ● Recognize the relationship between the solutions of an equation and its graph
     ● Graph a linear equation by plotting points (*23)
     ● Graph a linear equation in standard form by plotting points (*23)
     ● Graph vertical and horizontal lines (*24)
4.3 Graph with Intercepts

- Intercepts on the Coordinate Plane
  - Identify the x- and y-intercepts on a graph
  - Find the x- and y-intercepts from an equation of a line
  - Graph a line using the x- and y-intercepts (*23)

4.4 Understand Slope of a Line

- Understanding Slope
  - Use a geoboard to model slope (*13)
  - 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 (*22)
  - Determine the slope in applications

4.5 Use the Slope-Intercept Form of an Equation of a Line

- Slope-Intercept Form
  - Identify the slope and y-intercept from an equation of a line and relate a graph to the equation
  - Graph a line given its equation using its slope and y-intercept (*21)
  - Graph lines using a variety of methods
  - Graph and interpret applications of slope-intercept

- Parallel and Perpendicular Lines
  - Use slopes to identify parallel lines
  - Use slopes to identify perpendicular lines

4.6 Find the Equation of a Line

- Equations of Lines
  - Find an equation of the line given the slope and y-intercept
  - Find an equation of the line given the slope and a point
  - Find an equation of the line given two points

- Equations of Parallel and Perpendicular Lines
  - Find an equation of a line parallel to a given line
  - Find an equation of a line perpendicular to a given line

4.7 Graphs of Linear Inequalities

- Graphing Linear Inequalities
  - Verify solutions to an inequality in two variables
  - Recognize the relationship between the solutions of an inequality and its graph
  - Graph a linear inequality (*22)

Chapter 5: Systems of Linear Equations

5.1 Solve Systems of Equations by Graphing

- Solving Systems of Linear Equations by Graphing
  - Determine whether an ordered pair is a solution of a system of linear equations
  - Solve a system of linear equations by graphing (*13)
5.2 Solve Systems of Equations by Substitution
   - Solving Systems of Linear Equations by Substitution
     - Solve a system of linear equations by substitution
     - Solve applications of systems of linear equations by substitution

5.3 Solve Systems of Equations by Elimination
   - Solving Systems of Linear Equations by Elimination
     - Solve a system of linear equations by elimination
     - Solve applications of systems of equations by elimination
     - Solve a system of linear equations using a variety of methods

5.4 Solve Applications with Systems of Equations
   - Systems of Linear Equations and Problem Solving
     - Translate a word problem to a system of equations
     - Solve a word problem using a system of equations
     - Solve an application in geometry using a system of equations
     - Solve uniform motion applications using a system of equations

5.5 Solve Mixture Applications with Systems of Equations
   - Mixture Problems and Systems of Equations
     - Solve mixture applications involving tickets or money with a system of equations
     - Solve mixture applications involving concentrations using a system of equations
     - Solve interest applications using a system of equations

5.6 Graphing Systems of Linear Inequalities
   - Solving Systems of Linear Inequalities
     - Determine whether an ordered pair is a solution of a system of linear inequalities
     - Solve a system of linear inequalities by graphing
     - Solve applications of systems of linear inequalities

Chapter 6: Polynomials
6.1 Add and Subtract Polynomials
   - Adding and Subtracting Polynomials
     - Identify the types and degrees of polynomials
     - Add and subtract monomials
     - Add and subtract polynomials
     - Evaluate a polynomial for a given value

6.2 Use Multiplication Properties of Exponents
   - Product Properties of Exponents
     - Simplify numerical expressions containing exponents
     - Simplify expressions using the product property for exponents
     - Simplify expressions using the power property for exponents or the product to a power property for exponents
     - Simplify expressions by applying several properties
6.3 Multiply Polynomials
   ● Multiplying Polynomials
     ● Multiply monomials
     ● Multiply a polynomial by a monomial
     ● Multiply a binomial by a binomial
     ● Multiply a trinomial by a binomial

6.4 Special Products
   ● Special Products of Binomials
     ● Square a binomial using the binomial squares pattern
     ● Multiply conjugates using the product of conjugates pattern
     ● Recognize and use the appropriate special product pattern

6.5 Divide Monomials
   ● Quotient Properties of Exponents and Dividing Monomials
     ● Simplify expressions using the quotient property for exponents and the exponent of zero
     ● Simplify expressions using the quotient to a power property
     ● Simplify expressions by applying several quotient properties of exponents
     ● Divide monomials

6.6 Divide Polynomials
   ● Dividing Polynomials
     ● Divide a polynomial by a monomial
     ● Divide a polynomial by a binomial using polynomial long division

6.7 Integer Exponents and Scientific Notation
   ● Negative Exponents
     ● Use the definition of a negative exponent
     ● Simplify expressions with integer exponents
   ● Scientific Notation
     ● Convert from decimal notation to scientific notation
     ● Convert from scientific notation to decimal notation
     ● Multiply and divide using scientific notation

Chapter 7: Factoring
7.1 Greatest Common Factor and Factor by Grouping
   ● The Greatest Common Factor and Factoring by Grouping
     ● Find the greatest common factor of two or more expressions
     ● Factor the greatest common factor from a polynomial
     ● Factor a polynomial by grouping

7.2 Factor Quadratic Trinomials with Leading Coefficient 1
   ● Factoring Trinomials with a Leading Coefficient of 1
     ● Factor a trinomial of the form $x^2 + bx + c$ where $c$ is positive
     ● Factor a trinomial of the form $x^2 + bx + c$ where $c$ is negative
     ● Factor a trinomial of the form $x^2 + bxy + cy^2$
7.3 Factor Quadratic Trinomials with Leading Coefficient Other than 1
   ● Factoring Trinomials with a Leading Coefficient Other than 1
     ● Factor a trinomial of the form $ax^2+bx+c$ with a GCF
     ● Factor a trinomial using trial and error
     ● Factor a trinomial using the 'ac' method

7.4 Factor Special Products
   ● Factoring Special Products
     ● Factor a perfect square trinomial
     ● Factor a difference of squares
     ● Factor sums and differences of cubes

7.5 General Strategy for Factoring Polynomials
   ● Choosing a Factoring Strategy
     ● Recognize and use the appropriate method to factor a polynomial completely

7.6 Quadratic Equations
   ● Solving Quadratic Equations by Factoring
     ● Solve a factored quadratic equation using the zero product property
     ● Solve a quadratic equation by factoring
     ● Solve applications modeled by quadratic equations

Chapter 8: Rational Expressions and Equations
8.1 Simplify Rational Expressions
   ● Domain of Rational Expressions and Simplifying Rational Expressions
     ● Determine the values for which a rational expression is undefined
     ● Evaluate a rational expression
     ● Simplify a rational expression
     ● Simplify a rational expression with opposite factors

8.2 Multiply and Divide Rational Expressions
   ● Multiplying and Dividing Rational Expressions
     ● Multiply rational expressions
     ● Divide rational expressions
     ● Multiply or divide more than two rational expressions

8.3 Add and Subtract Rational Expressions with a Common Denominator
   ● Adding and Subtracting Rational Expressions with a Common Denominator
     ● Add rational expressions with a common denominator
     ● Subtract rational expressions with a common denominator
     ● Add and subtract rational expressions whose denominators are opposites

8.4 Add and Subtract Rational Expressions with Unlike Denominators
   ● Adding and Subtracting Rational Expressions with Unlike Denominators
     ● Find the least common denominator of rational expressions
     ● Find equivalent rational expressions
     ● Add rational expressions with different denominators
     ● Subtract rational expressions with different denominators
8.5 Simplify Complex Rational Expressions

- Simplifying Complex Fractions
  - Simplify a complex rational expression by writing it as division
  - Simplify a complex rational expression by using the LCD

8.6 Solve Rational Equations

- Solving Rational Equations
  - Solve a rational equation that results in a linear equation
  - Solve a rational equation that results in a quadratic equation
  - Solve a rational equation for a specific variable

8.7 Solve Proportion and Similar Figure Applications

- Proportions and Problem Solving with Rational Equations
  - Solve proportions
  - Solve applications with proportions
  - Solve similar figure applications

8.8 Solve Uniform Motion and Work Applications

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

8.9 Use Direct and Inverse Variation

- Variation and Problem Solving
  - Solve direct variation problems
  - Solve inverse variation problems

Chapter 9: Roots and Radicals

9.1 Simplify and Use Square Roots

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

9.2 Simplify Square Roots

- Simplifying Square Root Expressions
  - Use the product property to simplify square roots
  - Use the quotient property to simplify a perfect square fraction
  - Use the quotient property to simplify square roots

9.3 Add and Subtract Square Roots

- Adding and Subtracting Square Root Expressions
  - Add and subtract like square roots
  - Add and subtract square roots that need simplification

9.4 Multiply Square Roots

- Multiplying Square Root Expressions
  - Multiply square roots
  - Use polynomial multiplication to multiply square roots
  - Use special product formulas to multiply square roots
9.5 Divide Square Roots
- Dividing Square Root Expressions and Rationalizing Denominators
  - Divide square roots
  - Rationalize a one-term denominator
  - Rationalize a two-term denominator

9.6 Solve Equations with Square Roots
- Solving Radical Equations
  - Solve a square root equation with a single radical
  - Solve a square root equation with two radicals
  - Use square roots in applications

9.7 Higher Roots
- Understanding Higher Roots
  - Simplify numerical expressions with higher roots
  - Simplify expressions with higher roots
- Simplifying Higher Roots and Operations on Higher Roots
  - Use the product property to simplify expressions with higher roots
  - Use the quotient property to simplify expressions with higher roots
  - Add and subtract higher roots

9.8 Rational Exponents
- Simplifying Expressions with Rational Exponents
  - Simplify expressions with rational exponents and a numerator of 1
  - Simplify expressions with rational exponents and a numerator greater than 1
  - Use the laws of exponents to simplify expressions with rational exponents

Chapter 10: Quadratic Equations
10.1 Solve Quadratic Equations Using the Square Root Property
- Solving Quadratic Equations Using the Square Root Property
  - Solve a quadratic equation using the square root property
  - Solve a quadratic equation with a binomial as the quadratic term using the square root property
  - Solve a quadratic equation where factoring results in a perfect square binomial

10.2 Solve Quadratic Equations by Completing the Square
- Solving Quadratic Equations by Completing the Square
  - Complete the square of a binomial expression
  - Solve a quadratic equation with a leading coefficient of 1 by completing the square
  - Solve a quadratic equation with a leading coefficient greater than 1 by completing the square

10.3 Solve Quadratic Equations Using the Quadratic Formula
- Solving Quadratic Equations with the Quadratic Formula
  - Solve a quadratic equation using the quadratic formula with 2 real solutions
  - Solve a quadratic equation using the quadratic formula with 1 or 0 real solutions
  - Use the discriminant to predict the number of solutions of a quadratic equation
10.4 Solve Applications Modeled by Quadratic Equations
   ● Problem Solving with Quadratic Equations
     ● Solve applications modeled by quadratic equations that may require the quadratic formula
     ● Solve geometric applications that may require the quadratic formula

10.5 Graphing Quadratic Equations
   ● Parabolas and Their Properties
     ● Graph a quadratic equation by plotting points and recognize the direction a parabola opens (*11)
     ● Find the axis of symmetry and vertex of a parabola
     ● Find the intercepts of a parabola
   ● Graphing Quadratic Equations
     ● Graph a quadratic equation in two variables by using key points (*22)
     ● Find the maximum or minimum of a quadratic equation and use it in applications