Mathematics
Unit 4: Geometry and Measurement

Essential Understandings	▪ Lines are the fundamental building blocks of polygons. ▪ Different tools are used to measure different things. ▪ Standard units provide common language for communicating measurement.
Essential Questions	▪ How can one describe possible relationships between lines? ▪ How can one use attributes to recognize and classify polygons and three dimensional figures? ▪ How are angles classified? ▪ How are angles used to identify polygons? ▪ How does one construct a polygon? ▪ How can one construct, describe, and compare circles? ▪ How can triangles be classified? ▪ What is line symmetry? ▪ What is rotational symmetry? ▪ How can one measure length? ▪ How can one find perimeter? ▪ What are similar figures? ▪ How can one find area using formulas? ▪ How does one convert units within the standard measurement system (i.e., meters and millimeters)? ▪ How does one measure volume? ▪ How can one mark the passage of time? ▪ What is elapsed time? ▪ How does one calculate elapsed time? ▪ How can one measure temperature? ▪ How does on measure capacity?

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Essential Knowledge	- Lines can be intersecting, parallel, or perpendicular. - Relationships between lines can be used to identify and classify polygons. - One can use attributes to determine how polygons and three-dimensional figures are alike and different. - Angles are acute, obtuse, or right. - A straight edge, compass and protractor can be used to construct a polygon. - All points on a circle are an equal distance from the center point. - Triangles are classified as acute, obtuse or right and isosceles, equilateral or scalene. - An object is symmetrical when one half is the mirror image of the other half. - Slides, rotations, and reflections can be used to create patterns and demonstrate congruence. - An object has rotational symmetry if an outline of the turning figure matches its original shape. - Similar figures have corresponding equal angles and the lengths of the sides are proportional. - Perimeter is measured in linear units. - Area is measured in square units. - Volume is measured in cubic units. - Elapsed time is the amount of time that has passed between two given points in time.
Vocabulary	- Terms: - octagon, parallelogram, base, acute, obtuse and straight angles, compass, protractor, pyramid, triangular prism, equilateral, equiangular, acute, obtuse, right isosceles and scalene triangles, reflect, slide, rotate, rotational symmetry, line of reflection, linear length, relative size, square unit, meters, millimeters, liters, elapsed time, attributes
Essential Skills	- Recognize and explain the relationship between lines (intersecting, parallel, perpendicular). (R, A) - Identify and use two and three dimensional shape terms: vertex, edge, face, and base. (I, R, A) - Identify, describe, draw and distinguish the following polygons; rectangle, square, rhombus, parallelogram, trapezoid, hexagon, and octagon. (I, R, A) - Identify and name angles (acute, obtuse, right) and use them to identify polygons. (R, A) - Draw and construct polygons using a straight edge, compass, and protractor. (I, R)

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Essential Skills	- Recognize attributes of two and three dimensional figures using multiple methods including sides, edges, vertices, and faces. Shapes include rectangular and triangular prisms, cylinders, spheres, pyramids, and cones. (I, R)Describe, draw and compare circles. (I, R)Identify, describe, draw and distinguish the following triangles: isosceles, equilateral, acute, obtuse, scalene and right. (I, R) - Identify, describe, and draw symmetrical objects. (R, A) - Recognize line symmetry in figures. (R, A) - Slide, rotate, or reflect figures to create patterns or demonstrate congruence. (I, R) - Identify and create figures with rotational symmetry. (I, R) - Demonstrate conceptual understanding of similarity by applying scales on maps or applying characteristics of similar figures to identify similar figures (same shape, but not necessarily same size). (I, R, A) - Recognize that a number without a unit is not a measurement, and that an appropriate unit must always be attached to a number to provide a measurement. (R, A) - Measure linear length using inches, feet, yards, centimeters, and meters. (I, R) - Measure the perimeter of polygons to the nearest quarter inch and half centimeter. (I, R) - Recognize and estimate the relative sizes of inches, feet, and centimeters. (I, R, A) - Measure the area of squares and rectangles to the nearest square unit. (I, R) - Convert centimeters to meters, millimeters to meters, centimeters to millimeters, millimeters to centimeters, meters to kilograms, grams to kilograms and visa versa. (I, R) - Recognize and estimate the relative sizes of 1 square meter, 1 square centimeter, 1 square inch and 1 square foot. (I, R, A) - Measure and use units of measure appropriately and consistently to solve problems. (I, R) - Explain and illustrate the differences between linear and square. (I) - Use manipulatives to find the volume and the surface area of rectangular prisms. (I) - Use formulas to compute area and perimeter of squares and rectangles. (I, R) - Recognize and estimate the relative sizes of one square meter, one square inch, and one square foot. (I, R, A) - Calculate elapsed time. (I, R) - Find temperature in Fahrenheit and Celsius to 1 degree. (R, A) - Measure capacity in milliliters, liters, ounces, cups, pints, quarts, and gallons. (I, R)

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Related Maine Learning Results	B. Data
	   Measurement and Approximation
	   B1. Students understand and use measurement of time, capacity, and temperature.
	     a. Select appropriate tools and units for these measures.
	     b. Solve and justify problems with these measures.
	     c. Measure capacity in milliliters, liters, ounces, cups, pints, quarts, and gallons. (I, R)
	   Data Analysis
	   B2. Students collect and represent data in tables, line plots, and interpret these types of data displays.
	C. Geometry
	   Geometric Figures
	   C1. Students identify and name angles, lines, relationships between lines, quadrilaterals, and triangles.
	     a. Identify perpendicular and parallel lines and sides.
	     b. Identify and sketch the following quadrilaterals: rectangle, square, parallelogram, rhombus, and trapezoid.
	     c. Identify and sketch the following triangles: isosceles, equilateral, acute, obtuse, and right.
	   C2. Students understand the concept of area of a figure.
	     a. Find the area of shapes in non-standard units.
	     b. Find the area of squares and other rectangles in standard units.
	     c. Recognize and estimate the relative sizes of one square meter and one square centimeter and one square inch and one square foot
	   Transformations
	   C3. Students recognize congruent figures and line symmetry in figures.
	     a. Recognize whether a line is a line of symmetry in a figure.

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NECAP	NECAP
	  Geometry and Measurement
	  M (G & M) 4 – 3
	    Uses properties or attributes (shapes of bases or number of lateral faces) to identify, compare, or describe three-dimensional shapes (regular prisms, triangular prisms, cylinders, or spheres).
	  M (G & M) 4 – 5
	    Demonstrates conceptual understanding of similarity by applying scales on maps, or applying characteristics of similar figures (same shape but not necessarily the same size) to identify similar figures, or to solve problems involving similar figures. Describes relationships using models or explanations.
	  M (G & M) 4 - 6
	    Demonstrates conceptual understanding of perimeter of polygons, and the area of rectangles, polygons or irregular shapes on grids using a variety of models, manipulates, of formulas, Expresses all measures using appropriate units.