Metric System- Part 2

Metric Units & Converting Between Them

A. Metric units are very nice to work with, since they are all multiples of ten (or a hundred, or one-tenth, etc) of each other. You can *convert* between the various *different* sizes by merely *moving the decimal* point the correct number of places.

B. The base metric units are **meters (m)** (for length), **grams (g)** (for mass or weight), and **liters (L)** (for volume). And the different units convert into one another rather nicely, with one milliliter equaling one cubic centimeter (the "cc" of medical shows on television) and one gram being the weight of one cc of water.

C. There are many metric-unit prefixes, but the usual ones required in school are these: kilo-, hecto-, deka-, deci-, centi-, and milli-. To convert between the various prefixes, and thus the variously-sized units, you just move up and down this list of prefixes, *moving the decimal* point as you go.

D. To remember the prefixes in order, you can use the following sentence:

King Henry Doesn't [Usually] Drink Chocolate Milk

The first letters of the words stand for the prefixes, with "Usually" in the middle standing for the "unit", being meters, grams, or liters. Many memory phrases omit the "Usually", and consequently students forget where the basic unit goes, messing up their conversions. Leave the "Usually" in there so you can keep things straight:

kilo- hecto- deka- [unit] deci- centi- milli-

E. Since each step is *ten times* or *one-tenth* as much as the step on either side, we have:

1 kilometer = 10 hectometers = 100 dekameters = 1000 meters = 10 000 decimeters = 100 000 centimeters = 1 000 000 millimeters
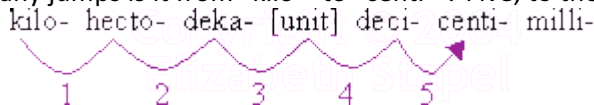Alternatively, we have:
1 milliliter = 0.1 centiliters = 0.01 deciliters = 0.001 liters = 0.000 1 dekaliters= 0.000 01 hectoliters = 0.000 001 kiloliters

You can convert from one unit to another by moving the decimal point one place, filling in, as necessary, with zeroes. To move to a smaller unit (a unit with a prefix some number of places further to the right in the listing), you move the decimal place to the right that same number of places, and vice versa. Together with the prefix sentence ("King Henry..."), this makes conversion between the different metric sizes very simple.

- **Convert 12.54 kilometers to centimeters.**
  How many jumps is it from "kilo-" to "centi-"? Five, to the right.

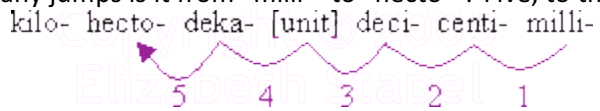 So I move the decimal point five places to the right, filling in the extra space with zeroes:

  The loops help you keep track of the steps that you're counting, and make it really easy to see where to add the zeroes, if you need to. In this case, after moving the decimal point and adding the zeroes, I get:
     12.54 km = 1 254 000 cm

- **Convert 457 mL to hL.**

    How many jumps is it from "milli-" to "hecto-"? Five, to the left.

    kilo- hecto- deka- [unit] deci- centi- milli-

    5   4   3   2   1

    So I move the decimal point five places to the left, filling in the empty spots after the decimal point with zeroes:

    .0 0 4 5 7.

    Then my answer is:

    457 mL = 0.00457 hL

    That's all there is to metric conversions. As long as you keep the prefixes straight and remember where in the sequence the "units" name goes, you'll be fine. Just count the number of jumps and note the direction; then move the decimal point the same direction and the same number of places.