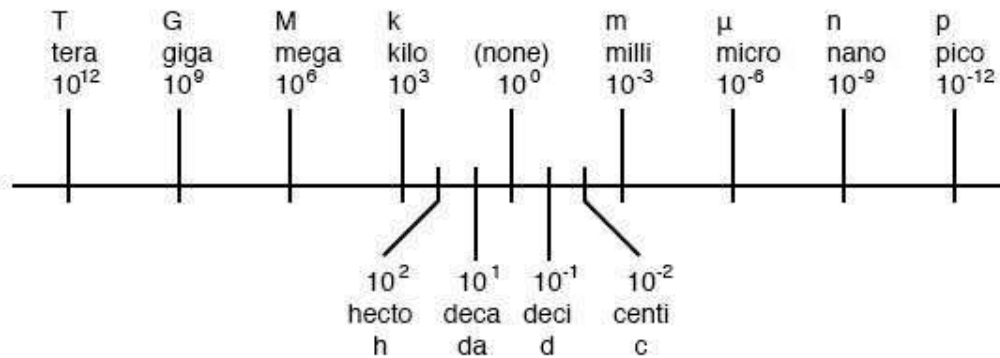


# Unit Conversion - Tutorial

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## METRIC PREFIX SCALE



### How do you use above scale?

If you want to convert a unit to base unit, then use the multiplication factor given in the table.

For example if you want convert mm into m, the multiply by 10<sup>-3</sup>.

$$124 \text{ mm} = 124 \times 10^{-3} \text{ m} = 0.124 \text{ m}$$

$$3.4 \text{ km} = 3.4 \times 10^3 \text{ m} = 3400 \text{ m}$$

$$60 \text{ } \mu\text{F} = 60 \times 10^{-6} \text{ F}$$

### Exercise 1 (write your answers with scientific notation)

- (1) 30  $\mu\text{m}$  into m =  $30 \times 10^{-6} = 3.0 \times 10^{-5} \text{ m}$
- (2) 124 kg into g =  $124 \times 10^3 = 1.24 \times 10^5 \text{ g}$
- (3) 70 GHz into Hz =  $70 \times 10^9 = 7.0 \times 10^{10} \text{ Hz}$
- (4) 60 pF into F =  $60 \times 10^{-12} = 6.0 \times 10^{-11} \text{ F}$

Note:  $1/10^a = 10^{-a}$

$$10^a = 1/10^{-a}$$

If you want to convert a base unit in another order, then divide by the factor in above chart.

E.g.: 3 m into km =  $3/10^3 = 3 \times 10^{-3} \text{ km}$  or 0.003 km

$$0.005 \text{ C into mC} = 0.005/10^{-3} = 0.005 \times 10^3 \text{ mC} = 5 \text{ mC}$$

## Exercise 2

- (1) 6560 Hz into kHz =  $6560 / 10^3 = 6560 \times 10^{-3} = 6.56 \times 10^0 \text{ kHz} = 6.56 \text{ kHz}$
- (2) 0.0078 C into mC =  $0.0078 \text{ C} / 10^{-3} = 0.0078 \times 10^3 = 7.8 \text{ mC}$
- (3) 45 s into ms =  $45 / 10^{-3} = 45 \times 10^3 = 4.5 \times 10^2 \text{ ms}$
- (4) 24567 W into MW =  $24567 / 10^6 = 24567 \times 10^{-6} = 2.4567 \times 10^{-2} \text{ MW}$

## The SI Units

Base quantity	Name	Symbol
Length	meter	m
Mass	kilogram	kg
Time	second	s
Electrical Current	ampere	A
Thermodynamic temperature	kelvin	K
Amount of substance	mole	mol
Luminous intensity	candela	cd



# SI Electrical Units

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Physical parameter	Unit Name	Symbol	Equivalent SI Unit
Power	Watt	W	J / s
Electric Potential	Volt	V	W / A
Frequency	Hertz	Hz	s <sup>-1</sup>
Electric Charge	Coulomb	C	A s
Electric Resistance	Ohm	Ω	V / A
Capacitance	Farad	F	C/V
Inductance	Henry	H	V s / A
Electric Conductance	Siemens	S	A / V
Magnetic Flux	Weber	Wb	V s
Magnetic Flux Density	Tesla	T	Wb / s <sup>2</sup>

# Converting the units of length area and volume

Length – one dimension **e.g.: 3 mm<sup>0</sup>**

Area – two dimensions (length x length) **e.g.: 3 mm<sup>2</sup>**

Volume – three dimensions (length x length x length) **e.g.: 3 mm<sup>3</sup>**

*Conversion factor will be squared for area and cubed for area.*

For example, The conversion factor for mm to m is  $10^{-3}$ .

Therefore conversion factor mm<sup>2</sup> to m<sup>2</sup> is  $(10^{-3})^2 = 10^{-6}$ .

Similarly conversion factor for mm<sup>3</sup> to m<sup>3</sup> is  $(10^{-3})^3 = 10^{-9}$ .

Example 1: Convert 5000 mm<sup>2</sup> into m<sup>2</sup>

$$5000 \times (10^{-3})^2 \text{ m}^2 = 5000 \times 10^{-6} \text{ m}^2 = 5 \times 10^{-3} \text{ m}^2$$

Example 2: Convert 89000 mm<sup>3</sup> into m<sup>3</sup>

$$89000 \times (10^{-3})^3 \text{ m}^3 = 89000 \times 10^{-9} \text{ m}^3 = 8.9 \times 10^{-5} \text{ m}^3$$

Example 3: Convert 54 m<sup>2</sup> into mm<sup>2</sup>

$$54 \div (10^{-3})^2 = 54 \div 10^{-6} = 54 \times 10^6 = 5.4 \times 10^7 \text{ mm}^2$$

Example 4: Convert 0.0078 m<sup>3</sup> into mm<sup>3</sup>

$$0.0078 \div (10^{-3})^3 = 0.0078 \div 10^{-9} = 0.0078 \times 10^9 = 7.8 \times 10^6 \text{ mm}^3$$

## Exercise 3

- (1) Convert 3800 mm<sup>2</sup> in m<sup>2</sup>  $\Rightarrow 3800 \times (10^{-3})^2 = 3800 \times 10^{-6} = 3.8 \times 10^{-3} \text{ m}^2$
- (2) Convert 3456 cm<sup>2</sup> into m<sup>2</sup>  $\Rightarrow 3456 \times (10^{-2})^2 = 3456 \times 10^{-4} = 3.456 \times 10^{-1} \text{ m}^2$
- (3) Convert 0.0678 m<sup>2</sup> into mm<sup>2</sup>  $\Rightarrow 0.0678 / (10^{-3})^2 = 0.0678 \times (10^3)^2 = 0.0678 \times 10^6 = 6.78 \times 10^4 \text{ mm}^2$
- (4) Convert 34500 mm<sup>3</sup> in m<sup>3</sup>  $\Rightarrow 34500 \times (10^{-3})^3 = 34500 \times 10^{-9} = 3.45 \times 10^{-5} \text{ m}^3$
- (5) Convert 3456 cm<sup>3</sup> into m<sup>3</sup>  $\Rightarrow 3456 \times (10^{-2})^3 = 3456 \times 10^{-6} = 3.456 \times 10^{-3} \text{ m}^3$
- (6) Convert 0.0678 m<sup>3</sup> into mm<sup>3</sup>  $\Rightarrow 0.0678 / (10^{-3})^3 = 0.0678 \times 10^9 = 6.78 \times 10^7 \text{ mm}^3$