WAMC Lab Template

Math Concept(s): Geometry

Source / Text:

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Attach the following documents:

Lab Instructions

Student Handout(s)

Rubric and/or Assessment Tool

Indicate "*SPECIFIC*" relationship to Science, Technology, or Engineering

Volume of cylinders or cones is needed for fields such as engineering or construction.

Short Description (Be sure to include where in your instruction this lab takes place):

In the classroom students will compare volumes of different cups and cones through exploration and applying volume formulas. Students can use rice to determine which shape has the greatest volume or calculate volume using the formula

Lab Plan

Lab Title: Cup or Cone?

Prerequisite skills: Solving equations, using a tape measure.

Lab objective: Students will be able to determine the volume of different figures and determine which shape has the greatest volume.

Standards:

Mathematics K–12 Learning Standards:

- CCSS.MATH.CONTENT.HSG.GMD.A.3
  Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.

Standards for Mathematical Practice:

- 2. Reason abstractly and quantitatively. 4. Model with Mathematics.

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

- CCSS.ELA-LITERACY.W.6.1.A
  Introduce claim(s) and organize the reasons and evidence clearly.

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	INFORMATION, MEDIA & TECHNOLOGY SKILLS	LIFE & CAREER SKILLS	**Productivity and Accountability**
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 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	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	☐ 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

- Cylinders
- Cones
- Rice
- Ruler or measuring tape
- Calculator

Set-Up Required:

- Have materials available to students
- Copies of student directions

Lab Organization Strategies:

Leadership (Connect to 21st Century Skills selected):

- Critical thinking and Problem Solving
- Communication and Collaboration
- Initiative and Self-Direction

Cooperative Learning:

- Students will work in groups to compare the volume of cylinders and cones and conclude which has the greatest volume

Expectations:

- Students will complete all components of the lab with precision and communicate their discovery effectively.

Timeline:

- 50 minutes

Post Lab Follow-Up/Conclusions:

Discuss real world application of learning from lab

- Students will be able to use volume formulas to determine which product to purchase when comparting two different options
- Students will be able to use volume formulas to maximize or minimize volume in their career such as pool design, tank design, etc

Career Applications

- Construction, engineering, consumer science

Optional or Extension Activities

- Continue the exploration with different prisms

- Identify how to maximize volume of different figures

Lab Instructions (teacher):

- Begin with a discussion of why students may want to know which figures have a greater volume (buying products, etc.)
- Split class into groups of 3 or 4 and pass out materials
- Have students work through student instruction sheet and monitor their progress
- When students complete student instructions give them exit slip and have them complete it
- Clean up all materials

Rubric:

1	2	3	4
NO participation in class/group discussion and activity. Did not complete exit task or calculations.	Low participation in class/group discussion and activity. Completed exit task partially or incorrectly. Several errors in group calculations.	Participation in class/group discussion and activity. Completed exit task. One or two errors in group calculations.	Participation in class/group discussion and activity. Completed exit task. No errors in group calculations.

Which Container? Lab

Student Instructions

Objective: Work in groups to develop an understanding of volume and how to apply that in everyday life.

Instructions:

- Once in your groups collect materials
- Discuss with your group which figure you think has the greatest volume and why (think critically and be clear in your explanations)
- Test the volume of one figure by filling it with rice
- Compare the volume of this figure to another by filling your second figure with the rice in the first figure
- Discuss with your group if based on the rice the figures have the same volume.
- Which figure has a greater volume? A smaller volume?
- Calculate the actual volume of both figures using the volume formulas
- Record your calculations on a piece of paper to be turned in (make sure all group members participate in the calculations and recording
- Clean up your work space and complete the exit task for the lab before leaving

Exit Task:
Which figure had the greatest volume?

Was this what you predicted? Why was your prediction right/ wrong?

How can you apply what we know about volume?