Measurements, Units, and Significant Figures

Measurement requires a number and a unit.

Measurement		English system	SI units (metric)	Conversion factor
mass		**pounds (lb)**	**kilograms (kg)**	**1 lb = 453.6 g**
length		**feet (ft)**	**meters (m)**	**1 in = 2.54 cm**
time		**minute (min)**	**second (s)**	**1 min = 60 sec**
volume	**length^3**	**fluid ounces**	**liters (L=1 dm^3)**	**12 fl oz = 355 mL**
		cubic inch (in^3)	**cubic cm (cm^3)**	
density	**mass/length^3**	**lb/ft^3**	**kg/dm^3**	
area	**length^2**	**square feet (ft^2)**	**square m (m^2)**	
temperature		**Fahrenheit (^{o}F)**	**Celsius (^{o}C)**	**^{o}F-32 = 1.8 ^{o}C**
			kelvins (K)	**K = ^{o}C + 273.15**

SI unit	abbreviation		SI prefix names	abbreviation	Number	
gram	**g**		giga	**G**	10^9	billion
meter	**m**		mega	**M**	10^6	million
second	**s**		kilo	**k**	10^3	thousand
liter	**L**		deci	**d**	10^{-1}	tenth
			centi	**c**	10^{-2}	hundredth
			milli	**m**	10^{-3}	thousandth
			micro	**μ**	10^{-6}	millionth
			nano	**n**	10^{-9}	billionth
			pico	**p**	10^{-12}	trillionth

Significant Figures

Rounding Off - less than 5, round down; more than 5, round up.

Adding or Subtracting - result has same number of decimal places as data with smallest number of decimal places.

Multiplying or Dividing - result has same number of significant digits as data with smallest number of significant digits.

Dimensional Analysis - Factor Label Method

Convertables

length

$$\left|\frac{12\text{ in}}{1\text{ ft}}\right.$$

$$\left|\frac{2.54\text{ cm}}{1\text{ in}}\right.$$

$$\left|\frac{10^{-2}\text{ m}}{1\text{ cm}}\right.$$

mass

$$\left|\frac{1000\text{ g}}{1\text{ kg}}\right.$$

$$\left|\frac{453.6\text{ g}}{1\text{ lb}}\right.$$

volume

$$\left|\frac{1\text{ cm}^3}{1\text{ mL}}\right.$$

$$\left|\frac{10^{-3}\text{ L}}{1\text{ mL}}\right.$$

$$\left|\frac{12.0\text{ fl.oz.}}{355\text{ mL}}\right.$$

amounts

$$\left|\frac{6.022 \times 10^{23}}{1\text{ mole}}\right.$$

$$\left|\frac{12.011\text{ g C}}{1\text{ mole C}}\right. \qquad \left|\frac{1.008\text{ g H}}{1\text{ mole H}}\right. \qquad \left|\frac{16.00\text{ g O}}{1\text{ mole O}}\right.$$

$$\left|\frac{6\text{ moles C}}{1\text{ mole } C_6H_{12}}\right.$$