UNITS

A unit – is defined as a symbol or sign which is assigned to a number to describe a kind of measurement made

Units of Length

Convertion of One Unit of Length to Another

Convert one unit of length to another

The conversion of one unit to another is done by considering the arrangement below

km						1
hm					1	0
dam				1	0	0
m			1	0	0	0
dm		1	0	0	0	0
cm	1	0	0	0	0	0
mm	0	0	0	0	0	0

Example, from the above we get

1 km = 1,000,000 mm
1 hm = 100,000 mm
1 dam = 1000 cm
1 m = 100 cm

Computations on Metric Units of Length

Perform computations on metric units of length

Example 1

Convert

(a) 12cm to dm

(b) 2,500 mm to m

(c) 87 km to cm

Solution

(a) 12cm to dm

$$1dm = 10\ cm$$
$$? = 12\ cm$$

By cross multiplication, we get

$$\models \frac{1\ dm\ \ x\ \ 12\ cm}{10\ cm} = \frac{12}{10}\ dm = 1.2\ dm$$

(b) 2,500 mm to m

$$1m = 1000\ mm$$
$$? = 2500\ mm$$

By cross multiplication, we get

$$= \frac{1\ m\ \ x\ \ 2\ 500\ mm}{1000\ mm} = \frac{2500}{1000}\ m = 2.5\ m$$

(c) 87 km to cm

$$1\ km = 100\ 000\ cm$$
$$87\ km = \ ?$$

By cross multiplication, we get

$$= \frac{87\ km\ \ x\ \ 100\ 000\ cm}{1\ km} = \frac{8\ 700\ 000}{1}\ cm = 8\ 700\ 000\ cm$$

Unit of Mass

Convertion of One Unit of Mass to Another

Convert one unit of mass to another

The conversion of one unit to another is done by considering the arrangement below

kg						1
hg					1	0
dag				1	0	0
g			1	0	0	0
dg		1	0	0	0	0
cg	1	0	0	0	0	0
mg	0	0	0	0	0	0

Example, from the above

1 kg = 1,000,000 mg
1 hg = 100,000 mg
1 dag = 1000 cg
1 g = 100 cg

The conversion of *tonne*to other units is done converting it to *kilogram*first and then from*kilogram*to the required unit.

1 tonne = 1000kg

Computation on Metric Units of Mass

Perform computation on metric units of mass

Example 2

Convert (i) 8 500 g to kg

(ii) 0.000025 kg to mg

(iii) 4.67cg to dg

Solution

(i) 8 500 g to kg

$$1\ kg = 1000\ g$$
$$?\ = 8\,500\ g$$
$$= \frac{1\ kg\ \ x\ 8\,500\ g}{1000\ g} = \frac{8\,500}{1000}\ kg = 8.5\ kg$$

(ii) 0.000025 kg to mg

$$1\ kg = 1\,000\,000\ mg$$
$$0.000025\ kg = \ ?$$
$$= \frac{0.000025\ kg\ \ x\ 1\,000\,000\ mg}{1\ kg} = \frac{25}{1}\ mg = 25\ mg$$

(iii) 4.67cg to dg

$$1\ dg = 10\ cg$$
$$?\ = 4.67\ cg$$
$$= \frac{1\ dg\ \ x\ 4.67\ cg}{10\ cg} = \frac{4.67}{10}\ dg = 0.467\ dg$$

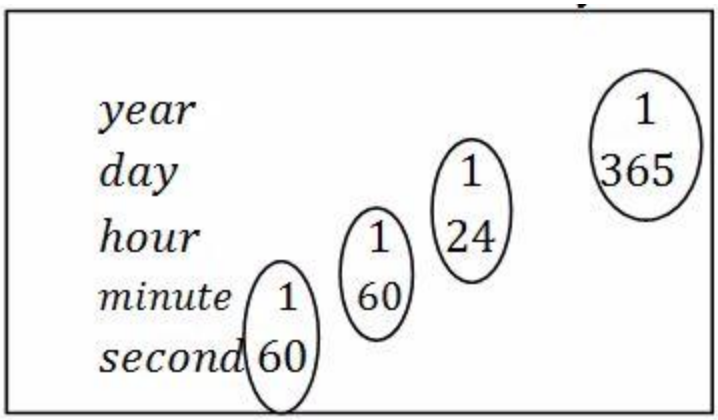
Units of Time

The units of time are of two types, smaller and larger units of time.Smaller units of time includes seconds, minutes, hours and days.Larger units of time includes week, month, year, decade, century,millennium.

Convertion of One Unit of Time to another

Convert one unit of time to another

The conversion of units of time to another can be done by considering the arrangement below



Example, from the circle above

$1\ min = 60\ sec$	$1\ hour = 60$ min	$1\ day = 24\ hours$	$1\ year = 365\ days$

Also

1 year = 365 x 24 x 60 x 60 seconds

1 days = 24 x 60 x 60 seconds
1 hour = 60 x 60 seconds
1 minute = 60 seconds

Example 3

Convert

(i) 54,000 seconds to minutes

(ii) 7,200 minutes to hours

(iii) 6 hours to seconds

Solution

(i) 54,000 seconds to minutes

$$1\ min = 60\ sec$$

$$?\ = 54\ 000\ sec$$

$$= \frac{1\ min\ x\ 54\ 000\ sec}{60\ sec} = \frac{54\ 000}{60}\ min = 900\ minutes$$

(ii) 7,200 minutes to hours

$$1\ hour = 60\ minutes$$

$$?\ = 7\ 200\ minutes$$

$$= \frac{1\ hour\ x\ 7\ 200\ minutes}{60\ minutes} = \frac{7\ 200}{60}\ hours = 120\ hours$$

(iii) 6 hours to seconds

$$1\ hour = 60\ x\ 60\ sec$$

$$6\ hours = \ ?$$

$$= \frac{1\ hours\ x\ 60\ x\ 60\ sec}{1\ hour} = \frac{3600}{1}\ seconds = 3\ 600\ seconds$$

Convertion of Unit Time of 12 Hour Clock to 24 Hour Clock and Vice Versa

Read and convert unit time of 12 hour clock to 24 hour clock and vice versa

The hours can exist in two systems: *12- hour clock and 24 - hour clock.*

A 12- *hour clock* has 12 hours between midnight and midday*(a.m)*and 12 hours between midday and midnight*(p.m).*

A 21 - hour has 24 hours in a day.Times in the morning are the same in both systems.For times in the afternoon, convert by adding or subtracting 12 hours

Example 4

Convert the following times from the 12 - hour clock to 24 - hour clock.

(i) $5.30\ a.m$
(ii) $1.40\ p.m$
(iii) $7.15\ \ p.m$

Solution

(i) $5.30\ a.m = 0530\ hrs$
(ii) $1.40\ p.m = (0140 + 1200) = 1340\ hrs$
(iii) $7.15\ \ p.m = (0715 + 1200) = 1915\ hrs$

Example 5

Convert the following times from the 24 - hour clock to 12 - hour clock.

(i) $0450\ hrs$
(ii) $1245\ hrs$
(iii) $2300\ \ hrs$

Solution

(i) $0450\ hrs = 4.50\ a.m$
(ii) $1245\ hrs = 12.45\ p.m$
(iii) $2300\ \ hrs = (2300 - 1200) = 11.00\ p.m$

Units of Capacity

Standard Unit of Measuring Capacity

State the standard unit of measuring capacity

Capacity is related to the volume.

Definitions:

- Capacity-is defined as the ability hold or contain something
- The S.I unit of capacity is *litre.*
- Volume –is defined as the amount of space occupied by a substance
- The S.I unit of volume is *cubic metres (m^3)*

Capacity is related to the volume as follows:

1 litre = 1000cm^3 = 0.001m^3 = 1dm^3

Also *1 ml = 1 cm^3*

Other units related to litre are kiloliter (kl), hectoliter (hl), decalitre (dal), litre (l), deciliter (dl), centiliter (cl) and mililitre (ml).

The conversion of one unit to another is done by considering the arrangement below

kl						1
hl					1	0
dal				1	0	0
l			1	0	0	0
dl		1	0	0	0	0
cl	1	0	0	0	0	0
ml	0	0	0	0	0	0

Example, from the above

$$1\,kl = 1{,}000{,}000\,ml$$
$$1\,hl = 100{,}000\,ml$$
$$1\,dal = 1000\,cl$$
$$1\,l = 100\,cl$$

The Litre in Daily Life

Use the litre in daily life

Example 6

Convert the following units into

(i) $3500\,ml$

(ii) $0.006\ m^3$

(iii) $4000\ dm^3$

(iv) $500\,mm^3$

Solution

(i) Convert first $3500\,ml \;\; to \;\; cm^3$

$$1\,ml = 1\,cm^3$$
$$3500\,ml = \;\; ?$$
$$= \frac{3500\,ml \;\; x \;\; 1\,cm^3}{1\,ml} = \frac{3500}{1}\;cm^3 = 3\,50$$

Then $3\,500cm^3 \;\; to \;\; litres$

$$1\;litre = 1000\;cm^3$$
$$? \;\;\; = 3\,500cm^3$$
$$= \frac{3500\;cm^3 \;\; x \;\; 1\;litre}{1000\;cm^3} = \frac{3500}{1000}\;litres = 3.$$

(ii) $0.006 \;\; m^3 \;\; to \;\; litres$

$$1\;litre = 0.001\;m^3$$
$$? \;\;\; = 0.006 \;\; m^3$$
$$= \frac{1\;litre \;\; x \;\; 0.006 \;\; m^3}{0.001\;m^3} = \frac{0.006}{0.001}\;litres = 6$$

(iii) Convert first $4000 \;\; dm^3$ to cm^3

$$1\;dm = 10\;cm$$
$$(1\;dm)^3 = (10\;cm)^3 \;\; \rightarrow \;\; 1\;dm^3 = 1000\;cm^3$$

So

$$1\;dm^3 = 1000\;cm^3$$
$$4000 \;\; dm^3 = \;?$$
$$= \frac{4000 \;\; dm^3 \;\; x \;\; 1000\;cm^3}{1\;dm^3} = \frac{4\,000\,000}{1}\;cm^3 = 4\,000\,000cm^3$$

Second, convert $4\,000\,000cm^3 \;\; to \;\; litres$

$$1\;litre = 1000\;cm^3$$
$$? \;\;\; = 4\,000\,000cm^3$$
$$= \frac{1\;litre \;\; x \;\; 4\,000\,000cm^3}{1000\;cm^3} = \frac{4\,000\,000}{1000}\;litres = 4\,000\;litres$$

(iv) $500\ mm^3$

Convert first $500\ mm^3$ to cm^3

$$1\ cm = 10\ mm$$

$$(1\ cm)^3 = (10\ mm)^3 \quad \rightarrow \quad 1\ cm^3 = 1000\ mm^3$$

So

$$1\ cm^3 = 1000\ mm^3$$

$$? \quad = 500\ mm^3$$

$$= \frac{1\ cm^3\ x\ 500\ mm^3}{1000\ mm^3} = \frac{500}{1000}\ cm^3 = 0.5\ cm^3$$

Second, convert $0.5\ cm^3\ to\ litres$

$$1\ litre = 1000\ cm^3$$

$$? \quad = 0.5\ cm^3$$

$$= \frac{1\ litre\ x\ 0.5\ cm^3}{1000\ cm^3} = \frac{0.5}{1000}\ litres = 0.0005\ litres$$