Unit	Lesson	Lesson Objectives

Foundations of Euclidean Geometry

Euclidean Geometry
Analyze descriptions and diagrams that illustrate basic postulates about points, lines, and planes.
Identify and name undefined terms of point, line, plane, and distance along a line.

Defining Terms
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.

Measuring Length and Angles
Apply the protractor postulate and angle addition postulate to calculate angle measures.
Apply the ruler postulate and segment addition postulate to calculate the lengths of line segments.
Identify a midpoint or bisector of a line segment or angles.

Logic and Reasoning
Distinguish between inductive and deductive reasoning and realize that inductive reasoning may not determine a valid conclusion.
Identify a logical statement, and determine its hypothesis and conclusion.
Use counterexamples to show that a statement is false.

Conditional Statements and Equivalence
Determine the truth value of a conditional statement.
Identify the converse, inverse, and contrapositive of a given conditional statement.
Translate between verbal and symbolic form of statements.

Compound Statements
Determine the truth value of a compound statement.
Translate between verbal and symbolic form of compound statements.

Introduction to Proof
Complete the steps to prove algebraic and geometric statements.
Identify proof formats, the essential parts of a proof, and the assumptions that can be made from a given drawing.

Linear Pairs and Vertical Angles
Identify linear pairs and vertical angles from given diagrams.
Calculate angle measures by using definitions and theorems about linear pairs and vertical angles.
Complete the steps to prove statements using linear pairs and vertical angles.

Complementary and Supplementary Angles
Complete the steps to prove statements using complementary angles and supplementary angles.
Identify complementary angles and supplementary angles from given diagrams.
Solve problems involving measures of complementary and supplementary angles.

Performance Task: Constructions

Geometric Transformations

Introduction to Transformations
Identify the type of transformation given a pre-image and an image.
Determine if a transformation is isometric and identify corresponding parts of the pre-image and image.

Unit	Lesson	Lesson Objectives

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.

Translations

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

Develop the definition of a translation using constructions.

Write the rule that describes a given translation.

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.

Compositions

Determine the image of a figure after a given composition of transformations.

Determine the rule that describes a given composition of transformations.

Symmetry

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

Identify rotational symmetry and its order in geometric figures.

Performance Task: Tessellations

Angles and Lines

Parallel and Perpendicular Lines

Construct parallel and perpendicular lines.

Identify parallel, perpendicular, and skew lines from three-dimensional figures.

Solve problems involving the distance from a point on the perpendicular bisector to both endpoints of the line segment.

Lines Cut by a Transversal

Complete the steps to prove angle relationships given parallel lines cut by a transversal.

Solve for angle measures when parallel lines are cut by a transversal.

Proving Lines Parallel

Apply theorems to determine if lines are parallel.

Prove lines are parallel given angle relationships.

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.

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.

Unit	Lesson	Lesson Objectives

Triangles

Triangle Angle Theorems
Calculate the measures of interior and exterior angles of a triangle.
Complete the steps to prove that the sum of the measures of the interior angles of a triangle is 180 degrees.
Identify and relate the interior and exterior angles of a triangle.

Triangles and Their Side Lengths
Analyze the relationships between the angles of acute, right, and obtuse triangles.
Construct or justify the construction of isosceles and equilateral triangles.
Determine if three given segments will satisfy the triangle inequality.
Determine the length or parameters for a third side of a triangle given the other two sides.

Triangle Inequalities
Identify angle and side relationships between two triangles.
Identify angle and side relationships in a triangle.
Solve real world problems involving relationships between angle measures and side lengths of one or two triangles.

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.

Centroid and Orthocenter
Complete the steps to prove that the medians of a triangle meet at a point.
Identify the characteristics of the centroid or orthocenter of a triangle.
Solve for unknown measures created by medians in a triangle.

Incenter and Circumcenter
Construct inscribed and circumscribed circles of a triangle.
Identify the characteristics of the incenter or circumcenter of a triangle.
Solve for unknown measures created by perpendicular or angle bisectors in a triangle.

Triangle Congruence

Congruent Figures
Determine if figures are congruent and, if so, identify their corresponding parts.
Determine unknown measures of congruent figures.
Write congruency statements for transformed figures.

Triangle Congruence: SAS
Complete the steps to prove triangles are congruent using SAS.
Determine the isometric transformations that would map one triangle onto another triangle given that two corresponding sides and the included angle are congruent.
Identify the sides and angle that can be used to prove triangle congruency using SAS.

Triangle Congruence: ASA and AAS
Complete the steps to prove triangles are congruent using ASA or AAS.
Determine the isometric transformations that would map one triangle onto another triangle given that two pairs of corresponding angles and one pair of corresponding sides are congruent.
Identify the side and angles that can be used to prove triangle congruency using ASA or AAS.

Unit	Lesson	Lesson Objectives

Triangle Congruence: SSS and HL

Complete the steps to prove triangles are congruent using SSS or HL.

Determine the isometric transformations that would map one triangle onto another triangle given that three corresponding sides are congruent.

Identify the parts that can be used to prove triangle congruency using SSS or HL.

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.

Performance Task: Congruency Proofs

Similarity Transformations

Dilations

Calculate and interpret the scale factor for dilations of figures.

Determine the unknown measures of an image or pre-image of a dilated figure given the scale factor.

Verify experimentally the properties of dilations given a center and a scale factor.

Similar Figures

Determine if two polygons are similar using dilations.

Find the coordinates of the vertices of an image or pre-image of a dilated polygon given the scale factor.

Verify the properties of dilations, including the scale factor and slopes of corresponding line segments.

Triangle Similarity: AA

Complete the steps to prove triangles are similar using the AA similarity theorem.

Identify the composition of similarity transformations in a mapping of two triangles.

Triangle Similarity: SSS and SAS

Complete the steps to prove triangles are similar using SAS similarity theorem.

Complete the steps to prove triangles are similar using SSS similarity theorem.

Identify the sides and angle that can be used to prove triangle similarity using SSS similarity theorem and SAS similarity theorem.

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.

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.

Directed Line Segments and Modeling

Find the coordinates of a point on a directed line segment that partitions the segment into a given ratio.

Model and solve real-world problems involving directed line segments.

Congruent and Similar Triangles in the Coordinate Plane

Apply coordinate geometry to prove properties of congruent triangles.

Apply coordinate geometry to prove properties of similar triangles.

Unit	Lesson	Lesson Objectives

Applications of 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.

Finding Outcomes
Evaluate expressions involving factorials.
Identify possible outcomes for an event.
Solve combination problems including finding a subset of the total number of possible combinations.
Solve permutation problems including finding a subset of the total number of possible permutations.

Theoretical and Experimental Probability
Calculate theoretical and experimental probability.
Identify the sample space of an experiment and the complement of an event.

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.

Conditional Probability
Calculate conditional probabilities using formulas and Venn diagrams.
Calculate probabilities of compound events.
Use calculations to determine if two events are independent.

Probability and Two-Way Tables
Compute conditional probabilities from data displayed in a two-way table.
Construct a two-way table.
Use a two-way table to determine if two events are independent.

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.

Performance Task: Applying Probability Concepts

Right Triangle Relationships and Trigonometry

Triangle Classification Theorems
Apply the converse of the Pythagorean theorem and triangle inequality theorems to solve problems.
Classify a triangle using the converse of the Pythagorean theorem and triangle inequality theorems.
Determine an unknown side length or range of side lengths of a triangle given its classification.

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.

Unit	Lesson	Lesson Objectives

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.

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.

Law of Sines

Apply the law of sines to solve real-world problems.

Complete the steps to prove the law of sines.

Solve mathematical problems using the law of sines.

Law of Cosines

Apply the law of cosines to solve real-world problems.

Complete the steps to prove the law of cosines.

Solve mathematical problems using the law of cosines.

Area and Perimeter of Triangles

Derive the area formula $A = 1/2 ab\sin C$.

Solve area and perimeter problems using $A = 1/2 ab\sin C$.

Solve area and perimeter problems using Heron's formula.

Quadrilaterals and Coordinate Algebra

Classifying Quadrilaterals

Classify and describe relationships within the family of quadrilaterals.

Describe real-world objects using characteristics of quadrilaterals.

Solve mathematical problems using characteristics of quadrilaterals.

Solve real-world problems using characteristics of quadrilaterals.

Parallelograms

Apply properties of parallelograms to solve problems.

Complete the steps to prove theorems about properties of parallelograms.

Proving a Quadrilateral Is a Parallelogram

Analyze a figure to determine if it is a parallelogram.

Apply properties of parallelograms to solve for unknown values.

Complete the steps to prove that a quadrilateral is a parallelogram.

Unit	Lesson	Lesson Objectives

Special Parallelograms

Apply properties of rectangles to solve mathematical and real-world problems.

Apply properties of rhombi to solve mathematical and real-world problems.

Apply properties of squares to solve mathematical and real-world problems.

Complete the steps to prove theorems about properties of rhombi, rectangles, and squares.

Trapezoids and Kites

Apply properties of kites to solve mathematical and real-world problems.

Apply properties of trapezoids to solve mathematical and real-world problems.

Complete proofs involving properties of trapezoids and kites.

Figures in the Coordinate Plane

Apply coordinate algebra proofs to triangles and quadrilaterals.

Calculate the perimeter of a triangle or quadrilateral given the coordinates of the vertices.

Circles

Introduction to Circles

Calculate the degree measure of an arc using the arc addition postulate.

Complete the steps to prove that all circles are similar.

Identify and describe terms related to circles.

Central Angles

Determine the measures of central angles, chords, and arcs using the angles-chords-arcs congruency theorems.

Identify congruent central angles, chords, and arcs.

Solve problems using the radius tangent theorem and its converse.

Inscribed Angles

Apply theorems about inscribed angles and angles formed by a tangent and a chord.

Complete the steps to prove theorems involving inscribed angles and their intercepted arcs.

Secants, Tangents, and Angles

Solve problems about angles formed by a secant and a tangent that intersect outside a circle.

Solve problems about angles formed by two intersecting chords.

Solve problems about angles formed by two intersecting tangents.

Solve problems about angles formed by two secants that intersect outside a circle.

Special Segments

Solve problems involving segments formed by a secant and a tangent that intersect outside a circle.

Solve problems involving segments formed by two intersecting chords.

Solve problems involving segments formed by two intersecting tangents.

Solve problems involving segments formed by two secants that intersect outside a circle.

Performance Task: Common Tangents of Circles

Circumference and Arc Length

Determine the radian measure of a central angle.

Solve problems involving arc length with central angles measured in degrees.

Solve problems involving arc length with central angles measured in radians.

Solve problems involving circumference of a circle.

Unit	Lesson	Lesson Objectives

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.

Angle Relationships

　　Determine segment lengths, angle measures, and arc measures using definitions and theorems relating to circles.

Performance Task: Circle Constructions

Describing Curves with Coordinates

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.

Parabolas

　　Describe key features of a parabola.

　　Determine the equation of a parabola given the focus and directrix.

Equations of Ellipses

　　Identify the center, foci, directrix, and vertices of an ellipse from an equation or graph.

　　Write the equation of an ellipse from a given graph or information about its center, foci, directrix, or vertices.

Equations of Hyperbolas

　　Determine the foci, directrices, vertices, and asymptotes of a hyperbola with center at the origin from an equation or graph.

　　Graph a hyperbola with center at the origin from a given equation.

　　Write the equation of a hyperbola with center at the origin from a given graph or information about its foci, directrices, or vertices.

Equations of Hyperbolas (continued)

　　Determine the center, foci, directrices, vertices, and asymptotes of a hyperbola from an equation or graph.

　　Write the equation of a hyperbola from a given graph or information about its center, foci, directrices, or vertices.

Geometric Modeling in Two Dimensions

Area of Triangles and Parallelograms

　　Solve problems involving areas of triangles and parallelograms.

Perimeter and Area of Rhombi, Trapezoids, and Kites

　　Calculate the perimeter of a rhombus, trapezoid, or kite given the coordinates of the vertices.

　　Solve problems involving the area of a rhombus, trapezoid, and kite given the coordinates of the vertices.

　　Solve problems involving the area of a rhombus, trapezoid, and kite.

Angle Measures of Polygons

　　Apply the polygon exterior angle sum theorem to solve problems.

　　Apply the polygon interior angle sum theorem to solve problems.

　　Identify and describe polygons.

Area of Regular Polygons

　　Calculate the area of a regular polygon.

　　Calculate the length of the apothem of a regular polygon.

　　Solve real-world problems involving the area of regular polygons.

Unit	Lesson	Lesson Objectives

Area of Composite Figures

Calculate the area of composite 2-D figures, including real-world applications.

Decompose composite 2-D figures.

Write an expression that represents the area of a composite 2-D figure.

Density and Design Problems

Solve problems involving density of an area.

Use geometric concepts to solve design problems.

Geometric Modeling in Three Dimensions

Solids

Determine the number of faces, edges, and vertices of a given solid.

Classify a solid.

Describe and apply relationships between the faces, edges, and vertices of solids.

Modeling 3-D Figures

Create a model of a 3-D figure.

Describe a 3-D figure that can be created from a 2-D representation.

Identify a 2-D representation of a 3-D figure.

Three-Dimensional Figures and Cross Sections

Classify a 3-D figure and identify the characteristics (base, edge, etc.).

Determine the 3-D figure generated by a rotation of a 2-D figure.

Determine the horizontal and vertical cross-sections of 3-D figures.

Volume of Prisms

Calculate the volume or an unknown measure of a right prism based on a mathematical or real-world model.

Calculate the volume or an unknown measure of an oblique prism based on a mathematical or real-world model.

Write expressions to represent the volumes or unknown measures of right and oblique prisms.

Volume of Pyramids

Calculate the volume or an unknown measure of a right pyramid based on a mathematical or real-world model.

Calculate the volume or an unknown measure of an oblique pyramid based on a mathematical or real-world model.

Write expressions to represent the volumes or unknown measures of right and oblique pyramids.

Volume of Cylinders, Cones, and Spheres

Solve mathematical and real-world problems involving the volume of right and oblique cones.

Solve mathematical and real-world problems involving the volume of right and oblique cylinders.

Solve mathematical and real-world problems involving the volume of spheres.

Write expressions to represent the volumes or unknown measures of cylinders and cones.

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.

Changing Dimensions of 3-D Figures

Determine and describe how proportional or nonproportional changes in linear dimensions of a shape affect other measurements such as perimeter, area, surface area, or volume.

Identify similar solids and determine their scale factors.

Solve problems about length, area, and volume measures using scale factors.