**Introduction to the Mole Activity #1**

**Names \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**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 packages of different types of candy, balance, worksheet, calculator, pencil

**Procedure**

1. Record the number of items of each type of candy in each package in the table below. Measure and record the mass of each type of candy in each package using the cup at the scale (make sure it has been zeroed out).

2. Answer questions in Analysis and Interpretations.

**Data**

|  |  |  |
| --- | --- | --- |
| **Type of candy** | **Mass** | **number** |
| **M & M** |  |  |
| **Swedish fish** |  |  |
| **Tootsie rolls** |  |  |
| **total** |  |  |

**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 HAWK. Each of your packages contains \_\_\_\_\_ of each item. We will call this number of items an HAWK. If you understand the concept of HAWK as a counting unit, just like a dozen for counting by 12, you should be able to complete the following questions.

**Questions**

A HAWK of oranges will have \_\_\_\_\_ oranges.

A HAWK of pretzels has \_\_\_\_ pretzels. A HAWK of desks has \_\_\_\_\_ desks.

A HAWK of molecules of water has \_\_\_\_ molecules of water.

An HAWK of particles has \_\_\_ particles.

An HAWK of atoms of iron has \_\_\_\_\_ atoms of iron.

An HAWK of formula units of salt has \_\_\_\_\_\_\_ formula units of salt.

Now that you understand the meaning of a HAWK, you should be able to answer the following:

1. How many Hershey’s Kisses are in 2 HAWKS? \_\_\_\_\_\_\_

2. How many caramels are in 10 HAWKS? \_\_\_\_\_\_\_

3. How many Hershey’s Kisses are in 400 HAWKS? \_\_\_\_\_\_\_

4. How many caramels are in 1/2 HAWK? \_\_\_\_\_

WRITE DIRECTIONS FOR **FINDING THE # OF ITEMS** IF GIVEN THE **# OF HAWKS.**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Use the above directions to answer the following questions.

1. How many pencils are in 20 HAWKS? \_\_\_\_\_\_\_

2. How many pencils are in 100 HAWKS? \_\_\_\_\_\_\_

3. How many apples are in 10 HAWKS? \_\_\_\_\_\_\_

4. How many oranges are in 5 HAWKS? \_\_\_\_\_\_\_

5. How many pencils are in 0.5 HAWKS? \_\_\_\_\_\_\_

6. How many pencils are in 0.25 (1/4) HAWKS? \_\_\_\_\_\_\_

7. How many atoms of silver are in 20 HAWKS? \_\_\_\_\_\_\_

8. How many molecules of water are in 10 HAWKS? \_\_\_\_\_\_\_

**Finding the Number of HAWKS**

If you are given the number of items you can tell the number of HAWKS. For example, if you were finding how many dozen of an item you have and there 24 items then the answer would be 2 dozen. **Find the number of HAWKS using YOUR value for a HAWK.**

1. How many HAWKS are 16 Hershey’s Kisses? \_\_\_\_\_\_

2. How many HAWKS are 100 pretzels? \_\_\_\_

3. How many HAWKS are 400 desks? \_\_\_\_

4. How many HAWKS is 1 orange? \_\_\_\_\_\_\_\_ (Write a fraction or a decimal.)

5. How many HAWKS are 2 caramels? \_\_\_\_\_\_\_\_\_

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

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. How many HAWKS are 48 Hershey’s Kisses? \_\_\_\_\_\_

2. How many HAWKS are 2 Hershey’s Kisses? \_\_\_\_\_\_

3. How many HAWKS are 32 Hershey’s Kisses? \_\_\_\_\_\_

4. How many HAWKS are 3 Hershey’s Kisses? \_\_\_\_\_\_

5. How many HAWKS are 24 Minty Bells? \_\_\_\_\_\_

6. How many HAWKS are 2 Minty Bells? \_\_\_\_\_\_

7. How many HAWKS are 20 caramels? \_\_\_\_\_\_

**Using the MOLE**

As you can imagine, an HAWKS 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 **602,000,000,000,000,000,000,000** items. This number is called **AVOGADRO’S NUMBER** and is written in scientific notation as **6.02 x 1023**.**One MOLE of anything has 6.02 x 1023 items.** Use the rules you have written for calculations involving **HAWKS** to answer questions about **MOLES**. Remember to use **6.02 x 1023** for the number of items in a MOLE. You will need to use EE or EXP on your calculator for numbers written in scientific notation. The EE or EXP will do the x 10^ part for you.

1. How many Hershey’s Kisses make up 1 **MOLE**? \_\_\_\_\_\_\_

2. How many caramels make up 10 **MOLES**? \_\_\_\_\_\_\_

3. Find the number of Minty Bells in 4 **MOLES**. \_\_\_\_\_\_\_

4. Find the number of atoms of sodium in 2 **MOLES**. \_\_\_\_\_\_\_

5. Find the number of molecules of water in 6 **MOLES**. \_\_\_\_\_\_\_

6. Find the number of caramels in 0.5 **MOLES**. \_\_\_\_\_\_\_\_

7. How many **moles** of caramels is 6.02x1023 of caramels? \_\_\_\_\_\_\_

8. How many **moles** of desks is 6.02x1023 of desks? \_\_\_\_\_\_

9. How many **moles** of pens is 1.20x1024 of pens? \_\_\_\_\_\_

10. How many **moles** of sodium atoms is 1.20x1024 of sodium atoms? \_\_\_\_\_\_\_

**Reminder:** One MOLE has **6.02 x 1023** items or there are **6.02 x 1023** items/mole.

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 NaCl (table salt) make up 10 MOLES? \_\_\_\_\_
4. How **many molecules** of water make up 5 MOLES? \_\_\_\_\_
5. How **many moles** are 6.02 x 1023 atoms of sodium? \_\_\_\_\_
6. How **many moles** are 1.20 x 1024 atoms of carbon? \_\_\_\_\_
7. How **many moles** are 1.80 x 1024 atoms of sodium? \_\_\_\_\_
8. How many moles are 6.02 x 1024 atoms of sodium? \_\_\_\_\_
9. How many moles are 6.02 x 1023 molecules of water? \_\_\_\_\_
10. How many moles are 1.20 x 1024 molecules of water? \_\_\_\_\_
11. How many moles are 3.01 x 1024 molecules of water? \_\_\_\_\_
12. How many moles are 1.81 x 1024 formula units of salt? \_\_\_\_\_