

# MATHEMATICS

## Measurement and Geometry

Grade 7		
<p><b>1. Students choose appropriate units of measure and use ratios to convert within and between measurement systems to solve problems.</b></p> <p>7.1.1 Compare weights, capacities, geometric measures, times and temperatures within and between measurement systems (e.g., miles per hour and feet per second, cubic inches to cubic centimeters)</p> <p>7.1.2 Construct and read scale drawings and models</p> <p>7.1.3 Use measures expressed as rates (e.g., speed, density) and measures expressed as products (e.g., person-days) to solve problems, checking units of the solutions; and use dimensional analysis to check the reasonableness of the answer</p> <p><b>2. Students compute the perimeter, area and volume of common geometric objects and use these to find measures of less common objects; they know how perimeter, area, and volume are affected under changes of scale.</b></p> <p>7.2.1 Routinely use formulas for finding the perimeter and areas of basic two-dimensional figures and for the surface area and volume of basic three-dimensional figures, including rectangles, parallelograms, trapezoids, squares, triangles, circles, prisms, and circular cylinders</p>	<p>7.2.2 Estimate and compute the area of more complex or irregular two- and three-dimensional figures by breaking them up into more basic geometric objects</p> <p>7.2.3 Compute the length of the perimeter, the surface area of the faces, and the volume of a 3-D object built from rectangular solids. They understand that when the lengths of all dimensions are multiplied by a scale factor, the surface area is multiplied by the square of the scale factor and the volume is multiplied by the cube of the scale factor</p> <p>7.2.4 Relate the changes in measurement under change of scale to the units used (e.g., square inches, cubic feet) and to conversions between units (1 square foot = 144 square inches, 1 cubic inch = 16.39 cubic centimeters)</p> <p><b>3. Students know the Pythagorean Theorem and deepen their understanding of plane and solid geometric shapes by constructing figures that meet given conditions and by identifying attributes of figures.</b></p> <p>7.3.1 Identify and construct basic elements of geometric figures, (e.g., altitudes, midpoints, diagonals, angle bisectors and perpendicular bisectors; and central angles, radii, diameters and chords of circles) using compass and straight-edge</p>	<p>7.3.2 Understand and use coordinate graphs to plot simple figures, determine lengths and areas related to them, and determine their image under translations and reflections</p> <p>7.3.3 Know and understand the Pythagorean Theorem and use it to find the length of the missing side of a right triangle and lengths of other line segments, and, in some situations, empirically verify the Pythagorean Theorem by direct measurement</p> <p>7.3.4 Demonstrate an understanding of when two geometrical figures are congruent and what congruence means about the relationships between the sides and angles of the two figures</p> <p>7.3.5 Construct two-dimensional patterns for three-dimensional models such as cylinders, prisms and cones</p> <p>7.3.6 Identify elements of three-dimensional geometric objects (e.g., diagonals of rectangular solids) and how two or more objects are related in space (e.g., skew lines, the possible ways three planes could intersect)</p>