Mathematics

Support Centre

Title: Metric Units

Target: On completion of this worksheet you should be able to convert between the metric units for length, weight and capacity

The metric unit of length is the **metre**.
The metric unit of weight is the **gram**.
The metric unit in capacity is the **litre**.
There are then both larger and smaller units for each of these measures but the prefixes used are the same:
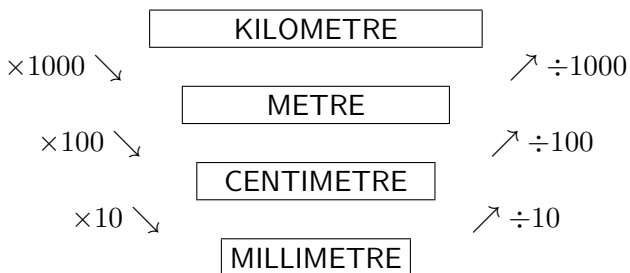
kilo	$\times 1000$
centi	$\times 1/100$
milli	$\times 1/1000$
micro	$\times 1/10000$

Not all these prefixes are used for each of the above measurements.

The most commonly used ones are:
1 kilometre = 1000 metres
1 metre = 100 centimetres
1 metre = 1000 millimetres
1 kilogram = 1000 grams
1 gram = 1000 milligrams
1 gram = 1000000 micrograms
1 litre = 1000 millilitres

This pyramid shows the units for length:

The abbreviations used are:

kilometre	km
metre	m
centimetre	cm
millimetre	mm

We can use this diagram to help convert lengths in the metric system.

- If you are converting a large measure to a smaller one then go down the pyramid multiplying by the appropriate factors.

- If you are converting a small measure to a larger one then go up the pyramid dividing by the appropriate factots.

Examples

1. Change 2 metres into millimetres.
   Go down the pyramid from metres to millimetres and see that we multiply by 100 and then by 10.
   2 metres = 2×1000 millimetres = 2000mm

2. Change 5.2 kilometres into metres.
   Go down the pyramid from kilometre to metres and so we multiply by 1000.
   5.2 km = 5.2×1000 m = 5200 m

3. Change 407 centimetres into metres.
   Go up the pyramid from centimetres to metres so we divide by 100.
   407cm= $407 \div 100$ m= 4.07m

Exercise
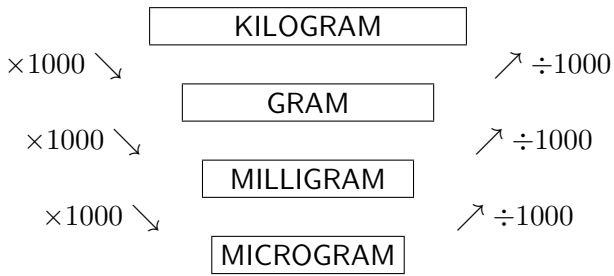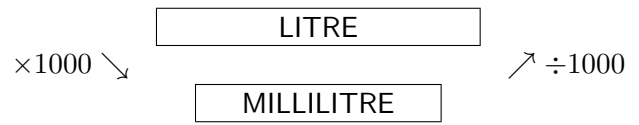Change the following to the given units:

1. 6km to m 2. 7cm to mm

3. 5.4km to cm 4. 12.5km to mm

5. 710cm to m 6. 36500mm to m

7. 9700cm to km 8. 32000mm to km

(Answers: $6000, 70, 540000, 12500000,$
$7.1, 36.5, 0.097, 0.032$)

A similar pryamid for weight is:

$$\text{KILOGRAM}$$
$\times 1000 \searrow \qquad\qquad\qquad \nearrow \div 1000$
$$\text{GRAM}$$
$\times 1000 \searrow \qquad\qquad\qquad \nearrow \div 1000$
$$\text{MILLIGRAM}$$
$\times 1000 \searrow \qquad\qquad\qquad \nearrow \div 1000$
$$\text{MICROGRAM}$$

The abbreviations used are:

kilogram   kg
gram   g
milligram   mg
microgram   mcg or μg

Examples

1. Change 3 kilograms into grams
   Go down the pyramid and multiply by 1000.
   3 kilograms $= 3 \times 1000$ grams $= 3000$g

2. Change 0.4 milligrams into micrograms
   Go down the pyramid and multiply by 1000.
   0.4 milligrams $= 0.4 \times 1000$ micrograms $= 400\mu$g

3. Change 0.00063 grams into micrograms
   Go down the pyramid and multiply by 1000 and
   then by 1000 again.
   0.00063 g $= 0.00063 \times 1000000\mu$g $= 630\mu$g

4. Change 9301 micrograms into milligrams
   Go up the pyramid and divide by 1000.
   9301μg $= 9301 \div 1000$ mg $= 9.301$mg

Exercise
Change the following to the given units:

1.   7kg to g   2.   3g to mg

3.   0.0032g to mg   4.   1.6mg to μg

5.   207μg to mg   6.   548200μg to g

7.   0.025mg to μg   8.   500μg to mg

(Answers: $7000, 3000, 3.2, 1600, 0.207,$
$0.5482, 25, 0.5$)

For capacity we have:

$$\text{LITRE}$$
$\times 1000 \searrow \qquad\qquad\qquad \nearrow \div 1000$
$$\text{MILLILITRE}$$

The abbreviations used are:

litre l
millilitre   ml

Examples

1. Change 4 litres into millilitres
   4 litres $= 4 \times 1000$millilitres $= 4000$ml

2. Change 0.025 litres into millilitres
   0.025 litres $= 0.025 \times 1000$millilitres$= 25$ml

3. Change 575 millilitres into litres
   575 millilitres $= 575 \div 1000 = 0.575l$

Note: The abbreviation for litres (l) can
sometimes look like a number one (1) so beware.

Exercise
Change the following to the given units:

1. $7l$ to ml   2. $2.3l$ to ml

3. $0.5l$ to ml   4.   0.5ml to l

5.   0.205ml to l 6. $1.2l$ to ml

(Answers: $7000, 2300, 500, 0.0005, 0.000205, 1200$)

Mixed Exercise
Change the following to the given units:

1.   4kg to g   2.   0.5mg to μg

3.   25mm to cm   4.   125μg to mg

5. $0.75l$ to ml   6.   45000μg to g

7.   12300ml to l 8.   976mm to m

9.   10g to mg   10.   5.3km to m

(Answers: $4000, 500, 2.5, 0.125, 750,$
$0.045, 12.3, 0.976, 10000, 5300$)