

***Numbers and Operations***

**Lesson 1: Simplifying Fractions and Complex Fractions**

Master the skills to simplify both regular and complex fractions, ensuring a strong foundation for more complex mathematical concepts.

**Lesson 2: Understanding Square Roots and Cube Roots**

Explore the concepts of square roots and cube roots, including their properties and how to evaluate them, to comprehend the roots of numbers thoroughly.

**Lesson 3: Classifying Numbers: Rational and Irrational**

Understand the distinction between rational and irrational numbers, learning to sort and classify them effectively. This lesson emphasizes the properties of operations on both types of numbers.

***Expressions***

**Lesson 4: Introduction to Expressions**

Understand the concept of expressions and their importance in mathematics. Learn to write variable expressions involving one or more operations.

**Lesson 5: Evaluating and Simplifying Expressions**

Evaluate variable expressions with integers and rational numbers. Simplify linear expressions using the properties of addition and multiplication. Apply the distributive property to simplify expressions. Sort factors of variable expressions and identify like terms.

***Solving Linear Equations***

**Lesson 6: Introduction to Linear Equations**



Understand the concept of linear equations and their significance. Learn to write variable equations to represent real-world situations. Determine if a given value of 'x' satisfies a linear equation.

### **Lesson 7: Solving Linear Equations**

Explore the properties of equality and how they relate to solving equations. Identify equivalent equations and their solutions. Model and solve linear equations using algebraic tiles to develop a visual understanding. Begin solving equations by learning to solve one-step and two-step linear equations.

### ***Geometry, Measurement, and Error Analysis***

### **Lesson 8: Solving Area, Perimeter, Volume Word Problems**

Learn to apply geometry and measurement concepts to solve word problems involving area, perimeter, and volume.

### **Lesson 9: Exploring Surface Area and Precision**

Understand the principles of surface area and precision to measure and analyze three-dimensional objects with accuracy.

### **Lesson 10: Error Analysis and Percent Error**

Develop the skills to calculate the greatest possible error, minimum and maximum area and volume, and apply these concepts to find the percent error in various situations.

### ***Problem Solving with Units***

### **Lesson 11: Scale Drawings and Conversions**

Solve word problems involving scale drawings, focusing on units and conversions. Convert measurements between customary and metric units. Understand unit prices and perform unit conversions in problem-solving scenarios.

### **Lesson 12: Rate Problems and Weighted Averages**



Solve multi-step problems related to rate of travel, incorporating unit conversions. Apply the concept of weighted averages to real-world situations, emphasizing units and conversions.

### ***Solving Linear Inequalities***

#### **Lesson 13: Introduction to Linear Inequalities**

Understand the concept of inequalities. Graph inequalities on a number line. Write inequalities from given graphs. Identify solutions to inequalities.

#### **Lesson 14: Solving Linear Inequalities**

Solve one-step linear inequalities involving addition, subtraction, multiplication, and division. Graph solutions to one-step linear inequalities. Solve two-step linear inequalities. Graph solutions to two-step linear inequalities.

### ***Understanding Sets and Operations***

#### **Lesson 15: Sets and Set Operations**

Introduce the concept of sets, subsets, and complements. Define set-builder notation. Explain interval notation for representing sets. Teach how to perform unions and intersections of sets.

#### **Lesson 16: Practical Applications of Set Operations**

Explore real-world examples and practical applications of set operations. Provide exercises and scenarios where students can apply set operations. Reinforce the understanding of set-builder and interval notation through examples.

### ***Mastering Absolute Value Equations and Inequalities***

#### **Lesson 17: Solving Absolute Value Equations and Inequalities**

Teach students how to solve absolute value equations algebraically. Introduce graphical representations of absolute value equations and how to interpret them. Provide examples and exercises to reinforce understanding of solving absolute value equations.

#### **Lesson 18: Absolute Value Inequalities and Graphical Solutions**



Explore the concept of absolute value inequalities and how to solve them algebraically. Discuss graphical solutions to absolute value inequalities. Provide real-world examples and applications of absolute value inequalities.

### ***Exploring the Coordinate Plane***

#### **Lesson 19: Coordinate Plane Basics and Midpoint-Distance Formulas**

Introduce students to the basics of the coordinate plane, including the x and y-axes. Teach them how to identify and plot points on the coordinate plane. Explain the concept of the origin (0,0) and quadrants. Introduce the midpoint formula and demonstrate how to find the midpoint of a line segment. Teach the distance formula and how to calculate the distance between two points on the coordinate plane. Provide practical examples and exercises to reinforce understanding.

### ***Understanding Slope***

#### **Lesson 20: Calculating Slope from Graphs, Points, Tables, and Missing Coordinates**

Begin by explaining the concept of slope and its importance in understanding the steepness of a line. Teach students how to find the slope of a graph by examining the rise and run. Show them how to calculate the slope using two given points on a line. Explain how to determine slope from a table of values, focusing on the change in y and x coordinates. Introduce the concept of a missing coordinate and guide students in finding it using the slope formula. Provide ample practice exercises and real-world examples to reinforce their understanding of slope calculations.

### ***Understanding Linear Equations***

#### **Lesson 21: Exploring Linear Equations and Solutions**

Start by introducing linear equations and their significance in mathematics and real-world applications. Explain the concept of ordered pairs (x, y) and how they represent solutions to linear equations. Provide examples of linear equations and guide students in checking if a given (x, y) pair satisfies the equation. Offer real-life scenarios to show how linear equations are used to solve practical problems.

#### **Lesson 22: Slope-Intercept Form and Graphical Representations**



Teach students about the slope-intercept form ( $y = mx + b$ ) of a linear equation and its components, including slope ( $m$ ) and  $y$ -intercept ( $b$ ). Show them how to find the slope and  $y$ -intercept from an equation. Illustrate how to graph a linear equation in slope-intercept form and emphasize the relationship between the graph and the equation. Guide students in writing linear equations from graphs and tables of values. Provide ample practice problems for reinforcement.

### ***Linear Equations and Their Forms***

#### **Lesson 23: Solving Linear Equations for $y$**

Begin with solving linear equations for  $y$  and transforming equations between different forms. Teach students how to isolate  $y$  on one side of the equation, emphasizing step-by-step solutions. Provide various linear equations for practice with a focus on converting them into slope-intercept form. Include real-world applications to demonstrate the importance of solving for  $y$ .

#### **Lesson 24: Standard Form and Intercepts**

Introduce the standard form of linear equations ( $Ax + By = C$ ) and explain its significance. Show students how to find the  $x$ - and  $y$ -intercepts of equations in standard form. Provide practice exercises to reinforce the concept. Include real-world examples that require converting linear equations to standard form and finding intercepts.

#### **Lesson 25: Graphing Linear Equations and Special Cases**

Cover methods for graphing linear equations, including both standard and point-slope forms. Teach how to graph horizontal and vertical lines and write equations for them. Discuss the characteristics of horizontal and vertical lines. Explain how to determine the slope and intercepts from an equation. Discuss the slopes of parallel and perpendicular lines and how to write equations for them.

### ***Function Concepts and Evaluation***

#### **Lesson 26: Relations and Function Basics**

Introduce relations and their representation through tables, graphs, mappings, and lists of points. Explain the concepts of domain and range for relations. Differentiate between independent and dependent variables within relations. Emphasize the importance of identifying functions within relations.



### **Lesson 27: Function Representation and Evaluation**

Expand on the concept of identifying functions, including the use of the vertical line test. Teach students how to find values using function graphs. Cover how to evaluate a function by plugging in expressions. Explore the process of completing a function table from a graph and an equation.

### **Lesson 28: Applications and Rate of Change**

Provide real-world applications of functions and interpretation using everyday language. Challenge students with word problems that require identifying graphs. Introduce the concept of rate of change and how it can be represented through tables and graphs. Provide practical exercises that involve calculating and interpreting rates of change.

### **Linear Functions and Their Characteristics**

#### **Lesson 29: Identifying Linear Functions**

Teach students how to identify linear functions both from graphs and equations. Provide examples of linear functions in various forms (e.g., slope-intercept, point-slope) and explain how to recognize them. Practice exercises that require students to determine whether given relations are linear functions.

#### **Lesson 30: Linear Functions from Tables and Applications**

Explore how to identify linear functions from tables of values. Discuss real-world scenarios and word problems where linear functions are applicable. Show how linear functions can be used to model and solve practical problems.

#### **Lesson 31: Graphing and Evaluating Linear Functions**

Explain how to complete a table of values and graph linear functions. Provide word problems that involve interpreting linear function graphs and evaluating them for specific scenarios. Emphasize the relationship between the slope and y-intercept in linear functions.

#### **Lesson 32: Domain, Range, Comparisons, and Transformations**



Cover the domain and range of linear functions, including word problems that explore these concepts. Teach students how to compare linear functions using graphs, equations, and tables. Introduce transformations of linear functions, including shifts, reflections, and stretches.

### ***Systems of Linear Equations***

#### **Lesson 33: Introduction to Systems of Linear Equations**

Define what a system of linear equations is and why it is important. Explain how to represent systems of linear equations using variables and coefficients. Provide simple examples of systems of equations.

#### **Lesson 34: Solving Systems of Equations Graphically**

Teach students how to graphically solve a system of equations. Discuss scenarios where graphing is a practical method for solving systems. Include exercises and word problems that require graphing.

#### **Lesson 35: Solving Systems of Equations Algebraically**

Introduce algebraic methods for solving systems, focusing on substitution and elimination. Provide step-by-step instructions for using these methods. Include word problems that can be solved algebraically.

#### **Lesson 36: Advanced Techniques and Applications**

Cover advanced topics like augmented matrices for solving systems. Provide word problems that require choosing the most appropriate method to solve a given system. Explore real-world applications of systems of linear equations, such as mixture problems and optimization.

### ***Two-Variable Linear Inequalities***

#### **Lesson 37: Solving and Graphing Two-Variable Linear Inequalities**

Introduce the concept of two-variable linear inequalities. Explain how to solve linear inequalities for  $y$  and graph the solutions on the coordinate plane. Include examples and exercises to reinforce the understanding of inequalities and graphing.

#### **Lesson 38: Systems of Linear Inequalities**



Discuss how to write and solve systems of linear inequalities.  
Explain methods for graphing systems of linear inequalities on the coordinate plane.  
Include real-world applications and word problems related to systems of linear inequalities.

### ***Integer Exponents***

#### **Lesson 39: Introduction to Integer Exponents**

Define integer exponents and their significance. Explain the difference between the base and exponent. Introduce the concept of powers with integer bases. Provide examples and exercises for practice.

#### **Lesson 40: Operations with Integer Exponents**

Expand on the concept of powers with decimal and fractional bases. Cover the rules for negative exponents. Introduce the multiplication rule for exponents and demonstrate its application. Provide practice problems to reinforce understanding.

#### **Lesson 41: Exponent Rules and Simplification**

Explore the division rule for exponents. Teach the power rule for exponents. Show how to simplify exponential expressions using multiplication, division, and power rules. Provide a variety of exercises to master exponent rules.

#### **Lesson 42: Evaluating and Identifying Equivalent Expressions**

Teach how to evaluate expressions using exponent rules. Illustrate how to identify equivalent exponential expressions using the rules. Offer challenging problems and real-world applications. Conclude the module by summarizing key concepts.

### ***Rational Exponents***

#### **Lesson 43: Introduction to Rational Exponents**

Define rational exponents and their significance. Explain the concept of integers raised to positive rational exponents. Provide examples and exercises for practice.

#### **Lesson 44: Operations with Rational Exponents**





Expand on the concept of integers raised to general rational exponents. Cover multiplication and division with rational exponents. Teach the power rule with rational exponents. Show how to simplify expressions involving rational exponents. Provide practice problems to reinforce understanding

### ***Mastering Scientific Notation***

#### **Lesson 45: Conversion and Comparison**

This lesson covers the basics of scientific notation, focusing on converting numbers from standard to scientific notation and vice versa. Students will also learn how to compare numbers written in scientific notation, emphasizing the importance of understanding magnitude.

#### **Lesson 46: Operations with Scientific Notation**

Objective: In this lesson, students will delve into the arithmetic of scientific notation. They will learn how to perform addition, subtraction, multiplication, and division of numbers expressed in scientific notation. Real-world applications and problem-solving exercises will reinforce their skills.

### ***Sequences Unraveled***

#### **Lesson 47: Exploring Sequences**

Objective: This lesson introduces the concept of sequences, emphasizing the distinction between arithmetic and geometric sequences. Students will learn to identify sequences and understand the key characteristics that define them.

#### **Lesson 48: Arithmetic Sequences**

Objective: This lesson delves deep into arithmetic sequences, covering how to identify them and write variable expressions for arithmetic sequences. Students will also master the art of evaluating variable expressions in the context of arithmetic sequences.

#### **Lesson 49: Geometric Sequences and Recursive Formulas**

Objective: In this comprehensive lesson, students will explore geometric sequences and how to write variable expressions for them. Additionally, they will gain an understanding of recursive formulas for sequences and learn how to convert between recursive and explicit formulas.



### **Lesson 50: Mastering Sequences**

Objective: This final lesson brings everything together with a mixed review of sequences, allowing students to apply their knowledge to both arithmetic and geometric sequences. Practical problem-solving exercises reinforce their skills and understanding.

### **Exploring Exponential Functions**

#### **Lesson 51: Understanding Exponential Functions**

Objective: This foundational lesson introduces students to exponential functions, enabling them to evaluate such functions and understand their core characteristics. Students will grasp the fundamental concepts that underlie exponential growth and decay.

#### **Lesson 52: Visualizing Exponential Functions**

Objective: In this lesson, students will explore graphing exponential functions. They will learn to match exponential functions with their corresponding graphs, strengthening their understanding of how exponential functions behave.

#### **Lesson 53: Applying Exponential Functions**

Objective: This final lesson extends the knowledge gained in the previous lessons to practical applications. Students will explore word problems related to exponential growth, decay, and compound interest. They will learn to write exponential functions from real-world scenarios and tackle complex problem-solving exercises.

### ***Mastering Polynomials***

#### **Lesson 54: Introduction to Polynomial Vocabulary**

Objective: This lesson serves as an introduction to polynomial vocabulary. Students will gain a strong foundation in the terminology used in polynomial algebra, which is crucial for understanding and working with polynomials effectively.

#### **Lesson 55: Modeling Polynomials with Algebra Tiles**



Objective: Algebra tiles provide a tangible and visual representation of polynomials. In this lesson, students will model various polynomials using algebra tiles, helping them grasp the concept of polynomial shapes and structures.

### **Lesson 56: Addition and Subtraction of Polynomials**

Objective: Students will learn to add and subtract polynomials both conceptually and algebraically. This lesson will include practical applications, such as finding the perimeter of geometric shapes using polynomial addition

### **Lesson 57: Multiplying Polynomials**

In this extensive lesson, students will delve into the multiplication of polynomials. They will explore standard multiplication, special cases, and various models, including area models. Real-world scenarios involving polynomial multiplication will be included.

### **Lesson 58: Dividing Polynomials**

Objective: The final lesson will focus on dividing polynomials, specifically by monomials. Students will understand the process of polynomial division and apply it to solve relevant problems.

## **Polynomial Factoring**

### **Lesson 59: Greatest Common Factor (GCF) of Monomials**

Objective: In this lesson, students will explore how to find the Greatest Common Factor (GCF) of monomials. They will understand how to identify and factor out the largest common factor in polynomial expressions, providing a foundation for more advanced factoring techniques.

### **Lesson 60: Factoring Out a Monomial**

Objective: Students will learn to factor out monomials from polynomial expressions. This lesson will focus on identifying common factors and factoring them out to simplify polynomial expressions.

### **Lesson 61: Factoring Quadratics Using Algebra Tiles**

Objective: Algebra tiles will be introduced to help students visually understand factoring quadratic expressions. Students will practice using algebra tiles to factor quadratics of the form  $(x^2 + bx + c)$ .

## Quadratic Functions

### Lesson 62: Characteristics of Quadratic Functions: Graphs

Objective: In this lesson, students will explore the characteristics of quadratic functions as seen in their graph. They will learn how to identify the vertex, axis of symmetry, direction of opening, and other key features of quadratic functions from their graphs.

### Lesson 63: Characteristics of Quadratic Functions: Equations

Objective: Students will dive into the characteristics of quadratic functions by examining their equations. They will learn how to identify and interpret key elements such as the vertex, axis of symmetry, and solutions of quadratic functions through their equations.

### Lesson 64: Writing Quadratic Functions from X-Intercepts and Another Point

Objective: In this lesson, students will learn how to write quadratic functions when provided with the x-intercepts and another point on the graph. This skill will allow them to create quadratic functions that represent real-world situations and solve practical problems.

## Quadratic Equations

### Lesson 65: Solving Quadratic Equations Using Square Roots

Objective: In this lesson, students will learn how to solve simple quadratic equations by using square roots. They will explore the basic steps to isolate the variable and find its square root to determine the solutions to the equation.

### Lesson 66: Factoring and Completing the Square

Objective: Students will delve into more complex quadratic equations by learning how to solve them through factoring and completing the square. They will explore these alternative methods for finding the solutions to quadratic equations.

### Lesson 67: Quadratic Formula and Applications



Objective: In this lesson, students will be introduced to the quadratic formula and its application in solving quadratic equations. They will also solve real-world problems involving quadratic equations, enhancing their understanding and problem-solving skills.

## **Linear, Quadratic, and Exponential Functions**

### **Lesson 68: Identifying Functions from Graphs and Tables**

Objective: In this lesson, students will learn to distinguish linear and exponential functions from graphs and tables. They will be introduced to the key characteristics that define these functions and practice identifying them in various representations.

### **Lesson 69: Identifying Linear, Quadratic, and Exponential Functions**

Students will expand their function identification skills by learning to differentiate between linear, quadratic, and exponential functions from graphs and tables. This lesson will provide them with a broader understanding of these fundamental function types.

### **Lesson 70: Writing Functions and Comparing Growth**

In this final lesson, students will apply their knowledge by writing linear and exponential functions to model real-world scenarios. They will also explore the growth and decay characteristics of linear, exponential, and quadratic functions, allowing them to make informed comparisons.

## ***Absolute Value Functions***

### **Lesson 71: Function Tables and Graphs (Duration: 40 minutes)**

Objective: In this lesson, students will complete function tables for absolute value functions, gaining a firm grasp of how the absolute value function behaves. They will practice graphing these functions to visualize their patterns and characteristics.

### **Lesson 7 2: Analyzing Domain and Range (Duration: 45 minutes)**

Objective: Students will explore the domain and range of absolute value functions through both graphing and equations. By the end of this lesson, they will have a clear understanding of the limitations and possibilities for these functions.



### **Lesson 73: Transformations of Absolute Value Functions (Duration: 50 minutes)**

Objective: This lesson delves into transformations of absolute value functions. Students will learn how to apply translations, reflections, and dilations to these functions, allowing them to manipulate and adapt them to various scenarios.

#### ***Radical Expressions***

### **Lesson 74: Simplifying Radical Expressions (Duration: 40 minutes)**

Objective: In this lesson, students will learn how to simplify radical expressions. They will start with basic radicals and progressively work on more complex expressions. By the end of this lesson, they should be able to simplify radicals efficiently.

### **Lesson 75: Operations with Radical Expressions (Duration: 50 minutes)**

Objective: This lesson focuses on arithmetic with radical expressions. Students will learn how to multiply, add, and subtract radical expressions. This is crucial for solving problems involving these expressions.

### **Lesson 76: Advanced Simplification Techniques (Duration: 45 minutes)**

Objective: In this final lesson, students will explore advanced techniques for simplifying radical expressions. They will learn to use the distributive property and conjugates to simplify radicals further. This knowledge will help them tackle more complex expressions.

#### ***Data Interpretation and Graphs***

### **Lesson 77: Understanding Line Plots and Histograms**

Objective: In this lesson, students will learn how to interpret and create line plots and histograms. They will understand the different uses and applications of these graphical representations in real-world scenarios.

### **Lesson 78: Mastering Bar Graphs, Line Graphs, and Circle Graphs**

Objective: In this lesson, students will explore the interpretation and creation of bar graphs, line graphs, and circle graphs. They will grasp the core concepts behind these common graph types, helping them make sense of complex data.



### **Lesson 79: Advanced Graphics Interpretation**

Objective: In the final lesson, students will dive deeper into data interpretation by examining stem-and-leaf plots, box plots, and more advanced graphical representations. They will enhance their skills in deciphering complex data and drawing meaningful conclusions.

#### ***Data Analysis and Measures of Center and Variation***

### **Lesson 80: Identifying Biased Samples**

Lesson Objective: Learn how to identify and recognize biased samples, understanding their potential impact on data analysis.

### **Lesson 81: Understanding Measures of Center**

Lesson Objective: Gain knowledge and proficiency in calculating and interpreting the mean, median, mode, and range for a given dataset.

### **Lesson 82: Measures of Spread: Quartiles and Interquartile Range**

Lesson Objective: Explore quartiles and interquartile range as measures of data spread and learn how to calculate them.

### **Lesson 83: Detecting Outliers and Their Impact**

Lesson Objective: Understand the concept of outliers, their identification, and analyze their effects on data.

#### ***Bivariate Data Analysis***

### **Lesson 84: Interpreting Scatter Plots**

Lesson Objective: Learn how to interpret scatter plots, recognizing patterns and trends in bivariate data.

### **Lesson 85: Identifying and Understanding Outliers**



Lesson Objective: Understand the impact of outliers on bivariate data and learn to detect them in scatter plots.

### **Lesson 86: Calculating and Understanding Correlation Coefficients**

Lesson Objective: Learn to calculate and interpret correlation coefficients as a measure of the strength and direction of a linear relationship between two variables.

### **Lesson 87: Regression Analysis and Causation**

Lesson Objective: Understand regression lines, how to find their equations, and explore the concepts of correlation vs. causation in the context of bivariate data.

### ***Probability and Statistics Mastery***

### **Lesson 88: Theoretical vs. Experimental Probability**

Lesson Objective: Understand the fundamental difference between theoretical probability (based on theory) and experimental probability (based on empirical observations).

### **Lesson 89: Two-Way Frequency Tables and Conditional Probabilities**

Lesson Objective: Learn to use two-way frequency tables to find probabilities and calculate conditional probabilities in real-world scenarios.

### **Lesson 90: Compound Events and Independence**

Lesson Objective: Explore the outcomes of compound events and understand the concepts of independent and dependent events.

### **Lesson 91: The Counting Principle**

Lesson Objective: Master the counting principle as a tool to systematically count and calculate probabilities for complex events.

### ***Permutations and Combinations***

### **Lesson 92: Introduction to Permutations**





Lesson Objective: Gain a thorough understanding of permutations, their notation, and how to calculate them.

### **Lesson 93: Combinations and Notation**

Lesson Objective: Explore combinations, their notation, and the distinctions between permutations and combinations.

### **Introduction to Matrices and Operations**

### **Lesson 94: Matrix Fundamentals, Operations and Rules**

Lesson Objective: Understand the basic vocabulary and components of matrices. Learn the rules governing matrix operations and how to manipulate matrices within these rules.

### **Lesson 95: Matrix Addition and Subtraction**

Lesson Objective: Master the addition and subtraction of matrices, including scalar multiplication.

### **Lesson 96: Matrix Multiplication and Properties**

Lesson Objective: Explore matrix multiplication and the properties associated with matrices, including distributive properties.