

Lab Framework

Text: CORD

Unit number and title: Unit 3 – Measuring in English and Metric Units

Short Description: Students fill an irregular flower pot with water, measure that in mL, and then convert to a solid volume measure in order to accurately fill the flower pot with the correct number of sand/cat litter/soil.

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Lab Title

Fill my Flower Pot

LAB PLAN

TEACHER: Teacher Prep/ Lesson Plan

- **Lab Objective**

—To show students how liquid volume measures are related to solid volume measures. (and the proper measuring process)

- **Statement of pre-requisite skills needed** (i.e., vocabulary, measurement techniques, formulas, etc.)

Student must be able to: perform basic arithmetic, accurately read volume measures, use the required materials correctly, and convert between measurement units

- **Vocabulary**

graduated cylinder, bulb syringe

- **Materials List**

graduated cylinders

bulb syringes

various sizes of flower pots (or other water-tight containers)

water

cat litter/soil/sand

a measured (in cubic inches) vessel

paper towels

extra water (in washed out milk cartons)

- **State Standards addressed**

Math:

7.2.1 Solve single- and multi-step problems involving conversions within or between

G.6.F Solve problems involving conversions within and between systems, including those involving derived units, and analyze solutions in terms of reasonableness of solutions and appropriate units.

A1.8.G Synthesize information to draw conclusions, and evaluate the arguments and conclusions of others.

Reading/Writing:

1.2 Use style appropriate to the audience and purpose. Use voice, word choice, and sentence fluency for intended style and audience.

1.3 Apply writing conventions. Know and apply correct spelling, grammar, sentence structure, punctuation, and capitalization.

2.1 Write for different audiences.

- 2.2. Write for different purposes, such as telling stories, presenting analytical responses to literature, persuading, conveying technical information, completing a team project, and explaining concepts and procedures.
 - 2.3 Write in a variety of forms, including narratives, journals, poems, essays, stories, research reports, and technical writing.
 - 2.4 Write for career applications.
 - 3.1 Pre-write—generate ideas and gather information.
 - 3.2 Draft—elaborate on a topic and supporting ideas.
 - 3.3 Revise—collect input and enhance text and style.
 - 3.4 Edit—use resources to correct spelling, punctuation, grammar, and usage.
 - 3.5 Publish—select a publishing form and produce a completed writing project to share with chosen audience.
 - 4.1 Assess own strengths and needs for improvement. Analyze effectiveness of own writing and set goals for improvement.
 - 4.2 Seek and offer feedback.
- **Leadership Skills**
Group work. 3 people per group are allowed.
Roles are:
 - Recorder (keeps track of all data in an organized fashion)
 - Materials Technician (collects and returns materials)
 - Facilitator (ultimately responsible for the group, must group on task, on time, and is the only member who can ask questions of the teacher)
 - **SCAN Skills/Workplace Skills**
Writing: A. Communicates thoughts, ideas, information, and messages in writing
 B. Records information completely and accurately
Arithmetic: A. Performs basic computations
Mathematics: B. Uses quantitative data to construct logical explanations for real world situations
 C. Expresses mathematical ideas and concepts orally and in writing
 D. And understands the role of occurrence and prediction of events.
Listening: A. Receives, attends to, interprets, and responds to verbal messages and other cues such as body language in ways that are appropriate to the purpose
 B. For example, to comprehend
 C. To learn
 D. To critically evaluate
 E. To appreciate
 F. Or to support the speaker
Speaking: A. Organizes ideas and communicates oral messages appropriate to listeners and situations
 B. Participates in conversation, discussion, and group presentations
 C. Selects an appropriate medium for conveying a message
 E. Speaks clearly and communicates a message
 F. Understands and responds to listener feedback
 - **Set-up information**
 “Litter filling station” must be set up prior to the lab. This requires a bag of litter (get the cheap stuff, it doesn’t matter!), and a pre-measured ‘scoop.’
 Students must have access to water, and you may also want to have some extra on hand (perhaps in a washed out milk carton) for top-offs (or in case of spillage).

- **Lab organization**(-Grouping/leadership opportunities/cooperative learning expectations; -**Timeline required**)
see student instructions
- **Teacher Assessment of student learning** (scoring guide, rubric)
Students will be assessed on how accurately they fill their flower pot with litter. Exactly right would be 100%. Off by a centimeter or so would be 90%, etc.
- **Summary of learning** (to be finished after student completes lab)
 - discuss real world application of learning from lab
 - opportunity for students to share/present learningStudents show their ability to convert from the volume of water in mL to cubic centimeters, and then to cubic inches.
- **Career Applications**
Any career that deals with packaging or the volume measurement of fluids and/or solids. (*Medical careers, advertising, construction, food industry, landscapers, pool technicians, engineers, personal/at home aides, cosmetologists, agricultural workers, painters*)

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LAB TITLE: Fill my Flower Pot

STUDENT INSTRUCTIONS:

- **Statement of problem addressed by lab**
How are liquid volume measures and solid volume measure (and their units) related?
- **Grouping instructions and roles**
3 people per group are allowed.
Roles are:
 - Recorder (keeps track of all data in an organized fashion)
 - Materials Technician (collects and returns materials)
 - Facilitator (ultimately responsible for the group, must group on task, on time, and is the only member who can ask questions of the teacher)
- **Procedures** – steps to follow/instructions
 1. Select a flower pot.
 2. Fill the flower pot (carefully!) with water. Make sure it gets filled all the way to the top.
 3. Carefully measure the volume (in mL) of all the water in your pot. You may want to use a bulb syringe to get out some of the water on top so you don't spill. Measure all of the water using a graduated cylinder.
 4. Once you know how many mL fill your flower pot, write that here: _____.
 5. Make sure your flower pot is completely dry.
 6. 1 milliliter = 1 cubic centimeter. Convert your mL measurement to cubic centimeters. Convert your cubic centimeter measurement to inches:

 7. How many cm^3 will it take to fill your flower pot? _____
How many in^3 will it take to fill your flower pot? _____

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8. You're almost ready to be tested on your measurement! As a team, you will need to bring your flower pot to the "litter filling station." Here you will see a scoop. This scoop can hold exactly 44 in^3 of litter. How many scoops will you need to fill your flower pot? (Make it exact!) _____

9. Take your flower pot to the "litter filling station." Before you begin you will need to announce how many scoops you plan to use. That is how many you MUST use. You can not adjust during the filling process. Filling your pot exactly will earn your team 100% on this lab. Good luck!

- **Outcome instructions**
see above
- **Assessment instructions** (peer-teacher)
see above

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