Mathematics **Brunswick School Department**

Geometry: Academic
Unit 11: Areas and Volumes of Solids

Essential Understandings	▪ Area and volume of solids have many real-life applications.
Essential Questions	▪ What is surface area? ▪ What is lateral area? ▪ What is volume? ▪ What are some of the basic geometric solids? ▪ How do we find areas and volumes of geometric solids? ▪ How can we use area and volume to solve other real-life situations? ▪ What are similar solids? ▪ What is the relationship between the areas and the volumes of similar solids?
Essential Knowledge	▪ The area and volume of geometric solids can be applied to many real-life problems.
Vocabulary	Terms: o prism, pyramid, cylinder, cone, sphere, great circle, hemisphere, height, lateral height, slant height, area of the base, lateral area, total surface area, volume, similar solids
Essential Skills	▪ Find the lateral area, total surface area, and volume of prisms, pyramids, cylinders, cones, spheres, and hemispheres. ▪ Find the surface area and/or volume of solids that are formed by combining other solids (examples: a cone with a hemisphere, or a sphere inscribed in a cylinder). ▪ Use proportions to find the areas and volumes of similar solids.
Related Maine Learning Results	Mathematics C. Geometry Geometric Figures C1. Students justify statements about polygons and solve problems. a. Use the properties of triangles to prove theorems about figures and relationships among figures. b. Solve for missing dimensions based on congruence and similarity. c. Use the Pythagorean Theorem in situations where right triangles are created by adding segments to figures. d. Use the distance formula. C2. Students justify statements about circles and solve problems. a. Use the concepts of central and inscribed angles to solve problems and justify statements. b. Use relationships among arc length and circumference, and areas of circles and sectors to solve problems and justify statements.

Related Maine Learning Results	C3.Students understand and use basic ideas of trigonometry. a. Identify and find the value of trigonometric ratios for angles in right triangles. b. Use trigonometry to solve for missing lengths in right triangles. c. Use inverse trigonometric functions to find missing angles in right triangles. Geometric Measurement C4.Students find the surface area and volume of three-dimensional objects. a. Find the volume and surface area of three-dimensional figures including cones and spheres. b. Determine the effect of changes in linear dimensions on the volume and surface areas of similar and other three-dimensional figures. D. Algebra Symbols and Expressions D1.Students understand and use polynomials and expressions with rational exponents. a. Simplify expressions including those with rational numbers. b. Add, subtract, and multiply polynomials. c. Factor the common term out of polynomial expressions. d. Divide polynomials by (ax+b). Equations and Inequalities D2.Students solve families of equations and inequalities. a. Solve systems of linear equations and inequalities in two unknowns and interpret their graphs. b. Solve quadratic equations graphically, by factoring in cases where factoring is efficient, and by applying the quadratic formula. c. Solve simple rational equations. d. Solve absolute value equations and inequalities and interpret the results. e. Apply the understanding that the solution(s) to equations of the form f(x) = g(x) are x-value(s) of the point(s) of intersection of the graphs of f(x) and g(x) and common outputs in table of values. f. Explain why the coordinates of the point of intersection of the lines represented by a system of equations is its solution and apply this understanding to solving problems. D3.Students understand and apply ideas of logarithms. a. Use and interpret logarithmic scales. b. Solve equations in the form of $x + b^{y}$ using the equivalent form $y = \log_b x$.

Mathematics **Brunswick School Department**

Geometry: Academic

Unit 11: Areas and Volumes of Solids

Sample Lessons And Activities	▪ Use the properties of prisms, formula for area and formula for volume of prisms to find the surface area and volume of triangular, rectangular, hexagonal and other types of prisms.
Sample Classroom Assessment Methods	▪ Quizzes ▪ Take-home worksheets ▪ Tests
Sample Resources	▪ Publications: o Geometry, Jurgensen, Brown, Jurgensen (McDougal Littell) o Geometry: Concepts and Skills, Larson, Boswell, Stiff (McDougal Littell)