

## HOW BIG IS A MOLE PROJECT?

**DUE DATE Friday 10/30**

**Points 100**

### Introduction

The unit "mole" is used in chemistry as a counting unit for measuring the amount of something. One mole of something has  $6.02 \times 10^{23}$  units of that thing. The magnitude of the number  $6.02 \times 10^{23}$  is challenging to imagine.

The goal of this project is to understand just how big is a mole and how to use dimensional analysis to explain magnitude of large numerical values.

In this project, you will compare a mole of a familiar object to something with a huge magnitude.

The specific project requirements are:

- a. to solve two conversion problems (from two different categories).
- b. to make a poster *for each problem* according to the requirements posted below.
- c. to save posters as a jpeg and upload them into cts.

**For problem #1:** You must choose one problem from the example list below. The examples are divided into four categories: distance, mass, volume, area.

**For problem #2:** You must select a different category type than your first problem and create a unique second problem. Your problem must be unique and cannot be one that is one the teacher's list. You can look to the examples as a guide only.

Be sure to ask your teacher if you have any questions or problems as you work through the project.

### Project Components

The poster requirements are listed below. Read the project requirements carefully so that your final product will be accepted. Be sure to ask approval ahead of time if you have a good reason to deviate from the requirements. Note that any deviation must be approved before you finalize your project.

### Project Requirements:

The poster requirements are listed below. Read the project requirements carefully so that your final product will be accepted. Be sure to ask approval ahead of time if you have a good reason to deviate from the requirements. Note that any deviation must be approved before the presentation day

1. Use 14" by 22" poster board or paper. (Remember you must make 2 posters)
2. Include the following information:
  - a. Statement of the problem.
  - b. Researched data that are used as a basis for the calculation.
  - c. Calculation done correctly and clearly written out with units labeled.
  - d. Illustrations must relate to the problem. Be creative and make sure your project is appropriate for hanging in the classroom or sharing with other students. Make good use of color and illustrations

- e. Bibliography. Cite sources used for information and illustrations.
  - f. Your name and block
3. After completing each poster, you will take a picture of each poster and save each as a jpeg File.
  4. Check each of your pictures and verify that each one is easy to read, focused and the details are clear to see.
  5. Once you have verified each picture, you are to submit them to the teacher through ctls as an attachment.

### **EVALUATION:**

- The poster must conform to the size specified.
- The title of the poster must be in the form of a question.
- The problem should be solved using dimensional analysis.
- The problem should be solved correctly.
- All units should be shown and correct.
- All work should be displayed and viewable.
- You should include artwork that is related to your question.
- You should include a list of resources on the front of the poster in the lower right corner.
- Your name, date turned in and class period should be on the lower left corner.
- The poster should be neat and organized.
- The posters are turned in on time.

### **Examples of Mole Project Problems**

#### **Category 1: Distance**

1. A mole of Big Macs stacked up would reach from the earth to the moon and back how many times?
2. A mole of dollar bills joined end to end would encircle the earth how many times?
3. A mole of pop cans stacked on top of one another would reach from here to the sun and back how many times?
4. A mole of Twinkies placed end to end would encircle the planet Jupiter how many times?

#### **Category 2: Mass or Weight**

5. A mole of moles (the mammal) would have a mass how many times greater than the mass of the earth?
6. A mole of bowling balls would have a mass how many times greater than the mass of the moon?
7. A mole of cans of Spam would weigh how much more than all the gold in the U.S. Treasury?
8. A mole of elephants would weigh how much more than the moon?

**Category 3: Volume**

9. A mole of M&M's would fill how many holes the size of Lake Erie?
10. A mole of jellybeans would fill up how many buildings the size of the Empire State Building?
11. A mole of basketballs would cover the surface of the earth to a depth of how much?
12. A mole of marbles would cover the continental U.S. to a depth of how much?

**Category 4: Area**

13. A mole of 1-gallon cans of paint could cover every square inch of the surface of how many planets the size of the earth?
14. A mole of Hershey bars could cover every square kilometer of the surface of how many continents the size of Africa?
15. A mole of football fields could cover every square meter of the surface of how many moons?
16. A mole of pizzas could cover every square meter of the surface of how many continents the size of Antarctica?

RUBRIC for Each Problem

CATEGORY	4	3	2	1
<b>Strategy/Procedures</b>	Typically, uses an efficient and effective strategy to solve the problem(s).	Typically, uses an effective strategy to solve the problem(s).	Sometimes uses an effective strategy to solve problems but does not do it consistently.	Rarely uses an effective strategy to solve problems.
<b>Explanation</b>	Explanation is detailed and clear.	Explanation is clear.	Explanation is a little difficult to understand but includes critical components.	Explanation is difficult to understand and is missing several components OR was not included.
<b>Completion</b>	Problem is completed.	One step in the problem was not included.	Problem is complete but units were not included.	Several steps omitted in the problem.
<b>Neatness and Organization</b>	The work is presented in a neat, clear, organized fashion that is easy to read.	The work is presented in a neat and organized fashion that is usually easy to read.	The work is presented in an organized fashion but may be hard to read at times.	The work appears sloppy and unorganized. It is hard to know what information goes together.

OVERALL SCORE \_\_\_\_\_