

Geometry with Data Analysis is an Alabama-specific course that is the first of three required math courses in the state, providing an introductory mathematical experience for students entering high school. It builds upon students' command of geometric relationships and formulating mathematical arguments as well as generating real-world data analytical abilities through modeling exercises. Students learn through discovery and application, developing the skills they need to break down complex challenges and demonstrate their knowledge in new situations.

Course topics include reasoning, proof, and the creation of sound mathematical arguments; points, lines, and angles; triangles and trigonometry; quadrilaterals and other polygons; circles; congruence, similarity, transformations, and constructions; coordinate geometry; three-dimensional solids; descriptive statistics; and data and mathematical modeling.

This course supports all students as they develop computational fluency and deepen conceptual understanding. Students begin each lesson by discovering new concepts through guided instruction, and then confirm their understanding in an interactive, feedback-rich environment. Modeling activities equip students with tools for analyzing a variety of real-world scenarios and mathematical ideas. Journaling activities allow students to reason abstractly and quantitatively, construct arguments, critique reasoning, and communicate precisely. Performance tasks prepare students to synthesize their knowledge in novel, real-world scenarios and require that they make sense of multifaceted problems and persevere in solving them.

This course is built to Alabama state standards. Throughout the course, students are evaluated by a variety of assessments designed to prepare them for the content, form, and depth of state exams.

Length: One Semester

Unit 1: Foundations of Geometry

- Induction: The Search for Rules and Patterns
- Deduction: Making a Case
- The Look and Language of Logic
- Introduction to Proofs
- Basic Postulates in Geometry
- Planes and the Space of Geometry
- Intersecting Lines and Proofs
- Parallel Lines and Proofs
- Foundations of Geometry Wrap-Up

Unit 2: Triangles

- What Is a Triangle?
- The Angles of a Triangle

- Congruence
- Congruence Postulates
- Proofs of Congruence
- Similar Triangles
- Similarity Theorems and Proportional Reasoning
- Triangle Theorems
- Medians and Altitudes
- Bisectors and Midsegments
- Performance Task: The Parallax Problem
- Triangles Wrap-Up

Unit 3: Right Triangles

- The Pythagorean Theorem
- Congruent Right Triangles
- Similar Right Triangles
- Special Right Triangles
- Right Triangles Wrap-Up

Unit 4: Trigonometry

- Trigonometric Ratios
- Law of Cosines and Proofs
- Law of Sines and Proofs
- Trigonometry Wrap-Up

Unit 5: Quadrilaterals and Other Polygons

- Angle Sums of a Polygon and Proofs
- Parallelograms and Proofs
- Tests for Parallelograms
- Rectangles
- Rhombi and Squares
- Trapezoids
- Quadrilaterals and Other Polygons Wrap-Up

Unit 6: Circles Without Coordinates

- What Is a Circle?
- Chords
- Arcs
- Chord and Arc Relationships
- Circles, Angles, and Proofs
- Secants, Tangents, and Proofs
- Circumference and Arc Length
- Area and Sectors
- Circles and Triangles
- Circles and Polygons
- Circles Without Coordinates Wrap-Up

Unit 7: Semester 1 Exam**Unit 8: Coordinate Geometry**

- Midpoint Formula
- The Distance Formula
- Patterns and Lines
- Slope
- Equations of Lines
- Equations of Parallel and Perpendicular Lines and Proofs
- Coordinate Geometry with Polygons
- Area of a Triangle with Coordinate Geometry
- Area and Perimeter of Polygons with Coordinate Geometry
- Coordinate Geometry Wrap-Up

Unit 9: Conic Sections

- From Lines to Conic Sections
- Geometry of Conic Sections
- Circles with Coordinates and Proofs
- Parabolas
- Locus of Points
- Conic Sections Wrap-Up

Unit 10: Constructions and Transformations

- Constructions
- Paper Folding
- Impossible Problems from Antiquity
- Transformations
- Symmetry
- Tessellations
- Constructions and Transformations Wrap-Up

Unit 11: Three-Dimensional Solids

- Three Dimensions
- What Is a Polyhedron?
- Cylinders and Cones
- Platonic Solids
- Surface Area
- Volume
- Spheres
- Similar Solids
- Performance Task: Three-Dimensional Solids
- Three-Dimensional Solids Wrap-Up

Unit 12: Descriptive Statistics

- Measures of Center and Spread

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- Dot Plots, Box Plots, and Histograms
 - Describing Distributions
 - Two-Way Frequency Tables
 - Descriptive Statistics Wrap-Up

Unit 13: Data and Mathematical Modeling

- Two-Variable Data and Scatterplots
- Fitting Linear Models to Data
- Nonlinear Models
- Data and Mathematical Modeling Wrap-Up

Unit 14: Semester 2 Exam