

Unit Title: Applying Area, Volume and Surface Area with Real World Examples**Grade Level:** 9-12**Subject Area:** Math/Geometry**Duration/Length/Number of class periods:** 10

Description: This unit will give students the opportunity to apply the concepts of area, volume, and surface area of geometric shapes to solve real world problems associated with building and landscape design. Since students have varying levels of understanding of these geometric concepts, the unit will be taught in a flip format. Students will take CK-12 Adaptive assignments to provide frequent formative assessment to dictate the necessary content that will serve to create the necessary skills to complete the summative real word project.

One goal of this unit is to show students that there are many online tools that they can use to compute the areas and volumes necessary to complete the required computations in real world situations. Students will explore and utilize online resources to determine the necessary areas and volumes to complete the assignments.

Established Goals (National, State, Local):

This unit satisfies the following Minnesota State Standards for Mathematics 2007

Minnesota Standard 9.3.1.1 Determine the surface area and volume of pyramids, cones and spheres. Use measuring devices or formulas as appropriate.

Minnesota Standard 9.3.1.2 Compose and decompose two and three-dimensional figures; use decomposition to determine the perimeter, area, surface area and volume of various figures.

Minnesota Standard 9.3.3.7 Use properties of polygons—including quadrilaterals and regular polygons—to define them, classify them, solve problems and logically justify results.

What Enduring Understandings are desired?

I can use formulas for the area of polygons to determine the area of real world situations.

I can use formulas for the volume and surface area of prisms, pyramids, cones, and spheres to compute volumes and surface areas.

I can determine the area of irregular shapes.

I can apply the concepts of area, volume, and surface area to solve real world situations.

What [Essential Questions](#) will be considered?

1. How can I break down a large complicated object into component geometric shapes that I can manipulate to satisfy the needs of the project?
2. What formulas will I need to use and how do identify the key measurements to apply the formulas?
3. What technology is available to me to complete the summative project?

Students will know / be able to:

1. Take a real world situation involving area and volume and apply their geometric skills to solve problems.
2. Develop a familiarity with online tools and resources to solve real world problems

Description <i>Units must include at least one of each formative, summative, introductory activity and learning activity. Check the appropriate box; one per row.</i>	Fo rm ati ve	Su m m ati ve	Intr odu ctor y Acti vity	Lea rnin g Acti vity	Stu den t Tec hno log y Use d	Teac her Tech nolo gy Use d	ISTE Stan dard s
Complete "What shapes do I see?" introductory activity.			X				
Overview of course project. Student brainstorm ideas			X				
Introduction to area and volume online tools. Complete survey on possible tools to use and research online options.						X	
Flipped classroom experience to introduce and/or review basic area concepts				X			
Complete basic areas of squares, rectangles, parallelograms, and trapezoids adaptive assessments to determine student familiarity with basic computational skills. Link to CK-12 Activity	X						
Complete CK-12 adaptive assessment for calculating area of polygons. This focuses on how students will determine the area of irregular shapes. Link to CK-12 Activity	X						
Complete practice activities and differentiated instruction based upon results of formative assessment in previous steps				X			
Complete Area of Triangle PLIX activity in class. We work together on challenge questions in class. Link CK-12 PLIX						X	

Complete technology exploration using Geogbra					x		
Flipped classroom experience to introduce and or review basic volume concepts				x			
Complete CK-12 adaptive assessment for volume of prisms. Link to CK-12 Activity	x						
Complete CK-12 adaptive assessment for volume of pyramids. Link to CK-12 Activity .							
Complete Volume exploration using Geogbra Activity						x	
Complete practice activities and differentiated instruction based upon results of formative assessment in previous steps for volume.				x			
Introduce and demonstrate online Volume Calculator						x	
Students complete exercise using online volume calculator.							1c
Complete Irregular area and volume worksheets from Holt Geometry curriculum				x			
Flipped classroom experience to introduce and or review surface area				x			
Complete CK-12 Adaptive Assessment for surface area. Link to CK-12 Activity	x						
Complete practice activities and differentiated instruction based upon results of formative assessment in previous steps for surface area.				x			
Complete classroom activity to prepare for assessment activity utilizing technology					x		
Complete landscape design, kitchen or home remodeling, or other approved project to demonstrate proficiency with concepts of area, volume, and surface area		x					
Present results of student activity							6c
Complete reflective activity on Google Form		x					
Complete district assessment on Schoology		x					

Materials, tools and resources: Schoology, CK-12, worksheets and text resources from Holt Geometry 2007, and teacher created paper and pencil exercises.

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Additional credit given to