Unit 5: Area and Volume

Content Area: **Template**
Course(s):
Time Period: **Full Year**
Length: **Full Year**
Status: **Published**

UNIT RATIONALE

Students' experience with two-dimensional and three- dimensional objects is extended to include informal explanations of circumference, area, and volume formulas. Additionally, students apply their knowledge of two-dimensional shapes to consider the shapes of cross-sections and the result of rotating a two-dimensional object about a line.

ESSENTIAL QUESTIONS

- How are one, two, and three dimensional formula related?
- How do the surface areas and volumes of similar solids compare?
- How do two dimensional shapes create three dimensional objects?

STANDARDS

NEW JERSEY STUDENT LEARNING STANDARDS: CONTENT AREA

New Jersey (NJSLS) - High School - Mathematics (2020)

MA.G-GMD.A	Explain volume formulas and use them to solve problems
MA.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.
MA.G-GMD.A.2	Give an informal argument using Cavalieri’s principle for the formulas for the volume of a sphere and other solid figures.
MA.G-GMD.A.3	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.
MA.G-MG.A	Apply geometric concepts in modeling situations
MA.G-MG.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).

New Jersey (NJSLS) - K-12 - Math Practice Standards (2020)

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.4	Model with mathematics.

NEW JERSEY STUDENT LEARNING STANDARDS: CAREER READINESS, LIFE LITERACIES AND KEY SKILLS

PFL.9.1.12.CFR.2	Summarize causes important to you and compare organizations you seek to support to other organizations with similar missions.
PFL.9.1.12.CFR.4	Demonstrate an understanding of the interrelationships among attitudes, assumptions, and patterns of behavior regarding money, saving, investing, and work across cultures.
TECH.9.4.12.CT.4	Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.
TECH.9.4.12.TL.4	Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).

NEW JERSEY STUDENT LEARNING STANDARDS: COMPUTER SCIENCE AND DESIGN THINKING

CS.9-12.8.1.12.AP.5	Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects.
CS.9-12.8.2.12.NT.1	Explain how different groups can contribute to the overall design of a product.

PRE-ASSESSMENTS

Non-curricular tasks to identify student readiness in respect to problem solving.

Students will collaboratively solve real- world tasks.

INSTRUCTIONAL PLAN

MODULE 1

Student Learning Intentions (SLI) WALT: (We are learning to…)	We are learning to find Surface area and volume of three dimensional shapes
Student Learning Strategies	Students will complete INB pages

Success Criteria	I can find the surface area of a prism, cone, pyramid and sphere. I can find the volume of a prism, cone, pyramid, and sphere.
Formative Assessment (drives instructional decisions)	Formative assessment will be determined by student responses to the questions in the activity.
Activities and Resources	INB pages and examples will be complete
Suggested Modifications	Some students will need additional time to complete examples.

MODULE 2

Student Learning Intentions (SLI) WALT: (We are learning to…)	We are learning to build paper rollercoasters that demonstrate the effects of Newton's three laws of motion
Student Learning Strategies	Students will be building paper rollercoasters that will give a marble a ride of 30 seconds.
Success Criteria	I can build a funnel. I can build a curved track I can build a loop.
Formative Assessment (drives instructional decisions)	Formative assessment will be determined by student responses to the questions in the activity.
Activities and Resources	Powerpoints and worksheets

Suggested Modifications	Have students bring tape and group them into pairs

Day by Day instructions.docx

Planning_-_Video_watching_handout.docx

Handout on three laws of motion video.docx

Newton_s_laws_of_motion_video_links.docx

paper roller coaster template kit 2022-07-11.pdf

Paper Roller Coasters.pdf

Rubric.docx

MODULE 3

Student Learning Intentions (SLI) WALT: (We are learning to…)	We are learning to build a tetrahedral Kite
Student Learning Strategies	Students will build a kite that is made of 4 pyramids
Success Criteria	I can fly my kite for
Formative Assessment (drives instructional decisions)	Formative assessment will be determined by studen responses to the questions in the activity.
Activities and Resources	Students will use straws, string and tissue paper to

	build a kite
Suggested Modifications	Students can do this project individually or with partners.

build_a_tetrahedral_kite.pdf

MODULE 4

Student Learning Intentions (SLI) WALT: (We are learning to…)	We are learning to use surface area and volume calculations to determine supplies needed to flip a house.
Student Learning Strategies	Students will determine how much paint, flooring, ec will be needed to redo a house.
Success Criteria	I can find surface areas. I can find volumes. I can find areas of composite figures
Formative Assessment (drives instructional decisions)	Formative assessment will be determined by studen responses to the questions in the activity.
Activities and Resources	Students will need the handout and a calculator
Suggested Modifications	Have three dimensional shapes in the classroom so that students can visualize some of the shapes.

House_Flip.pdf

MODULE 5

Student Learning Intentions (SLI) WALT: (We are learning to…)	We are learning to find surface areas of items that are found at home.
Student Learning Strategies	Students will calculate surface areas of products they have at home.
Success Criteria	I can find surface areas. I can determine what formula to use. I can measure accurately
Formative Assessment (drives instructional decisions)	Formative assessment will be determined by studen responses to the questions in the activity.
Activities and Resources	Handout, ruler, calculator
Suggested Modifications	Help students determine shapes of containers.

Grocery_Project.pdf

REFLECTIONS

This unit was the most fun for the students. The rollercoaster project was a favorite for many students and the kite project was a close second! The rollercoaster project took longer than expected.

INTERDISCIPLINARY CONNECTIONS: NEW JERSEY STUDENT LEARNING STANDARDS FOR ELA, SOCIAL STUDIES, SCIENCE AND/OR MATHEMATICS