

Unit	Lesson	Lesson Objectives
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Number and Quantity**Exponential Functions with Radical Bases**

- Determine the key aspects of an exponential function having a radical base by rewriting it using the properties of exponents.
- Simplify and evaluate exponential expressions having whole number bases and fractional exponents.
- Transform expressions in radical form to exponential form and vice versa.

Rational Exponents

- Evaluate numeric expressions using properties of rational exponents.
- Simplify algebraic expressions using properties of rational exponents.

Operations on Rational and Irrational Numbers

- Explain why the product of a nonzero rational number and an irrational number is irrational.
- Explain why the sum and product of two rational numbers are rational.
- Explain why the sum of a rational number and an irrational number is irrational.

Quantitative Reasoning

- Describe a quantitative relationship shown in a table or graph, including graphs without scales.
- Interpret a graph given with or without a scale to determine the quantitative relationship it describes.

Dimensional Analysis

- Use dimensional analysis to convert units and compare quantities, attending to limitations on the unit of measurement.

Precision in Measurement

- Determine the margin of error for a measurement.
- Indicate and compare the accuracy and precision of measurements.
- Use significant figures to determine the most precise result of an operation.

Creating Equations**Equations in One Variable**

- Create two-step, one-variable linear equations to model problems.
- Explain the steps used to solve a two-step, one-variable linear equation.
- Solve two-step, one-variable linear equations and simple absolute value equations, pointing out solutions that are viable or not viable in a modeling context.

Inequalities in One Variable

- Create two-step one-variable linear inequalities to model and solve problems, pointing out solutions that are viable or not viable in the context.
- Explain the steps used to solve a two-step one-variable linear inequality.
- Solve two-step one-variable linear inequalities, and state the solution in set or interval notation or graph it on a number line.

Solving Absolute Value Equations

- Create absolute value equations to model and solve problems.
- Solve absolute value equations using tables or algebra, pointing out solutions that are viable or not viable in a modeling context.

Absolute Value Inequalities

- Rewrite absolute value inequalities as compound inequalities.
- Solve absolute value inequalities graphically and algebraically.

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Use Exponential Functions

Determine growth and decay factors for exponential functions represented by a table of values or an equation.

Determine the doubling and halving time.

Graph exponential functions defined by $y = ab^x$.

Modeling with Quadratic Equations

Write and solve quadratic equations to model real-world scenarios, estimating where appropriate and identifying solutions that are not viable in terms of the context.

Modeling with Rational Functions

Model and solve real-world problems using rational functions.

Writing and Solving Equations in Two Variables

Determine a two-variable linear equation that represents a scenario, identifying constraints on the variables in terms of the context.

Solve for an unknown quantity in a two-variable linear equation, given one of the values.

Writing and Graphing Equations in Two Variables

Construct a table of values and a graph for a two-variable linear equation that models a situation, pointing out solutions that are viable or not viable based on the context.

Interpret graphs and rates by examining the quantities represented by each axis.

Write a two-variable linear equation to model a quantitative relationship, describing the constraints of the model based on the context.

Introduction to Systems of Linear Equations

Create a system of linear equations to model a problem.

Interpret the solution of a system of linear equations in a modeling context.

Solve a system of linear equations graphically, using technology as a tool for finding the solution, when appropriate.

Literal Equations

Rearrange a literal equation to highlight a quantity of interest and use it to solve problems.

Interpreting Functions: Part One**Introduction to Functions**

Analyze a mapping diagram, table, graph, or scenario to recognize functional relationships.

Determine the domain and range of a functional relationship given in a mapping diagram, table, graph, or scenario.

Function Notation

Identify the input and output of a functional relationship, pointing out constraints on the domain and range.

Interpret function notation that models a real-world situation.

Use function notation to represent a functional relationship.

Evaluating Functions

Analyze a function represented by an equation, table, or graph to determine the output when given the input, and vice versa.

Find input and output values of two functions graphed in the same coordinate plane.

Write the inverse of a given linear function.

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Recognizing Patterns

Analyze a sequence of numbers to determine the pattern, and identify whether it is arithmetic or geometric.

Use a recursive rule to calculate a term of a sequence.

Write a recursive rule for a sequence.

Analyzing Functional Relationships

Graph a function given a verbal description of a relationship.

Interpret key features of a function represented graphically in terms of a real-world context.

Interpret key features of a function represented tabularly in terms of a real-world context.

Domain and Range

Determine the domain and range of a function in both mathematical and real-world contexts.

Rate of Change

Calculate the average rate of change of a function over a specified interval.

Interpret the average rate of change of a function over a specified interval.

Solve problems involving direct variation.

Slope-Intercept Form of a Line

Analyze how a change in a parameter of a linear function affects its graph or the scenario it represents.

Identify the slope and y -intercept of a linear function, and use them to graph the function.

Write a linear function, in slope-intercept form, for a given relationship.

Point-Slope Form of a Line

Graph a line given its equation in point-slope form, identifying the slope and intercepts.

Write the equation of a line given its slope and a point on the line in point-slope form, and express the relationship as a function.

Standard Form of a Line

Graph a line given its equation in standard form, identifying the slope and intercepts.

Write the equation of a line in standard form given a graph or scenario.

Quadratic Functions: Standard Form

Graph a quadratic function given in standard form, identifying the key features of the graph.

Quadratic Functions: Factored Form

Graph a quadratic function given in factored form, identifying the key features of the graph.

Quadratic Functions: Vertex Form

Graph a quadratic function given in vertex form, identifying the key features of the graph.

Relate the parameters of a quadratic function in vertex form to transformations of the graph $y = x^2$.

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Interpreting Functions: Part Two**Linear Piecewise Defined Functions**

Evaluate a piecewise-defined function that is defined by linear functions over all intervals of its domain.

Graph a piecewise-defined function that is defined by linear functions over all intervals of its domain.

Relate the graph of a piecewise-defined function to its algebraic representation, limiting it to linear functions over its domain.

State the domain and range of linear piecewise-defined functions.

Step Functions

Evaluate a step function.

Graph a step function.

Interpret a step function in terms of the problem it models.

State the domain and range of step functions.

Absolute Value Functions and Translations

Analyze key features of the absolute value function and its translations.

Graph the absolute value function and its translations.

Reflections and Dilations of Absolute Value Functions

Graph reflections and dilations of the absolute value function.

State the domain and range of reflections and dilations of the absolute value function.

Square Root Functions

Find the domain of a square root function.

Find the inverse of a quadratic function.

The Cube Root Function

Graph the cube root function, and translations and reflections of it.

State the key features of the cube root function, and translations and reflections of it.

Graphing Exponential Functions

Determine the domain and range of exponential functions.

Graph exponential functions.

Identify exponential functions.

Graphing Logarithmic Functions

Determine the domain and range of logarithmic functions.

Identify and analyze the graphs of logarithmic functions.

Identify logarithmic functions.

Graphing Sine and Cosine

Analyze key features of sine and cosine functions from equations and graphs.

Changes in Period and Phase Shift of Sine and Cosine Functions

Relate transformations of the graphs of the sine and cosine functions to the equation.

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		Graphing Cosecant and Secant Functions Analyze key features of secant and cosecant functions from equations and graphs.
		Graphing Tangent and Cotangent Analyze key features of tangent and cotangent functions from equations and graphs.
		Completing the Square Determine key aspects of the graph of a quadratic function given in standard form and with $a = 1$ by writing it in vertex form. Relate the geometric model of completing the square to the algebraic process. Relate the parameters of a quadratic function in vertex form to transformations of the graph $y = x^2$. Write quadratic functions given in standard form and with $a = 1$ into vertex form by completing the square.
		Completing the Square (Continued) Determine key aspects of the graph of a quadratic function given in standard form by writing it in vertex form. Relate the parameters of a quadratic function in vertex form to transformations of the graph $y = x^2$. Write quadratic functions given in standard form into vertex form by completing the square.
		Solving Quadratic Equations: Zero Product Property Solve problems by factoring quadratic equations given in standard form. Write quadratic equations given rational solutions.
		Rewriting Exponential Functions Use alternative forms of an exponential function to highlight different information about that function and the real-world situation it models. Write exponential functions and expressions in equivalent forms, using the properties of exponents to justify steps.
		Comparing Characteristics of Functions Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). Determine the similarities and differences in characteristics of multiple functions graphically. Determine the similarities and differences in characteristics of multiple functions symbolically. Determine the similarities and differences in characteristics of multiple functions tabularly.
		Seeing Structure in Expressions
		Expressions in One Variable Evaluate one-variable expressions. Identify parts of an expression. Interpret expressions that represent a quantity in terms of its context. Write expressions to represent scenarios.
		Factoring Polynomials: GCF Determine an appropriate way to factor a polynomial for a given context. Determine the greatest common monomial factor of two or more terms. Write a polynomial as the product of a monomial and polynomial having the same number of terms.

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		Factoring Polynomials Completely Analyze the structure of a polynomial to write it in completely factored form.
		Finite Geometric Series Solve problems using the formula for the sum of a finite geometric series.
Geometry and Arithmetic with Polynomials		
		Trigonometric Ratios Given an acute angle of a right triangle, label the hypotenuse, opposite, and adjacent sides. Given an acute angle of a right triangle, write ratios for sine, cosine, and tangent. Relate trigonometric ratios of similar triangles and the acute angles of a right triangle.
		Adding and Subtracting Polynomials Add and subtract polynomials, determining the degree and number of terms of the sum or difference. Find and evaluate polynomial sums or differences that model real-world situations.
		Multiplying Monomials and Binomials Identify a product that results in the difference of squares or a perfect square trinomial. Multiply a binomial by a monomial or binomial algebraically and by using geometric models.
		Multiplying Polynomials and Simplifying Expressions Interpret the structure of an expression involving addition, subtraction, and multiplication of polynomials in order to write it as a single polynomial in standard form. Multiply a binomial by a trinomial algebraically and by using geometric models.
Reasoning with Equations and Inequalities		
		Properties of Equality Create one and two-step equations in one variable and use them to solve problems. Identify the properties of equality. Solve one and two-step equations using the properties of equality.
		Rational Equations Determine the reasonableness of a solution to a rational equation. Solve rational equations and determine extraneous solutions. Use rational equations to model and solve real-world problems.
		Radical Equations and Extraneous Roots Model and solve mathematical and real-world problems using radical equations, and determine extraneous roots.
		Graphing Two-Variable Linear Inequalities Relate the graph of a two-variable linear inequality to its algebraic representation.
		Solving Systems of Linear Inequalities Determine a system of two-variable linear inequalities given a solution set. Graph a system of two-variable linear inequalities. Identify solutions of a system of two-variable linear inequalities.

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		Solving Quadratic Equations: Factoring Solve problems by rewriting quadratic equations in standard form and factoring, pointing out the solutions that are viable or not viable in a modeling context. Write a quadratic equation that models a scenario.
		Solving Quadratic Equations: Square Root Property Use the square root property to solve quadratic equations.
		Solving Quadratic Equations: Completing the Square Solve a quadratic equation whose leading coefficient is 1 by completing the square.
		Solving Quadratic Equations: Completing the Square (Continued) Solve a quadratic equation whose leading coefficient is greater than 1 by completing the square.
		Introduction to the Quadratic Formula Determine the values of a , b , and c from a given quadratic equation in standard form. Justify the steps used to derive the quadratic formula by completing the square. Recognize an expression that uses the quadratic formula to find the solutions of a quadratic equation. Relate the discriminant in the quadratic formula to the types of solutions of a quadratic equation.
		Solving Quadratic Equations: Quadratic Formula Determine the number of real zeros of a quadratic function by finding the values of a , b , and c , and then calculating the discriminant. Solve a quadratic equation using the quadratic formula.
		Quadratic Equations and their Related Functions Relate the solutions of a quadratic equation to the x -intercepts of the related quadratic function, and use the function's graph to solve the equation.
		Solving Linear Equations: Variable on One Side Create one-variable linear equations, having the variable on one side only, to model and solve problems. Determine the input value that produces the same output value for two functions from a table or graph. Explain the steps used to solve a one-variable linear equation having the variable on one side only. Solve one-variable linear equations having the variable on one side only, pointing out solutions that are viable or not viable in a modeling context.
		Solving Linear Equations: Variables on Both Sides Create one-variable linear equations, having the variable on both sides, to model and solve problems. Explain the steps used to solve a one-variable linear equation having the variable on both sides. Solve one-variable linear equations having the variable on both sides using tables, graphs, or algebra, pointing out solutions that are viable or not viable in a modeling context.
		Solving Linear Equations: Distributive Property Create one-variable linear equations involving the distributive property to model and solve problems. Determine if a one-variable linear equation has zero, one, or infinite solutions. Solve one-variable linear equations involving the distributive property.

Unit	Lesson	Lesson Objectives
		Exponential Growth Functions <ul style="list-style-type: none">Graph an exponential growth function, and state the domain and range.Identify an exponential growth function given tables, graphs, and function rules, determining the rate of change.State the domain and range of an exponential growth function.Write an exponential growth function to model a real-world problem, pointing out constraints in the modeling context.
		Solving Logarithmic Equations using Technology <ul style="list-style-type: none">Rewrite logarithmic expressions using the change of base algorithm.Solve a one-variable equation containing logarithms by transforming it into a system of equations.
		Solving Polynomial Equations using Technology <ul style="list-style-type: none">Use technology to solve or approximate solutions of one-variable polynomial equations.
		Solving Compound Inequalities <ul style="list-style-type: none">Create one-variable compound linear inequalities to model and solve problems.Solve one-variable compound inequalities, pointing out solutions that are viable or not viable in a modeling context, and graph the solutions.
		Solving One-Variable Inequalities <ul style="list-style-type: none">Explain the steps used to solve a multistep one-variable linear inequality.Graph the solution sets of one-variable linear inequalities.Solve multistep one-variable linear inequalities.
		Building Functions
		Function Operations <ul style="list-style-type: none">Combine functions using arithmetic operations, expressing the results both algebraically and graphically.Evaluate sums, differences, products, and quotients of functions.
		Composition of Functions <ul style="list-style-type: none">Evaluate the composition of functions.Find the domain of the composition of functions.Write an expression for the composition of functions.
		Geometric Sequences <ul style="list-style-type: none">Graph and analyze geometric sequences as a special case of exponential functions with the domain restricted to natural numbers.Write recursive and explicit rules for geometric sequences using function notation.
		Arithmetic Sequences <ul style="list-style-type: none">Apply the formula of an arithmetic sequence.Determine if a sequence is arithmetic.Find the common difference of an arithmetic sequence.Find the terms of an arithmetic sequence.
		Recursive Formulas <ul style="list-style-type: none">Write a rule for a recursively defined function.Write the first n terms of a recursive function given a formula and a term.

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Interpreting Categorical and Quantitative Data**Measures of Center**

Calculate the mean and median for a set of data using technology when appropriate.

Compare the mean and median of a set of data that is symmetrical and for a set of data that is not symmetrical, determining which is a better measure of center for a given data set.

Create a dot plot or histogram for a set of data.

Discuss the effect of outliers on measures of center.

Box Plots

Analyze box plots for symmetry and outliers.

Compare box plots.

Create and interpret box plots.

Standard Deviation

Analyze a normal distribution curve to determine statistical measures.

Analyze histograms for skewness and symmetry.

Calculate variance and standard deviation for a given data set.

Comparing Data Sets

Choose which measure of center, measure of variability, and display should be used to describe a data set.

Compare two distributions in terms of center, variability, and shape.