

# Geometry A

## SCOPE OF COURSE

Plane and solid geometry are examined visually, analytically, and logically. Constructions are made with a compass and straight edge and by folding paper. Geometric concepts beginning with basic points, lines, planes, angles, and rays are developed along with properties of parallel and perpendicular lines as a basis for the study of polygons. Triangles and triangle properties are studied. Similarities and differences between polygons are addressed using a hierarchical approach. Area, perimeter, and volume connect plane and solid geometry. Students are taught to use definitions, axioms, and postulates to justify conjectures.

The focus and goals of the geometry sequence are concept based and designed to help students think logically and analytically. Making sense of the world through geometry is a priority.

## SEQUENCE OF SKILLS

### UNIT 1 – Foundations

- Introduction to Geometry
- Points, Lines, and Planes
- Line Segments, Rays, and Angles
- Plane Geometry
- Polygons
- Solid Geometry
- Sketches and Intersections of Planes with Solids
- Ominoes
- Nets for Cubes
- Nets of other Three-Dimensional Figures
- Visualizing Three-Dimensional Objects
- Perspective
- Sketch Geometric Models
- Proofs

### UNIT 2 – Congruent Triangle Theorems & Constructions

- Proofs
- Side-Angle-Side Theorem
- Angle-Side-Angle Theorem
- Isosceles Triangle Theorems
- Converse of the Isosceles Triangle Theorem
- Side-Side-Side Theorem
- Introduction to Constructions
- Triangle Constructions
- Conditions That Are Or Are Not Sufficient To Prove Triangles Congruent
- Perpendicular Bisector Theorem
- More Constructions
- Right Triangle Theorem I
- Right Triangle Theorem II

# Geometry A

## SEQUENCE OF SKILLS

### UNIT 3 – Parallel, Perpendicular, & Angle Theorems

- Exterior Angles
- Lines Perpendicular to the Same Line
- Lines Perpendicular to Parallel Lines and Non-Euclidean Geometries
- Transversals and Parallel Lines
- Interior Angles and Corresponding Angle Theorems
- The Sum of the Angles in a Triangle
- Equal Segments Theorem
- Points on the Bisector of an Angle
- Angle Comparisons
- Mid-Segments
- The Median in a Right Triangle
- Triangles with Unequal Sides
- Triangles with Unequal Angles
- Comparing Triangles

### UNIT 4 – Perimeter, Area, and Volume

- Perimeter
- Area
- Connection Between Perimeter and Area
- Area of Parallelograms
- Area of Triangles
- Area of Trapezoids
- Area of Regular Polygons
- Surface Area of Prisms
- Surface Area of Cylinders and Spheres
- Surface Area of Pyramids and Cones
- Volume of Prisms
- Volume of Pyramids
- Volume of Cylinders, Cones, and Spheres
- Effects of Changing Dimensions

### UNIT 5 – Properties of Common Geometric Shapes

- Hierarchy of Polygons and How This Relates to Their Properties
- Properties of Special Parallelograms
- Sufficient Conditions for a Parallelogram
- Parallelogram Constructions
- Sufficient Conditions for Rectangles, Rhombi, and Squares
- Isosceles Trapezoids
- Constructing Trapezoids
- Trigonometric Ratios
- Right Triangle Applications and Properties of Special Right Triangles
- Identities
- Law of Cosines
- Law of Sines

# Geometry B

## SCOPE OF COURSE

Students study and analyze circles and arcs. Tangents, secants, and chords and the angles they form are examined. Concurrent lines are found in triangles while studying altitudes, angle bisectors, and medians. Regular inscribed and circumscribed polygons and similarities and proportions are some of the other concepts addressed. Connections are drawn between geometry, art, and algebra.

Logic is developed using Venn diagrams and truth tables. Motion geometry is studied using grid paper, a compass, and an image reflector.

Students are taught to think logically and to justify their conjectures using a variety of types of proofs. The focus and goals of the geometry sequence are concept based and designed to help students think logically and analytically. Making sense of the world through geometry is a priority.

## SEQUENCE OF SKILLS

### UNIT 1 – Circles

- Circles – Related Definitions and Postulates
- Three Point Circles
- Constructing a Circle with Three Points
- Chords and Arcs
- Diameters and Other Chords
- Intersecting Circles
- Chords Equidistant from the Center
- Unequal Minor Arcs
- Unequal Chords
- Tangents and Radii
- Tangents from the Same Outside Point
- Tangent Circles
- Constructing Tangents to a Circle
- Parallel Lines and Circles

### UNIT 2 – Angles, Arcs, Concurrent Lines, Similarities and Proportions

- Inscribed Angles
- Angles Formed by a Tangent and a Chord
- Angles Formed by Two Intersecting Chords
- Angles Formed by Secants and Tangents
- Concurrent Lines
- Regular Inscribed Polygons
- Regular Circumscribed Polygons
- Ratio and Proportion and Parallel Line Proportionality
- Proportionality and Parallelism
- Similar Triangles
- Bisectors of Interior and Exterior Angles of Triangles and Proportionality
- Right Triangles and Similarity
- Circles and Proportionality

# Geometry B

## SEQUENCE OF SKILLS

### UNIT 3 – Logic

- Statements and Their Opposites
- Conjunctions
- Disjunctions
- Truth Tables – Conditional Statements
- The Converse of a Statement
- Biconditionals
- The Inverse of a Statement
- Contrapositives and Logically Equivalent Statements
- Identities
- Tautologies, Contradictions, and Contingencies
- Quantifiers
- Valid Arguments
- Logic Puzzles – Single Matching
- Logic Puzzles – Complex Matching

### UNIT 4 – Coordinate Geometry

- Analytic Geometry
- Using Coordinate in Proofs
- Coordinate Geometry – Three Dimensions
- Three-Dimensional Distances, Prisms, and Pyramids
- The Locus Problem
- Locus of Points in a Plane
- Intersection of Loci
- Coordinate Geometry and the Locus of First-Degree Equations
- Coordinate Geometry and the Locus of Circles
- Locus and an Ellipse
- Locus and a Parabola
- Locus and a Hyperbola
- Conic Sections Identified and Shifted
- Vectors

### UNIT 5 – Motion Geometry

- Transformations
- Translations
- Reflections
- Rotations
- Combinations of Transformations
- Identifying Transformations
- Size Transformations
- Symmetry
- Tessellations with Polygons
- Escher-like Tessellations
- Fractals and Chaos