

The mission of Hermon High School is to prepare students for personal success in college, career, and community.

Honors Geometry

Instructor(s):

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This college preparatory course covers plane and solid geometry with a focus on proof and analytical methods. Basic geometric terms are studied, along with theorems and their applications. Individual topics covered include (but are not limited to): lines, segments, angles, triangle congruence, circles, properties of quadrilaterals, proportion and similarity, and an introduction to right-triangle trigonometry and conic sections.

2 Semesters/1 Credit

Graduation Standards: (the number of the standard is referenced in the performance indicators listed in each unit.)

HS.M.1A Applies properties of real numbers and quantitative reasoning.

HS.M.2.A Solves polynomial, rational, radical, and transcendental equations & systems of equations.

HS.M.2B Understands and analyzes polynomial, rational, radical, and transcendental functions.

HS.M.3.A Applies properties of similarity and congruence.

HS.M.3B Analyzes features of 2-D and 3-D shapes.

Unit 1	Basic Definitions		
Summary	In this unit, students will be introduced to points, lines, and angles. Accuracy of measurement will be explored, and the concept of congruence will be introduced.		
Performance Indicators Assessed in Unit	AR.A.7 Create equations and/or inequalities that describe numbers or relationships. ★ AR.A.8 Understand solving equations as a process of reasoning and explain the reasoning. GR.A.3 Prove geometric theorems and when appropriate, the converse of theorems. <i>Supporting</i> QR.A.3 Reason quantitatively and use units to solve problems.		
Understandings:		Students will know...	Students will be able to...
<ul style="list-style-type: none">Algebraic equations can be used to model geometric representations.Congruence can be translated to equivalence.Formulas are created to assist in similar types of questions		<ul style="list-style-type: none">How to name a point, line, line segment, ray and plane.How to create and solve an equation using the segment addition postulate.	<ul style="list-style-type: none">Make sense of problems and persevere in solving themAttend to precision

<p>and representations.</p> <ul style="list-style-type: none"> • The differences between geometric terms. 	<ul style="list-style-type: none"> • Find the midpoint of a line using the formula • Find the distance between two points using a formula • Create and solve equations involving basic geometric relationships. • Identify, create and illustrate angles • Use the definition of a bisector to solve problems • Use geometric shapes, their measures, and their properties to describe objects • Proper naming conventions for geometric models 	
Unit 2	Proofs, Parallel Lines, and Transversals	
Summary	Students are introduced to the proof process, starting with content they are familiar with and slowly working toward material involving segment and angle addition. Students will also be able to identify different angle relationships created by parallel lines and a transversal.	
Performance Indicators Assessed in Unit	<p>AR.A.7 Create equations and/or inequalities that describe numbers or relationships.</p> <p>★</p> <p>AR.A.8 Understand solving equations as a process of reasoning and explain the reasoning.</p> <p>GR.A.6 Prove theorems involving similarity using a variety of ways of writing proofs, showing validity of underlying reasoning.</p> <p><i>Supporting</i></p> <p>QR.A.3 Reason quantitatively and use units to solve problems.</p>	
Understandings:	Students will know...	Students will be able to...
<ul style="list-style-type: none"> • Proofs definitively show that a given statement is a fact. • Parallel lines create unique angle pair relationships • Algebra can be used to find angle measures 	<ul style="list-style-type: none"> • How to write a two-column proof • How to identify all angles that occur by parallel lines and a transversal 	<ul style="list-style-type: none"> • Reason abstractly and quantitatively • Make sense of problems and persevere in solving them • Look for and make use

		<ul style="list-style-type: none"> How to use angle relationships from parallel lines to solve for given variables and calculate angle measures How to identify parallel planes, intersecting planes, skew lines and intersecting lines. 	<ul style="list-style-type: none"> of structure Model with mathematics Attend to precision
Unit 3	Triangles		
Summary	Students will learn how to use triangles and their properties to model and analyze real-world situations. They will also learn about relationships in and among triangles, including congruence, similarity, and trigonometry.		
Performance Indicators Assessed in Unit	<p>AR.A.7 Create equations and/or inequalities that describe numbers or relationships. ★</p> <p>GR.A.2 Understand congruence in terms of rigid motions.</p> <p>GR.A.3 Prove geometric theorems and when appropriate, the converse of theorems.</p> <p>GR.A.5 Understand similarity in terms of similarity transformations.</p> <p>GR.A.6 Prove theorems involving similarity using a variety of ways of writing proofs, showing validity of underlying reasoning.</p> <p>GR.A.7 Define trigonometric ratios and solve problems involving right triangles.</p> <p><i>Supporting</i></p> <p>QR.A.3 Reason quantitatively and use units to solve problems.</p>		
Understandings:		Students will know...	Students will be able to...
<ul style="list-style-type: none"> Triangles are the basis for all other polygons, so understanding their properties will help to understand all other Geometry concepts There are multiple ways to prove triangles are congruent to each other There are minimum requirements for proving that triangles must be congruent Triangles and trigonometry have common applications in the real world 		<ul style="list-style-type: none"> How to classify triangles How to apply the triangle sum theorem, exterior angle theorem Methods to determine congruence. How to apply the properties of isosceles and equilateral triangles. How to apply triangle inequality theorem, inequalities in triangles, special segments of triangles. How to use ratios and proportions to solve 	<ul style="list-style-type: none"> Make sense of problems and persevere in solving them Model with mathematics Attend to precision Look for and make use of structure Look for and express regularity in repeated reasoning

		problems. • Identify similar polygons. • Method to determine similarity. • Prove that triangles are similar. • Use similar triangles to solve problems. • Prove triangles congruent. • Solve problems using the Pythagorean Theorem and its converse. • How to solve special right triangles. • Use right triangle trig to solve triangles. • How to solve problems of elevation and depression.	
Unit 4	Quadrilaterals and Circles		
Summary	In this unit students focus on quadrilaterals and circles. They learn the properties of various quadrilaterals and circles. They also learn about inscribed and circumscribed polygons, tangents, angle and arc measures, and chords.		
Performance Indicators Assessed in Unit	AR.A.7 Create equations and/or inequalities that describe numbers or relationships. ★ GR.A.3 Prove geometric theorems and when appropriate, the converse of theorems. GR.A.9 Understand and apply theorems about circles. GR.A.10 Find arc lengths and areas of sectors of circles. GR.A.11 Translate between the geometric description and the equation for a conic section. <i>Supporting</i> QR.A.3 Reason quantitatively and use units to solve problems.		
Understandings:		Students will know...	Students will be able to...
• There is a relationship between the number of sides of a polygon and the sum of its interior angles. • There are several different		• Find the sum of the measures of interior and exterior angles of a polygon. • Recognize and apply	• Look for and make use of structure. • Construct viable arguments and critique the reasoning of others.

<p>geometric shapes that are examples of quadrilaterals. Each of these shapes have individual characteristics that make it unique.</p> <ul style="list-style-type: none"> • When combining the use of quadrilaterals and circles there are many shared properties. • There is a specific relationship between the properties of a circle, and a circle on a coordinate plane. • A circle is a unique geometric shape in which the angles, arcs, and segments intersecting that circle have special relationships. 	<p>properties of the sides and angles of parallelograms, and the diagonals of parallelograms.</p> <ul style="list-style-type: none"> • Recognize the conditions that ensure a quadrilateral is a parallelogram. Prove that a set of points forms a parallelogram in the coordinate plane. • Recognize and apply properties of rectangles. Determine whether parallelograms are rectangles. • Recognize and apply the properties of rhombi and squares. • Recognize and apply the properties of trapezoids. Solve problems involving the medians of trapezoids. • Identify and use parts of circles. Solve problems involving the circumference of a circle. Prove all circles are similar. • Recognize major arcs, minor arcs, semicircles, and central angles and their measures. Find arc length. • Recognize and use relationships between arcs and chords, and chords and diameters. Derive the formula for the area of a sector. • Write the equation of a circle. Graph a circle on the coordinate plane. 	<ul style="list-style-type: none"> • Reason abstractly and quantitatively • Model with mathematics
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Unit 5		Area, Surface Area, and Volume	
Summary	Students will be utilizing formulas to find area, surface area, and volume of polygons, circles, and 3-dimensional objects.		
Performance Indicators Assessed in Unit	GR.A.13 Explain volume formulas and use them to solve problems. GR.A.14 Visualize relationships between two-dimensional and three-dimensional objects. AR.A.7 Create equations and/or inequalities that describe numbers or relationships. ★ AR.A.8 Understand solving equations as a process of reasoning and explain the reasoning. <i>Supporting</i> QR.A.3 Reason quantitatively and use units to solve problems. AR.A.1 Interpret the structure of expressions.		
Understandings:		Students will know...	Students will be able to...
<ul style="list-style-type: none">● Volume of 3D figures is related to the area of 2D figures.● Finding surface area and volume is a process rather than simply an equation		<ul style="list-style-type: none">● Perimeter and area of triangles and parallelograms● Area of trapezoids, rhombi, circles, regular polygons and irregular figures	<ul style="list-style-type: none">● Make sense of problems and persevere in solving them● Reason abstractly and quantitatively● Model with mathematics
Unit 6		Factoring	
Summary	This unit will review the essential skills of Algebra 1 that are needed in Algebra 2. Topics include: solving linear equations, writing and graphing linear equations, and factoring.		
Performance Indicators Assessed in Unit	AR.A.2 Write expressions in equivalent forms to reveal information and to solve problems. ★ AR.A.3 Perform arithmetic operations on polynomials. AR.A.4 Understand the relationship between zeros and factors of polynomials. AR.A.9 Solve equations and inequalities in one variable. AR.A.16 Build new functions from existing functions. <i>Supporting</i> QR.A.3 Reason quantitatively and use units to solve problems. AR.A.1 Interpret the structure of expressions.		
Understandings:		Students will know...	Students will be able to...

<ul style="list-style-type: none"> FOIL is a mnemonic device used to assist with the distributive property of binomials Factoring a polynomials is simply the reverse of the distributive property When a quadratic is equal to zero there are often multiple solutions 	<ul style="list-style-type: none"> How to multiply binomials and polynomials How to factor polynomials by grouping How to factor trinomials in quadratic form 	<ul style="list-style-type: none"> Make sense of problems and persevere in solving them Model with mathematics Look for and make use of structure Look for and express regularity in repeated reasoning
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Summative Assessments/Retake

- Summative assessments will count as 70% of the grade.
- Students have the opportunity to retake summative assessments.
- The student must submit a retake form to the teacher within five (5) school days of the date that the summative assessment score is reported to the student.
- The highest score a student can receive on a retake or late assessment is a 75.
- The score achieved on a retake will replace the current score (even if the score is lower).
- If a student is making up a test from an absence, that assessment will be graded up to 100.

Make-up Work

Upon their return to school from an absence, it is the student's responsibility to secure make-up work from their teacher. The due date of the missed work will be one additional class period for each day of absence from that class or at the discretion of the teacher.

Grading of Formative Assessments

- Formative assessments will count as 30% of the grade.
- Formative assessments may be scored on either a 0-100 scale or a 0-4 scale.
- The 0-4 scale will be represented in Power School as 4=100, 3=87, 2=77, and 1=67.
- The method of scoring of formative assessments will be determined by assignment.

Finals / Midterms

An end of course Final Exam will be conducted, making up 10% of the students overall grade.