



## Greenwich Public Schools Curriculum Overview

### Honors Geometry

Personalized learning is achieved through standards-based, rigorous and relevant curriculum that is aligned to digital tools and resources.

*Note: Teachers retain professional discretion in how the learning is presented based on the needs and interests of their students.*

### Course Description

Honors Geometry

Full Year

028100

6 Blocks

1 Credit

Prerequisite: B- or better test and quiz average in 8th grade Algebra 1 and teacher recommendation; or an A- or better in Algebra 1 with teacher recommendation.

This accelerated course includes a rigorous axiomatic study of plane and solid figures in Euclidean Geometry. It examines their properties, measurement and mutual relations in space. Topics include a general review of algebraic concepts, parallel and perpendicular lines, geometric reasoning and proofs, triangle congruence and similarity proofs, polygons, right triangle trigonometry, law of sines and cosines, radian measure, circles, three-dimensional solids, and geometric probability.

### Unit Guide

Unit 1: Basics of Geometry

Unit 2: Reasoning, Proofs, Parallel & Perpendicular Lines, and Transformations

Unit 3: Congruent Triangles and Relationships Within Triangles

Unit 4: Quadrilaterals and Other Polygons

Midterm Review & Midterm Exam\*

Unit 5: Similarity, Right Triangles, and Trigonometry

Unit 6: Circles and Other Conic Sections

Unit 7: Surface Area and Volume

Unit 8: Applications of Probability (*If time allows*)

Final Review & Final Exam\*

**Note:** Semester exam review packets, answer keys and formula sheets can be found by joining our [Schoolology](#) Math Department Review Course, using COURSE access code P9V9X-H6V37.

### Mathematical Practices

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.

## **Enduring Understandings**

- *Unit 1:*
  - To experiment with points, lines, and planes, as well as calculate distances and midpoints.
  - Discover angle classifications.
- *Unit 2:*
  - Prove algebraic and geometric theorems through inductive reasoning.
  - Explore angle and line relationships.
  - Understand congruence in terms of rigid motions.
- *Unit 3:*
  - Prove geometric theorems and construct geometric figures.
- *Unit 4:*
  - Understanding quadrilaterals and other polygons.
- *Unit 5:*
  - Prove theorems involving similarity.
  - Define trigonometric ratios, as well as solve real world problems involving right triangles.
- *Unit 6:*
  - Understand and apply theorems about circles and translate between the geometric description and the equation for a conic section.
- *Unit 7:*
  - Explain volume formulas and use them to solve problems AND apply geometric concepts in modeling situations.
- *Unit 8:*
  - Understand independence and conditional probability and use them to interpret data.
  - Use the rules of probability to compute probabilities of compound events in a uniform probability model.

## **Essential Questions:**

- *Unit 1:*
  - What is the relationship of points, lines and planes? How can points, lines and planes be identified?
  - How can the midpoint and distance between two points be calculated?
  - How are angles named, measured, and classified?
- *Unit 2:*
  - What is a proof?
  - How do conditional statements relate to proofs?
  - What is a postulate and how does it relate to geometric diagrams?
  - How do algebraic properties relate to geometric diagrams?
  - What are the different pairs of angle relationships?
  - How do we prove geometric theorems involving segments and angles?
  - How can parallel and perpendicular lines be defined?
  - How can equations of parallel and perpendicular lines be calculated?
  - What types of angles are formed by two lines and a transversal?
  - What types of angles are formed by parallel lines and a transversal?
  - What is the relationship between the measures of angles formed by intersecting lines?
  - How can the relationship of angles be used to prove lines parallel?

- **Unit 3:**
  - How do segment and angle bisectors relate to the properties of congruence?
  - What are the different ways to prove triangles congruent?
  - How can congruent triangles help to find missing corresponding parts?
- **Unit 4:**
  - How do we name polygons and triangles?
  - How do we derive the formula for the sum of the interior and exterior angles of any convex polygon?
  - What are some special properties of triangles?
  - How do you solve problems involving relations within triangles?
  - How can some of the triangle properties be used in proofs?
  - What are the properties of the different quadrilaterals?
  - How can the properties of parallelograms be used in proofs? How do you show that a quadrilateral is a {parallelogram, rectangle, square, rhombus, trapezoid, or kite}?
  - How can the area of triangles, parallelograms, trapezoids, rhombi, and kites be calculated?
  - How can different transformations be modeled and compared?
  - How can rigid motion be defined? How can different transformations be modeled and compared?
- **Unit 5:**
  - How was the Pythagorean Theorem developed and how does the converse help determine what type of triangle is in a problem?
  - How do the ratios of triangle side lengths compare to one another?
  - How do the trigonometric ratios relate to the right triangle?
  - How can you use the angle of elevation and angle of depression with trigonometric ratios?
  - How can you solve for side lengths, angle measures, and area of oblique triangles?
  - What are the relationships in the two special right triangles?
  - What is a radian measure, and how can we draw angles on a coordinate plane?
  - How can you find trig ratios of general angles without your calculator?
  - How can the measure of the angles in a right triangle be calculated using the ratios?
  - How are ratios, proportions and the geometric mean related?
  - How can proportions be used to solve geometry problems?
  - What is a regular polygon and how can the characteristics help you calculate the area?
  - What is the relationship between congruence and similarity?
  - How can triangles be proven similar?
  - How can the altitude in right triangles be used to solve problems?
  - How can proportionality concepts be used to solve real-world problems?
- **Unit 6:**
  - What are the characteristics of a circle?
  - What are the different relationships formed between angles and circles when they intersect?
  - What is the relationship between angle and arc measures?
  - What are all the relationships of angles in a circle and chords, secants, and tangents?
  - What are all the relationships of angles in a circle and chords, secants, and tangents?
  - What is the relationship between chords, arcs, and other segments in a circle?
  - How can you use the central angle to find the arc length and area of a sector?
  - How do you use central angle and radius to find the arc length or the area of a sector in a circle?
  - What is the relationship between the equation of a circle and the Pythagorean Theorem?
  - How can you use an equation in general form to find the center and the radius of a

circle?

- **Unit 7:**
  - What are the characteristics of solid figures?
  - How can you use volume to model real life and mathematical situations?
  - How can you use surface area to model real life and mathematical situations?
- **Unit 8:**
  - What are the characteristics of theoretical, experimental and geometric probability?
  - How can it be determined when an event is dependent or independent?

## **Resources and Assured Experiences**

### Textbook Information:

Geometry with Calc Chat and Calc View

Ron Larson & Laurie Boswell

Big Ideas Learning (2022)

ISBN 13: 978-1-64727-418-4

### GHS Capstone Task:

[Vision of the Graduate](#) #3 - Explore, define, and solve complex problems

- To be completed after Unit 6

### Extra Resources:

- [Curriculum help aligned with CCSS](#)
- [CCSS resources from CSDE](#)
- [IXL provides scaffolding questions on multiple topics covered](#)
- [Khan Academy](#)
- [Kuta Software](#)
- [Three Act Math: Website full of project resources by Dan Meyer](#)
- [Project based learning resources](#)
- [Performance tasks](#)

**Quarterly Grading** - Quarter Grades will be determined using the following components:

- Participation (includes Classwork) = 5%
- Preparation (includes Homework) = 5%
- Assessments (both Summative & Formative) = 90%

## **Connecticut Common Core State Standards**

- **Unit 1:** CCSS.MATH.CONTENT.HSG-CO.A.1,D.12; HSG-GPE.B7; HSG-MG.A.1
- **Unit 2:** CCSS.MATH.CONTENT.HSG-CO.A.1, A.2, A.3, A.4, A.5, B.6, C.9, C.10,C.11, D.12; HSG-SRT.B.4; HSG-GPE.B.5,B.6; HSG-SRT.A.1a, A.1b, A.2
- **Unit 3:** CCSS.MATH.CONTENT.HSG-CO.A.3, B.7, B.8, C.9, C.10; HSG-SRT.B.5; HSG-GPE.B.4
- **Unit 4:** CCSS.MATH.CONTENT.HSG-CO.C11; HSG-GPE.B.4
- **Unit 5:** CCSS.MATH.CONTENT.HSG-SRT.A.2, A.3, B.5, B.5, C.6, D.9, D.10, D.11; HSG-GPE.B.5, B.6;
- **Unit 6:** CCSS.MATH.CONTENT.HSG-CO.A.1, D.13; HSG-C.A.1, A.2, A.3, A.4, B.5; HSG-GPE.A.1, A.2, B.4; HSG-GMD.A.1, A.3; HSG-MG.A.1, A.2, A.3
- **Unit 7:** CCSS.MATH.CONTENT.HSG-GMD.A.1, A.3, B.4; HSG-MG.A.1, A.2

*Adapted from 2011 Grant Wiggins & Jay McTighe  
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- *Unit 8:* CCSS.MATH.CONTENT.HSS-CP.A.1, A.2, A.3, A.4, A.5, B.6, B.7, B.8, B.9