WODSS SCIENCE Name: _____

SCH 3UI Date: _____

Measurements and Conversion Factors

There are many kinds of measurements in the world. One that we are familiar with is the dozen (= ___)
You can have a dozen anything… eggs, donuts, buns, etc.
How many eggs are in 8 dozen eggs?

$$\text{\# of eggs} = 8 \text{ dozen} \times \frac{12 \text{ eggs}}{1 \text{ dozen}} = \_\_\_\_\_ \text{ eggs}$$

How many donuts are there in 6 dozen?

How many dozens of timbits are in a box of 40 timbits?

Another measurement is called a ream. 1 ream = 500 sheets of paper.

List the possible conversion factors from the equation above:

Multiply the key values below by the correct conversion factor so that the given units cancel, and the required units remain.
How many sheets of paper are in 5 reams?

How many reams are in 3 250 sheets of paper?

Avogadro's Constant and the Mole

In Chemistry, we don't talk about a certain number of atoms reacting, because atoms are too small to count. We'd be talking in HUGE numbers if we were counting atoms. Instead, we use a quantity called a mole.

1 mole = 6.022×10^{23} particles (atoms, ions, molecules or formula units)
= 602 200 000 000 000 000 000 000 particles!!!

The number 6.022×10^{23} is called **Avogadro's constant** (N_A). Avogadro realized that 6.022×10^{23} atoms of any element have a mass, in grams, that is equal to the numerical value of the element's atomic mass.

Example – one atom of carbon has a mass of _____, and one mole of carbon atoms has a mass of _____ .
One atom of iron has a mass of _____, and one mole of iron atoms has a mass of _____.

We can use Avogadro's constant to calculate the number of moles of a substance, or the number of particles in a substance. We use the following symbols in our calculations:

Symbol	**Quantity**	**Unit**
n	# of moles	mol
N	# of particles	atoms, ions, formula units or molecules
N_A	Avogadro's number (6.022×10^{23})	particles / mol

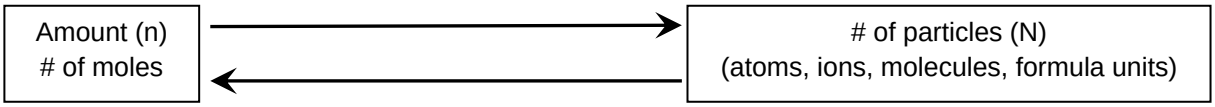
We know that 1 mole = 6.022×10^{23} particles. List the possible conversion factors from this equation:

Examples:

1. How many particles are in 3 moles?

2. How many moles are in 8.27×10^{23} particles?

3. Complete the graphic organizer below to help you convert from moles to number of particles. Note that the arrow points towards the REQUIRED piece of information (what you are trying to figure out).



4. How many atoms does a 2.6 mol sample of silver have?

5. A sample contains 1.25 mol of NO_2.
   a. How many molecules are there?

   b. How many atoms are there in the sample?

6. How many moles are there if a sample of NaCl contains 3.21×10^{23} formula units?