Unit	Lesson	Lesson Objectives

Number and Quantity

Prime Numbers and Prime Factorization

Identify a number as prime or composite.

List the factors of a number.

Represent a number as the product of its prime factors, using exponents to show repeated factors.

Factors and Multiples

Apply greatest common factors and least common multiples to solve real-world problems.

Determine the greatest common factor of two numbers.

Determine the least common multiple of two numbers.

Solving Problems Involving Integers

Apply properties of operations to solve real-world and mathematical problems involving more than one operation with integers.

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.

Complex Numbers

Determine the absolute value of a complex number.

Represent complex numbers in the form $a + bi$ or in the complex plane.

Represent square roots of negative numbers as multiples of i.

Simplify powers of i using their cyclic nature.

Adding and Subtracting Matrices

Apply matrix addition to model problems and solve matrix equations.

Identify and apply the properties of matrix addition.

Perform matrix addition and subtraction.

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.

Rational Exponents

Evaluate numeric expressions using properties of rational exponents.

Simplify algebraic expressions using properties of rational exponents.

Operations with Complex Numbers

Identify the field properties of complex numbers.

Perform addition, subtraction, and multiplication of complex numbers.

Unit	Lesson	Lesson Objectives

Scalar and Matrix Multiplication

Perform multiplication of a scalar and a matrix.

Perform multiplication of two matrices.

Algebraic Vectors

Add, subtract, multiply, and find the magnitude of vectors algebraically.

Find ordered pairs that represent vectors.

Ordering Rational Numbers

Order rational numbers using a number line.

Write and interpret statements of comparison for rational numbers in real-world contexts.

Algebra: Part One

Simplifying Expressions

Evaluate expressions using the order of operations and the field properties of real numbers.

Identify parts of an algebraic expression.

Simplify expressions using the order of operations and the field properties of real numbers.

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.

Solving Equations

Create multistep equations in one variable and use them to solve problems.

Simplify and solve multistep equations.

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.

Addition and Subtraction of Polynomials

Perform addition and subtraction of polynomials.

Multiplication of Polynomials

Perform multiplication of polynomials.

Solving Quadratic Equations: Zero Product Property

Solve problems by factoring quadratic equations given in standard form.

Write quadratic equations given rational solutions.

Unit	Lesson	Lesson Objectives

Solving Quadratic Equations: Square Root Property

    Use the square root property to solve quadratic equations.

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 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.

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.

Algebra: Part Two

Powers with the Same Base

    Evaluate powers of the same base through multiplication and division.

    Simplify expressions of powers with the same base.

Exploring the Pythagorean Theorem

    Apply the Pythagorean theorem using Pythagorean triples as the side lengths.

    Identify sets of Pythagorean triples.

    Recognize perfect squares.

    Use Pythagorean triples to determine if a triangle is a right triangle.

Rewriting Expressions with Radicals

    Use operations to rewrite expressions involving radicals.

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.

Raising a Power to a Power

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

Evaluating Expressions with Exponents

    Evaluate expressions using substitution of the variables.

    Simplify expressions using the rules of exponents.

Unit	Lesson	Lesson Objectives

Adding and Subtracting Rational Expressions

Add and subtract rational expressions with a common denominator.

Evaluate rational expressions for a given value.

State values for which rational expressions are undefined.

Comparing Slopes and Intercepts

Compare the slope and intercepts of linear functions, including when they are expressed as equations written in different forms.

Determine slope and y-intercept of linear functions represented differently.

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.

Graphing Inequalities on a Number Line

Graph solutions of one-step inequalities on number line diagrams.

Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions.

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.

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 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.

Functions

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.

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.

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.

Unit	Lesson	Lesson Objectives

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.

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.

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.

Domain and Range

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

Relations and Functions

Determine if a relation is a function.

Determine if the function is one-to-one.

Determine the domain and range of a relation.

Evaluate function rules.

Represent a relation in multiple ways, including equations, graphs, words, and tables of values.

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.

Using Function Notation

Identify the domain and range of a function.

Use function notation to describe and evaluate a function.

Vertical Asymptotes of Rational Functions

Determine the vertical asymptotes and holes in the graph of a rational function having the x-axis as its only horizontal asymptote.

Solve problems involving inverse variation.

Graphing Rational Functions

Determine the horizontal asymptotes of a rational function.

Graph rational functions that have only vertical or horizontal asymptotes.

Interpreting Graphs

Analyze qualitative graphs.

Create a graph to model a situation.

Interpret information given in a graph.

Unit	Lesson	Lesson Objectives

Direct and Inverse Variation

Model and solve direct and inverse variation problems.

Recognize direct and inverse variation.

Recursive Formulas

Write the first n terms of a recursive function given a formula and a term.

Write a rule for a recursively defined function.

Composition of Functions

Evaluate the composition of functions.

Find the domain of the composition of functions.

Algebra and Functions

Dimensional Analysis

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

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.

Word Problems

Create equations to solve a variety of word problems such as mixture, time-distance-rate, and work.

Solve a variety of word problems, and interpret the solutions in context.

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.

Transformations of Functions

Identify a function as belonging to a family of functions.

Analyze a function rule or graph to determine transformations of the parent function.

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.

Geometry: Part One

Finding Unknown Angle Measures

Use angle relationships to find unknown measures in a figure.

Unit	Lesson	Lesson Objectives

Symmetry

Identify reflectional symmetry in geometric figures and the number of lines of symmetry.

Identify rotational symmetry and its order in geometric figures.

Isosceles Triangles

Complete the steps to prove the isosceles triangle theorem and its converse.

Identify characteristics of an isosceles triangle.

Solve for unknown measures of isosceles triangles.

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.

Perimeter of Composite Figures

Calculate perimeters of many-sided plane figures using combinations of formulas.

Use unit analysis to solve problems involving perimeters.

Area of Triangles and Parallelograms

Solve problems involving areas of triangles and parallelograms.

Circumference

Solve problems involving the circumference of a circle.

Area of a Circle and a Sector

Solve problems involving area of a circle.

Solve problems involving area of a sector with central angles measured in degrees.

Solve problems involving area of a sector with central angles measured in radians.

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.

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.

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.

Unit	Lesson	Lesson Objectives

Partitioning a Line Segment

Use the formula for partitioning a directed line segment to find a point that partitions a segment in a given ratio, or to find an endpoint of a segment.

Use the midpoint formula to calculate the midpoint or an endpoint of a line segment in the coordinate plane.

Rotations

Describe the properties of and write rules for rotations.

Determine the image or pre-image of a figure after a given rotation.

Develop the definition of a rotation using constructions.

Geometry: Part Two

Geometric Probability

Calculate geometric probabilities.

Identify the probability of landing in a given region of a geometric figure as impossible, unlikely, likely, or certain.

Right Triangle Similarity

Apply the Pythagorean theorem to find side lengths of a right triangle.

Apply theorems to solve problems involving geometric means.

Complete the steps to prove the Pythagorean theorem using similar triangles.

Identify similar right triangles formed by an altitude and write a similarity statement.

Special Right Triangles

Complete the steps to prove special right triangle theorems.

Determine unknown measures of 30°-60°-90° triangles.

Determine unknown measures of 45°-45°-90° triangles.

Solve real-world problems involving special right triangles.

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.

Solving for Side Lengths of Right Triangles

Apply trigonometric ratios to solve real-world problems.

Solve for unknown side lengths of right triangles using trigonometric ratios.

Write equations using trigonometric ratios that can be used to solve for unknown side lengths of right triangles.

Solving for Angle Measures of Right Triangles

Apply inverse trigonometric functions to solve real-world problems.

Solve for unknown angles of right triangles using inverse trigonometric functions.

Write equations that can be used to solve for unknown angles in right triangles.

Unit	Lesson	Lesson Objectives

Applications of Slope and the Distance Formula

Apply the distance and slope formulas to identify geometric figures and points that lie on those figures, in the coordinate plane.

Use the distance formula to compute perimeters and areas of polygons in the coordinate plane.

Slopes of Parallel and Perpendicular Lines

Complete the steps to prove the slope criteria for parallel and perpendicular lines using coordinate geometry.

Determine if two lines are parallel or perpendicular.

Prove the slope criteria for perpendicular lines.

Use slope criteria to find additional points on a line parallel or perpendicular to a given line.

Writing Linear Equations

Write the equation of a line parallel to a given line that goes through a particular point.

Write the equation of a line perpendicular to a given line or segment that goes through a particular point.

Reflections

Describe the properties of and write rules for reflections.

Determine the image or pre-image of a figure after a given reflection.

Develop the definition of a reflection using constructions.

Rotations in the Coordinate Plane

Describe the rotation of a figure using coordinates.

Rotate figures on the coordinate plane given the degree and direction.

Equation of a Circle

Determine if a given point lies on a circle.

Determine the equation of a circle.

Identify the center and radius from the equation of a circle, including equations given in general form.

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 $y = x^2$.

Scale Drawings and Area

Compute areas of figures from scale drawings.

Statistics and Probability

Sets and Venn Diagrams

Identify and represent elements of sets and subsets, including the empty and universal sets.

Represent and interpret the union and intersection of sets using set notation and Venn diagrams.

Interpreting Two-Way Tables

Interpret and analyze a two-way table.

Use frequencies to describe a possible association between two variables.

Unit	Lesson	Lesson Objectives

Compound Events and Sample Space

Determine outcomes in a sample space that represents a given compound event.

Identify the sample space for an experiment involving compound events.

Probability of Compound Events

Find probabilities of dependent compound events using organized lists, tables, or tree diagrams.

Find probabilities of independent compound events using organized lists, tables, or tree diagrams.

Independent and Mutually Exclusive Events

Calculate probabilities using the addition rule.

Calculate probabilities using the multiplication rule of independent events.

Identify mutually exclusive and independent events.

Theoretical and Experimental Probability

Calculate theoretical and experimental probability.

Identify the sample space of an experiment and the complement of an event.

Introduction to Modeling with Functions

Analyze a data set to determine a linear, quadratic, or exponential function to model it.

Write exponential functions and expressions in equivalent forms, using the properties of exponents to justify steps.

Probability with Combinations and Permutations

Identify expressions that represent probabilities of compound events.

Use combinations to compute probabilities of compound events.

Use permutations to compute probabilities of compound events.

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.

Finding the Mean

Calculate the mean of a set of data.

Explain how the mean of a set of data is a balance point.

Find a missing value in a set of data given the mean.