

Name: \_\_\_\_\_

# Introduction to the Mole (Part I)

## Purpose

To discover a method of counting "things" that you are not able to see.

## Information

When you buy eggs you usually ask for a \_\_\_\_\_ eggs. You know that one dozen of any item is \_\_\_\_\_. Paper is not packaged by the dozen. Paper is packaged by a ream. A ream of paper has 500 sheets. Why is it useful to use units like a dozen or a ream?

---

What determines how many items should make up a particular unit? \_\_\_\_\_

---

If you were asked to design a new unit to count something, what would you consider when choosing how many items should be included in your new counting unit?

---

## Materials

3 bags of different types of candy, balance, worksheet, calculator, pencil

## Procedure

1. Record the number of items in each bag. Measure the mass of each bag. Record the mass of each bag in the data table.
2. Answer questions in Analysis and Interpretations.
3. Record masses your group measured on the board summarizing class data.

## Data

Each package contains \_\_\_\_\_ items.

Name of items in the bag	Mass of the bag	Mass of ALL items in the bag
Skittles		
Gum drops		
Jelly beans		

## ANALYSIS AND INTERPRETATION

1. As you know, a dozen represents 12 items. Since I did not have enough items to make a dozen, I decided to make a new counting unit. I called this unit an OWL.

Each of your bags contains \_\_\_\_\_ items (candies).

We will call this number of items an OWL. If you understand the concept of OWL as a counting unit, just like a dozen for counting by 12, you should be able to complete the following questions.

Name:

- e. How many OWLS are 16 Hershey's Kisses? \_\_\_\_\_
- f. How many OWLS are 100 pretzels? \_\_\_\_\_
- g. How many OWLS are 400 desks? \_\_\_\_\_
- h. How many OWLS is 1 orange? \_\_\_\_\_ (Write as a decimal.)
- i. How many OWLS are 2 skittles? \_\_\_\_\_ (Write as a decimal.)

Write directions for finding the **number** of OWLS if **given** the **number of pieces**.

---

---

- 1. How many OWLS are 48 Hershey's Kisses? \_\_\_\_\_
- 2. How many OWLS are 2 Hershey's Kisses? \_\_\_\_\_
- 3. How many OWLS are 32 Hershey's Kisses? \_\_\_\_\_
- 4. How many OWLS are 3 Hershey's Kisses? \_\_\_\_\_
- 5. How many OWLS are 24 gum drops? \_\_\_\_\_
- 6. How many OWLS are 2 gum drops? \_\_\_\_\_
- 7. How many OWLS are 20 skittles? \_\_\_\_\_

\*\*\*\*\*STOP HERE AND WAIT FOR YOUR TEACHER\*\*\*\*\*

---

As you can imagine, an OWL of molecules of water would be too small to see. Scientists had to select a bigger unit for counting molecules of substances. The unit scientists use is called a **MOLE**.

One **MOLE** of anything has **602,200,000,000,000,000,000** items.

This number is called **AVOGADRO'S NUMBER** and is usually written in scientific notation as  **$6.022 \times 10^{23}$**

**One MOLE of anything has  $6.022 \times 10^{23}$  items.**

**Reminder:**

**When MULTIPLYING numbers in scientific notation**, multiply the number part, times ten to the power of the sum of the exponents. For example:  $(2 \times 10^4) \times (3 \times 10^5) = 6 \times 10^9$

**When dividing numbers in scientific notation**, divide the number part. The answer is multiplied by 10 to the power which is the difference between the exponents.

$$\text{For example: } \frac{6 \times 10^{45}}{3 \times 10^{30}} = 2 \times 10^{45-30} = 2 \times 10^{15}$$

Use the rules you have written for calculations involving **OWLS** to answer questions about **MOLES**. Remember to use  **$6.022 \times 10^{23}$**  for the number of items in a MOLE.

Name:

**Mole Worksheet #1:**

If you understood the Introduction to the Mole Activity, you will be able to complete the following questions.

**Reminder:** One MOLE has  $6.022 \times 10^{23}$  items or there are  $6.022 \times 10^{23}$  items/mole.

Items may mean: skittles, jelly beans, bananas, oranges, ATOMS, FORMULA UNITS, MOLECULES, IONS, etc.

Show your work!

1. How many atoms of potassium make up one MOLE ? \_\_\_\_\_

2. How many atoms of potassium make up 2 MOLES? \_\_\_\_\_

3. How many formula units of salt make up 10 MOLES? \_\_\_\_\_

4. How many molecules of water make up 1 MOLE? \_\_\_\_\_

5. How many molecules of water make up 5 MOLES? \_\_\_\_\_

6. How many moles are  $6.022 \times 10^{23}$  atoms of sodium? \_\_\_\_\_

7. How many moles are  $1.204 \times 10^{24}$  atoms of carbon? \_\_\_\_\_

8. How many moles are  $1.806 \times 10^{24}$  atoms of sodium? \_\_\_\_\_

9. How many moles are  $6.022 \times 10^{24}$  atoms of sodium? \_\_\_\_\_

10. How many moles are  $6.022 \times 10^{23}$  molecules of water? \_\_\_\_\_

11. How many moles are  $1.204 \times 10^{24}$  molecules of water? \_\_\_\_\_

12. How many moles are  $3.010 \times 10^{24}$  molecules of water? \_\_\_\_\_

13. How many moles are  $1.806 \times 10^{24}$  formula units of salt? \_\_\_\_\_

14. How many FORMULA UNITS are 6 MOLES of NaCl? \_\_\_\_\_

Name:

**Mole Worksheet #1:**

If you understood the Introduction to the Mole Activity, you will be able to complete the following questions.

**Reminder:** One MOLE has  $6.022 \times 10^{23}$  items or there are  $6.022 \times 10^{23}$  items/mole.

Items may mean: skittles, jelly beans, bananas, oranges, ATOMS, FORMULA UNITS, MOLECULES, IONS, etc.

Show your work!

1. How many atoms of potassium make up one MOLE ? \_\_\_\_\_

2. How many atoms of potassium make up 2 MOLES? \_\_\_\_\_

3. How many formula units of salt make up 10 MOLES? \_\_\_\_\_

4. How many molecules of water make up 1 MOLE? \_\_\_\_\_

5. How many molecules of water make up 5 MOLES? \_\_\_\_\_

6. How many moles are  $6.022 \times 10^{23}$  atoms of sodium? \_\_\_\_\_

7. How many moles are  $1.204 \times 10^{24}$  atoms of carbon? \_\_\_\_\_

8. How many moles are  $1.806 \times 10^{24}$  atoms of sodium? \_\_\_\_\_

9. How many moles are  $6.022 \times 10^{24}$  atoms of sodium? \_\_\_\_\_

10. How many moles are  $6.022 \times 10^{23}$  molecules of water? \_\_\_\_\_

11. How many moles are  $1.204 \times 10^{24}$  molecules of water? \_\_\_\_\_

12. How many moles are  $3.010 \times 10^{24}$  molecules of water? \_\_\_\_\_

13. How many moles are  $1.806 \times 10^{24}$  formula units of salt? \_\_\_\_\_

14. How many FORMULA UNITS are 6 MOLES of NaCl? \_\_\_\_\_