



## Math Department Curriculum Guide

## Geometry

**Course Description**

The fundamental purpose of the course in Geometry is to formalize and extend students' geometric experiences. Students explore more complex geometric situations and deepen their explanations of geometric relationships, moving towards formal mathematical arguments.

Upon successful completion of this course, students will be able to:

- Experiment with transformations in the plane
- Understand congruence in terms of rigid motions
- Prove geometric theorems
- Make geometric constructions
- Understand similarity in terms of similarity transformations
- Define trigonometric ratios and solve problems involving right triangles
- Understand and apply theorems about circles
- Find arc lengths and areas of sectors of circles
- Use coordinates to prove simple geometric theorems algebraically
- Explain volume formulas and use them to solve problems
- Visualize relationships between two-dimensional and three-dimensional objects
- Apply geometric concepts in modeling situations

**Calculator**

Hanover High School students enrolled in Algebra 1, Algebra 2, Precalculus, Calculus, or Statistics should purchase a graphing calculator, preferably a TI-84 Plus or TI-84 Color. A scientific calculator will suffice in Geometry. It is important for students to gain familiarity with their own calculator in order to use it as a tool during class and for homework. Furthermore, students are expected to use calculators on standardized assessments, including MCAS, PSAT, SAT, and AP, as well as college placement exams. Many of the questions on these assessments are designed in such a way that students are expected to use a graphing calculator. Although there are graphing calculator apps that can be downloaded and used on mobile devices, keep in mind that mobile devices are not allowed on the MCAS, PSAT, SAT, and AP exams. Therefore, it is important that students have access to and learn to use an assessment-approved graphing calculator. There is a limited number of graphing calculators that can be borrowed on a first come first serve basis – please contact the office for information.

**Geometry – Calculator Skills**

- Perform operations with fractions and exponents
- Convert between decimals and fractions
- Use trigonometric functions to solve triangles
- Use inverse trigonometric functions to solve triangles



**Content Standards**

**Number and Quantity**

*Quantities*

- A. Reason quantitatively and use units to solve problems.

**Geometry**

*Congruence*

- A. Experiment with transformations in the plane.
- B. Understand congruence in terms of rigid motions.
- C. Prove geometric theorems and, when appropriate, the converse of theorems.
- D. Make geometric constructions.

*Similarity, Right Triangles, and Trigonometry*

- A. Understand similarity in terms of transformations.
- B. Prove theorems involving similarity.
- C. Define trigonometric ratios and solve problems involving right triangles.
- D. Apply trigonometry to general triangles.

*Circles*

- A. Understand and apply theorems about circles.
- B. Find arc lengths and area of sectors of circles.

*Expressing Geometric Properties with Equations*

- A. Translate between the geometric description and the equation for a conic section.
- B. Use coordinates to prove simple geometric theorems algebraically.

*Geometric Measurement and Dimension*

- A. Explain volume formulas and use them to solve problems.
- B. Visualize relationships between two-dimensional and three-dimensional objects.

*Modeling with Geometry*

- A. Apply geometric concepts in modeling situations.

**Statistics and Probability**

*Conditional Probability and the Rules of Probability*

- A. Understand independence and conditional probability and use them to interpret data from simulations or experiments.
- B. Use the rules of probability to compute probabilities of compound events in a uniform probability model.



**Subject: Geometry**

Units	Content
<b>Unit 1 - Tools for Geometry</b>  Term 1 September	<ul style="list-style-type: none"> <li>▪ Patterns and inductive reasoning - modeling activity</li> <li>▪ Points, lines and planes</li> <li>▪ Segments, rays and parallel planes</li> <li>▪ Segment addition (Algebra 1 - equations)</li> <li>▪ Angles and angle pairs - definition and measurement</li> <li>▪ Angle addition and subtraction</li> </ul>
<b>Unit 2 - Proving Geometric Theorems with Lines and Angles</b>  Term 1 October	<ul style="list-style-type: none"> <li>▪ Proving angles congruent and finding measurement of angles algebraically</li> <li>▪ Parallel lines cut by a transversal</li> <li>▪ Proving lines parallel</li> <li>▪ Triangle angle-sum theorem, exterior angles of a triangle theorem</li> <li>▪ Distance and midpoint</li> <li>▪ Lines in the coordinate plane</li> <li>▪ Parallel and perpendicular lines</li> </ul>
<b>Unit 3 - Congruence through Transformations</b>  Term 1 and Term 2 November	<ul style="list-style-type: none"> <li>▪ Translations</li> <li>▪ Reflection and line symmetry</li> <li>▪ Rotations and rotational/ Point symmetry</li> <li>▪ Dilations</li> <li>▪ Compositions of Transformations</li> </ul>
<b>Unit 4 - Proving Geometric Theorems with Triangles</b>  Term 2 December	<ul style="list-style-type: none"> <li>▪ Congruence based on rigid motions and classifying triangles</li> <li>▪ Triangle congruence: SSS, SAS, ASA, AAS</li> <li>▪ Triangle congruence in right triangles: HL theorem</li> <li>▪ Isosceles and equilateral triangle proofs</li> <li>▪ Corresponding parts of congruent triangle (CPCTC) proofs, angle and segment addition and subtraction with overlapping triangles</li> </ul>
<b>Unit 5 - Relationships with Triangles</b>  Term 2 December	<ul style="list-style-type: none"> <li>▪ Midsegments of triangles (proofs)</li> <li>▪ Bisectors of triangles - examples on coordinate plane</li> <li>▪ Medians and centroids - patty paper activity</li> <li>▪ Triangle inequality and angle comparison theorems</li> </ul>
<b>Unit 6 - Proving Geometric Theorems with Quadrilaterals</b>  Term 2 January	<ul style="list-style-type: none"> <li>▪ Classifying polygons</li> <li>▪ Interior and exterior polygon angle sums - polygon lab</li> <li>▪ Classifying quadrilaterals</li> <li>▪ Properties of parallelograms</li> <li>▪ Proving a quadrilateral is a parallelogram</li> <li>▪ Proving special parallelograms: Rhombi and rectangles</li> <li>▪ Trapezoids and Kites</li> </ul>



Units	Content
<b>Unit 7 - Similarity</b>  Term 3 February	<ul style="list-style-type: none"> <li>▪ Ratios and proportions</li> <li>▪ Similar polygons</li> <li>▪ Proving triangles similar</li> <li>▪ Similarity in right triangles</li> <li>▪ Proportions in similar triangles</li> </ul>
<b>Unit 8 - Right triangles</b>  Term 3 March	<ul style="list-style-type: none"> <li>▪ The Pythagorean Theorem and its converse - prove using distance formula</li> <li>▪ Equation of a circle on a graph</li> <li>▪ Special right triangles</li> <li>▪ Trigonometric ratios</li> <li>▪ Using trigonometry to find missing sides and angles including applications</li> </ul>
<b>Unit 9 - Area and Introduction to Circles</b>  Term 3 March	<ul style="list-style-type: none"> <li>▪ Areas of triangles, parallelograms, trapezoids, rhombi and kites (use graph)</li> <li>▪ Area of regular polygons</li> <li>▪ Circles: The basics</li> <li>▪ Areas of circles and sectors</li> </ul>
<b>Unit 10 - Volume and Surface Area of 3D Solids</b>  Term 4 April	<ul style="list-style-type: none"> <li>▪ Space figures and cross sections</li> <li>▪ Volume and surface area of prisms and cylinders</li> <li>▪ Volume and surface area of pyramids and cones</li> <li>▪ Volume and surface area of spheres</li> <li>▪ Area and volume of similar solids</li> </ul>
<b>Unit 11 - Circles</b>  Term 4 May	<ul style="list-style-type: none"> <li>▪ Tangent lines</li> <li>▪ Chords and arcs</li> <li>▪ Inscribed angles</li> <li>▪ Angle measures and segment lengths</li> </ul>
<b>Unit 12 - Probability</b>  Term 4 June	<ul style="list-style-type: none"> <li>▪ Simple probability</li> <li>▪ Multiple probabilities - consecutive events</li> <li>▪ Adding probabilities one event with multiple favorable outcomes</li> <li>▪ Conditional probability</li> </ul>
<b>Unit 13 - Constructions</b>  Term 4 June	<ul style="list-style-type: none"> <li>▪ Basic constructions</li> <li>▪ Constructing parallel and perpendicular lines</li> <li>▪ Constructing polygons</li> </ul>