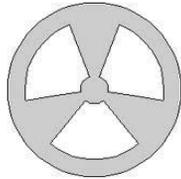


## Core Content

<b>Cluster Title: Apply geometric concepts in modeling situations.</b>
<b>Standard G.MG.1:</b> Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).
<b>Concepts and Skills to Master</b>
<ul style="list-style-type: none"> <li>• Use geometric shapes to deconstruct objects or situations.</li> <li>• Use cross-sections (see III.G.GMD.4) to deconstruct three-dimensional objects.</li> <li>• Use measures of appropriate two- and three-dimensional shapes to estimate the measures of complex objects taking into account any overlap that may occur.</li> </ul>

## Supports for Teachers

<b>Critical Background Knowledge</b>	
<ul style="list-style-type: none"> <li>• Finding measures of two-dimensional and three-dimensional shapes (7.G.4, 7.G.6, 8.G.9)</li> </ul>	
<b>Academic Vocabulary</b>	
area, volume, surface area, perimeter, circumference, circle, rectangle, triangle, cylinder, cone, sphere, pyramid, prism	
<b>Suggested Instructional Strategies</b>	<b>Resources</b>
<ul style="list-style-type: none"> <li>• Find the volume of oddly shaped containers by deconstructing them into component parts.</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="http://illustrativemathematics.org/standards/hs">http://illustrativemathematics.org/standards/hs</a></li> <li>• <a href="http://map.mathshell.org/materials/lessons.php?taskid=216&amp;subpage=concept">http://map.mathshell.org/materials/lessons.php?taskid=216&amp;subpage=concept</a></li> </ul>
<b>Sample Formative Assessment Tasks</b>	
<p><b>Skill-Based Task:</b> Estimate the area of the shaded region and the non-shaded region, given that the radius of the wheel is 10 inches.</p> 	<p><b>Problem Task:</b> Estimate the volume of the Great Salt Lake.</p>

## Core Content

<b>Cluster Title: Apply geometric concepts in modeling situations.</b>
<b>Standard G.MG.2:</b> Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).
<b>Concepts and Skills to Master</b>
<ul style="list-style-type: none"> <li>Understand density as a ratio.</li> <li>Differentiate between area and volume densities, their units, and situations in which they are appropriate (e.g., area density is ideal for measuring population density spread out over land, and the concentration of oxygen in the air is best measured with volume density).</li> </ul>

## Supports for Teachers

<b>Critical Background Knowledge</b>	
<ul style="list-style-type: none"> <li>Finding areas of two-dimensional figures and volumes of three-dimensional objects</li> </ul>	
<b>Academic Vocabulary</b>	
density	
<b>Suggested Instructional Strategies</b>	<b>Resources</b>
<ul style="list-style-type: none"> <li>Collaborate with appropriate science teacher to share teaching strategies to help students further understand density and its math applications</li> </ul>	<ul style="list-style-type: none"> <li>NCTM Illuminations: “Tetrahedral Kites” Lesson</li> </ul>
<b>Sample Formative Assessment Tasks</b>	
<p><b>Skill-Based Task:</b> The current population of New York City is 3.8 million. The area of New York City is 300 square miles. Calculate the population density of New York City.</p>	<p><b>Problem Task:</b> You are researching two job offers: one in Georgia and one in Massachusetts. Being from a small town, you really enjoy your space and don’t want to live in a heavily populated area. Massachusetts has a population of 6.6 million. Georgia has a population of 9.8 million. Which state seems like the better choice based solely on population?</p>

## Core Content

<b>Cluster Title: Apply geometric concepts in modeling situations.</b>
<b>Standard G.MG.3:</b> Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).
<b>Concepts and Skills to Master</b>
<ul style="list-style-type: none"> <li>Design solutions to problems through geometric modeling.</li> </ul>

## Supports for Teachers

<b>Critical Background Knowledge</b>	
<ul style="list-style-type: none"> <li>Construct and deconstruct complex 3-dimensional shapes (III.G.MG.1)</li> <li>Find appropriate measures of complex 2- and 3-dimensional shapes (III.G.MG.1)</li> </ul>	
<b>Academic Vocabulary</b>	
maximize, minimize, optimize, constraints	
<b>Suggested Instructional Strategies</b>	<b>Resources</b>
<ul style="list-style-type: none"> <li>Explore design problems that exist in local communities, such as building a shed with maximum capacity in a small area or locating a hospital for three communities in a desirable area.</li> </ul>	<ul style="list-style-type: none"> <li><a href="http://illuminations.nctm.org/LessonDetail.aspx?id=L793">http://illuminations.nctm.org/LessonDetail.aspx?id=L793</a></li> <li><a href="http://illuminations.nctm.org/LessonDetail.aspx?id=L797">http://illuminations.nctm.org/LessonDetail.aspx?id=L797</a></li> <li><a href="http://illuminations.nctm.org/LessonDetail.aspx?id=L767">http://illuminations.nctm.org/LessonDetail.aspx?id=L767</a></li> </ul>
<b>Sample Formative Assessment Tasks</b>	
<b>Skill-Based Task:</b>	<b>Problem Task:</b> Maximize the number of parking spaces in a given complex-shaped parking lot. Work with given constraints such as standard parking stall size, area needed between sections of stalls, etc...Justify your work.