

## 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

$$kg = 10^3 g$$

$$km = 10^3 m$$

$$ks = 10^3 s$$

$$kL = 10^3 L$$

Just apply the prefix to the base unit!

## How do we actually USE a conversion factor?

Convert 15.75 m to cm

$$15.75 \cancel{\text{m}} \times \frac{\text{cm}}{10^{-2} \cancel{\text{m}}} = 1575 \text{ cm}$$

$\text{cm} = 10^{-2} \text{ m}$

\* Similar to...

If  $X = 2$ , then

$$\frac{X}{2} = 1$$

15.75 / [EE]-2 .. on TI-83

\* 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

$$\text{kg} = 10^3 \text{ g}$$

$$0.01893 \cancel{\text{kg}} \times \frac{10^3 \text{ g}}{\cancel{\text{kg}}} = 18.93 \text{ g}$$

### 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

$$\text{mg} = 10^{-3} \text{g}$$

$$\text{kg} = 10^3 \text{g}$$

Convert 14500 mg to kg

$$14500 \text{ mg} \times \frac{10^{-3} \text{ g}}{\text{mg}} \times \frac{\text{kg}}{10^3 \text{ g}} = 0,0145 \text{ kg}$$

Convert  $0.147 \text{ cm}^2$  to  $\text{m}^2$

$$\text{cm} = 10^{-2} \text{m}$$

$$0.147 \text{ cm}^2 \times \frac{10^{-2} \text{ m}}{\text{cm}} \times \frac{10^{-2} \text{ m}}{\text{cm}} = 1.47 \times 10^{-5} \text{ m}^2$$

$0.0000147 \text{ m}^2$

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

$$\text{cm}^2 = \text{cm} \times \text{cm}$$

$$\text{cm}^3 = \text{cm} \times \text{cm} \times \text{cm}$$

$$\text{kg} = 10^3 \text{g}$$

$$\mu\text{g} = 10^{-6} \text{g}$$

8.45 kg to  $\mu\text{g}$

$$8.45 \cancel{\text{kg}} \times \frac{10^3 \cancel{\text{g}}}{\cancel{\text{kg}}} \times \frac{\mu\text{g}}{10^{-6} \cancel{\text{g}}} = \boxed{8450000000 \mu\text{g}}$$

(8.45  $\times 10^9$   $\mu\text{g}$ )

88100 kHz to MHz

$$\text{kHz} = 10^3 \text{Hz}$$

$$\text{MHz} = 10^6 \text{Hz}$$

$\text{Hz} = \text{s}^{-1}$   
 (frequency)

$$88100 \cancel{\text{kHz}} \times \frac{10^3 \cancel{\text{Hz}}}{\cancel{\text{kHz}}} \times \frac{\text{MHz}}{10^6 \cancel{\text{Hz}}} = \boxed{88.1 \text{MHz}}$$

Convert 38.47 in to m, assuming 2.54 cm = 1 in

$$2.54 \text{ cm} = 1 \text{ in} \quad \text{cm} = 10^{-2} \text{ m}$$

$$38.47 \text{ in} \times \frac{2.54 \text{ cm}}{1 \text{ in}} \times \frac{10^{-2} \text{ m}}{\text{cm}} = 0.9771 \text{ m}$$

Convert 12.48 km to in

$$2.54 \text{ cm} = 1 \text{ in} \quad \text{cm} = 10^{-2} \text{ m} \quad \text{km} = 10^3 \text{ m}$$

$$12.48 \text{ km} \times \frac{10^3 \text{ m}}{\text{km}} \times \frac{\text{cm}}{10^{-2} \text{ m}} \times \frac{1 \text{ in}}{2.54 \text{ cm}} = 491300 \text{ in}$$