Unit	Lesson	Lesson Objectives

Representing Relationships

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.

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 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.

Analyzing Graphs

Use the graph of a function to determine the key aspects, using interval notation where applicable.

Analyzing Tables

Given a table of values for a continuous function, make predictions about the key features of the graph of the function.

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.

Unit	Lesson	Lesson Objectives

Linear Functions

Introduction to Linear Functions

Calculate the rate of change of a function and, if constant, the initial value of the function.

Determine if a relationship is linear by analyzing the rate of change.

Slope of a Line

Determine the slope of a line from a graph, table of values, or ordered pairs.

Identify if the slope of a linear relationship is zero, positive, negative, or undefined.

Interpret slope in the context of real-world scenarios.

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.

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.

Special Linear Relationships

Determine if a relationship is a direct variation.

Find the constant of variation in a direct variation.

Write an equation for a direct variation.

Write recursive and explicit rules for arithmetic sequences using function notation.

Linear Equations and Inequalities

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.

Unit	Lesson	Lesson Objectives

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 Mixture Problems

     Use a table to organize information given in mixture problems.

     Write and solve one-variable linear equations to model and solve mixture problems.

Solving Rate Problems

     Use a table to organize information given in time-distance-rate and work problems.

     Write and solve one-variable linear equations to model and solve time-distance-rate and work problems.

Literal Equations

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

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.

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.

Introduction to Compound Inequalities

     Relate the solution set of a compound inequality to its graph.

     Write compound inequalities to model problems.

Systems of Equations and Inequalities

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.

Solving Systems: Introduction to Linear Combinations

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

     Solve systems of linear equations using linear combinations, limiting the systems to those that do not require multiples of both equations.

     Verify that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.

Unit	Lesson	Lesson Objectives

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.

Graphing Two-Variable Linear Inequalities

Relate the graph of a two-variable linear inequality to its algebraic representation.

Modeling with Two-Variable Linear Inequalities

Create a two-variable linear inequality to model a problem.

Graph the solutions to a two-variable linear inequality.

Interpret the solutions of a two-variable linear inequality in a modeling context.

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.

Modeling with Systems of Linear Inequalities

Create a system of two-variable linear inequalities to model a problem.

Graph the solutions to a system of two-variable linear inequalities.

Interpret the solutions to a system of two-variable linear inequalities in a modeling context.

Nonlinear Functions

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.

Unit	Lesson	Lesson Objectives

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.

The Square Root Function

Graph the square root function and reflections over the axes.

Simplify a square root whose radicand is a perfect square.

State the domain and range of square root functions.

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.

Performance Task: Construct and Analyze Piecewise Functions

Exponential Functions

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.

Exponential Decay Functions

Graph an exponential decay function, and state the domain and range.

Identify an exponential decay function given tables, graphs, and function rules, determining the rate of change.

Relate exponential growth and decay functions using laws of exponents and reflections over the y-axis.

Write an exponential decay function to model a real-world problem, pointing out constraints in the modeling context.

Vertical Stretches and Shrinks of Exponential Functions

Determine the parameters and create an equation for a vertically dilated exponential growth or decay function given a table, equation, or scenario.

Graph a vertically dilated exponential growth or decay function given a table, equation, or scenario.

Reflections of Exponential Functions

Analyze key aspects of exponential functions that have been reflected across an axis.

Graph reflections of exponential functions.

Translations of Exponential Functions

Analyze key aspects of exponential functions that have been translated.

Graph translations of exponential functions.

Unit	Lesson	Lesson Objectives

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.

Geometric Sequences

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.

Polynomial Expressions

Introduction to Polynomials

Classify a polynomial by degree and number of terms.

Identify a polynomial and its equivalent forms.

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.

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.

Factoring Polynomials: Double Grouping

Factor a polynomial by double grouping or indicate that the polynomial is prime.

Factoring Trinomials: a = 1

Determine if a trinomial with a leading coefficient of 1 and a positive constant is factorable and, if so, write it in factored form.

Relate the factorization of a trinomial with a leading coefficient of 1 and a positive constant to a geometric model.

Factoring Trinomials: a = 1 (Continued)

Determine if a trinomial with a leading coefficient of 1 and a negative constant is factorable and, if so, write it in factored form.

Relate the factorization of a trinomial with a leading coefficient of 1 and a negative constant to a geometric model.

Unit	Lesson	Lesson Objectives

Factoring Trinomials: a > 1

Determine if a trinomial with a leading coefficient greater than 1 is factorable and, if so, write it in factored form.

Relate the factorization of a trinomial with a leading coefficient greater than 1 to a geometric model.

Factoring Polynomials: Difference of Squares

Determine if a polynomial is factorable by recognizing that it is a difference of two squares and, if so, applying the identity.

Identify a monomial that is a perfect square and find the square root.

Factoring Polynomials: Sum and Difference of Cubes

Determine if a polynomial is factorable by recognizing that it is a sum or difference of two cubes and, if so, applying the identity.

Identify a monomial that is a perfect cube and find the cube root.

Factoring Polynomials Completely

Analyze the structure of a polynomial to write it in completely factored form.

Quadratic Functions

Introduction to Quadratic Functions

Calculate the rate of change of a quadratic function over an interval of its domain, and compare it to linear and exponential functions.

Evaluate a quadratic function using tables, graphs, and equations.

Identify a quadratic function and the values of the coefficients and constant from the standard form.

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 $y = x2$.

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 $y = x2$.

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 $y = x2$.

Write quadratic functions given in standard form into vertex form by completing the square.

Unit	Lesson	Lesson Objectives

Modeling with Quadratic Functions

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

Write quadratic functions to model problems.

Quadratic Equations

Solving Quadratic Equations: Zero Product Property

Solve problems by factoring quadratic equations given in standard form.

Write quadratic equations given rational solutions.

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.

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.

Solving Linear-Quadratic Systems

Solve a system of equations consisting of a line and a parabola algebraically and graphically, using technology where appropriate.

Unit	Lesson	Lesson Objectives

Data Analysis

Describing Data

Determine if a sample fairly represents the population as a whole or if there is bias.

Identify various data collection methods and analyze various displays of data.

Informally describe the shape, center, and variability of a distribution based on a dot plot, histogram, or box plot.

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.

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.

Line of Best Fit

Determine if a data set shows a correlation and, if so, the type of correlation.

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.

Analyzing Residuals

Analyze the residual plot to determine whether the function is an appropriate fit for a linear model.

Compute the residuals for a set of data and a line of best fit.

Determine the residual plot for a given scatterplot and line of best fit.

Unit	Lesson	Lesson Objectives

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.

Regression Models

Determine an exponential, quadratic, or linear model for a given data set using technology.

Identify limitations of models in real-world contexts.

Interpret the graph of a regression model in the context of the problem.

Use a linear, quadratic, or exponential regression model to make a prediction.

Performance Task: Super Survey Simulator