Geometry, Part 1
Course Outline & Objectives

Course Description:

In Geometry, students will build a strong foundation by mastering essential vocabulary, geometric constructions, and logic-based reasoning. They will explore the properties and relationships of parallel and perpendicular lines, learn to calculate distances and midpoints, and apply angle theorems. Students will analyze transformations—such as reflections, translations, and rotations—and use them to investigate congruence. Through triangle classification and congruence theorems, students will write and prove geometric statements. Finally, students will study similarity, scale factors, dilations, and triangle proportionality, applying these concepts to solve real-world problems and geometric proofs.

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

Course Outline

Unit 1: Measurements and Proof

1.1 Basic Geometry Vocabulary
1.2 Measuring Segments
1.3 Measuring Angles
1.4 Angle Pairs and Relationships
1.5 Constructions
1.6 Conditional Statements
1.7 Inductive and Deductive Reasoning
1.8 Algebraic Proofs
1.9 Segment and Angle Proofs

Unit 2: Parallel and Perpendicular Lines

2.1 Lines and Angles
2.2 Parallel Lines and Algebra
2.3 Proving Lines Parallel
2.4 Slope and Equations of Parallel Lines
2.5 Slope and Equations of Perpendicular Lines

Common Core Standards

In Unit 1, students will:
Learn key geometric vocabulary and how to represent points, lines, angles, and shapes using proper notation.
Measure and classify segments and angles, and apply formulas for midpoint and distance.
Explore angle relationships, special pairs, and geometric constructions using a compass and straightedge.
Analyze logical statements using conditional reasoning, and apply deductive and inductive logic to proofs.
Construct algebraic and geometric proofs involving segments, angles, bisectors, and vertical angles.
[G-CO.A.1, G-CO.C.9, G-CO.D.12, G-GPE.B.6]

In Unit 2, students will:
Identify and classify relationships between lines and angles, including parallel, perpendicular, and skew lines.
Use transversals to recognize special angle pairs and apply angle theorems to solve problems.
Prove lines are parallel using angle relationships and their converses.
Apply the concept of slope to determine and write equations of parallel and perpendicular lines.
Solve geometric problems using algebraic equations that represent relationships between angles and lines.
[G-CO.A.1, G-CO.C.9, G-GPE.B.5]

Course Outline

Unit 3: Rigid Motion and Congruence

3.1 Classifying Triangles and Angles of Triangles
3.2 Rigid Transformations
3.3 Symmetry
3.4 Compositions of Transformations
3.5 Congruent Figures
3.6 Congruent Triangles (SSS, SAS)
3.7 Congruent Triangles (ASA, AAS)
3.8 HL and CPCTC
3.9 Isosceles and Equilateral Triangles

Unit 4: Relationships in Triangles

4.1 Midsegments of a Triangle
4.2 Perpendicular and Angle Bisectors
4.3 Medians and Altitudes of Triangles
4.4 Constructing Centers of Triangles
4.5 Indirect Proofs
4.6 Inequalities in One and Two Triangles

Unit 5: Similarity

5.1 Ratios and Proportions
5.2 Similar Polygons and Scale Factor
5.3 Dilations
5.4 Proving Triangles are Similar
5.5 Geometric Mean and Parts of Similar Triangles
5.6 Parallel Lines and Proportional Parts

Common Core Standards

In Unit 3, students will:
Classify triangles by sides and angles and apply the Triangle Sum and Exterior Angle Theorems.
Describe and perform rigid transformations—translations, reflections, and rotations—on the coordinate plane.
Identify line, point, and rotational symmetry and explore compositions of transformations.
Prove figures and triangles congruent using SSS, SAS, ASA, AAS, HL, and CPCTC.
Solve problems involving isosceles and equilateral triangles using triangle congruence and geometric reasoning.
[G-CO.A.2, G-CO.A.4, G-CO.A.5, G-CO.B.6, G-CO.B.7, G-CO.B.8, G-CO.C.10, G-SRT.B.5]

In Unit 4, students will:
Explore triangle centers by constructing and analyzing midsegments, angle bisectors, perpendicular bisectors, medians, and altitudes.
Identify and apply properties of points of concurrency: circumcenter, incenter, centroid, and orthocenter.
Solve problems using triangle inequality theorems, including the Triangle Inequality and Hinge Theorems.
Use indirect reasoning to prove geometric conjectures.
Apply triangle relationships to classify sides and angles and solve problems involving triangles.
[G-CO.C.9, G-CO.C.10, G-SRT.B.5]

In Unit 5, students will:
Use ratios and proportions to compare figures and solve real-world problems.
Identify similar polygons and apply scale factors to find missing side lengths.
Perform and describe dilations on and off the coordinate plane.
Prove triangles are similar using the SSS, SAS, and AA similarity theorems.
Apply geometric mean relationships and proportionality theorems within triangles, including those involving parallel lines and angle bisectors.
[G-CO.A.2, G-SRT.A.1, G-SRT.A.2, G-SRT.A.3, G-SRT.B.4, G-SRT.B.5]