HOW TO COUNT ATOMS

Background Information:

- **subscripts** – little numbers that tell how many atoms there are

   (ex: In $3H_2O$, the $_2$ is the subscript)

- **coefficients** – regular-sized numbers that tell how many

   molecules there are (ex: In $3H_2O$, the **3** is the coefficient)

Example: $3H_2O$

- The subscript $_2$ in the example above comes after the H.
   This means there are two H's (hydrogen atoms) in each molecule.

- The coefficient **3** shows that there are three of the H_2O molecules.

When counting atoms in the example ($3H_2O$), we can look at the atoms this way [since there are 3 of the H_2O molecules]: (3 water molecules each with 2 hydrogen and 1 oxygen)

- So now, we can count the number of H's and the number of O's.
   Thus, $3H_2O$ has **6 hydrogen atoms** and **3 oxygen atoms**.

However, drawing out each equation is **not practical**, so…

Although the 1 is usually not written, $3H_2O$ can be written as $3H_2O_1$. (In other words, $3H_2O$ and $3H_2O_1$ are the same thing.) The number of atoms can be counted without drawing everything out **by multiplying the coefficient by all the subscripts in the molecule (you get the number of atoms)**. So with the case of $3H_2O_1$, we can multiply the 3 with the $_2$ to find that there are 6 H's. Then we can multiply the 3 with the $_1$ to find that there are 3 O's.

HOW TO COUNT ATOMS IN A CHEMICAL FORMULA

(5 Easy Steps)

Step 1: Write the chemical formula

Step 2: List all the atoms

Step 3: Count the number of atoms of each element in ONE molecule.

Step 4: Multiply the number of atoms of each by the coefficient.

Step 5: Make sure you answer makes sense.

PRACTICE TIME: Count the number of each type of atom in each molecule.

$P_4 + O_2$	$4P_2O_3$
P 4	P 2*4=8
O 2	O 3*4=12

Two More Practice Example

6 C_2H_5OH (Ethanol)

C -   2*6=12
H -   6*6=36
O -   1*6=6

4 $C_6H_{12}O_6$ (Glucose - Sugar)

C -   6*4=24
H -   12*4=48
O -   6*4=24