# Geometry, Part 2
# Course Outline & Objectives

**Course Description:**

In Geometry Part 2, students will build on their foundational knowledge by exploring right triangles and trigonometric relationships, including the Pythagorean Theorem and the laws of sines and cosines. They will examine the structure and classification of polygons and apply properties of special quadrilaterals such as rectangles, rhombi, and trapezoids. Using coordinate geometry, students will verify relationships and solve problems involving quadrilaterals. They will also explore circles, including central and inscribed angles, arc measures, and tangents. The course concludes with an introduction to conic sections and a unit on basic probability, where students learn to calculate simple and compound probabilities and interpret geometric probability models.

Credits - One Semester (0.5 Carnegie unit / CA: 5 credits) | Prerequisites: Algebra 1; Geometry, Part 1

## Course Outline

### Unit 1: Right Triangles and Trigonometry

1.1 Pythagorean Theorem and Its Converse
1.2 Special Right Triangles
1.3 Basic Trigonometric Functions
1.4 Angles of Elevation and Depression
1.5 Area of a Triangle
1.6 Law of Sines and Law of Cosines

## Common Core Standards

**In Unit 1, students will learn to**:
Use the Pythagorean Theorem and its converse to solve and classify right triangles.
Solve problems involving special right triangles (45°-45°-90° and 30°-60°-90°).
Define and apply sine, cosine, and tangent to find missing side lengths and angles in right triangles.
Solve real-world problems involving angles of elevation and depression.
Find the area of triangles using basic formulas, Heron's formula, and trigonometric methods, including the Laws of Sines and Cosines.
**[ G-SRT.C.6, G-SRT.C.7, G-SRT.C.8, G-SRT.D.9, G-SRT.D.10, G-SRT.D.11 ]**

### Unit 2: Polygons and Quadrilaterals

2.1 Classifying Polygons
2.2 Polygon Theorems
2.3 Parallelograms
2.4 Rectangles, Rhombuses, and Squares
2.5 Trapezoids and Kites
2.6 Quadrilaterals on a Coordinate Plane
2.7 Constructing Regular Polygons

**In Unit 2, students will learn to**:
Classify polygons and apply properties of interior and exterior angles in regular and irregular polygons.
Identify and use properties of special quadrilaterals, including parallelograms, rectangles, rhombuses, squares, trapezoids, and kites.
Use coordinate geometry to verify and classify quadrilaterals on the coordinate plane using slope, distance, and midpoint formulas.
Solve problems involving midsegments, angles, and sides in trapezoids and kites.
Construct regular polygons using a compass and straightedge.
**[ G-CO.A.3, G-CO.C.11, G-CO.D.13, G-GPE.B.4 ]**

## Course Outline

### Unit 3: Circles

3.1 Central Angles, Chords, and Arcs
3.2 Inscribed Angles and Inscribed Polygons
3.3 Tangent Lines and Circumscribed Polygons
3.4 Chords, Secants, and Tangents
3.5 Area and Circumference of a Circle
3.6 Arc Length and Areas of Circle Sectors and Segments
3.7 Equations of Circles
3.8 Introduction to Conic Sections

### Unit 4: Solids

4.1 Area and Perimeter of Polygons
4.2 Solids, Nets, and Cross Sections
4.3 Surface Area of Prisms and Cylinders
4.4 Surface Area of Pyramids and Cones
4.5 Volume of Prisms and Cylinders
4.6 Volume of Pyramids and Cones
4.7 Surface Area and Volume of Spheres
4.8 Composite Solids
4.9 Similar Solids and Effects of Changing Dimensions

### Unit 5: Probability

5.1 Sample Spaces
5.2 Probability and Counting
5.3 Geometric Probability
5.4 Two-Way Frequency Tables
5.5 Probability and the Addition Rule
5.6 Probability and the Multiplication Rule
5.7 Conditional Probability
5.8 Probability with Permutations and Combinations

## Common Core Standards

**In Unit 3, students will learn to**:
Identify and use properties of circles, including central angles, arcs, chords, tangents, and secants.
Apply theorems related to inscribed angles, tangent lines, and intersecting lines to solve problems.
Calculate circumference, area, arc length, and sector area of circles, both in standard form and on the coordinate plane.
Write and graph equations of circles and prove similarity between circles using algebraic and geometric reasoning.
Explore basic features and equations of conic sections, including ellipses, parabolas, and hyperbolas.
**[ G-CO.A.1, G-C.A.1, G-C.A.2, G-C.A.3, G-C.A.4, G-C.B.5, G-GPE.A.1, G-GPE.A.2, G-GPE.A.3, G-GPE.B.4 ]**

**In Unit 4, students will learn to**:
Calculate the area and perimeter of 2D polygons and composite figures, including shaded regions.
Identify and classify three-dimensional solids, their nets, and cross sections.
Find surface area and volume of prisms, pyramids, cones, cylinders, and spheres.
Solve problems involving composite solids and apply formulas to calculate their surface area and volume.
Analyze the effects of scale factor on area, surface area, and volume in similar solids.
**[ G-GPE.B.7, G-GMD.A.1, G-GMD.A.2, G-GMD.A.3, G-GMD.B.4, G-MG.A.1, G-MG.A.2, G-MG.A.3 ]**

**In Unit 5, students will learn to**:
Explore sample spaces, set notation, and Venn diagrams to represent and calculate probabilities.
Compare theoretical and experimental probability, and use probability to predict outcomes.
Apply the addition and multiplication rules to both independent and dependent events.
Analyze two-way frequency tables and calculate conditional probabilities.
Use permutations, combinations, and geometric probability to solve advanced probability problems.
**[ S-CP.A.1, S-CP.A.2, S-CP.A.3, S-CP.A.4, S-CP.A.5, S-CP.B.6, S-CP.B.7, S-CP.B.8, S-CP.B.9, S-MD.A.2, S-MD.A.3, S-MD.B.5 ]**