

Unit	Lesson	Lesson Objectives
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Numbers and Operations on Numbers**Estimating and Comparing Square Roots**

- Estimate square roots without using technology.
- Make comparative statements involving square roots.
- Plot the estimated values of square roots on a number line.

Rational Numbers

- Describe real-world situations that can be represented by rational numbers, including where opposite quantities combine to make 0.
- Represent positive and negative rational numbers on vertical and horizontal number lines.
- Write a rational number as a decimal that eventually terminates or repeats.

Solving Problems Involving Rational Numbers

- Solve real-world and mathematical problems involving addition, subtraction, multiplication, and division with rational numbers.

Simplifying Nonperfect Roots

- Simplify nonperfect roots without rationalizing.

Rational Exponents

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

Powers with the Same Base

- Evaluate powers of the same base through multiplication and division.
- Simplify expressions of powers with the same base.

Raising a Power to a Power

- Simplify and evaluate expressions of raising a power to a power of integer exponents.

Introduction to Scientific Notation

- Convert very small or very large numbers between scientific notation and standard notation.
- Order and estimate products and quotients of numbers written in scientific notation.

Operations with Scientific Notation

- Evaluate products and quotients of scientific notation values.
- Identify proper units of measurement for quantities written in scientific notation.
- Recognize scientific notation answers generated by technology and identify the symbols associated with the value.

Addition and Subtraction with Scientific Notation

- Evaluate sums and differences of scientific notation values.

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.

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		Precision in Measurement <ul style="list-style-type: none">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.
		Estimating with Percents <ul style="list-style-type: none">Make use of estimation strategies such as a benchmark percent, approximate fraction, decimal equivalent, or rounded numbers to find the percent of a number in real-world situations.Use estimations to verify the reasonableness of an answer.Use the distributive property to estimate percents that are more than 100.
		Applications of Percent <ul style="list-style-type: none">Solve multistep percent problems involving tax, gratuity, commission, markup, discount, and markdown.
		Applications of Unit Rates <ul style="list-style-type: none">Apply unit rates to solve for an unknown in real-world problems.Determine a unit rate from a real-world context.Use unit rates to make comparisons.
		Equivalent Ratios <ul style="list-style-type: none">Analyze patterns in a table of equivalent ratios.Find missing values in a table using ratio reasoning.
		Plotting Equivalent Ratios <ul style="list-style-type: none">Identify patterns of plots of equivalent ratios.Plot tables of equivalent ratios on the coordinate plane.
Measurement / Geometry		
		Circumference <ul style="list-style-type: none">Solve problems involving the circumference of a circle.
		Area of a Circle <ul style="list-style-type: none">Describe the relationship between the circumference and area of a circle.Solve problems involving the area of a circle.
		Defining Terms <ul style="list-style-type: none">Identify and name a pair of parallel lines, a pair of perpendicular lines, a ray, an angle, an arc, a circle, and a line segment.Use undefined terms to precisely define parallel lines, perpendicular lines, ray, angle, arc, circle, and line segment.
		Congruence and Transformations <ul style="list-style-type: none">Describe a sequence of transformations that shows that a given pre-image is congruent to a transformed figure.
		Similarity and Transformations <ul style="list-style-type: none">Apply scale factor to find unknown side lengths of an image or pre-image after a dilation or sequence of transformations.Describe a sequence of transformations that result in a similar figure.Determine the similarity of figures by comparing corresponding side lengths and angle measures.

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		Finding the Hypotenuse in Right Triangles Approximate the length of the hypotenuse of a right triangle to solve real-world problems. Use the Pythagorean theorem to find the length of the hypotenuse of a right triangle.
		Unknown Leg Lengths in Right Triangles Approximate the length of a leg of a right triangle to solve real-world problems. Given the length of one leg and the hypotenuse of a right triangle, use the Pythagorean theorem to find the length of the other leg.
		Finding Distance in the Coordinate Plane Apply the Pythagorean theorem to find the distance between two points on the coordinate plane. Generate and use the distance formula to find the distance between two points on the coordinate plane.
		Pythagorean Theorem in Three Dimensions Identify diagonals and right triangles within cubes. Solve for unknown side lengths of right triangles within a cube.
		Using Triangle Congruence Theorems Complete the steps to prove angles, segments, and triangles are congruent using triangle congruence theorems and CPCTC. Identify the triangle congruency theorem that can be used to prove two triangles congruent.
		Using Triangle Similarity Theorems Complete the steps to prove theorems involving similar triangles. Solve for unknown measures of similar triangles using the side-splitter theorem and its converse. Solve for unknown measures of similar triangles using the triangle midsegment theorem.
		Volume of Pyramids Calculate volumes of rectangular and square pyramids.
		Surface Area and Volume of Cylinders Solve mathematical and real-world problems involving the volume and surface area of cylinders.
		Applications with the Volume of a Cone Find unknown dimensions of a cone given its volume. Solve a real-world problem utilizing the formula for volume of a cone.
		Spherical and Cubic Volume Applications Apply volume formulas, including those that evaluate perfect cubes, to find unknown measurements. Recognize perfect cubes. Solve a real-world problem utilizing the formula for volume of a sphere.
		Area of Composite Figures Solve problems involving the area of composite figures.
		Surface Area Solve mathematical and real-world problems about lateral and surface areas of composite figures. Solve mathematical and real-world problems involving lateral area of prisms, cylinders, pyramids, and cones. Solve mathematical and real-world problems involving surface area of prisms, cylinders, cones, spheres, and pyramids.

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		Volume of Composite Figures Calculate volumes of composite figures.
		Density and Design Problems Solve problems involving density of an area. Use geometric concepts to solve design problems.
		Cavalieri's Principle and Volume of Composite Figures Calculate the volumes of composite figures, including those that model real-world objects. Write an expression to represent the volume of a composite figure.
		Finding Unknown Angle Measures Use angle relationships to find unknown measures in a figure.
		Parallel Lines Cut by a Transversal Determine if two lines cut by a transversal are parallel. Find missing measurements using angle relationships in a diagram of a transversal crossing parallel lines. Identify interior angles, exterior angles, alternate interior angles, and alternate exterior angles when a transversal crosses parallel lines.
		Solving for Unknown Angles in Triangles Apply properties of parallel lines cut by a transversal to solve for unknown angle measures of a triangle. Use algebra to find unknown interior or exterior angle measures of a triangle.
		Similar Triangles Analyze and apply third angle theorem and angle-angle criterion in similar triangles. Identify proportionality of side lengths to determine triangle similarity. Write similarity statements of similar triangles.
Data Analysis / Probability / Statistics		
		Data Displays and Statistics Compare two data sets using measures of center and spread. Describe the impact of the number of observations on the shape of the data. Interpret the shape of a data set in the context of the way in which data was collected.
		Summarizing Data Sets with Statistics Compare two data sets with the same measure of center but different measures of spread. Find the mean, median, range, and interquartile range of a data set.
		Exploring Association Analyze the correlation and association in scatterplots.
		Using Equations to Represent Trend Lines Create the linear equation of the trend line. Find and interpret the slope of a trend line.

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Making Predictions

- Analyze data to determine interpolations and extrapolations.
- Substitute x - and y -values into the data to create predictions of a real-world scenario.
- Use a calculator to graph a scatterplot and create line of best fit.

Two-Way Tables

- Calculate relative frequencies and display them in a two-way relative frequency table.
- Display data in a two-way frequency table given a scenario or Venn diagram, and identify joint and marginal frequencies.
- Interpret joint and marginal relative frequencies in the context of the data.

Relative Frequencies and Association

- Create conditional relative frequency tables, by row and by column.
- Determine whether there is an association between two variables by analyzing conditional relative frequencies.
- Interpret conditional relative frequencies in the context of the 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.

Line of Best Fit

- Determine if a data set shows a correlation and, if so, the type of correlation.
- Determine if a given linear function is a reasonable model for a set of data arising from a real-world situation.
- Use a line of best fit to make a prediction.
- Use technology to determine the line of best fit for a data set, and interpret the parameters of the model in context.

Experimental Probability

- Find the experimental probability of an event, expressing it as a ratio.
- Use experimental probability to make predictions.

Probability of Compound Events

- Find probabilities of dependent compound events using organized lists, tables, or tree diagrams.
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Simulations to Estimate Probabilities

Design a simulation to experimentally determine the probability of compound events.

Use a simulation to generate frequencies for compound events; e.g., use a coin to simulate the gender of a baby and find the experimental probability of having exactly 1 boy in a family of three children.

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.

Populations and Sampling

Determine when sampling is an appropriate and helpful measure of a population and when it is not.

Explain that statistics can be used to gain information about a population by examining a sample of the population.

Inferences and Predictions

Examine sample size and the effect on a prediction using the results of a simulation.

Make an inference about the whole population based on a sample by using proportional reasoning.

Comparing Measures of Center and Variability

Analyze two numerical data distributions with similar variation by calculating and comparing the measures of center to the measure of variability.

Compare the measures of center of two sets of data using a multiple of the measure of variability, expressed as a ratio.

Draw an informal comparative inference about two sets of data.

Comparing Populations

Draw informal comparative inferences using measures of center and variability.

Recognize the measure of center and variability to use when making comparisons.

Strength of Correlation

Analyze data to draw conclusions about correlation and causation.

Calculate the correlation coefficient for a linear model using technology.

Interpret the strength of a linear model based on the correlation coefficient.

Algebraic Concepts: Part One**Equations in the Real World**

Write and solve equations to represent real-world situations.

Inequalities in the Real World

Write, solve, and graph inequalities to represent real-world situations.

Analyzing Solutions

Identify equations that have one solution, infinitely many solutions, and no solution.

Solve equations that have one solution, infinitely many solutions, and no solution.

Write equations that have infinitely many solutions and no solution.

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Exponential Growth Functions

- 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.

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.

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 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.

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: 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.

Solving One-Variable Inequalities

- 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.

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 Quadratic Functions

- Use quadratic functions to solve mathematical and real-world problems.
- Write quadratic functions to model problems.

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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.

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.

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: 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 Systems of Linear Equations: Graphing

Analyze a system of linear equations to determine if it has one solution, no solution, or infinitely many solutions.

Use technology to find or approximate the solution of a system of linear equations graphically.

Solving Systems of Linear Equations: Substitution

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

Solve a system of linear equations using substitution.

Algebraic Concepts: Part Two

Solving Systems of Linear Equations: Linear Combinations

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

Solve a system of linear equations using linear combinations.

Modeling with 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.

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.

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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.

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.

Writing Linear Equations

Use linear models to solve problems.

Write two-variable linear equations in different forms using varying pieces of information about the relationships.

Quadratic Functions: Standard Form

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

Quadratic Functions: Factored Form

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.

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 $y = x^2$.

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.

Absolute Value Functions and Translations

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

Graph the absolute value function and its translations.

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.

Literal Equations

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

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.

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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.

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.

Function Operations

Combine functions using arithmetic operations, expressing the results both algebraically and graphically.

Evaluate sums, differences, products, and quotients of functions.

Algebraic Concepts: Part Three**Composition of Functions**

Evaluate the composition of functions.

Find the domain of the composition of functions.

Write an expression for the composition of functions.

Multiplying and Dividing Rational Expressions

Perform multiplication and division of rational expressions.

Adding and Subtracting Rational Expressions

Perform addition and subtraction of rational expressions.

Simplify complex rational expressions containing sums or differences.

Division of Polynomials

Use inverse operations to check the result of polynomial division.

Use long division to find quotients of polynomials.

The Quadratic Formula

Find real and complex solutions of quadratic equations using the quadratic formula.

Use the discriminant to determine the number and type of roots of a quadratic equation.

Unit	Lesson	Lesson Objectives
		Rational Equations <ul style="list-style-type: none">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 <ul style="list-style-type: none">Model and solve mathematical and real-world problems using radical equations, and determine extraneous roots.
		Graphing Radical Functions <ul style="list-style-type: none">Determine the domain and range of square root and cube root functions.Relate transformations to the graphs of square root and cube root functions to their parent function.
		Piecewise Defined Functions <ul style="list-style-type: none">Determine the domain, range, and continuity of piecewise defined functions.Evaluate piecewise defined functions.Graph piecewise defined functions.
		Graphing Polynomial Functions <ul style="list-style-type: none">Graph polynomial functions using key features.
		Graphing Rational Functions <ul style="list-style-type: none">Determine the horizontal asymptotes of a rational function.Graph rational functions that have only vertical or horizontal asymptotes.
		Graphing Exponential Functions <ul style="list-style-type: none">Determine the domain and range of exponential functions.Graph exponential functions.Identify exponential functions.
		Graphing Logarithmic Functions <ul style="list-style-type: none">Determine the domain and range of logarithmic functions.Identify logarithmic functions.
		Rate of Change <ul style="list-style-type: none">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.
		Vertical Asymptotes of Rational Functions <ul style="list-style-type: none">Solve problems involving inverse variation.
		Analyzing Functional Relationships <ul style="list-style-type: none">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.

Unit	Lesson	Lesson Objectives
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Domain and Range

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

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.