Hamburg Area School District

Course Guide

Name:	Honors Plane Geometry(1275)
Grade(s):	*10-11*
Length:	*Place an X next to the correct option*
X	Full-Year (180 Sessions)
	Semester (90 Sessions)
	Quarter (45 Sessions)
	Other (Specify):
Text:	Geometry. Larson, Boswell, Kanold, Stiff, McDougal Littell Publishers, 2007.
Approved on:	2015 (Reviewed 2021-2022)

Description:

This course is designed for those students who plan to proceed through the advanced curriculum in order to take AP Calculus in their senior year. Great emphasis is placed on the application of theorems, postulates and corollaries in geometric proofs involving triangles, quadrilaterals, and circles. In addition, special attention is devoted to area, volume, circumference, and the study of right triangles in preparation for trigonometry.

Honors Plane Geometry

Unit: Points, Lines, Planes, and Angles
Unit Length: *3.5 weeks*

ESSENTIAL QUESTION- ESSENTIAL CONTENT	PERFORMANCE OBJECTIVES	STANDARDS/ ANCHORS
Concept of equidistant, point, and line	Understand the term equidistant. Use the terms point and line and draw representations of each.	2.9.5.A
Points, lines, and planes	Use the undefined terms point, line, and plane and draw representations of each. Use the terms collinear, coplanar, and intersection.	2.9.5.A 2.9.8.A
Segments, rays, and distance	Use symbols for lines, rays, segments, and distances. Calculate distance using absolute value. State and use the Segment Addition Postulate. Understand the concept of congruence.	2.9.11 M1.C.3.1.1 2.9.8.F
Angles	Name angles and find their measures. Differentiate between types of angles. State and use the Angle Addition Postulate. Recognize what can be concluded from a diagram.	M11.B.2.1.1 2.9.11 2.4.11.B
Postulates theorems relating points, lines, and planes	Memorize the postulates and theorems relating points, lines, and planes. Apply postulate or theorem based on given information.	2.9.11 2.4.11.A

Honors Plane Geometry

Unit: Deductive Reasoning
Unit Length: *5 weeks*

ESSENTIAL QUESTION- ESSENTIAL CONTENT	PERFORMANCE OBJECTIVES	STANDARDS/ ANCHORS
Inductive and deductive reasoning	Distinguish between inductive and deductive reasoning. Use given information to state conclusions based on deductive reasoning. Determine whether a statement is true or false by drawing diagrams. Provide counterexamples to show that a statement is false.	M11.E.1.1.1 M11.E.1.1.2 2.4.11.A 2.4.11.C 2.4.11
Properties from algebra	Recognize and apply properties of equality and congruence. Supply reasons for statements in an algebraic proof. Write proofs containing the Segment Addition and Angle Addition Postulates.	2.8.11 2.4.11.A
Proving theorems	Use the Midpoint Theorem and Angle Bisector Theorem. Recognize the types of reasons that may be used in a proof.	2.9.11 2.4.11.A
Special pairs of angles	Apply the definitions of complementary and supplementary angles. Apply the theorem about vertical angles. Solve application problems.	2.9.8.B M11.D.2.1.3
Perpendicular lines	Apply the definition and theorems about perpendicular lines. Make conclusions based on a diagram. State and apply the theorems about angles supplementary to, or complementary to, congruent angles.	2.4.11.A 2.9.11 2.9.8.B
Planning a proof	Review the five parts of a proof. Plan proofs and then write them in two-column form.	2.4.11.A 2.4.11

	Justify a statement using a definition, theorem or postulate from memory.	

Honors Plane Geometry

Unit: Parallel Lines and Planes
Unit Length: *5 Weeks*

ESSENTIAL QUESTION- ESSENTIAL CONTENT	PERFORMANCE OBJECTIVES	STANDARDS/ ANCHORS
Definitions for parallel lines and planes	Distinguish between intersecting lines, parallel lines, and skew lines. Understand the relationship between two parallel planes that are cut by a third plane. Identify corresponding, alternate interior, and same-side interior angles. Draw diagrams based on given information.	2.9.8.E 2.9.11 2.9.8.A
Properties of parallel lines	Apply the theorems about parallel lines being cut by a transversal (corresponding, alternate interior, and same-side interior angles). Apply the theorem about parallel lines being cut perpendicularly. Write proofs involving parallel and perpendicular lines.	2.9.8.E 2.4.11.A
Proving lines parallel	Demonstrate the five ways that can be used to prove that two lines are parallel. Prove that lines in a given diagram are parallel.	2.4.11.A 2.9.8.E
Angles of a triangle	Classify triangles according to sides and angles. Understand the relationships about the sum of the measures of the angles of a triangle. Relate the measure of an exterior angle of triangle to the sum of the measures of the remote interior angles. Solve for the lengths of the sides of an isosceles or equilateral triangle. Write proofs involving triangles.	M11.C.1.2.1 M11.C.1.2.3 2.4.11.A
Angles of a polygon	Recognize and name convex polygons and regular polygons. Find the measures of interior and exterior angles of convex polygons. Solve application problems.	M11.C.1.3.1

Honors Plane Geometry

Unit: Congruent Triangles
Unit Length: *5 weeks*

ESSENTIAL QUESTION- ESSENTIAL CONTENT	PERFORMANCE OBJECTIVES	STANDARDS/ ANCHORS
Congruent figures	Identify the corresponding parts of congruent figures. Plot given points on graph paper and find other locations that form congruent triangles. Locate corresponding parts of congruent figures.	M11.C.1.2.1
Proving triangles congruent with SSS, SAS, and ASA postulates	Prove two triangles congruent by using the SSS, ASA, and SAS postulates. Write a complete proof, with an original diagram, based on given information regarding triangles, perpendicularity, and polygons.	M11.C.1.2.1
Using congruent triangles	Deduce information about segments and angles after proving that two triangles are congruent. Decide on an appropriate order for the statements of a given proof. Write proofs using corresponding parts of congruent triangles.	M11.C.1.2.1 2.4.11.A
Isosceles triangles	Apply the Isosceles Triangle Theorem and its converse.	M11.C.1.2.1 M11.C.1.2.3
Proving triangles congruent with the AAS and HL theorems	Prove two triangles congruent by using the AAS and HL theorems. Prove that two overlapping triangles are congruent. Recognize the LL, HA, and LA methods of proving triangles congruent.	M11.C.1.2.1 2.4.11.A
Using more than one pair of congruent triangles	Prove two triangles congruent by first proving that two other triangles are congruent. Write the key steps of a proof. Become familiar with a paragraph proof.	M11.C.1.2.1 2.4.11.A
Medians, altitudes, and	Apply the definitions of the median and altitude of a	M11.C.1.2.1

perpendicular bisectors	triangle and the perpendicular bisector of a segment. Distinguish between the altitudes of right, acute, and obtuse triangles. Draw medians, altitudes, and perpendicular bisectors. State and apply the theorem about a point on the perpendicular bisector of a segment, and its converse. State and apply the theorem about a point on the bisector of an angle and its converse. Explore the idea of concurrency with medians, altitudes, and perpendicular bisectors.	

Honors Plane Geometry

Unit: Quadrilaterals
Unit Length: *5 weeks*

ESSENTIAL QUESTION- ESSENTIAL CONTENT	PERFORMANCE OBJECTIVES	STANDARDS/ ANCHORS
Properties of parallelograms	Apply the definition of a parallelogram. Discover and apply the properties of parallelograms. Write proofs involving parallelograms and congruent triangles.	M11.C.1.2.2 2.4.11.A
Proving that quadrilaterals are parallelograms	State and use the five ways (based on sides, angles, and diagonals) to prove that certain quadrilaterals are parallelograms. Write and solve a system of equations demonstrating the relationship between the angles formed by the diagonals of a parallelogram.	M11.C.1.2.2 M11.D.2.1.4
Theorems involving parallel lines	Apply the theorems about equidistance in parallel lines and congruent segments on transversals. Apply the midpoint theorems for triangles. Write proofs involving midpoints of the sides of triangles and parallel lines.	2.9.11 M11.C.1.2.1 M11.C.1.2.2 2.4.11.A
Special parallelograms	Discover the definitions of rectangles, rhombuses, and squares. Explore the special properties of rectangles, rhombuses, and squares. Ascertain when a parallelogram is a rectangle, rhombus, or square.	M11.C.1.2.2
Trapezoids	Utilize and identify the definitions and properties of trapezoids and isosceles trapezoids.	M11.C.1.2.2

Honors Plane Geometry

Unit: Ratio, Proportion, and Similarity
Unit Length: 3.*5 weeks*

ESSENTIAL QUESTION- ESSENTIAL CONTENT	PERFORMANCE OBJECTIVES	STANDARDS/ ANCHORS
Ratio and proportion	Express a ratio in simplest form. Solve for an unknown term in a given proportion. Express a given proportion in an equivalent form. Use proportions to solve application problems.	M11.A.2.1.1 M11.A.2.2.1 M11.A.2.2.2 M11.A.2.1.3 M11.A.2.1.2
Similar polygons	Discuss the concept of similarity. Understand the idea of “drawn to scale”. State and apply the properties of similar polygons (congruent angles and proportional sides).	M11.A.2.1.3 M11.C.1.3.1 M11.C.1.2.1 M11.C.1.2.3
Similar triangles	Identify similar triangles using the AA, SAS, and SSS Similarity Postulate/Theorems. Prove that triangles are similar using AA, SAS, and SSS, the Means-Extremes Property, and properties of proportions.	M11.A.2.1.3 M11.C.1.2.1 M11.C.1.2.3 2.4.11.A
Proportional lengths in triangles	State and apply the Triangle Proportionality Theorem and the Triangle Angle-Bisector Theorem. Solve application problems using the above theorems.	M11.A.2.1.3 M11.C.1.2.1 M11.C.1.2.3 M11.A.2.1.2

Honors Plane Geometry

Unit: Right Triangles
Unit Length: *4 weeks*

ESSENTIAL QUESTION- ESSENTIAL CONTENT	PERFORMANCE OBJECTIVES	STANDARDS/ ANCHORS
Right triangle similarity	Determine the geometric mean between two numbers. Memorize and utilize the relationships that exist when the altitude is drawn to the hypotenuse of a right triangle.	M11.A.1.1.1 M11.C.1.2.1 M11.C.1.3.1
Pythagorean Theorem	Explore the use of the Pythagorean Theorem, its converse, and related theorems about acute and obtuse triangles. Recognize the conditions necessary to form a triangle. Sketch a diagram according to specifications and use the converse of the Pythagorean Theorem to make conjectures.	M11.C.1.2.1 M11.C.1.4.1
Special right triangles	Recognize the rations of the lengths of the sides of 45°-45°-90° and 30°-60°-90° triangles. Calculate the lengths of two sides of a special right triangle given the length of the third side. Apply the special ratios to solve application problems.	

Honors Plane Geometry

Unit: Circles
Unit Length: *3.5 weeks*

ESSENTIAL QUESTION- ESSENTIAL CONTENT	PERFORMANCE OBJECTIVES	STANDARDS/ ANCHORS
Basic terms	Define and identify the terms center, radius, diameter, chord, tangent, point of tangency, sphere, concentric, inscribed, and circumscribed. Draw a circle with given specification. Recognize inscribed polygons and circumscribed circles.	M11.C.1.1 M11.C.1.1.1 2.9.11.E
Tangents	Apply theorems that relate tangents and radii. Recognize circumscribed polygons and inscribed circles. Discover a theorem about two lines tangent to a circle at the endpoints of a diameter.	M11.C.1.1.1 Arcs and central angles
Arcs and central angles	Define and apply properties of arcs and central angles.	M11.C.1.1.1 M11.C.1.1.2
Arcs and chords	Use relationships of arcs and chords in a circle.	M11.C.1.1.1 M11.C.1.1.2
Inscribed angles	Solve problems and prove statements involving inscribed angles. Solve problems and prove statements involving angles formed by chords, secants, and tangents.	M11.C.1.1.2 2.4.11.A M11.C.1.1.1 2.4.11.A
Angles that intercept arcs	Solve problems and prove statements involving angles formed by chords, secants, and tangents.	M11.C.1.1.1 M11.C.1.1.2 2.4.11.A
Circles and lengths of segments	Solve problems involving lengths of chords, secant segments, and tangent segments.	M11.C.1.1.1 M11.C.1.1.2

Honors Plane Geometry

Unit: Areas of Plane Figures
Unit Length: *3 weeks*

ESSENTIAL QUESTION- ESSENTIAL CONTENT	PERFORMANCE OBJECTIVES	STANDARDS/ ANCHORS
Area of rectangle	Understand the concept of area and the postulates for area. Find the area of rectangles and polygons that can be broken into rectangles. Solve application problems involving area.	M11.B.2.2 M11.B.2.2.1 M11.B.2.2.3 M11.B.2.2.4
Area of triangles	Know and use the formulas for the areas of parallelograms and triangles.	M11.B.2.2.2
Areas of regular polygons	Understand the relationship between circles and polygons.	2.9.11.E M11.B.2.2.2
Circumference and area of circles	Use the formulas for circumference and area of a circle. Solve application problems using circumference and area.	M11.B.2.3.1 M11.B.2.2.4