

FILLING AND WRAPPING Three Dimensional Measurement

<p>Instructional Time and Investigations</p>	<p>23 days</p>	<ul style="list-style-type: none"> • Inv. 1: Building Smart Boxes: Rectangular Prisms (4 Problems) • Inv. 2: Polygonal Prisms (3 Problems) • Inv. 3: Area and Circumference of Circles (4 Problems) • Inv. 4: Cylinders, Cones, and Spheres (5 Problems) 	
<p>Goals</p>	<p>Surface Areas and Volumes of Polygonal Prisms and Cylinders: Understand surface areas and volumes of prisms and cylinders and how they are related</p> <ul style="list-style-type: none"> • Prisms are named for their bases. The name of a prism indicates the number of vertices, edges, and faces the prism has. • Slicing prisms vertically, horizontally, or on a slant can expose different shapes of cross-sections, depending on which of the original edges are intersected. • Comparing, reasoning about, and extending what you know about area and volume leads to an understanding of the formulas for finding the surface area and volume of prisms, cones, and pyramids. • Proportional changes to dimensions of the sides of a prism lead to predictable changes in the surface area and the volume. 	<p>Areas and Circumferences of Circles: Understand the areas and circumferences of circles and how they are related.</p> <ul style="list-style-type: none"> • Approximations of the ratio of the circumference of a circle to the circle's diameter lead to exact formulas for the area and circumference of a circle. 	<p>Volumes of Spheres and Cones: Understand the relationships between the volumes of cylinders and the volumes of cones and spheres.</p> <ul style="list-style-type: none"> • Comparing, reasoning about, and extending what you know about area of circles and volume of cylinders leads to an understanding of the formulas for finding the volume of cones and spheres.
<p>Common Core Standards</p>	<p>Common Core Standards for Mathematical Practice</p> <p>MP.1: Make sense of problems and persevere in solving them.</p> <p>MP.2: Reason abstractly and quantitatively.</p> <p>MP.3: Construct viable arguments and critique the reasoning of others.</p> <p>MP.4: Model with mathematics.</p> <p>MP.5: Use appropriate tools strategically.</p> <p>MP.6: Attend to precision.</p> <p>MP.7: Look for and make use of structure.</p> <p>MP.8: Look for and express regularity in repeated reasoning.</p>	<p>Common Core Content Standards</p> <p>7.NS.A.3: Solve real-world and mathematical problems involving the four operations with rational numbers.</p> <p>7.G.A.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.</p> <p>7.G.A.3: Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.</p> <p>7.G.B.4: Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.</p> <p>7.G.B.6: Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.</p> <p>Also 7.RP.A.2, 7.EE.A.1, 7.EE.A.2</p>	

FILLING AND WRAPPING Three Dimensional Measurement

Content Connections to Other Units

Goals of the Unit	Prior Work	Future Work
<p>Surface Areas and Volumes of Polygonal Prisms and Cylinders Understand surface areas and volumes of prisms and cylinders and how they are related.</p>	<ul style="list-style-type: none"> • Interpreting area as the number of squares that cover a two-dimensional figure (<i>Covering and Surrounding</i>) • Interpreting perimeter as the number of linear units that surround a two-dimensional figure; interpreting area as the number of squares that cover a two-dimensional figure (<i>Covering and Surrounding</i>) • Comparing areas and perimeters of different two-dimensional figures (<i>Covering and Surrounding</i>) • Studying the relationship between perimeter and area in rectangles (<i>Covering and Surrounding</i>) 	<ul style="list-style-type: none"> • Finding volumes of cylinders, cones, and spheres (<i>Say It With Symbols</i>) • Comparing linear, quadratic, and cubic relationships by analyzing the measurements of a cube (<i>Frogs, Fleas, and Painted Cubes</i>) • Developing strategies for finding the distance between two points on a coordinate grid (<i>Looking for Pythagoras</i>) • Finding the Pythagorean Theorem and using it to solve problems (<i>Looking for Pythagoras</i>) • Algebraically analyzing the relationship between perimeter and area in rectangles (<i>Frogs, Fleas, and Painted Cubes</i>)
<p>Areas and Circumferences of Circles: Understand the areas and circumferences of circles and how they are related.</p>	<ul style="list-style-type: none"> • Developing strategies and algorithms for finding the perimeter and area of rectangles, triangles, parallelograms, and composite figures (<i>Covering and Surrounding; Stretching and Shrinking</i>) 	<ul style="list-style-type: none"> • Finding the equation of a circle (<i>Looking for Pythagoras</i>) • Using variables to represent a variety of relationships algebraically (<i>Thinking With Mathematical Models; Looking for Pythagoras; Growing, Growing, Growing; Frogs, Fleas, and Painted Cubes; Say It With Symbols</i>)
<p>Volumes of Spheres and Cones: Understand the relationships between the volumes of cylinders and the volumes of cones and spheres.</p>	<ul style="list-style-type: none"> • Enlarging, shrinking, and distorting two-dimensional figures (<i>Stretching and Shrinking</i>) • Scaling quantities up and down using ratios and proportions (<i>Comparing and Scaling</i>) 	<ul style="list-style-type: none"> • Describing the relationships among volumes of cylinders, cones, and spheres with algebraic equations (<i>Say It With Symbols</i>)