WAMC Lab Template

Math Concept(s): Volume and sketching

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The following documents are attached:

- Lab Description
- Student Handout(s)
- Rubric and/or Assessment Tool

Lab Plan

Lab Title: Volume Lab

Prerequisite skills: Students should have basic knowledge about calculating square footage and volume of different objects using rulers and tape measures. They should also be familiar with drawing simple 3-D shapes.

Lab objective: The purpose of this lab is to build understanding of calculating volume of objects in different units and converting between the different units.

Standards:

Mathematics K–12 Learning Standards:

- HSN-Q: Reason quantitatively and use units to solve problems.
- 7.G: Solve real-life and mathematical problems.
- 8.EE.C: Analyze and solve linear equations and pairs of simultaneous linear equations.

Standards for Mathematical Practice:

- 1. Make sense of problems and persevere in solving them.
- 4. Model with mathematics
- 6. Attend to precision

K-12 Learning Standards-ELA (Reading, Writing, Speaking & Listening):

- Speaking and Listening: Comprehension and Collaboration
- B. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed.
- C. Propel conversations by posing and responding to questions that probe reasoning and evidence.

Technology

- 1. Empowered learner. Students leverage technology to take an active role in choosing, achieving and demonstrating competency in their learning goals, informed by learning sciences.
- 5. Computational thinker. Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technology.

Engineering

- HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

Leadership/21st Century Skills:

21st Century Interdisciplinary themes (Check those that apply to the above activity.)

☐ Global Awareness ☐ Financial/Economic/Business/Entrepreneurial Literacy ☐ Civic Literacy
☐ Health/Safety Literacy ☐ Environmental Literacy

21st Century Skills (Check those that students will demonstrate in the above activity.)

LEARNING AND INNOVATION

Creativity and Innovation
☒ Think Creatively
☒ Work Creatively with Others
☒ Implement Innovations

Critical Thinking and Problem Solving
☒ Reason Effectively
☒ Use Systems Thinking
☒ Make Judgments and Decisions
☒ Solve Problems

Communication and Collaboration
☒ Communicate Clearly
☒ Collaborate with Others

INFORMATION, MEDIA & TECHNOLOGY SKILLS

Information Literacy
☐ Access and Evaluate Information
☐ Use and manage Information

Media Literacy
☐ Analyze Media
☐ Create Media Products

Information, Communications and Technology (ICT Literacy)
☐ Apply Technology Effectively

LIFE & CAREER SKILLS

Flexibility and Adaptability
☐ Adapt to Change
☐ Be Flexible

Initiative and Self-Direction
☒ Manage Goals and Time
☐ Work Independently
☐ Be Self-Directed Learners

Social and Cross-Cultural
☒ Interact Effectively with Others
☒ Work Effectively in Diverse Teams

Productivity and Accountability
☐ Manage Projects
☒ Produce Results

Leadership and Responsibility
☒ Guide and Lead Others
☐ Be Responsible to Others

Teacher Preparation: (What materials and set-up are required for this lab?)

Materials

- Pencil and paper
- Tape measures, rulers, measuring wheels
- Calculators

Set-Up Required:

- Identify 8-10 objects of varying sizes in the classroom that can be used to calculate volume. Prepare additional items, if necessary.

Lab Organization Strategies:

Leadership (Connect to 21st Century Skills selected):

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Cooperative Learning:

- Students will be in groups of 2-3. One student will measure the objects and the other students will sketch out the shape and dimensions.

Timeline:

- Students are expected to understand how to measure objects and calculate volume in different units including cubic inches, cubic feet, and cubic yards.

Timeline:

- This lab can be conducted in 50-60 minutes. 5-10 minutes for lab introduction, 3 minutes for group creation, 20 minutes for measurements, 20 minutes for calculations, and 10 minutes for classroom discussion.

Post Lab Follow-Up/Conclusions:

Discuss real world application of learning from lab

- Calculate necessary quantities of materials for construction processes including excavation, concrete, insulation, and landscape materials.

Career Applications

- Machinery operation, concrete finishing, insulation, and landscaping

Optional or Extension Activities

- Many items can be measured for volume and if students desire additional learning opportunities, they will be challenged to calculate the volume of the classroom. For further challenge, how many cubic yards of concrete would be necessary to fill the entire classroom?

Volume Lab Worksheet

Name: _____

Directions: Identify 5 objects of various sizes in the classroom you can measure for volume. Sketch each object in 3-D and annotate the dimensions of each object. Calculate the volume of each object in the most appropriate unit which could be: cubic inches, cubic feet, or cubic yards.

Object #1

Object #2

Object #3

Object #4

Object #5

Bonus question: How many cubic yards of concrete would be required to fill the classroom?