

Honors Geometry

Narrative:

The fundamental purpose of the Geometry Course is to formalize and extend students' geometric experiences from the middle grades. In this Geometry course, students explore more complex geometric situations and deepen their explanations of geometric relationships by presenting and hearing formal mathematical arguments. Important differences exist between this course and the historical approach taken in geometry classes. For example, transformations are emphasized in this course. Close attention should be paid to the introductory content for the Geometry conceptual category.

For this Geometry course, instructional time should focus on six critical areas: (1) establish criteria for congruence of triangles based on rigid motions; (2) establish criteria for similarity of triangles based on dilations and proportional reasoning; (3) informally develop explanations of circumference, area, and volume formulas; (4) apply the Pythagorean Theorem to the coordinate plane; (5) prove basic geometric theorems; and (6) extend work with probability.

The Standards for Mathematical Practice complement the content standards so that students increasingly engage with the subject matter as they grow in mathematical maturity and expertise throughout the elementary, middle, and high school years.

Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Unit name	Pacing <i>Number of days proposed</i>	Instructional Block <i>Number of lessons</i>	Standards Students will be able to:
1. Tools of Geometry	9 Days	5 lessons	GEO.G-CO.1, GEO.G-CO.9, GEO.G-CO.10, GEO.G-CO.12 - Understand basic terms and postulates of geometry. - Identify segments, rays, and parallel lines. - Find the lengths of segments and measures of angles. - Complete geometric constructions using geometry software. - Identify angle pairs and prove and apply theorems about angles.
2. Parallel and Perpendicular Lines	9 Days	6 lessons	GEO.G-CO.1, GEO.G-CO.9, GEO.G-CO.10, GEO.G-CO.11, GEO.G-CO.13, GEO.G-GPE.5 - Identify angles formed by two lines and a transversal. - Prove and use properties of parallel lines. - Use a transversal in proving lines parallel. - Relate parallel and perpendicular lines. - Classify triangles and find measures of their angles. - Use exterior angles in triangles. - Classify and find the sums of the measures of interior and exterior angles of polygons. - Graph lines given their equations and write equations of lines. - Relate slope of parallel and perpendicular lines.
3. Congruent Triangles	9 Days	6 lessons	GEO.G-CO.10; GEO.G-SRT.5 - Recognize congruent figures and their corresponding parts - Prove two triangles congruent using SSS, SAS, ASA, AAS, and HL. - Use triangle congruence and CPCTC to prove that parts of two triangles are congruent. - Use and apply properties of isosceles triangles.
4. Transformations	6 Days	5 lessons	GEO.G-CO.1, GEO.G-CO.2, GEO.G-CO.3, GEO.G-CO.4, GEO.G-CO.5, GEO.G-CO.6, GEO.G-CO.7, GEO.G-CO.8, GEO.G-SRT.1

			- Identify isometries and find reflection images of figures. - Describe translations using vectors, and find translation images using matrix and vector sums. - Draw and identify rotation images of figures. - Use compositions of reflections and glide reflections. - Locate dilation images of figures.
5. Relationships within Triangles	6 Days	3 lessons	GEO.G-CO.9, GEO.G-CO.10, GEO.G-SRT.5 - Use properties of midsegments to solve problems - Use properties of perpendicular bisectors and angle bisectors. - Use inequalities involving sides and angles of triangles.
6. Exploring Quadrilaterals	10 Days	7 lessons	GEO.G-CO.11, GEO.G-SRT.5, GEO.G-GPE.4, GEO.G-GPE.5, GEO.G-GPE.7 - Use relationships among sides, angles, and diagonals of parallelograms. - Determine whether a quadrilateral is a parallelogram. - Define and classify special types of parallelograms. - Use properties of diagonals of rhombuses and rectangles. - Determine whether a parallelogram is a rectangle, rhombus, or square. - Use properties of trapezoids and kites. - Classify a quadrilateral in the coordinate plane.
7. Area	15 Days	8 lessons	GEO.N-Q.3, GEO.G-GPE.7, GEO.G-MG.4, GEO.G-SRT.4 - Know that the area of a parallelogram or a triangle can be found when the length of its base and its height are known. - Understand that if the lengths of any two sides of a right triangle are known, the length of the third side can be found by using the Pythagorean Theorem. - Know that certain right triangles have properties that allow their side lengths to be determined without using the Pythagorean Theorem. - Understand that if certain combinations of side lengths and angle measures of a right triangle are known, ratios can be used to find other side lengths and angle measures. - Understand that the area of a trapezoid can be found when the height and lengths of its bases are known. - Know that the area of a rhombus or a kite can be found when the lengths of its diagonals are known. - Understand that the area of a regular polygon is a function of the distance from the center to a side and the perimeter. - Know that ratios can be used to compare the perimeters and areas of similar figures.
8. Similarity	7 Days	5 lessons	GEO.G-SRT.2, GEO.G-SRT.3, GEO.G-SRT.4, GEO.G-SRT.5 - Use ratios and proportions to decide whether two polygons are similar and to find unknown side lengths of similar figures. - Show that two triangles are similar when you know the relationships between only two or three pairs of corresponding parts. - Draw the altitude to the hypotenuse of a right triangle to form three pairs of similar right triangles. - Know that when two or more parallel lines intersect other lines, proportional segments are formed.
9. Right Triangle Trigonometry	10 Days	6 lessons	GEO.N-Q.3, GEO.G-SRT.6, GEO.G-SRT.7, GEO.G-SRT.8, GEO.G-SRT.9, GEO.G-SRT.10, GEO.G-SRT.11

			• Use the trigonometric ratios sine, cosine, and tangent to find missing sides and angles in right triangles. • Use angles of elevation and depression to solve real world problems. • (+) Find the area of regular polygon and any triangle with two sides and the included angle. • (+) Use the law of sines and law of cosines to find missing sides and angles in any triangle.
10. Surface Area and Volume	12 Days	8 lessons	GEO.N-Q.3, GEO.G-GMD.1, GEO.G-GMD.2, GEO.G-GMD.3, GEO.G-GMD.4, GEO.G-MG.1, GEO.G-MG.2, GEO.G-MG.3, GEO.G-MG.4 • Complete unit conversions. • Solve problems using dimensional analysis. • Know that a three-dimensional figure can be analyzed by describing the relationships between its vertices, edges, and faces. • Understand that a cross section is the intersection of a three dimensional figure and a plane. • (+) Use Cavalieri's principle for formulas for volume of a sphere and other solid figures. • Understand that the area of a three dimensional figure is equal to the sum of the areas of each surface to the figure. • Know that the area of a three dimensional figure is equal to the sum of the areas of each surface to the figure. • Understand that the volume of a prism and a cylinder can be found when its height and the area of its base are known. • Know that the volume of a composite space figure is the sum of the volumes of the figures that are combined. • Understand that the volume of a pyramid is related to the volume of a prism with the same base and height. • Know that the volume of a cone is related to the volume of a cylinder with the same base and height. • Understand that the surface area and the volume of a sphere can be found when its radius is known. • Use ratios to compare the areas and volumes of similar solids.
11. Circles	12 Days	8 lessons	GEO.G-C.1, GEO.G-C.2, GEO.G-C.3, GEO.G-C.4, GEO.G-C.5, GEO.G-GPE.1, GEO.G-GMD.1 • Understand that the radius of a circle and the tangent that intersects the endpoint of the radius on the circle have a special relationship. • Know that a circle has a special relationship to a triangle whose sides are tangent to the circle. • Understand that information about congruent parts of a circle (of congruent circles) can be used to find information about other parts of the circle (or circles). • Know that angles formed by intersecting lines have a special relationship to the arcs, the intersecting lines intercept. • Know that specifically, arcs intercepted by chords that form inscribed angles are related to the inscribed angles. • Understand that the arcs formed by lines intersecting either within a circle or outside a circle are related to the angles formed by the lines. • Know that there are special relationships between intersecting chords, intersecting secants and a secant and tangent that intersect. • Understand that the information in the equation of a circle allows the circle to be graphed. • Write the equation of a circle when the center and radius are known. • Understand that the length of a circle's circumference can be found by relating it to a central angle in the circle.

			• Know that the area of a circle can be found when the circle's radius is known. • Understand the area of parts of a circle formed by radii and an arc can be found when the circle's radius and the arc's measure are known.
12. Probability	7 Days	6 lessons	GEO.S-CP.1, GEO.S-CP.2, GEO.S-CP.3, GEO.S-CP.4, GEO.S-CP.5, GEO.S-CP.6, GEO.S-CP.7, GEO.S-CP.8, GEO.S-CP.9 • Understand that probability is a measure of the likelihood that an event will occur. • Use tables to organize data by frequency and find probabilities. • Use counting techniques to find all of the possible ways to complete different tasks or choose items from a list. • Find the probability of compound events by using the probability of each part of the compound event. • Use two-way frequency tables to organize data, identify samples spaces and approximate probabilities. • Use tables, tree diagrams, and formulas to find conditional probability. • Use probability and random selection in making appropriate and fair decisions.
	Total: 112 days		

The amount of time individual students need to achieve the Mathematics standards will vary. The chart below provides the time assumed to be provided for mathematical instruction by grade span to inform the standards development:

Grade Span	Assumed Minutes per Day (Hours per week)
K–2	90 minutes/day
3–5	60 minutes/day
6–8	50 minutes/day
9–12	68 minutes/day; 5 out of 7 days

*Total number of days are an approximation and may be adjusted by course demands. Additional days will be used for content review, a midterm exam, and a final exam.