Geometry Level 1 - Unit G - Area, Surface Area and Volume

Unit Focus

This short unit on area, surface area and volume gives students an opportunity to apply the Geometry they have learned throughout the year. The goal for students is to understand the formulas involved through deriving the formulas rather than simply memorize the formulas.

Stage 1: Desired Results - Key Understandings

Standard(s)

Common Core
Mathematics: 9-12

- Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. (CCSS.MATH.CONTENT.HSA.CED.A.1)
- Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. (CCSS.MATH.CONTENT.HSA.CED.A.4)
- Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. (CCSS.MATH.CONTENT.HSG.GMD.A.1)
- Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). (CCSS.MATH.CONTENT.HSG.MG.A.1)
- Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). (CCSS.MATH.CONTENT.HSG.MG.A.2)
- 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). (CCSS.MATH.CONTENT.HSG.MG.A.3)

- Make sense of problems and persevere in solving them. (CCSS.MATH.MP.1)
- Construct viable arguments and critique the reasoning of others. (CCSS.MATH.MP.3)
- Attend to precision. (CCSS.MATH.MP.6)
- Look for and make use of structure. (CCSS.MATH.MP.7)

Transfer

Students will be able to independently use their learning to...
T1 draw conclusions about graphs, shapes, equations, or objects.
T2 make sense of a problem, initiate a plan, execute it, and evaluate the reasonableness of the solution.
T3 apply familiar mathematical concepts to a new problem or apply a new concept to rework a familiar problem.

Meaning

Understanding(s)

Students will understand that...
U1 Mathematicians identify relevant tools, strategies, relationships, and/or information in order to draw conclusions.
U2 Mathematicians apply the mathematics they know to solve problems occurring in everyday life.
U3 Mathematicians use geometric models, and spatial sense to interpret and make sense of the physical environment.

Essential Question(s)

Students will keep considering...
Q1 How can I break a problem down into manageable parts?
Q2 Does this solution make sense?
Q3 How can I use what I know in the world?

Acquisition of Knowledge and Skill

Knowledge

Students will know...
K1 The formulas for the area of a rectangle, parallelogram, triangle, trapezoid, circle
K2 That the volume of a cone (or pyramid) with an equal base and height of a cylinder (or prism) is ⅓ the volume of the cylinder (or prism)

Skill(s)

Students will be skilled at...
S1 Applying formulas to solve problems about surface area, area and volume
S2 Using nets to find surface area of 3D objects

Stage 1: Desired Results - Key Understandings		
Madison Public Schools Profile of a Graduate • Analyzing: Examining information/data/ evidence from multiple sources to identify possible underlying assumptions, patterns, and relationships in order to make inferences. (POG.1.2) • Idea Generation: Studying a problem, need or model (mentor text, political piece, documents, art work, etc.) to consider limitations and imagine new solutions/transformations. (POG. 2.1)	**K3** Changing the length of a side by k changes the area by k^2 and the volume by k^3 **K4** Vocabulary: bases, faces, edges, lateral faces, slant height, lateral edges	**S3** Converting between cubic inches and cubic feet, square inches and square feet or other similar conversions