

Lab Framework

Text: CORD

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

Short Description: In this activity, students will develop their number sense by determining if one million one dollar bills will fit in a standard size suitcase. They will first figure the dimensions in inches and then convert to centimeters. This activity is centered around the concept of volume

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Lab Title

A Million in One

LAB PLAN

TEACHER: Teacher Prep/ Lesson Plan

- **Lab Objective**
 - develop intuition about number relationships
 - estimate computational results
 - develop skills in using appropriate technology
- **Statement of pre-requisite skills needed** (i.e., vocabulary, measurement techniques, formulas, etc.)
 1. use of measurement tools (tape or ruler)
 2. use of calculator
 3. knowledge of volume formula
 4. conversion between English and Metric system
- **Vocabulary**

Area	Length x width, measured in square units The amount of surface available
Capacity (volume)	Length x width x height, the amount of a substance a container can hold. For liquids, measured in liters or gallons; units are cubed units.
Meter or centimeter	Metric measurement for length, standard measurement
Yard or foot or inch	English measurement for length, standard measurement
Weight or mass	Measured in grams or kilograms (metric) Or ounces and pounds in English system

- **Materials List**
 1. standard size suitcase (24 x 18 x 10) inches
 2. 120 \$1.00 play money bills or paper cut in the dimensions of 6" x 2.5".
 3. balance scale
 4. calculator and data sheet

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- **State Standards addressed**

Math: 1.2 Understand and apply concepts and procedures from measurements.

5.1.1 Apply multiple mathematical concepts and procedures in a given problem or situation.

5.1.2 Understand how to use different mathematical models and representations in the same situation.

5.3 Relate mathematical concepts and procedures to real-world situations.

Reading: 1.2 Use vocabulary (word meaning) strategies to comprehend text.

1.2.2 Apply strategies to comprehend words and ideas.

3.1 Read to learn new information.

3.3 Read for career applications.

Writing: 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.

- **Leadership Skills**

1.3 The student will demonstrate oral, interpersonal, written, and electronic communication and presentation skills and understand how to apply those skills.

1.4 The student will be involved in activities that require applying theory, problem-solving, and using critical and creative thinking skills while understanding outcomes of related decisions.

1.5 The student will demonstrate self-advocacy skills by achieving planned, individual goals.

- **SCAN Skills/Workplace Skills**

1.1 The student will demonstrate the ability to identify, organize, plan, and allocate **resources**. This means that the student is able to demonstrate allocating time, money, materials, space, and staff.

1.2 The student will demonstrate the ability to acquire and use **information** in a family, community, business and industry settings. This means that the student can acquire and evaluate data, organize and maintain files, interpret and communicate, and use computers to process information.

- **Set-up information**

How many times in a movie or on TV have you seen people exchange money in suitcases? Name some movies you have seen this in and how much money did they claim to have in the suitcase? Do you think these people were thinking about volume when they made these money exchanging deals? Well, it is a volume problem that we are going to solve today. By the end of class you will be able to answer these questions;

1. Can one million one dollar bills fit in a standard size suitcase?
2. If not, which denomination would work (\$10s or \$20's?)
3. What is the weight of one million one dollar bills?

- **Lab organization(-Grouping/leadership opportunities/cooperative learning expectations; -Timeline required)**

1. Have students work with a partner (lab partner for life!)
2. One student comes forward to collect materials
3. Give them about 15 minutes to calculate the one million one dollar bills, have teacher sign off before proceeding to rest of lab sheet.
4. Continue to work on problem, clean up with 10 minutes of class left.
5. Have students present their findings, compare struggles, insights, etc.
6. Hand in lab sheet and conclude class.

- **Teacher Assessment of student learning** (scoring guide, rubric)
 - Student lab sheet (see scoring on sheet)
 - Daily work points for set up, clean up and on task behavior
- **Summary of learning** (to be finished after student completes lab)
 - discuss real world application of learning from lab
 - opportunity for students to share/present learning
 - When would you use a concept like this? Give them time to name what they have recorded on their lab sheets?
 - Students present findings to rest of class about the best way to package one million dollars in a suitcase.

- **Optional activities**

Have students research online how banks and security companies transport money and how they package it. How does the US treasury transport money, or even better, get money into circulation?

- **Career Applications**

Volume calculations are used in every career, but in this case if you are not a criminal or member of FBI, maybe you work for something less exciting like a bank or security company who are in the business of transporting and packaging money.

Math Council

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STUDENT INSTRUCTIONS: How many times in a movie or on TV have you seen people exchange money in suitcases? Name some movies you have seen this in and how much money did they claim to have in the suitcase? Do you think these people were thinking about volume when they made these money exchanging deals? Well, it is a volume problem that we are going to solve today. By the end of class you will be able to answer these questions;

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- **Statement of problem addressed by lab**

1. Can one million one dollar bills fit in a standard size suitcase?
2. If not, which denomination would work (\$10s or \$20's?)
3. How much does one million dollars weigh?

- **Grouping instructions and roles**

Please be seated by your lab partner for life, and one partner should gather the materials needed for this lab.

- **Materials List**

- standard size suitcase dimensions (24" x 18" x 10")
- 20 \$1.00 play money bills or paper cut in the dimensions of 6" x 2.5".
- balance scale
- calculator and data sheet

- **Procedures** – steps to follow/instructions

1. Measure your \$1.00 bill and record the dimensions
 - i. Area= length x width _____sq. inches
2. Now stack up all twenty one dollar bills and calculate the volume of the stack
Volume = length x width x height = _____ in³
3. Measure the length, width and depth of the suitcase. Calculate the inside volume of the suitcase.
Length _____ inches
Width _____ inches
Depth _____ inches

Volume of suitcase _____

Have your teacher initial here that you have completed the lab this far. _____

4. How many stacks of 20 one dollar bills make one million dollars? (hint: this would be a division problem). Show your work here.

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5. What is the volume of these stacks? Show your work here.

6. Will one million one dollar bills fit in our standard size suitcase? State your explanation as a conclusion, supporting your conclusion with your calculations.

7. Now convert your calculations to centimeters. (Hint: 2.54 cm = 1 inch)

8. Now figure the weight on one million one dollar bills. Weigh a stack of 20 one dollar bills and record here _____ grams.
9. Using your number of stacks from above, calculate how much one million dollars would weigh. Show your work here. Could you carry this?

Now convert your weight measurements to pounds.

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10. Write a concluding statement about money in suitcases. What denomination of bills do you think they use? Is it feasible that a

person could easily carry this suitcase? Use your data to support your conclusion.



- **Outcome instructions**

When you are done:

1. clean up your area
2. return your materials to the lab box
3. Have your teacher look at your lab sheet and ok it's completion
4. turn in your lab sheet, Great job!!

- **Assessment instructions** (peer-teacher)

Scoring guide:

Calculations: 10 point with your work
Conclusions: 10 points
On task behavior: 10 points

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