**How to figure molarity**

A synonym for molarity is concentration (you will hear both words used in Chemistry).

The definition of molarity is moles of solute dissolved in liters of solvent, and is written as the following equation:

**# of moles/# of Liters = Molarity**

If we know two of the three factors, we can find the third by manipulating the formula. The following triangle is a visual reminder of how to do this:

moles

Liters

Molarity

Remove the letter you need to solve for;

Do the operation that remains:

If the letters are side by side, multiply; if the letters are up and down, divide.

Concentration and Dilution

When asked to make a more concentrated or less concentrated version of a solution, you will add more moles (to concentrate) or more water (to dilute). The formula used to figure this is:

**Molarity1 x Volume1 = Molarity2 x Volume2**

This formula can also be used when titrating an acid and a base if the acid and base have a 1:1 reactant molar ratio. This is why it is so important to always write and balance your equation!!!

Example: How much 2.0 M NaOH is required to neutralize 100 mL of 1.5 M HCl?

1 NaOH + 1 HCl 🡪 1 NaCl + 1 HOH

Looking at the reactant (Left) side of the equation you see that there is a 1:1 ratio between NaOH and HCl. Therefore, you can use the M1V1 = M2V2 formula.

(2.0 M)(x Liters) = (.200 L)(1.5 M)

(.200 L)(1.5 ~~M~~)/2.0 ~~M~~ = x Liters

.300/1.5 = x Liters

.200 = x Liters

200 mL

If you do not have a 1:1 reactant molar ratio you must solve the long way (see titration tutorial from Test 1 for details).