Unit 3: Volume

Content Area: **Math**
Course(s):
Time Period:
Length: **5 weeks**
Status: **Published**

State Mandated Topics Addressed in this Unit

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N/A	N/A

Unit Summary

Unit #3 focuses on working with dimensions of 2D and 3D shapes. Artists will develop formulas for volume and then apply them. We will also look at the cross section of three dimensional objects and explore using rotations to form 3D shapes. This ability to visualize and describe this process will be helpful later when they take Calculus (especially at the honors level).

Learning Objectives

- Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments.
- Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.
- Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.

Essential Skills

- Give informal arguments for the formulas of circumference and area of a circle.
- Give informal arguments for the volume of a cylinder, a pyramid, and a cone.
- Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.
- Use dissection arguments, Cavalieri's principle, and limit arguments.
- Use the volume formula for cylinders, pyramids, cones, and spheres to solve problems.

Standards

MATH.9-12.G.GMD.A.1	Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments.
MATH.9-12.G.GMD.A.3	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.
MATH.9-12.G.GPE.B.7	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.

Instructional Tasks/Activities

G.GMD.A.1 Activity #1 – Developing Circumference Formula

- g.gmd.a.1activity1.docx
- g.gmd.a.1activity1ans.pdf

G.GMD.A.1 Activity #1a – Learning about Pi

- g.gmd.a.1activity1a.docx
- g.gmd.a.1activity1aans.pdf

G.GMD.A.1 Activity #2 – Developing Parallelogram Formula

- g.gmd.a.1activity2.docx
- g.gmd.a.1activity2ans.pdf

G.GMD.A.1 Activity #3 – Developing Triangle Formula

- g.gmd.a.1activity3.docx
- g.gmd.a.1activity3ans.pdf

G.GMD.A.1 Activity #4 – Developing Trapezoid Formula

- g.gmd.a.1activity4.docx
- g.gmd.a.1activity4ans.pdf

G.GMD.A.1 Activity #5 – Developing Regular Polygon Formula

- g.gmd.a.1activity5.docx
- g.gmd.a.1activity5ans.pdf

G.GMD.A.1 Activity #6 – Developing Circle Formula

- g.gmd.a.1activity6.docx
- g.gmd.a.1activity6ans.pdf

G.GMD.A.1 Activity #7 – Investigating Volume Formula for Pyramids

- g.gmd.a.1activity7.docx
- g.gmd.a.1activity7ans.pdf

- G.GMD.A.1 Activity #1 – Developing Circumference Formula
- G.GMD.A.1 Activity #1a – Learning about Pi
- G.GMD.A.1 Activity #2 – Developing Parallelogram Formula
- G.GMD.A.1 Activity #3 – Developing Triangle Formula
- G.GMD.A.1 Activity #4 – Developing Trapezoid Formula
- G.GMD.A.1 Activity #5 – Developing Regular Polygon Formula
- G.GMD.A.1 Activity #6 – Developing Circle Formula
- G.GMD.A.1 Activity #7 – Investigating Volume Formula for Pyramids

Assessment Procedure

- Class discussions
- Classroom Total Participation Technique
- Classwork/homework
- Compare/contrast journals
- DBQ
- Electronic active responders
- Essay
- Exit Ticket/Entrance Ticket/Do Now
- Identify the error problems
- Journal / Student Reflection
- Kahoot
- Other named in lesson
- Peer Review
- Performance
- Problem Correction
- Project
- Quiz
- Response and analysis questions
- Rubric
- Teacher Collected Data
- Teacher observation
- Test
- Worksheet

Recommended Technology Activities

- Appropriate Content Specific Online Resource
- Appropriate Content Specific Online Resource
- Copy/Paste Content Specific Link Here
- Copy/Paste Content Specific Link Here
- Copy/Paste Content Specific Link Here
- Gimkit
- GoGuardian
- Google Classroom
- Google Docs
- Google Slides
- Google Slides
- Kahoot
- MagicSchool AI
- Other- Specified in Lesson
- Quiziz
- Screencastify
- Use of ChromeBooks for research and simulations, calculator activities throughout the unit as appropriate.

Accommodations & Modifications & Differentiation

Accommodations and Modifications should be used to meet individual needs. Their IEP and 504 plans should be used in addition to the following suggestions.

Special Education

Modifications and accommodations to this unit will be based on individual IEP needs and through the collaboration of the classroom teacher and the special education teacher under the direction of the Supervisor of Special Education.

Gifted and Talented

- Compare & Contrast
- Conferencing
- Debates

- Jigsaw
- Peer Partner Learning
- Problem Solving
- Structured Controversy
- Think, Pair, Share
- Tutorial Groups

Instruction/Materials

- alter format of materials (type/highlight, etc.)
- color code materials
- eliminate answers
- extended time
- extended time
- large print
- modified quiz
- modified test
- Modify Assignments as Needed
- Modify/Repeat/Model directions
- necessary assignments only
- Other (specify in plans)
- other- named in lesson
- provide assistance and cues for transitions
- provide daily assignment list
- read class materials orally
- reduce work load
- shorten assignments
- study guide/outline
- utilize multi-sensory modes to reinforce instruction

Environment

- alter physical room environment
- assign peer tutors/work buddies/note takers
- assign preferential seating
- individualized instruction/small group
- modify student schedule (Describe)
- other- please specify in plans
- provide desktop list/formula

Honors Modifications

Resources

- http://geometrycommoncore.com
- https://www.engageny.org/resource/high-school-geometry
- https://education.ti.com/en/timathnspired/us/standards-search

- http://geometrycommoncore.com
- https://education.ti.com/en/timathnspired/us/standards-search
- https://www.engageny.org/resource/high-school-geometry