Mathematics
Unit 3: Geometry and Measurement

Essential Understandings	▪ Basic properties about lines, angles, two- and three-dimensional figures can be used to solve a variety of theoretical and practical problems.
Essential Questions	▪ What are the various relationships between pairs of angles? ▪ What types of angles are formed when a transversal intersects two lines? ▪ When two parallel lines are intersected by a transversal, what is true about the measures of the angles? ▪ What are the types and properties of special quadrilaterals and how are they related? ▪ How does one find the sum of interior angles for a given polygon? ▪ What is the sum of the exterior angles in a polygon? ▪ How does one use algebra skills to solve for missing angle values in polygons? ▪ What is the relationship between the sides of any triangle? ▪ How does one use the Pythagorean Theorem to find missing sides in right triangles? ▪ How does one identify and name prisms, pyramids, and cylinders? ▪ What methods can be used to determine the volume and surface area of right pyramids, prisms, and cylinders? ▪ What is the difference between square and cubic units? ▪ How is unit analysis used to make conversions within and between measurement systems? ▪ How is the formula rate x time = distance used in practical situations? ▪ What are similar figures? ▪ What are the angle and side relationships in two-dimensional similar figures? ▪ How can missing sides and angles be found mathematically between similar figures? ▪ What are surface area and volume relationships between three-dimensional similar figures?

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Essential Knowledge	▪ A variety of angle pairs are formed when a transversal intersects two lines in different points. When the two lines are parallel, the values of the angle pairs will be consistent. ▪ Some properties of parallelograms and trapezoids are determined from properties of parallel lines. ▪ The sum of the interior angles of polygons can be calculated using a formula. ▪ The sum of the exterior angles of polygons is always 360 degrees. ▪ There are a variety of quadrilateral types and important relationships between these types. ▪ In a triangle the sum of any two sides of a triangle must be greater than the third side of the triangle (Triangle Inequality Theorem.) ▪ The Pythagorean Theorem can be used to find missing sides in right triangles. ▪ Polyhedron are named according to the number and shape of their bases. ▪ In polyhedron, square units identify the surface area and cubic units identify the volume. ▪ Unit analysis is a process which uses unit rates to make conversions within and between measurement systems. ▪ Distances can be calculated given a rate and a time. ▪ Specific formulas are used to calculate the volume and surface areas of polyhedron. ▪ Algebraic methods can be used to find missing sides in pairs of similar figures. ▪ There are specific relationships between the surface areas and between the volumes of similar three-dimensional figures.
Vocabulary	▪ <u>Terms</u>: ○ alternate interior and exterior angles, altitude, corresponding angles, cylinder, diagonal, exterior angles of polygons, hypotenuse, interior angles of polygons, lateral area, lateral faces, legs of a right triangle, net, polyhedron, pyramid, Pythagorean Theorem, regular polygon, similar figures, slant height, unit analysis

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Essential Skills	▪ Identify names of angle pairs formed by a transversal. (I, R) ▪ Find measures of missing angles when parallels are intersected by a transversal. (I, R) ▪ Know and use properties of angles created by parallel lines and transversals to determine the angle properties of trapezoids and parallelograms. (I) ▪ Apply the triangle inequality to determine whether or not three given lengths will form a triangle. (I, R) ▪ Find the sum of the measures of the interior angles of a polygon. (I, R) ▪ Use the property that the sum of the exterior angles of any polygon is 360 degrees to find measures of missing polygon angles. ▪ Use the Pythagorean Theorem to find missing sides in right triangles and apply the theorem to practical situations. (I, R) ▪ Explain and illustrate the difference between linear, square, and cubic units. (R, A) ▪ Use unit analysis to make conversions across and within measurement systems. (I, R) ▪ Apply distance = rate × time to a variety of situations. (I) ▪ Find the volume and surface area of right prisms (I, R), pyramids (I), and cylinders (I) by applying the correct formulas. ▪ Apply the understanding that the surface area of a figure is the sum of the areas of its faces. (I) ▪ Apply concepts of similarity to determine how the lengths of sides of similar triangles compare with specific scale factors. (I, R) ▪ Apply concepts of similarity to determine the impact of scaling on the volume or surface area of three-dimensional figures. (I)

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Related Maine Learning Results	B. Data Measurement and Approximation B1.Students understand and are derived measures (measurements expressed as rates). a. Calculate measures using multiple attributes including speed (distance per time). b. Solve for an unknown component of measure including finding time given average speed and distance. B2.Students convert across measurement systems and within a system for different units in derived measures. a. Approximate metric and customary equivalents given a conversion factor. Convert derived measures, including feet per second to miles per hour. C. Geometry Geometric Figures C1.Students know and use properties of polygons. a. Apply the triangle inequality. b. Find the sum of measures of the interior angles of a polygon. c. Apply the property that the sum of the measures of the exterior angles of a polygon is 360 degrees. C2.Students know and use angle properties of parallel lines to solve problems and determine geometric relationships. a. Know and use properties of angles created when parallel lines are cut by a transversal. b. Use angle properties to determine whether lines are parallel. c. Know and use properties of angles created by parallel lines and transversals to determine the angle of properties of trapezoids and parallelograms, and apply these properties in problem situations. Geometric Measurement C4.Students find the volume and surface area of prisms, pyramids, cylinders, and other figures composed of these solids. a. Apply the understanding that the volume of prisms and cylinders can be found by multiplying the area of a base by the height of the solid. b. Apply the understanding that the volume of pyramids can be found by multiplying the area of a base by 1/3 the height of the solid. c. Apply the understanding that the surface area of a figure is the sum of the areas of its faces and find the surface area of cylinders.

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NECAP	NECAP Geometry and Measurement M (G & M) 8-2 M (G & M) 8-5 Applies concepts of similarity to determine the impact of scaling on the volume or surface areas of three-dimensional figures when linear dimensions are multiplied by a constant factor… M (G & M) 8-6