STUDYPREP — MATH COURSES

FULL COURSE CURRICULUM

Geometry

A complete, proof-based Geometry course covering logical reasoning, transformations, congruence, similarity, right-triangle trigonometry, circles, area and volume, and coordinate geometry — including an interactive step-by-step proof builder.

8	41	92
Units	Topics	Estimated days (~19 weeks)

Course Overview

Unit 1 — Foundations & Logical Reasoning	5 topics · 8 days
Unit 2 — Transformations	5 topics · 8 days
Unit 3 — Congruence & Triangle Proofs	5 topics · 14 days
Unit 4 — Similarity	5 topics · 12 days
Unit 5 — Right Triangles & Trigonometry	5 topics · 12 days
Unit 6 — Circles	6 topics · 12 days
Unit 7 — Area & Volume	5 topics · 8 days
Unit 8 — Coordinate Geometry	5 topics · 10 days

Unit 1 — Foundations & Logical Reasoning

8 days

TOPIC	DESCRIPTION
Points, Lines & Planes	Undefined terms; collinear/coplanar points; segment and ray notation.
Measuring Segments & Angles	Ruler postulate; segment addition; angle addition; midpoints; bisectors.
Conditional Statements & Logic	If-then, converse, inverse, contrapositive, biconditionals, logical chains.
Geometric Proofs	Two-column proofs; paragraph proofs; flow proofs; algebraic properties of equality.
Parallel & Perpendicular Lines	Transversals; corresponding, alternate interior, and co-interior angles; parallel line theorems.

Unit 2 — Transformations

8 days

TOPIC	DESCRIPTION
Translations	Vector notation; coordinate rules (x+a, y+b); composition of translations.
Reflections	Reflections across x-axis, y-axis, y=x, y=−x, and arbitrary lines.
Rotations	90°, 180°, 270° rotations about the origin; center of rotation.
Dilations	Scale factor; center of dilation; enlargements and reductions; coordinate rules.
Symmetry & Compositions	Line symmetry; rotational symmetry; glide reflections; compositions of transformations.

Unit 3 — Congruence & Triangle Proofs

14 days

TOPIC	DESCRIPTION
Triangle Congruence (SSS, SAS, ASA, AAS, HL)	Five congruence postulates/theorems; identifying which applies to a given diagram.
CPCTC & Congruence Proofs	Using CPCTC after proving triangles congruent; writing two-column proofs.
Isosceles & Equilateral Triangles	Base angle theorem and converse; properties of equilateral triangles.
Perpendicular & Angle Bisectors	Circumcenter, incenter, median, altitude, centroid, orthocenter.
Parallelograms & Quadrilaterals	Properties and proofs for parallelograms, rectangles, rhombuses, squares, trapezoids.

Unit 4 — Similarity

12 days

TOPIC	DESCRIPTION
Ratio & Proportion	Extended ratios; properties of proportions; solving proportions; scale models.
Similar Polygons	Definition of similarity; corresponding parts; scale factor; perimeter and area ratios.
Triangle Similarity (AA, SAS, SSS)	AA postulate; SAS and SSS similarity theorems; indirect measurement.
Triangle Proportionality Theorem	Side-splitter theorem; midsegment theorem; proportional altitudes.
Geometric Means	Geometric mean in right triangles; altitude on hypotenuse theorem.

Unit 5 — Right Triangles & Trigonometry

12 days

TOPIC	DESCRIPTION
Pythagorean Theorem & Converse	Proving and applying the Pythagorean theorem; classifying triangles as acute/right/obtuse.
Special Right Triangles	45-45-90 and 30-60-90 triangles; exact side ratios; applications.
Trigonometric Ratios (SOH-CAH-TOA)	Sine, cosine, tangent definitions; finding missing sides and angles.
Inverse Trig & Problem Solving	Arcsin, arccos, arctan; angles of elevation and depression; multi-step problems.
Law of Sines (Introduction)	Setting up and solving non-right triangles with the Law of Sines.

Unit 6 — Circles

12 days

TOPIC	DESCRIPTION
Parts of a Circle & Central Angles	Radius, diameter, chord, arc, sector, central angle, intercepted arc.
Inscribed Angles & Arcs	Inscribed angle theorem; angles in semicircle; cyclic quadrilaterals.
Tangent Lines	Tangent-radius relationship; two tangents from external point; tangent-chord angle.
Secants, Chords & Angle Relationships	Intersecting chords; secant-secant; secant-tangent angle and segment length theorems.
Arc Length & Sector Area	Arc length formula; sector area formula; segment area.
Equation of a Circle	Standard form $(x-h)^2+(y-k)^2=r^2$; completing the square; graphing circles.

Unit 7 — Area & Volume

8 days

TOPIC	DESCRIPTION
Area of 2D Figures	Triangles, parallelograms, trapezoids, regular polygons; composite figures.
Prisms & Cylinders	Lateral and total surface area; volume; Cavalieri's principle.
Pyramids & Cones	Slant height; lateral surface area; total surface area; volume of pyramids and cones.
Spheres	Surface area and volume of spheres; hemispheres; comparing solids.
Cross-Sections & Composite Solids	Identifying cross-sections of prisms, cylinders, pyramids, cones; volume of composite solids.

Unit 8 — Coordinate Geometry

10 days

TOPIC	DESCRIPTION
Distance & Midpoint Formulas	Distance formula derivation; midpoint formula; partitioning a directed line segment.
Slopes of Parallel & Perpendicular Lines	Slope formula; parallel lines (equal slopes); perpendicular lines (negative reciprocal slopes).
Coordinate Proofs	Proving parallelograms, rectangles, rhombuses, and isosceles triangles using coordinates.
Partitioning Line Segments	Dividing a segment in a given ratio using the section formula.
Transformations on Coordinate Plane	Applying translation, reflection, rotation, dilation rules algebraically and graphically.

Course Summary

UNIT	TOPICS	EST. DAYS
1. Foundations & Logical Reasoning	5	8
2. Transformations	5	8
3. Congruence & Triangle Proofs	5	14
4. Similarity	5	12
5. Right Triangles & Trigonometry	5	12
6. Circles	6	12
7. Area & Volume	5	8
8. Coordinate Geometry	5	10
Total	**41**	**92**

This curriculum is available inside StudyPrep. Each topic includes AI-generated lessons with verified geometric figures, the step-by-step proof builder, adaptive practice, and an AI tutor grounded in your course material. Access at **app.studyprep.online**