## Converting from one unit to another

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

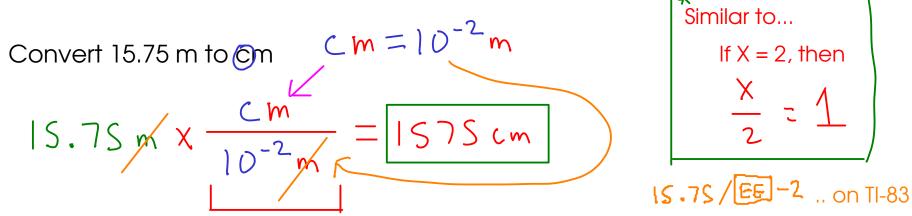
What's a conversion factor? A simple equality.

## Conversion factors in metric

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

For example, "
$$K_{10}$$
" means  $10^{3}$ 
 $K = 10^{3}$ 
 $K_{9} = 10^{3}$ 
 $K_{9} = 10^{3}$ 
 $K_{10} = 10^{3}$ 

## How do we actually USE a conversion factor?



\* This fraction equals one, so multiplying by it does not change the VALUE of the number, only its UNITS!

Convert 0.01893 kg to g
$$Kg = 10\frac{3}{9}$$
0.01893 kg \( \text{X} \) \( \frac{10^3 9}{\frac{1}{9}} = \frac{18.93 g}{\frac{1}{9}} \)

## DRAG AND DROP

- Drag the part of the factor that contains the unit you want to get rid of (cancel out) to the BOTTOM.
- Then, drag the other half of the factor to the TOP

Convert 14500 mg to kg

$$mg = 10g$$
  $Kg = 10g$ 

$$14500 \text{ m/g} \times \frac{10^{-3} \text{g}}{\text{m/g}} \times \frac{10^{3} \text{g}}{10^{3} \text{g}} = 0.0145 \text{ kg}$$

Convert 0.147 cm<sup>2</sup> to m<sup>2</sup> 
$$(m = 10^{-2} \text{m})$$
  
0.147 cm<sup>2</sup> x  $\frac{10^{-2} \text{m}}{\text{cm}}$  x  $\frac{10^{-m}}{\text{cm}}$  =  $\frac{1.47 \times 10^{-5} \text{m}^2}{0.0000 \text{ (47 m}^2)}$ 

When converting squared or cubed units, use each factor two (for squared) or three (for cubed) times.

$$(m^2 = (m \times cm) \quad (m^3 = (m \times cm) \times cm)$$

88100 kHz to MHz 
$$= 10^{3}$$
Hz  $= 5^{-1}$  (Frequency)

MHz= $10^{6}$ Hz

88100 KHz  $\times \frac{10^{3}$ Hx  $\times \frac{MHz}{10^{6}$ Hx}  $= 86.1$  MHz

KHz= $10^{6}$ Hz

Convert 38.47 in to m, assuming 2.54 cm =  $\frac{1}{2}$  in

$$2.54cm = in$$
  $cm = 10^{-2}m$ 

Convert 12.48 km to in