Core Content

Cluster Title: Apply geometric concepts in modeling situations.
Standard G.MG.2: Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).
Concepts and Skills to Master
• Understand density as a ratio. • 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).

Supports for Teachers

Critical Background Knowledge	
• Finding areas of two-dimensional figures and volumes of three-dimensional objects	
Academic Vocabulary	
density	
Suggested Instructional Strategies	**Resources**
• Collaborate with appropriate science teacher to share teaching strategies to help students further understand density and its math applications	• NCTM Illuminations: “Tetrahedral Kites” Lesson
Sample Formative Assessment Tasks	
Skill-Based Task: 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.	**Problem Task:** 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?

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Core Content

Cluster Title: Apply geometric concepts in modeling situations.
Standard G.MG.3: 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).
Concepts and Skills to Master
• Design solutions to problems through geometric modeling.

Supports for Teachers

Critical Background Knowledge	
• Construct and deconstruct complex 3-dimensional shapes (III.G.MG.1) • Find appropriate measures of complex 2- and 3-dimensional shapes (III.G.MG.1)	
Academic Vocabulary	
maximize, minimize, optimize, constraints	
Suggested Instructional Strategies	**Resources**
• 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.	• http://illuminations.nctm.org/LessonDetail.aspx?id=L793 • http://illuminations.nctm.org/LessonDetail.aspx?id=L797 • http://illuminations.nctm.org/LessonDetail.aspx?id=L767
Sample Formative Assessment Tasks	
Skill-Based Task:	**Problem Task:** 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.

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