

# Measurement In Science

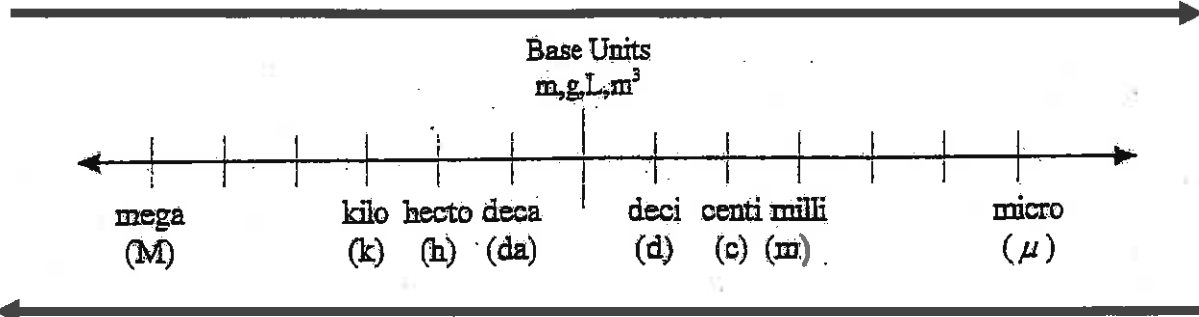
- scientists all over the world use the metric system of measurement
- developed in France, the metric system is used by most people in their everyday lives
- is based on 3 standard units called **base units** and uses multiples of 10 represented by the prefix before the standard unit
- base units:
  - Length = meter (m)
  - Mass = gram (g)
  - Volume = litre (l)

The table below shows the symbol, prefix, prefix meaning, and the scientific notation corresponding with the prefix.

Y	Yotta	one septillion	$10^{24}$
Z	Zetta	one sextillion	$10^{21}$
E	Exa	one quintillion	$10^{18}$
P	Peta	one quadrillion	$10^{15}$
T	Tera	one trillion	$10^{12}$
G	Giga	one billion	$10^9$
M	Mega	one million	$10^6$
k	kilo	one thousand	$10^3$
h	hecto	one hundred	$10^2$
da	deca	ten	$10^1$
	<i>Base Unit</i>	<i>Example: grams</i>	
d	deci	one tenth	$10^{-1}$
c	centi	one hundredth	$10^{-2}$
m	milli	one thousandth	$10^{-3}$
$\mu$	micro	one millionth	$10^{-6}$
n	nano	one billionth	$10^{-9}$
p	pico	one trillionth	$10^{-12}$
f	femto	one quadrillionth	$10^{-15}$
a	atto	one quintillionth	$10^{-18}$

## How to Convert between Metric Units

To convert to a smaller unit, move the decimal point to the right or multiply



To convert to a larger unit, move decimal point to the left or divide

# METRICS AND MEASUREMENT

Name \_\_\_\_\_

Scientists use the metric system of measurement, based on the number 10. It is important to be able to convert from one unit to another.

kilo	hecto	deca	<b>Basic Unit</b>	deci	centi	milli
(k)	(h)	(da)	gram (g)	(d)	(c)	(m)
1000	100	10	liter (L)	.1	.01	.001
$10^3$	$10^2$	$10^1$	meter (m)	$10^{-1}$	$10^{-2}$	$10^{-3}$

Using the above chart, we can determine how many places to move the decimal point and in what direction by counting the places from one unit to the other.

**Example:** Convert 5 mL to L.

**Answer:** To go from milli (m) to the basic unit, liters, count on the above chart three places to the left. Move the decimal point three places to the left and 5 mL becomes 0.005 L.

Convert the following.

1. 35 mL = \_\_\_\_\_ dL

6. 4,500 mg = \_\_\_\_\_ g

2. 950 g = \_\_\_\_\_ kg

7. 25 cm = \_\_\_\_\_ mm

3. 275 mm = \_\_\_\_\_ cm

8. 0.005 kg = \_\_\_\_\_ dag

4. 1,000 L = \_\_\_\_\_ kL

9. 0.075 m = \_\_\_\_\_ cm

5. 1,000 mL = \_\_\_\_\_ L

10. 15 g = \_\_\_\_\_ mg

## Metrics and Measurement

In the science classroom and lab, the metric system of measurement is used, so it is important to be able to convert from one unit to another.

### Using Correct Units

For each of the following commonly used measurements, indicate its symbol. Use the symbols to complete the following.

_____ milliliter	_____ milligram	_____ liter	_____ centimeter
_____ kilogram	_____ millimeter	_____ kilometer	_____ gram
_____ meter	_____ millisecond	_____ microgram	_____ nanometer

REMEMBER →  $1.0 \text{ cm}^3 = 1.0 \text{ mL}$

EX.  $0.0050 \text{ kg} = \underline{5.0} \text{ g}$        $0.075 \text{ km} = \underline{7500} \text{ cm}$        $3750 \text{ mL} = \underline{3750} \text{ L}$

Convert:

- |  |   |
|--|---|
| a. $9200 \text{ cm} = \underline{\hspace{2cm}} \text{ m}$    | b. $2.0 \text{ ML} = \underline{\hspace{2cm}} \text{ kL}$     |
| c. $238 \text{ kg} = \underline{\hspace{2cm}} \text{ Mg}$    | d. $50.0 \text{ cm} = \underline{\hspace{2cm}} \text{ mm}$    |
| e. $706 \text{ dag} = \underline{\hspace{2cm}} \text{ dg}$   | f. $70.0 \text{ hm} = \underline{\hspace{2cm}} \text{ m}$     |
| g. $72 \text{ km} = \underline{\hspace{2cm}} \text{ m}$      | h. $0.67 \text{ kL} = \underline{\hspace{2cm}} \text{ mL}$    |
| i. $1500 \text{ m} = \underline{\hspace{2cm}} \text{ km}$    | j. $5800 \text{ mm} = \underline{\hspace{2cm}} \text{ km}$    |
| k. $0.042 \text{ km} = \underline{\hspace{2cm}} \text{ dm}$  | l. $12.0 \text{ dam} = \underline{\hspace{2cm}} \text{ dm}$   |
| m. $4.601 \text{ dam} = \underline{\hspace{2cm}} \text{ cm}$ | n. $0.020 \text{ m} = \underline{\hspace{2cm}} \text{ cm}$    |
| o. $0.28 \text{ mL} = \underline{\hspace{2cm}} \text{ cm}^3$ | p. $7.50 \mu\text{g} = \underline{\hspace{2cm}} \text{ mg}$   |
| q. $142 \text{ Mm} = \underline{\hspace{2cm}} \text{ km}$    | r. $60.0 \text{ ml} = \underline{\hspace{2cm}} \text{ cm}^3$  |
| s. $12.0 \mu\text{m} = \underline{\hspace{2cm}} \text{ cm}$  | t. $65.0 \text{ g} = \underline{\hspace{2cm}} \text{ mg}$     |
| u. $750 \text{ ml} = \underline{\hspace{2cm}} \text{ L}$     | v. $81\,000 \text{ kg} = \underline{\hspace{2cm}} \text{ Mg}$ |