



Marietta City Schools
2023–2024 District Unit Planner

Honors Geometry: Concepts & Connections

Unit title	Unit 7: Modeling with Equations and Measurement	MYP year	5	Unit duration (hrs)	13 hours
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Mastering Content and Skills through INQUIRY (Establishing the purpose of the Unit): *What will students learn?*

GA DoE Standards

Standards

G.GSR.9 Develop informal arguments for geometric formulas using dissection arguments, limit arguments, and Cavalieri's principle; solve realistic problems involving volume; explore and visualize relationships between two-dimensional and three-dimensional objects to model and explain real-life phenomena.

G.GSR.9.1 Use volume formulas for prisms, cylinders, pyramids, cones, and spheres to solve problems including right and oblique solids.

Fundamentals

- Students should be able to verify experimentally the formulas for the volume of a cylinder, pyramid, sphere, prism and cone; emphasize volume as the product of the area of the base and the height for both prisms and cylinders.
- Students should be able to use and explain Cavalieri's Principle to show that the volume of an oblique solid can be found using right solids.
- Students should find the volume of solids and composite solids to explain real-life phenomena.

Terminology

- Prism – a solid figure that has the same cross section all along its length

G.GSR.9.2 Use geometric shapes, their measures, and their properties to describe objects and approximate volumes.

Strategies and Methods

- Students should be able to choose the appropriate geometric solid to approximate volumes of irregular objects.

Example

- Modeling a tree trunk or a human torso as a cylinder

G.GSR.9.3 Apply concepts of density based on area and volume in modeling situations.

Strategies and Methods

- Students should be able to choose the appropriate geometric figure or solid to approximate density of irregular objects in a geometric situation.

Example

- Persons per square mile, fish per cubic feet of a fish tank

G.MM.1: Apply mathematics to real-life situations; model real-life phenomena using mathematics.

G.MM.1.1 Explain mathematically applicable problems using a mathematical model.

Fundamentals

- Students should be provided with opportunities to learn mathematics through the exploration of real-life problems.

- Mathematically applicable problems are those presented in context where the context makes sense, realistically and mathematically, and allows for students to make decisions about how to solve the problem (model with mathematics).

G.MM.1.2 Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.

Fundamentals

- Students should be able to use the content learned in this course to create a mathematical model to explain real-life phenomena.

G.MM.1.3 Using abstract and quantitative reasoning, make decisions about information and data from a mathematically applicable situation.

Fundamentals

- Students should be able to connect learning of geometric shapes and their properties to describe objects.
- Students should be able to apply geometric methods and data to make decisions about structures and solve real-world problems.

G.MM.1.4 Use various mathematical representations and structures with this information to represent and solve real-life problems.

Fundamentals

- Students should be able to construct a model by selecting and creating algebraic and geometric representations that describe relationships between variables in context.

Concepts/Skills to support mastery of standards

- Calculate volume of solids and composite solids
- Calculate missing measurements given volume of solids
- Estimate volume of irregular objects
- Calculate density with area and volume for solids and populations

Vocabulary

Base	Cavalieri's Principle	Cone	Cylinder	Density	Geometric Properties
Height	Irregular Object	Oblique Object	Prism	Pyramid	Right Solid
Sphere	Volume				

Notation

$V = B \cdot h$ $V = \frac{1}{3} \cdot B \cdot h$ $D = m / v$ Volume units of measure: m^3 , ft^3 , in^3 , etc Density units of measure: g/m^3 , kg/L^3 , $people/m^2$, etc.

Key concept	Related concept(s)	Global context
Relationships	Representation, Models	Globalization & Sustainability - Urban planning, strategy & infrastructure
Statement of inquiry		
Relationships between 3D models and representations can be used to help with urban planning and infrastructure.		
Inquiry questions		

Factual—

- What is Cavalieri's Principle?
- How are 2-dimensional cross-sections identified from 3-dimensional shapes?

Conceptual—

- How do you describe geometric formulas using informal arguments?
- What is the process to solve using geometric modeling of 3 dimensional shapes and volume calculation?
- How can density be used in conjunction with area and volume to model situations?
- Where do geometric models fit into the design problem process?

Debatable-

- Do all cross-sections of fluid shaped have the same relationship with volume as cross sections of rigid shapes?
- Are all design problems able to be solved using modeling with geometric shapes?

MYP Objectives	Assessment Tasks	
<i>What specific MYP objectives will be addressed during this unit?</i>	<i>Relationship between summative assessment task(s) and statement of inquiry:</i>	<i>List of common formative and summative assessments.</i>
MYP C Communication MYP D Applications	Students will be able to communicate using mathematical language and correct forms of mathematical representation to describe the process of calculating the volume of a composite solid. Students will be able to identify relevant information and apply math strategies to reach a correct solution in the real-life situation of determining more favorable brands when comparing volume and price of concrete brands.	<u>Formative Assessment(s):</u> MYP C/D - Volume <u>Summative Assessment(s):</u> Unit 7 Test - Volume and Density
Approaches to learning (ATL)		
MYP C - Volume Category: Communication Skills Cluster: Communication		

Skill Indicator: Use and interpret a range of discipline-specific terms and symbols

MYP D - Volume

Category: Thinking Skills

Cluster: Transfer

Skill Indicator: Change the context of inquiry to gain a different perspective

Learning Experiences

Add additional rows below as needed.

Objective or Content	Learning Experiences	Personalized Learning and Differentiation
G.GSR.9.1 G.GSR.9.2 Students will use their knowledge of shapes and volumes to estimate volume for irregular objects.	Approximating Volume of Irregular Objects - Part I and II (GA DOE) Description: In this learning plan, students will choose the appropriate geometric solid to approximate the shape of an irregular object and use the formula to estimate their volume. Learning Goal: <ul style="list-style-type: none">I can choose the appropriate geometric solid to approximate volumes of irregular objects.	<ul style="list-style-type: none">- Provide hands on volume manipulatives to “create” the irregular shapes- Extend: Challenge students to calculate volume of irregular shapes within the classroom

Content Resources

Textbook Correlation: enVision A|G|A - Geometry

G.GSR.9.1 - Lesson 11-1, 11-2, 11-3, 11-4

G.GSR.9.2 - Lesson 11-1, 11-2, 11-3, 11-4

G.GSR.9.3 - Lesson 7-1, 9-1, 11-2