

Lab Template

Text: AMME

Unit number: 3 **Title of unit:** 3 Label Explosions

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Attach the Following Documents:

- 1. Lab Instructions**
- 2. Student Handout(s)**
- 3. Rubric and/or Assessment Tool**

Short Description:

Students use dimensional analysis skills to try and accurately predict the number of objects in a container whose quantity is known. The lab takes place in a classroom with 15 to 25 students

Bean Counter Lab

LAB PLAN

TEACHER: *(Teacher Prep/Lab Plan)*

Lab Objective

- ▲ Students will be able to identify the information that they need to make an accurate estimation and collect appropriate data where necessary.
- ▲ Students will be able to use their data, rate conversions and the label method to accurately predict the amount of objects in the large container.
- ▲ Students will clearly communicate their problems solving strategies for the problem to convince their peers of why their prediction is the most likely to be accurate.

Statement of prerequisite skills needed

- ▲ Students should at this point be comfortable with fluently using the four steps of the label method, because the goal of this lesson is that they apply these skills to solving a problem. They need to be familiar with how to set up data tables and collect data.

Vocabulary

- ▲ Estimate/Estimation, Conversion, Volume

State Standards addressed:

Math:

- ▲ **7.1. G** Solve Single and multi-step word problems involving rational numbers and verify solutions.
- ▲ **7.2.I** Solve Single and Multi Step Problems involving conversions within or between measurement systems and verify the solutions
- ▲ **7.6. A** analyzes a problem to determine the question(s) to be answered).

▲ **Reading:**

▲ **Writing:**

▲ **Leadership:**

Teacher Preparation:

- ▲ Materials: Large Container (half gallon or larger, see teacher considerations for things to consider when choosing your container.

- ▲ Small Items (Beans, M&Ms, rice, pebbles, all work fine) – enough to fill the container and have extras for students to use in their problem-solving and predicting.

- ▲ Volume Conversion Information
 - ▲ Small measuring containers (table spoon, half cup, quarter cup, etc., adjust according to the size of your large container)

 - ▲ Calculators

 - ▲ Cost of the items

 - ▲ Size variability – do you want objects that are uniformly sized, or things that are about the same size but with a little bit of variability? (a little variability might reward students who do multiple trials with smaller containers and find an average)

 - ▲ Known capacity of the container – one with a labeled capacity will save you some work

 - ▲ Countability – remember you need to count these objects (or somebody does), don't make the objects too small or the container too large, or you may be in for a lot of preparation time.

Set-Up Required:

- ▲ Teacher needs to count how many (Beans, M&Ms, rice, and pebbles) that are in the large jar.
- ▲ Teacher will set up two stations, one with worksheets and one with jars and filler. (Beans, M&Ms, rice, and pebbles)

Lab Organizational Strategies:

- ▲ Grouping/Leadership/Presentation Opportunities:
Students could be put into groups of two; three or students could work alone.
- ▲ Expectations:
Students are to follow all per set classroom expectation, procedures, and respect teacher, fellow students, and equipment.
- ▲ Time-line:
Duration of the Activity – Depending on how familiar your students are with open-ended problem solving and presenting and communicating their strategies to the class (and the size of your class) the amount of time this lab may take is variable.

As a rough estimate plan on:

Student Data Collection and Problem Solving 1-2 days

Student Work on Paper: 1 day

Post Lab Follow-Up/Conclusions *(to be covered after student completes lab)*

- ▲ Discuss real world application of learning from lab:
- ▲ Volume is the most widely used measure and is usually estimated for the assessment of economic value or commercial utilization potential. Students need to develop this skill not only for high school math but also to be able to estimate in many jobs.
- ▲ Career Applications:
 - ▲ People who use mathematics in their lives and careers find estimation to be preferable to the use of exact numbers in many circumstances. Frequently, it is either impossible to obtain exact answers or too expensive to do so. An air conditioning salesperson preparing a bid would be wasting time and money by measuring rooms exactly. Astronomers attempting to determine movements of celestial objects cannot obtain precise measurements. Many people use approximations because it is easier than using exact numbers. Shoppers, for example, use approximations to determine whether they have sufficient funds to purchase items. Travelers use rough estimates of time, distance, and cost when planning trips. Commonly reported data often use levels of precision which have been accepted as appropriate, even though they may not be considered “exact.” Astronomers usually report information to two significant digits, and batting averages for baseball players are always reported as three-place decimals.
(New Jersey Mathematics Curriculum Framework)

Bean Counter Lab Handout

Students will estimate the amount of (Beans, M&Ms, rice, and pebbles) in a 1gallon jar. Then using your newly acquired math skills **left, right, line them up, and blow them up!!**

How will you do this you ask?

Well, first you will need a small jar or cup. (Teacher will proved)

Next, you will need (Beans, M&Ms, rice, pebbles). **Only take what will fit in you jar or cup.** (Teacher will proved)

Then, your group will count how many (Beans, M&Ms, rice, pebbles) that are in your jar or cup.

Now here comes the fun part. Through the magic of math your group will find how many (Beans, M&Ms, rice, pebbles) are in the 1 gallon jar.

Remember Left, Right, Line them up and blow up the labels.

Last, you will turn in a three paragraph paper on you groups experience, problem solving and an explanation of the math used.



How many beans are in the 1 gallon jar?
How can we find out?

Unit 3 Bean Counter Lab

Name _____

Date _____

Group members _____

8oz in a cup, 2 cup in a pint, 2 pints in a quart, and 4 quarts in a gallon

Size of group container in (ounces, cups, or pints)	Number of (Beans, M&Ms, rice, and pebbles) that fit into container.
1	#
2	#
3	#
4	#
5	#
6	#

Show me some math!!! Remember Left, Right, Line them up and blow up the labels.

How many (Beans, M&Ms, rice, and pebbles) are in the 1 gallon jar?	
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Bean Counter Lab Rubric

score	4	3	2	1
<u>Group estimate</u>	Within 5% of count in 1gallon jar.	Within 10% of count in 1gallon jar.	Within 15% of count in 1gallon jar.	Within 20% of count in 1gallon jar.
<u>Student write up</u>	Student has a complete paper with few to no error in writing. Paper documents lab, problem solving and math that were used.	Student has a complete paper with some error in writing. Paper documents lab, problem solving and math that was used.	Student has a paper with lots error in writing. Student does not document lab.	Student hands in incomplete paper that does not document lab.

Students score out of 8

8 / _____