

Introduction to Geometry

	Unit Name	Content	Skills	Essential Questions
September	Essentials of Geometry (9 days)	<ul style="list-style-type: none"> Undefined terms 	<ul style="list-style-type: none"> Students will describe various undefined terms such as point, line, and plane. 	How do points, lines and planes relate to describe our world?
		<ul style="list-style-type: none"> The Real Numbers and Their Properties 	<ul style="list-style-type: none"> Identify and apply various properties such as closure, associative, commutative, identity, distributive, inverse, and property of zero. 	
		<ul style="list-style-type: none"> Definitions, Lines, and Line Segments 	<ul style="list-style-type: none"> Define various geometric relationships such as collinear points, segments, and lines. Define and apply the principal of betweenness 	
		<ul style="list-style-type: none"> Midpoints and Bisectors 	<ul style="list-style-type: none"> Define terms midpoint and bisector. Draw and label diagrams using given information and apply concepts of midpoint and bisector to discover unknown values. 	
		<ul style="list-style-type: none"> Rays and Angles 	<ul style="list-style-type: none"> Define ray, opposite rays, and angle Classify various types of angles 	

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September	Essentials of Geometry (Continued)	<ul style="list-style-type: none"> • More Angle Definitions 	<ul style="list-style-type: none"> • Define terms such as congruent angles, bisector of an angle, perpendicular lines, and distance from a point to a line. • Add and subtract angles 	
		<ul style="list-style-type: none"> • Triangles 	<ul style="list-style-type: none"> • Define the terms polygon, and triangle. • Classify triangles according to sides and angles. • Recognize angle and side relationships of various triangles. • Display and relate information using diagrams. 	
September	Congruence of Line Segments, Angles, and Triangles	<ul style="list-style-type: none"> • Postulates of Lines, Line Segments, and Angles (algebra only) 	<ul style="list-style-type: none"> • Apply definitions to write equations and discover angle measures. 	
		<ul style="list-style-type: none"> • Using Postulates and Definitions in Proofs (algebra only) 	<ul style="list-style-type: none"> • Identify types of angles from a given measure. • Apply definitions to write equations and discover segment and angle measures. 	<ul style="list-style-type: none"> • How do you identify whether an angle is acute, right, obtuse, or straight?

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		<ul style="list-style-type: none"> Proving Theorems about angles (algebra only) 	<ul style="list-style-type: none"> Identify pairs of angles using definitions. Identify pairs of angles using theorems. Write equations using information from a diagram, and solve for unknown. Apply definitions and theorems to write and solve equations from word problems. 	
October	Congruence Based on Triangles	<ul style="list-style-type: none"> Line Segments associated with Triangles 	<ul style="list-style-type: none"> Construct altitude, median, bisector, and triangles using tools of geometry. 	<ul style="list-style-type: none"> How are triangles used in the construction industry?
		<ul style="list-style-type: none"> Isosceles and Equilateral Triangles 	<ul style="list-style-type: none"> Apply definitions to write equations and solve for sides and angles. 	
		<ul style="list-style-type: none"> Basic Constructions 	<ul style="list-style-type: none"> Demonstrate the use of a compass and straightedge. Construct a line segment congruent to a given line segment Construct an angle congruent to a given 	

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			<p>angle</p> <ul style="list-style-type: none"> • Construct the perpendicular bisector of a given line segment and the midpoint of a given line segment. • Bisect a given angle. • Construct a line perpendicular to a given line through a given point on the line. • Construct a line perpendicular to a given line through a point not on the given line. 	
October	Transformations and The Coordinate Plane	<ul style="list-style-type: none"> • The Coordinates of a Point in a Plane 	<ul style="list-style-type: none"> • Graph points in the coordinate plane. • Apply formulas of various polygons. 	What is the relationship between the original figure and its image?
		<ul style="list-style-type: none"> • Line Reflections 	<ul style="list-style-type: none"> • Recognize length, angle measure and midpoint are preserved under line reflection. • Write a justification as to why figures remain congruent. • Draw lines of symmetry on a given figure 	When does a figure have line symmetry?
		<ul style="list-style-type: none"> • Line Reflections in 	<ul style="list-style-type: none"> • Graph points in the 	

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		<p>the Coordinate Plane</p> <ul style="list-style-type: none"> Point Reflections in the Coordinate Plane 	<p>coordinate plane</p> <ul style="list-style-type: none"> Identify and plot the coordinates of the image of points under a line reflection. Graph points in the coordinate plane Recognize length, angle measure, and midpoint is preserved under point reflection. Identify and plot coordinates of the image of points under a point reflection. 	
October	Transformation in the Coordinate Plane (continued)	<ul style="list-style-type: none"> Translations in the Coordinate Plane 	<ul style="list-style-type: none"> Graph points in the coordinate plane. Recognize length, angle measure, and midpoint are preserved under translation. Identify and plot coordinates of the image of points under a translation. 	
		<ul style="list-style-type: none"> Rotations in the Coordinate Plane 	<ul style="list-style-type: none"> Discover if a figure has rotational symmetry. Graph points in the coordinate plane. Recognize length, angle measure, and midpoint are preserved under a rotation. Memorize the laws for 	

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		<ul style="list-style-type: none"> • Glide Reflection 	<p>rotation about the origin.</p> <ul style="list-style-type: none"> • Identify and plot coordinates of the image of points under a rotation. • Graph points in the coordinate plane. • Recognize length, angle measure, and midpoint are preserved under a glide reflection. • Identify and plot the coordinates of the image of points under a glide reflection. 	<p>What is a glide reflection?</p>
<p>October</p>	<p>Transformation in the Coordinate Plane (Continued)</p>	<ul style="list-style-type: none"> • Dilations in the Coordinate Plane 	<ul style="list-style-type: none"> • Recognize a glide reflection as a composition of Graph points in the coordinate plane. • Recognize angle measure and midpoint are preserved under dilation. • Recognized length is not preserved under dilation. • Identify and plot the coordinates of the image of points under a dilation. 	

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November		<ul style="list-style-type: none"> • Transformations as Functions 	<ul style="list-style-type: none"> • Define isometry, direct isometry, and opposite isometry. • Recognize and apply the notation for compositions. • Graph points in the coordinate plane. • Identify and plot the coordinates of the image of points under a composition of transformations 	What are the similarities and differences between direct and opposite isometries
	Geometric Inequalities	<ul style="list-style-type: none"> • An Inequality Involving the Lengths of the Sides of a Triangle 	<ul style="list-style-type: none"> • State and apply the Triangle Inequality Theorem. • Determine either the longest side of a triangle given the three angle measures or the largest angle given the lengths of three sides of a triangle. 	
November	Geometric Inequalities (continued)	<ul style="list-style-type: none"> • Inequalities Involving Sides and Angles of a Triangle 	<ul style="list-style-type: none"> • State and apply theorems involving the relationships regarding triangles with unequal sides and angles. 	
	Slopes and Equations of Lines	<ul style="list-style-type: none"> • The Slope of a Line 	<ul style="list-style-type: none"> • State and apply the procedure for finding the slope of a line. • Identify lines that have positive, negative, zero, 	

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			<p>and undefined slope.</p> <ul style="list-style-type: none"> Plot points and draw lines, then determine their slopes. 	
		<ul style="list-style-type: none"> The Equation of a Line 	<ul style="list-style-type: none"> Find the x and y intercepts of a line. State and apply the postulate: any two line segments that lie on the same line have equal slopes. State and apply the procedure for finding the equation of a line given two points on the line. 	
November		<ul style="list-style-type: none"> Midpoint of a Line Segment 	<ul style="list-style-type: none"> Find the midpoint of a line segment, given its endpoints. State and apply the Midpoint Formula. 	

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<p style="writing-mode: vertical-rl; transform: rotate(180deg);">December</p>	<p>Slopes and Equations of Lines (continued)</p>	<ul style="list-style-type: none"> • The Slopes of Perpendicular Lines 	<ul style="list-style-type: none"> • Determine whether two lines are perpendicular given their equations. • Find the slope of a perpendicular line, given the equation of a line. • Find the equation of a line, given a point on the line and the equation of a line perpendicular to the given line. • Find the equation of a line that is the perpendicular bisector of a line segment, given the endpoints of the segment. 	
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">December</p>		<ul style="list-style-type: none"> • Distance Formula 	<ul style="list-style-type: none"> • Given its endpoints, state and apply the Distance Formula to find the length of a line segment in the coordinate plane 	
	<p>Parallel Lines</p>	<ul style="list-style-type: none"> • Proving lines Parallel (algebra only) 	<ul style="list-style-type: none"> • State the definition of parallel lines • Identify, Investigate, and justify the relationships between the various angles formed when parallel 	

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			<p>lines are cut by a transversal, such as: Alternate Interior Angles, Alternate Exterior Angles, Corresponding Angles, and Interior Angles on the Same Side of the Transversal.</p> <ul style="list-style-type: none"> Determine if two lines cut by a transversal are parallel, based on the measure of given pairs of angles formed by the transversal and the lines. 	
December		<ul style="list-style-type: none"> Properties of parallel lines (algebra only) 	<ul style="list-style-type: none"> Given parallel lines cut by a transversal; Identify, Investigate, and justify the relationships between the various angles formed. (Properties of parallel lines) 	
		<ul style="list-style-type: none"> Parallel Lines in the Coordinate Plane 	<ul style="list-style-type: none"> Determine whether two lines are parallel given their equations. Find the equation of a line, given a point on the line and the equation of a line parallel to the desired line. 	

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December	Parallel Lines (continued)	<ul style="list-style-type: none">• The Sum of the Measures of the Angles of a Triangle	<ul style="list-style-type: none">• Investigate, justify, and apply theorems and corollaries about the sum of the measures of the angles of a triangle.• Recall and apply information regarding types of triangles such as: right, isosceles, and equilateral.	
January	Parallel Lines (continued)	<ul style="list-style-type: none">• The Converse of the Isosceles Triangle Theorem	<ul style="list-style-type: none">• Investigate, justify, and apply the theorems and corollaries regarding the sides and angles of an isosceles triangle.	

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		<ul style="list-style-type: none"> Interior and Exterior Angles of Polygons 	<ul style="list-style-type: none"> Identify common polygons by name. State the definition of a regular polygon. Determine the measure of one interior angle of a regular polygon. Determine the sum of the interior angles of a polygon. Determine the sum of the exterior angles of a polygon. Determine the measure of one exterior angle of a regular polygon. State and apply formulas related to the interior and exterior angles of a polygon. 	
January	Midterm Exam	<ul style="list-style-type: none"> Review of all content covered up to this point 	<ul style="list-style-type: none"> Review of all skills covered up to this point. 	
February	Quadrilaterals	<ul style="list-style-type: none"> The General Quadrilateral 	<ul style="list-style-type: none"> Identify various parts of a quadrilateral 	Why is it important to compare and contrast different types of quadrilaterals?
		<ul style="list-style-type: none"> The Parallelogram 	<ul style="list-style-type: none"> Investigate, justify, and apply theorems about parallelograms involving their angles, sides, and 	

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			diagonals	
		<ul style="list-style-type: none"> The Rectangle 	<ul style="list-style-type: none"> Investigate, justify, and apply theorems about rectangles involving their angles, sides, and diagonals Justify and apply theorems to prove a quadrilateral is a rectangle 	
		<ul style="list-style-type: none"> The Rhombus 	<ul style="list-style-type: none"> Investigate, justify, and apply theorems about rhombus involving their angles, sides, and diagonals Justify and apply theorems to prove a quadrilateral is a rhombus 	
February		<ul style="list-style-type: none"> The Square 	<ul style="list-style-type: none"> Investigate, justify, and apply theorems about squares involving their angles, sides, and diagonals <p>Justify and apply theorems to prove a quadrilateral is a square</p>	

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	Quadrilaterals (continued)	<ul style="list-style-type: none"> The Trapezoid 	<ul style="list-style-type: none"> Investigate, justify, and apply theorems about trapezoids involving their angles, sides, and diagonals Justify and apply theorems to prove a quadrilateral is a trapezoid <p>Investigate, justify, and apply theorems about trapezoids (including isosceles trapezoids) involving their angles, sides, medians, and diagonals</p>	
	The Geometry of Three Dimensions	<ul style="list-style-type: none"> Surface Area of a Prism 	<ul style="list-style-type: none"> Know and apply that the surface area of a prism is the sum of the areas of all of the faces. Know and apply that the lateral area of a prism is the sum of the areas of the lateral faces of the prism. 	
February		<ul style="list-style-type: none"> Volume of a Prism 	<ul style="list-style-type: none"> Know and apply that the volume of a prism is the product of the area of the base and the altitude 	
	The Geometry of Three Dimensions (continued)	<ul style="list-style-type: none"> Pyramids 	<ul style="list-style-type: none"> Apply the properties of a regular pyramid, including: <ul style="list-style-type: none"> - lateral edges are congruent - lateral faces are 	

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			<p>congruent isosceles triangles</p> <ul style="list-style-type: none"> - volume of a pyramid equals one-third the product of the area of the base and the altitude 	
		<ul style="list-style-type: none"> • Cylinders 	<ul style="list-style-type: none"> • Apply the properties of a cylinder, including: <ul style="list-style-type: none"> -bases are congruent -volume equals the product of the area of the base and the altitude • lateral area of a right circular cylinder equals the product of an altitude and the circumference of the base 	
March		<ul style="list-style-type: none"> • Cones 	<ul style="list-style-type: none"> • Apply the properties of a right circular cone, including: <ul style="list-style-type: none"> -lateral area equals one-half the product of the slant -volume is one-third the product of the area of its base and its altitude 	
		<ul style="list-style-type: none"> • Spheres 	<ul style="list-style-type: none"> • Apply the properties of a sphere, including: <ul style="list-style-type: none"> -the intersection of a plane and a sphere is a circle -a great circle is the largest circle that can be drawn on a sphere -two planes 	

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			<p>equidistant from the center of the sphere and intersecting the sphere do so in congruent circles</p> <ul style="list-style-type: none"> -surface area formula -volume formula 	
March	Ratio, Proportion, and Similarity	<ul style="list-style-type: none"> • Ratio and Proportion 	<ul style="list-style-type: none"> • Apply the meaning of ratio and proportion • Justify the theorem in a proportion: The product of the means is equal to the product of the extremes 	
March	Ratio, Proportion, and Similarity (continued)	<ul style="list-style-type: none"> • Proportions Involving Line Segments 	<ul style="list-style-type: none"> • Calculate lengths of corresponding line segments using proportional reasoning • Investigate, justify, and apply theorems about geometrical relationships based on the properties of the line segment joining the midpoints of two sides of a triangle • Calculate the length of corresponding sides of similar triangles using proportional reasoning • Investigate, justify, and apply theorems about proportional relationships among the segments of the sides of the triangle, given one or more lines parallel to one side of a 	Why are the mid segments proportional to the parallel side?

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			<p>triangle and intersecting the other two sides of the triangle</p> <ul style="list-style-type: none"> Identify the ratio of corresponding sides of similar triangles 	
March	Ratio, Proportion, and Similarity (continued)	<ul style="list-style-type: none"> Similar Polygons 	<ul style="list-style-type: none"> Calculate the length of corresponding sides of similar polygons using proportional reasoning Investigate theorems about geometrical relationships based on the properties of similar polygons 	
		<ul style="list-style-type: none"> Proving Triangles Similar (algebra only) 	<ul style="list-style-type: none"> Calculate the length of corresponding sides of similar polygons using proportional reasoning Investigate theorems about geometrical relationships based on the properties of similar polygons 	<p>How are similar polygons different from congruent polygons?</p> <p>How are similar polygons the same as congruent polygons?</p>
		<ul style="list-style-type: none"> Dilations 	<ul style="list-style-type: none"> Recognize that dilated polygons in the coordinate plane are similar polygons Recognize that under dilation angle measure, midpoint, and collinearity are preserved 	

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		<ul style="list-style-type: none"> • Proportional Relations Among Segments Related to Triangles 	<ul style="list-style-type: none"> • Investigate, justify, and apply that if two triangles are similar, the lengths of corresponding altitudes, medians, and angle bisectors have the same ratio as the lengths of any two corresponding sides 	
	Ratio, Proportion, and Similarity (continued)	<ul style="list-style-type: none"> • Proportional Relations Among Segments Related to Triangles (continued) 	<ul style="list-style-type: none"> • Investigate, justify, and apply that if two triangles are similar, the ratio of their perimeters have the same ratio as the lengths of any two corresponding sides • Investigate, justify, and apply that if two triangles are similar, the ratio of their areas equals the ratio of any two corresponding sides squared 	
		<ul style="list-style-type: none"> • Proportions in a Right Triangle 	<ul style="list-style-type: none"> • Investigate, justify, and apply theorems about mean proportionality, including: the altitude to the hypotenuse of a right triangle is the mean proportional between the two segments along the hypotenuse • Investigate, justify, and apply theorems about mean proportionality, including: the length of 	

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			<p>the altitude to the hypotenuse of a right triangle is the mean proportional between the lengths of the projections of the legs on the hypotenuse</p> <ul style="list-style-type: none"> • Recognize the altitude to the hypotenuse of a right triangle divides the triangle into two triangles that are similar to each other and to the original triangle 	
<p>April</p>	<p>Ratio, Proportion, and Similarity (continued)</p>	<ul style="list-style-type: none"> • Pythagorean Theorem 	<ul style="list-style-type: none"> • Apply the Pythagorean Theorem to determine the unknown side of a right triangle • Identify the right angle, legs, and hypotenuse of a right triangle • Determine whether a given triangle is a right triangle by applying the Pythagorean Theorem • Investigate, justify, and apply the Pythagorean Theorem and its converse • Solve for the length of a line segment in the coordinate plane using the Pythagorean Theorem as an alternative to the distance formula 	

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		<ul style="list-style-type: none"> The Distance Formula 	<ul style="list-style-type: none"> Given its endpoints, state and apply the Distance Formula to find the length of a line segment in the coordinate plane 	How does the Distance Formula relate to the Pythagorean Theorem?
April	Geometry of the Circle	<ul style="list-style-type: none"> Arcs and Angles 	<ul style="list-style-type: none"> Define and identify: circle, radius, major arc, minor arc, central angle, and intercepted arc Investigate, justify, and apply theorems regarding arcs and angles of a circle including: all radii of the same circle are congruent, congruent circles are circles with congruent radii, a central angle of a circle is equal to the measure of its intercepted arc 	
		<ul style="list-style-type: none"> Arcs and Chords 	<ul style="list-style-type: none"> Investigate, justify, and apply theorems about arcs of a circle cut by two parallel lines Investigate, justify, and apply theorems regarding chords of a circle: perpendicular bisector of chords, the relative lengths of chords as compared to their distance from the center of the circle Define and identify: 	

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			chords of a circle, inscribed polygons, diameter of a circle	
April	Geometry of the Circle (continued)	<ul style="list-style-type: none"> Inscribed Angles and Their Measures 	<ul style="list-style-type: none"> Define and identify an inscribed angle of a circle Investigate and apply theorems about inscribed angles and their measures, including: the measure of an inscribed angle is equal to one half the measure of its intercepted arc; an angle inscribed in a semicircle is a right angle; if two inscribed angles of a circle intercept the same arc, then they are congruent Investigate and apply theorems about the arcs determined by the rays of angles formed by two lines intersecting a circle when the vertex is inside the circle (two chords) 	
May		<ul style="list-style-type: none"> Tangents and Secants 	<ul style="list-style-type: none"> Define and identify: a tangent to a circle, a secant of a circle, a common tangent, and a tangent segment Investigate, justify, and apply theorems about tangent lines to a circle, 	

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			including: a perpendicular to the tangent at the point of tangency; two tangents to a circle from the same external point; and common tangents of two circles	
		<ul style="list-style-type: none"> Angles Formed by Tangents, Chords, and Secants 	<ul style="list-style-type: none"> Investigate, justify, and apply theorems about arcs determined by the rays of angles formed by two lines intersecting a circle when the vertex is: on the circle (tangent and a chord), or outside the circle (two tangents, two secants, or tangent and secant) 	
		<ul style="list-style-type: none"> Measures of Tangent Segments, chords, and Secant Segments 	<ul style="list-style-type: none"> Investigate, justify, and apply theorems regarding segments intersected by a circle including: along two tangents from the same external point; along two secants along the same external point; along a tangent and a secant from the same external point; and along two intersecting chords of a given circle 	
May	Geometry of the Circle	<ul style="list-style-type: none"> Circles in the Coordinate Plane 	<ul style="list-style-type: none"> Write the equation of a circle, given its center and radius, or given the endpoints of the 	

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			<p>diameter</p> <ul style="list-style-type: none"> • Write the equation of a circle, given its graph • Find the center and radius of a circle, given the equation of the circle in Center Radius Form • Graph all types of circles, including those centered at the origin and those centered not at the origin 	
May	Locus and Construction	<ul style="list-style-type: none"> • Constructing Parallel Lines 	<ul style="list-style-type: none"> • Construct lines parallel to a given line through a given point using a straight edge and compass, and justify the construction • Recognize lines are parallel if alternate interior angles are congruent and lines are parallel if corresponding angles are congruent 	
		<ul style="list-style-type: none"> • The Meaning of Locus 	<ul style="list-style-type: none"> • Define locus • Demonstrate the ability to discover a locus 	
		<ul style="list-style-type: none"> • Five Fundamental Loci 	<ul style="list-style-type: none"> • Identify and recognize the five fundamental loci, including: given distance from a point; equidistant from two points; given distance from a line; 	

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			equidistant from two parallel lines; and equidistant from two intersecting lines	
		<ul style="list-style-type: none"> Points at a Fixed Distance in Coordinate Geometry 	<ul style="list-style-type: none"> Recognize that the locus from a fixed distance in the coordinate plane forms a circle Write the equation of the locus of points at a fixed distance in the coordinate plane from a point 	
June	Final Exam	<ul style="list-style-type: none"> Review of all content covered over the entire year 	<ul style="list-style-type: none"> Review of all skills covered throughout the year. 	