

**NYC DOE Magnet Program
Districts 25 and 28**

School: JHS 185

Grade: 6th GRADE

Teacher: Vandana Gupta

COURSE	Grade 6 Mathematics
UNIT	Measurement
TITLE	Measurement

ESSENTIAL QUESTION	How are area and volume essential to the design of the playground?
SUGGESTED TIME FRAME	4 weeks
THEME	Architecture

Essential Question

How are area and volume essential to the design of the playground?

Unit Name	Measurement
Mini-unit Titles	Review Ratio and Proportion
	Understanding and Applying Formulas for Area
	Understanding and Applying Formulas for Volume
	Identifying and converting metric units of capacity and customary units of capacity

Unit's Culminating Project (Brief Description)

The students will apply the concepts of measurement to design our school's playground which must include a swimming pool. They will use various measurement concepts and skills to design and describe a realistic swimming pool.

Stage 1- Desired Results

Standards-Based Learning Goals

- 6.A.5 Solve simple proportions within context
- 6. M.2 - Identify customary units of capacity (cups, pints, quarts, and gallons)
- 6. M.3 - Identify equivalent customary units of capacity (cups to pints, pints to quarts, and quarts to gallons)
- 6. M. 9- Determine personal references for capacity
- 6. M.5- Identify equivalent metric units of capacity (milliliter to liter and liter to milliliter)
- 6. G.4- Determine the volume of rectangular prisms by counting cubes and develop the formula.
- 6. M.1- Measure capacity and calculate volume of a rectangular prism

Concepts

Big Ideas for this Unit:

- Structure
 - Perspective
 - Communication
 - Relationships
- Math and everyday life

Magnet School Theme:

Architecture

Relevant/Connected Big Idea:

Our school theme is Architecture and Engineering. We will use architectural planning and design to build our playground.

Enduring Understandings:

- Balance drives building design
- Function is driven by structure
- Problem solving strategies
- Mathematical ideas through the manipulation of objects, numerical tables, drawings, pictures, charts, graphs, tables, diagrams, models, and symbols in written and verbal form .

Overarching Essential Question(s):

Do area restraints lead to singular designs, or can creative designs still be achieved?

How does measurement helps us understand and describe our world?

Content and Skills

Content (nouns)

Students will know...

Customary system
 Rectangular prism
 Metric system
 Cup
 Pint
 Quart
 Gallon
 Fl. Oz
 Capacity
 Perimeter
 Area
 Volume
 Formula
 Ratio
 Proportion
 Scale
 Scale factor
 Substitute
 Liter
 Milliliter
 Proportions within context
 Area of triangles and quadrilaterals (squares, rectangles, rhombi, and trapezoids) and formulas
 Different strategies to find the area of regular polygons
 Concept of rate
 Equivalent ratios as a proportion
 The difference between rate and ratio
 Proportions and equivalent fractions
 The product of the extremes

Skills (verbs)

Students will be able to...

- Calculate area and volume
- Evaluate formulas using substitution
- Determine the difference between area and volume.
- Apply the concept of volume in a real life situation
- Solve for Ratio, Rate, Proportion
- Identify Scale Factor and apply it in building the model.
- Represent the data through Scale

Drawing

- Identify customary units of capacity
- Identify metric units of capacity
- Identify equivalent customary units of capacity (cups to pint, pint to quarts, gallon to quarts, fl oz to cups)
- Identify equivalent metric units of capacity (liter to milliliter) and (milliliter to liter)

Stage 2- Summative Assessment Evidence

If students understand, know and are able to do the items in Stage 1, they should be able to show their understanding by completing an authentic task found in the world beyond the classroom.

Design the Culminating/Summative Project:

G- (goal):	The goal of this task is to apply concepts of area and volume to design and create a playground that contains a swimming pool.
R- (role):	The students will take the role of an architect or project manager for the company that will create a playground
A- (audience):	The plan must be submitted to Planning Board.
S- (situation):	Our school has been named as a community school. We will be responsible to make a blueprint of the playground with swimming pool.
P- (purpose and product):	Blueprint consisting of floor plan of playground with swimming pool
S- (standards for performance):	Create dimensionally accurate blue print. Creative use of space Application of ratio and proportion (chemicals to water)

Culminating Project Student Task

Our school yard has been designated as a community playground. You are an architect planner. You must decide what equipment you will include in your playground and how large an area you need for each equipment? The area of the playground is in sq feet. Your playground must contain a swimming pool (Area=?). You will submit your proposal for the design of the playground. You can either make a three dimensional model or a blue print for your playground.

The planning committee requests the following documents in your proposal;

Floor plan of the whole playground

Floor plan of 3 pieces of playground equipment

Floor plan of a swimming pool

In a Community Board approval application, calculate the square footage of the swimming pool and each of the 3 pieces of playground equipment. If the sum of these areas is less than the area of the entire playground (which it should be), explain how the unused space can be used. For example, as path ways, places for parents to sit and supervise, etc.

In a NYC Department of Buildings safety application, explain how the swimming pool will be kept clean. Research, or your teacher will provide, the chemicals (chlorine, antibiotics, etc.) used in a swimming pool, as well as the concentration (ratio of mL of chemical to Liters of water, for example) used. Using this information, indicate in the safety application exactly what amount (capacity) of each chemical will be used, based on the concentration that you researched or your teacher provided.

Key Concepts:

Built Environment with focus on community architecture

Analysis, inquiry and inferential thinking

Estimation, proportional reasoning, scale, measurement

Design concepts and process

Model making, representation

Rubric for Building a playground

Level	Understanding 60%	Product 30%	Presentation 10%
4	High level of understanding is demonstrated through evidence of independent application, subtle connections, and extensive and valid evidence to support all major claims and assertions.	Composition is extremely well organized and fully developed; with extensive evidence of original ideas and assertions supported by consistent evidence of independent research.	Culminating presentation is characterized by highly effective attention to the needs of the audience as well as creative use of visual aids to reinforce coherence, development, and persuasiveness.
3	Adequate level of understanding is demonstrated through some original insights and sections that are well developed; other sections need additional evidence to support fully with evidence all major claims and assertions	Composition is generally clearly organized, with some sections fully developed through original analysis, but other sections would benefit from greater attention to supporting details and elaborations.	Culminating presentation is characterized by a straight forward but underdeveloped approach, with some use of visual aids and generally a clear understanding and responsiveness to audience needs.
2	Incomplete level of understanding is demonstrated through an account that contains some sections with original insight supported with adequate evidence; many aspects need much more development and evidence to make a convincing, complete, and insightful argument.	Composition is somewhat superficial in its approach, with a tendency towards summary and highlights and with little attention to original analysis; much greater attention to supporting details, relevant evidence, and coherence of organization.	Culminating presentation is brief and lacks overall evidence of attention to the needs of the audience; there is little use of visual aid to lend coherence to the presentation's organization, and there is a consistent need for further explanation and elaboration through supporting evidence.
1	Little evidence of deep understanding is demonstrated as a result of a generally superficial account that tends to summarize rather than analyze key ideas; many aspects of the argument are sketchy or underdeveloped with little, if any, attention to balance and reliable evidence to support claims and assertions.	Composition is extremely superficial in its approach to presenting and supporting and original thesis and related supporting evidence claims; there is little evidence of original analysis for insight; and overall writing is poorly organized, with little, if any, attention to and overall organizational plan or use of transitional expressions.	Culminating presentation is inadequate, lacking any attention to the needs and background of the audience. Ideas are consistently summarized with no attention to the need to support and express them with power and conviction. No evidence is presented of the need to organize information and claims visually.