We will use the method of dimensional analysis, sometimes called the factor-label method. ... or, the "drag and drop" method!

Dimensional analysis uses conversion factors to change between one unit and another

What's a conversion factor? A simple equality.

$$12 in = 1 f f$$

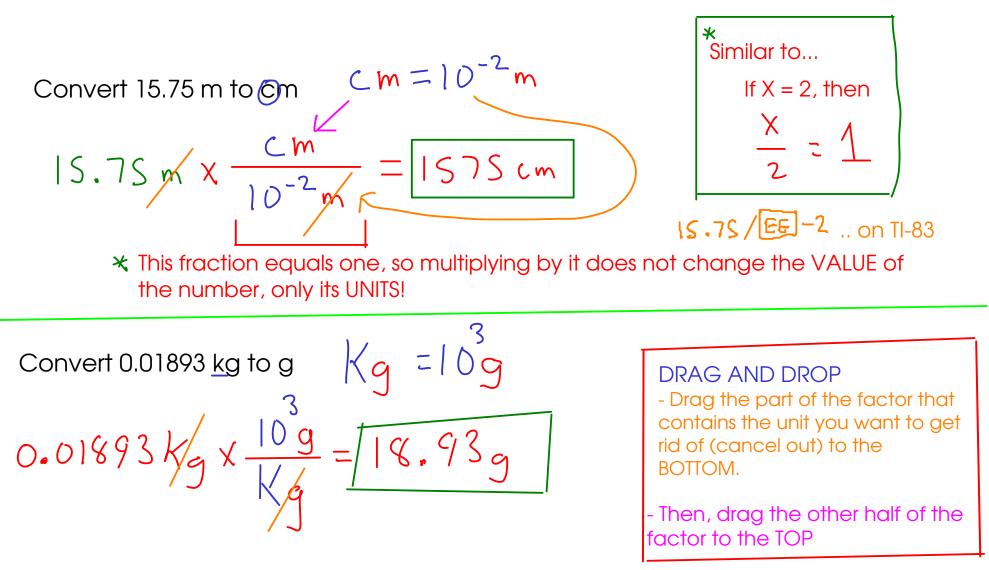
Conversion factors in metric

In the metric system, conversion factors between units may always be made from the metric prefixes!

For example, "Kilo-" means
$$10^3$$

 $K = 10^3$
 SO
 $\frac{Kg = 10^3}{50}$
 $\frac{Kg = 10^3}{10^3}$
 $\frac{Km = 10^3 m}{50}$
 $\frac{Ks = 10^3 s}{50}$

How do we actually USE a conversion factor?



mg = 10gkg =10°q Convert 14500 mg to kg $14500 m/g \times \frac{10^{-3}g}{m/g} \times \frac{Kg}{10^{3}g} = 0.0145 Kg$ $Cm = 10^{-2}$ Convert 0.147 cm^2 to m^2 Convertor 147 cm is in 0.147 cm² $\chi \frac{10^{-2}m}{cm} \chi \frac{10^{m}}{cm} = \frac{1.47 \chi 10^{-5} \chi^2}{(0.0000147 m^2)}$

When making conversion factors from prefixes, you must use units that DON'T already have an exponent!

Note: For squared or cubed units, you will use each conversion factor two (squared) or three (cubed) times! It makes senses if you remember:

$$Cm^2 = Cm \cdot Cm$$

 $Cm^3 = (m \cdot (m \cdot Cm))$

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8.45 kg to mg

$$Kg = 10\frac{3}{g} \qquad Mg = 10\frac{9}{g}$$

$$8.45 kg to mg$$

$$\frac{10\frac{9}{g}}{Kg} \times \frac{M9}{10\frac{9}{g}} = \frac{845000000 mg}{(8.45 \times 10^9 mg)}$$

88100 kHz to MHz

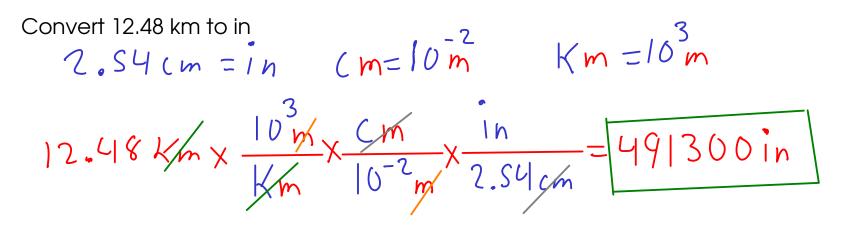
$$KHz = 10^{3}Hz$$

 $MHz = 10^{6}Hz$
 $88100 KHz \times \frac{10^{3}Hz}{KHz} \times \frac{MHz}{10^{6}Hz} = \frac{88.1 MHz}{88.1 MHz}$

Т

Convert 38.47 in to m, assuming 2.54 cm = 1 in
2.54 cm = in
$$Cm = 10^{-2}m$$

38.47 in $x \frac{2.54 cm}{1/h} x \frac{10^{-2}m}{Cm} = 0.9771 m$



- two related concepts that you must understand when working with measured numbers!

<u>Accuracy</u>

- how close a measured number is to the CORRECT (or "true") value of what you are measuring

- "Is it right?"

- checked by comparing measurements against a STANDARD (a substance or object with known properties)

Precision

- how close a SET of measured numbers are to EACH OTHER

- "Can I reproduce this?"
- checked by repeated measurements