**Density B First things First B Two Different Types of Volume Units**

One factor to take into consideration is that we have two different types of volume units to deal with.
Liters and Decimeters cubed ($dm^3$)

Notice that Table 4 shows the relationship of cubic volumes to each other as will as to Liter volumes.
There is a simple relationship between them which is listed in Table 4.

The ratio $\frac{\mathbf{1\ dm^3}}{\mathbf{1L}}$ **or** $\frac{\mathbf{1\ cm^3}}{\mathbf{1\ ml}}$ are therefore the ratios that relate Table 3 to Table 4

By using one of these two ratios you can convert between both types of volume units easily.

**Table # 4 ---- Metric Volume Conversion Table for $dm^3$**

| | $1000\ dm^3$ | $1\ dm^3$ | $1\ dm^3$ | $1\ cm^3$ | $1\ dm^3$ |
|---|---|---|---|---|---|
| **Volume** | $1\ m^3$ | 1 L | 1000 mL | 1 mL | $1000\ cm^3$ |

Some examples of conversions between the two types of volume units: (Refer to Table # 3 on your Metric Conversion Table Handout for conversions between units of volume involving Liters, milliliters, etx.)

Example 1:
How many hL are in 450 $dm^3$?

$$\mathbf{450\ \cancel{dm^3} \times \frac{1\ \cancel{L}}{1\ \cancel{dm^3}} \times \frac{1\ hL}{100\ \cancel{L}} = 4.5\ hL}$$

Example 2:
How many $cm^3$ are in 30 dL?

$$\mathbf{30\ \cancel{dL} \times \frac{1\ \cancel{L}}{10\ \cancel{dL}} \times \frac{1\ \cancel{dm^3}}{1\ \cancel{L}} \times \frac{1000\ cm^3}{1\ \cancel{dm^3}} = 3000\ cm^3}$$

Here is another way to set up the problem.

$$\mathbf{30\ \cancel{dL} \times \frac{1\ \cancel{L}}{10\ \cancel{dL}} \times \frac{1000\ \cancel{ml}}{1\ \cancel{L}} \times \frac{1\ cm^3}{1\ ml} = 3000\ cm^3}$$

Example 3:
Convert 525 ml to $m^3$ (This is an example of how scientific notation is use. Where numbers will be exceptionally large or exceptionally small you are expected to use scientific notation)

$$\mathbf{525\ \cancel{ml} \times \frac{1\ \cancel{cm^3}}{1\ \cancel{ml}} \times \frac{1\ \cancel{dm^3}}{1000\ \cancel{cm^3}} \times \frac{1\ m^3}{1000\ \cancel{dm^3}} = 525 \times 10^{-6}\ m^3 \quad \text{or} \quad 5.25 \times 10^{-8}\ m^3}$$

Notice that 1000 is changed to exponents $10^3$ $10^3$

Example 4:
Convert 50 $m^3$ to µL

$$\mathbf{50\ \cancel{m3} \times \frac{10^3}{1\ \cancel{m3}} \times \frac{1\ \cancel{L}}{1\ \cancel{dm3}} \times \frac{10^6\ \mu L}{1\ \cancel{L}} = 50 \times 10^9\ \mu L \quad \text{or} \quad 5.0 \times 10^{10}\ \mu L}$$