

Course Title:	Geometry		
Description: Geometry is designed to provide insight into the properties of geometry and mathematical proofs, which will provide a good foundation for students who may want to take advanced courses. Most of the work is with two-dimensional figures with the idea that students can transfer these properties to the three dimensional world.			
Reporting Topic	Grade Level Standards	<u>Competency</u> <u>Statement</u>	
Independent and Conditional Probability	<ul> <li>Understand independence and conditional probability and use them to interpret data (S-CP.A)</li> <li>1. Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not") (S-CP.A.1) (DOK 1,2)</li> <li>2. Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent. (S-CP.A.2) (DOK 1)</li> <li>3. Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B. (S-CP.A.3) (DOK 1,2)</li> <li>4. Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results. (S-CP.A.4) (DOK 1,2)</li> <li>5. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer. (S-CP.A.5) (DOK 1,2,3)</li> <li>Use probability to evaluate outcomes of decisions (S-MD.B)</li> <li>7. Analyze decisions and strategies using probability concepts (e.g., product testing, medical</li> </ul>	Students will be able to understand the difference between independence and conditional probability and use them to interpret data. Students will be able to use probability to evaluate outcomes of decisions.	



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	testing, pulling a hockey goalie at the end of a game). (S-MD.B.7) (DOK 2,3)	
<u>Probability of</u> <u>Compound</u> <u>Events</u>	<ul> <li>Use the rules of probability to compute probabilities of compound events in a uniform probability model (S-CP.B)</li> <li>6. Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model. (S-CP.B.6) (DOK 1,2)</li> <li>7. Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model. (S-CP.B.7) (DOK 1,2)</li> </ul>	Students will be able to find the probability of compound events.
<u>Vertex Edge</u> <u>Graphs</u>	<ul> <li>(IA) Use diagrams consisting of vertices and edges (vertex-edge graphs) to model and solve problems related to networks.</li> <li>IA.8.Understand, analyze, evaluate, and apply vertex-edge graphs to model and solve problems related to paths, circuits, networks, and relationships among a finite number of elements, in real-world and abstract settings. (DOK 2,3)</li> <li>IA.9.Model and solve problems using at least two of the following fundamental graph topics and models: Euler paths and circuits, Hamilton paths and circuits, the traveling salesman problem (TSP), minimum spanning trees, critical paths, vertex coloring. (DOK 2,3)</li> <li>IA.10.Compare and contrast vertex-edge graph topics and models in terms of: (DOK 2,3)</li> </ul>	Students will be able to vertex edge graphs to model and solve problems.
<u>Circles</u>	<ul> <li>Understand and apply theorems about circles (G-C.A)</li> <li>Prove that all circles are similar. (G-C.A.1) (DOK 3)</li> <li>Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle. (G-C.A.2) (DOK 1,2)</li> <li>Find arc lengths and areas of sectors of circles (G-C.B)</li> <li>5. Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector. (G-C.B.5) (DOK 1,2,3)</li> </ul>	Students will be able to understand and apply theorems about circles Students will be able to find arc length and areas of sectors of circles.
Right Triangle	<ul> <li>Define trigonometric ratios and solve problems involving right triangles (G-SRT.C)</li> <li>6. Understand that by similarity, side ratios in right triangles are properties of the angles in the</li> </ul>	Students will be able to use



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<u>Trigonometry</u>	<ul> <li>triangle, leading to definitions of trigonometric ratios for acute angles. (G-SRT.C.6) (DOK 1,2)</li> <li>7. Explain and use the relationship between the sine and cosine of complementary angles. (G-SRT.C.7) (DOK 1,2)</li> <li>8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. (G-SRT.C.8) (DOK 1,2)</li> </ul>	trigonometric ratios to solve right triangles.
<u>Similarity</u>	<ul> <li>Prove theorems involving similarity (G-SRT.B)</li> <li>4. Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity. (G-SRT.B.4) (DOK 3)</li> <li>5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. (G-SRT.B.5) (DOK 1,2,3)</li> </ul>	Students will be able to identify similar triangles using similarity postulates and theorems.
<u>Similarity</u> <u>Transformations</u>	<ul> <li>Understand similarity in terms of similarity transformations (G-SRT.A)</li> <li>1. Verify experimentally the properties of dilations given by a center and a scale factor: <ul> <li>a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.</li> <li>b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor. (G-SRT.A.1) (DOK 2)</li> </ul> </li> <li>2. Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides. (G-SRT.A.2) (DOK 1,2)</li> <li>3. Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar. (G-SRT.A.3) (DOK 2,3)</li> </ul>	Students will be able to decide if two figures are similar or have been dilated.
<u>Congruence</u> <u>Transformations</u>	<ul> <li>Understand congruence in terms of rigid motions (G-CO.B)</li> <li>6. Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent. (G-CO.B.6) (DOK 1,2)</li> <li>7. Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent. (G-CO.B.7) (DOK 2,3)</li> <li>8. Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the</li> </ul>	Students will be able to understand congruence in terms of rigid motions.



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	definition of congruence in terms of rigid motions. (G-CO.B.8) (DOK 2,3)	
<u>Transformations</u>	<ul> <li>Experiment with transformations in the plane (G-CO.A)</li> <li>1. Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc. (G-CO.A.1) (DOK 1)</li> <li>2. Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch). (G-CO.A.2) (DOK1,2)</li> <li>3. Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself. (G-CO.A.3) (DOK 1,2)</li> <li>4. Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. (G-CO.A.4) (DOK 2)</li> <li>5. Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another. (G-CO.A.5) (DOK 1,2)</li> </ul>	Students will be able to perform transformations in a plane.
<u>Constructions</u>	<ul> <li>Make geometric constructions (G-CO.D)</li> <li>12. Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line. (GCO.D.12) (DOK 2)</li> <li>13. Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle. (G-CO.D.13) (DOK 2)</li> <li>Understand and apply theorems of circles (G-C.A)</li> <li>3. Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle. (G-C.A.3) (DOK 2,3)</li> <li>4. (+) Construct a tangent line from a point outside a given circle to the circle. (G-C.A.4) (DOK 2)</li> </ul>	Students will be able to make geometric constructions and apply theorems of circles.
	<ul> <li>Use coordinates to prove simple geometric theorems algebraically (G-GPE.B)</li> <li>5. Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes</li> </ul>	Students will be able to use coordinate



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<u>Parallel and</u> <u>Perpendicular</u> <u>Lines</u>	<ul> <li>through a given point). (G-GPE.B.5) (DOK 1,2)</li> <li>Prove geometric theorems (G-CO.C)</li> <li>9. Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. (GCO.C.9) (DOK 3)</li> <li>10. Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point. (G-CO.C.10) (DOK 3)</li> </ul>	geometry to prove theorems involving parallel and perpendicular lines algebraically.
Volume and Area	<ul> <li>Use coordinates to prove simple geometric theorems algebraically (G-GPE.B)</li> <li>7. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula. (G-GPE.B.7) (DOK 1,2)</li> <li>Explain volume formulas and use them to solve problems (G-GMD.A)</li> <li>1. Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments. (G-GMD.A.1) (DOK 2,3)</li> <li>3. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.(G-GMD.A.3) (DOK 1,2)</li> <li>Apply geometric concepts in modeling situations (G-MG.A)</li> <li>1. Use geometric shapes, their measures, and their properties to describe objects (e.g.,modeling a tree trunk or a human torso as a cylinder). (G-MG.A.1) (DOK 1,2)</li> <li>2. Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).(G-MG.A.2) (DOK 1,2)</li> <li>3. Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios). (G-MG.A.3) (DOK 2,3,4)</li> <li>Visualize relationships between two-dimensional and three-dimensional objects (G-GMD.B)</li> <li>I.A.7.Plot points in three-dimensions. (DOK 1)</li> <li>4. Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects. (G-GMD.B.4) (DOK 1,2)</li> </ul>	Students will be able to explain volume formulas and use them to solve problems, as well as, apply geometric concepts in modeling situations



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Properties of Parallelograms	<ul> <li>Use coordinates to prove simple geometric theorems algebraically (G-GPE.B)</li> <li>4. Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, √3) lies on the circle centered at the origin and containing the point (0, 2). (G-GPE.B.4) (DOK 3)</li> <li>6. Find the point on a directed line segment between two given points that partitions the segment in a given ratio. (G-GPE.B.6) (DOK 1,2)</li> <li>Prove geometric theorems (G-CO.C)</li> <li>11. Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals. (G-CO.C.11) (DOK 3)</li> </ul>	Students will be able to use coordinates to prove simple geometric theorems algebraically for properties of parallelograms.
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