Honors Geometry builds upon students' command of geometric relationships and formulating mathematical arguments. 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; and applications of probability.

This course supports all students as they develop computational fluency, deepen conceptual understanding, and apply mathematical practice skills. Students begin each lesson by discovering new concepts through guided instruction, 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. In these activities, additional items require Honors students to extend their understanding by answering "what if" questions, thinking abstractly about the mathematics involved, and analyzing the strengths and weaknesses of the model as a reflection of the real-world situation. 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. Honors students are required to go deeper into these investigations; for example, they may be asked to change or validate assumptions, add constraints, or extend the project. Journal activities allow students to reason abstractly and quantitatively, construct arguments, critique reasoning, and communicate precisely. Throughout the course, students are evaluated through a diversity of assessments specifically designed to prepare them for the content, form, and depth of the high-stakes assessments.

No required or optional materials.

Length: Two Semesters

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

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- 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

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- 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

- 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

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- Volume
- Spheres
- Similar Solids
- Performance Task: Three-Dimensional Solids
- Three-Dimensional Solids Wrap-Up

Unit 12: Applications of Probability

- Probability
- Probability of Independent and Dependent Events
- Conditional Probability
- Two-Way Frequency Tables
- Permutations and Combinations
- Applications of Probability Wrap-Up

Unit 13: Semester 2 Exam

- Semester 2 Exam

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