MATH REVIEW: ALGEBRAIC OPERATIONS ANSWERS

1. Equations with one unknown:

   Solve for *x*:

   a) $2x + 8 = 4$ answers: a) $x = -2$

   b) $\frac{5x}{12} = \frac{9}{16}$ b) $x = 1.35$

   c) $3x^2 = 48$ c) $x = 4$

2. Equations with two unknowns.

   Solve for *x*:

   a) $2xy - 4 = 12$ answers: a) $x = 8/y$

   b) $2x^2 + 4y = 20$ b) $x = \sqrt{2(5-y)}$

3. Typical equations encountered in Chemistry

   a) The equation for density is

   $$d = \frac{m}{v}$$ answers: a) $v = \frac{m}{d}$

   where d is density, m is mass, and v is volume.
   Solve for v.

   b) The ideal gas law equation is

   $$PV = nRT$$

   where P is pressure, V is volume, n is the number of moles, R is the gas constant, and T is the temperature.

   i) Solve for P i) $P = nRT/V$

   ii) Solve for T ii) $T = PV/nR$

   iii) If $n = g/M$, substitute in the ideal gas law equation and solve for M (where g is the mass in grams and M is the molecular weight or molar mass of the substance)

   iii) $M = \frac{gRT}{PV}$

c) Molarity is defined as:

$$M = \frac{mol}{V}$$

where mol is moles of substance and V is the volume in Liters

Moles are defined as:

$$mol = \frac{g}{MW}$$

where g is the mass in grams and MW is the molecular weight (or molar mass) of the substance.

Volume in Liters is defined as:

$$L = \frac{mL}{1000\ ml/L}$$

where mL is the volume in milliliters and 1000 is the conversion factor for ml to Liters.

Combine thse three equations into a single equation for Molarity.

Answer: $M = \frac{g \cdot 1000}{MW \cdot mL}$