Metric Conversions

Prefix	Symbol	Fractions of Conversions
GIGA	G	1 giga = 1 x 10^9 bases
MEGA	M	1 mega = 1 x 10^6 bases
KILO-	k	1 kilo = 1 x 10^3 bases
BASE-	*g, l, m*	*1 base = 1 base*
DECI-	d	1 deci = 1 x 10^{-1} bases
CENTI-	c	1 centi = 1 x 10^{-2} bases
MILLI-	m	1 milli = 1 x 10^{-3} bases
MICRO-	μ	1 micro = 1 x 10^{-6} bases
NANO-	n	1 nano = 1 x 10^{-9} bases
PICO-	p	1 pico = 1 x 10^{-12} bases

Conversions are actually very easy if you follow the steps necessary to go from one unit to another.

Example 2: Convert 4 kilometers to meters.

Change to the base unit by multiplying by a **conversion factor** (a fraction equivalent to so that units can be cancelled.

$$4\text{km} \times \frac{10^3\text{m}}{1\text{km}} = 4\text{x}10^3\text{m}$$

Example 2: Convert 4234m to kilometers:

This is solved in the same manner except to cross out meters in the equation, the conversion step is flipped.

$$4234\text{m} \times \frac{\text{km}}{10^3\text{m}} = 4.234\ \text{x}10^3\text{m}$$

Example 3: Convert $1.345\text{x}10^7$ millimeters to kilometers:

This conversion requires a two step conversion process. First convert millimeters to meters then meters to kilometers. This is all written on one line.

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$$1.345\text{x}10^7\text{mm} \times \frac{10^{-3}\text{m}}{\text{mm}} \times \frac{\text{km}}{10^3\text{m}} = 1.345\ \text{x}10^1\text{km}$$

TABLE 1.5 • Prefixes Used in the Metric System and with SI Units

Prefix	Abbreviation	Meaning	Example
Peta	P	10^{15}	1 petawatt (PW) $= 1 \times 10^{15}$ watts[a]
Tera	T	10^{12}	1 terawatt (TW) $= 1 \times 10^{12}$ watts
⇨ Giga	G	10^{9}	1 gigawatt (GW) $= 1 \times 10^{9}$ watts
⇨ Mega	M	10^{6}	1 megawatt (MW) $= 1 \times 10^{6}$ watts
⇨ Kilo	k	10^{3}	1 kilowatt (kW) $= 1 \times 10^{3}$ watts
⇨ Deci	d	10^{-1}	1 deciwatt (dW) $= 1 \times 10^{-1}$ watt
⇨ Centi	c	10^{-2}	1 centiwatt (cW) $= 1 \times 10^{-2}$ watt
⇨ Milli	m	10^{-3}	1 milliwatt (mW) $= 1 \times 10^{-3}$ watt
⇨ Micro	μ[b]	10^{-6}	1 microwatt (μW) $= 1 \times 10^{-6}$ watt
⇨ Nano	n	10^{-9}	1 nanowatt (nW) $= 1 \times 10^{-9}$ watt
Pico	p	10^{-12}	1 picowatt (pW) $= 1 \times 10^{-12}$ watt
Femto	f	10^{-15}	1 femtowatt (fW) $= 1 \times 10^{-15}$ watt
Atto	a	10^{-18}	1 attowatt (aW) $= 1 \times 10^{-18}$ watt
Zepto	z	10^{-21}	1 zeptowatt (zW) $= 1 \times 10^{-21}$ watt

[a]The watt (W) is the SI unit of power, which is the rate at which energy is either generated or consumed. The SI unit of energy is the joule (J); 1 J = 1 kg · m^2/s^2 and 1 W = 1 J/s.

[b]Greek letter mu, pronounced "mew."

$$\text{Prefix} \quad X \quad \frac{10^{\text{? Base unit (gLmW)}}}{\text{Prefix}} = \text{Answer}$$

$$\text{Base unit} \quad X \quad \frac{\text{Prefix}}{10^{\text{? Base unit (gLmW)}}} = \text{Answer}$$

METRIC CONVERSIONS

Final answer should be in scientific notation.

1) 0.75 kg to milligrams _____

2) 1500 millimeters to km _____

3) 2390 g to kg _____

4) 0.52 km to meters _____

5) 65 kg to g _____

6) 750 micrograms to g _____

7) 2.77 kg to mg _____

8) 1.08 kg to μg _____

9) 9.57×10^{-8} mm to nm _____

10) 2.00 L to mL _____

11) 1.23×10^{5} mg to kg _____

12) 3.23×10^{7} μg to kg _____

13) 3.23×10^{7} ng to mg _____

14) 6.73×10^{9} ng to kg _____

15) 1.45 kg to mg _____

16) 24000 micrograms to ng _____

17) 1.77×10^{-9} kg to mg _____

18) 4.23×10^{-12} kg to ng _____

19) 5.57×10^{-9} nm to km _____

20) 2.007×10^{-9} ML to μL _____

21) 1.23×10^{6} μg to kg _____

22) 3.23×10^{9} μg to Mg _____

23) 9.13×10^{12} ng to kg _____

24) 8.73×10^{4} ng to mg _____

25) 1.45 Mg to mg _____

26) 46000 micrograms to kg _____

27) 7.13×10^{-9} Mg to μg _____

28) 6.13×10^{-11} Gg to ng _____

29) 3.57×10^{-9} nm to km _____

30) 5.001×10^{-5} GL to nL _____