Continuous variable

If a variable can take on any value between its minimum value and its maximum value, it is called a continuous variable. The value given to an observation for a continuous variable can include values as small as the instrument of measurement allows. Examples of continuous variables include height, time, age, and temperature.

Accuracy

Accuracy refers to the closeness of a measured value to a standard or known value. For example, if in lab you obtain a weight measurement of 3.2 kg for a given substance, but the actual or known weight is 10 kg, then your measurement is not accurate. In this case your measurement is not close to the known value.

Precision

Precision refers to the closeness of two or more measurements to each other. Using the example above, if you weigh a given substance five times, and get 3.2 kg each time, then your measurement is very precise. Precision is independent of accuracy. You can be very precise but inaccurate, as described above. You can also be accurate but imprecise.
For example, if on average, your measurements for a given substance are close to the known value, but the measurements are far from each other, then you have accuracy without precision.

Significant figures

Number of digits in a figure that express the precision of a measurement instead of its magnitude. The easiest method to determine significant digits is done by first determining whether or not a number has a decimal point.

Rules for determining the number of significant figures

All nonzero digits are significant.
Zeros are also significant with two exceptions:
zeros preceding the decimal point.
zeros following the decimal point and preceding the first nonzero digit.
Terminal zeros preceding the decimal point in amounts greater than one is an ambiguous case.

Questions on significant figures

Round off 92.810445 to three significant figures. In 92.810445, 928 are the first three digits, the next figure 1 which is less than 5, so we round off the number. When we round off 92.810576 to 3 significant figure is 92.8.

Dimensional analysis

Dimensional Analysis (also called Factor-Label Method or the Unit Factor Method) is a problem-solving method that uses the fact that any number or expression can be multiplied by one without changing its value. It is a useful technique.

SI units

The SI base units and their physical quantities are:
meter for length
kilogram for mass
second for time
ampere for electric current
kelvin for temperature
candela for luminous intensity
mole for the amount of substance

Derived units

Quantity	Name	Symbol	Expression
Frequency	Hertz	Hz	$1/s$
Force	Newton	N	$kg \cdot m/s^2$
Pressure, stress	Pascal	Pa	$N/m^2 = kg/m \cdot s^2$
Energy, work	Joule	J	$N \cdot m = kg \cdot m^2/s^2$
Power, radiant flux	Watt	W	$J/s = kg \cdot m^2/s^3$
Electric charge	Coulomb	C	$A \cdot s$
Voltage, electric potential	Volt	V	$W/A = kg \cdot m^2/A \cdot s^3$
Capacitance	Farad	F	$C/V = s^4A^2/m^2kg$
Electric resistance	Ohm	Ω	$V/A = m^2kg/s^3A^2$
Conductance	Siemens or mho	S or Ω	$1/\Omega = s^3A^2/m^2kg$
Magnetic field	Tesla	T	$N/A \cdot m = kg/s^2A$
Magnetic flux	Weber	Wb	$T \cdot m^2 = m^2kg/s^2A$
Inductance	Henry	H	$V \cdot s/A = m^2kg/s^2A^2$

Derived SI units are derived from the basic SI units. Some of the derived units are present in the image.

History of chemistry

Early potters found beautiful glazes to decorate and preserve their wares. Herdsmen, brewers and vintners used fermentation techniques to make cheese, beer and wine. Housewives leached the lye from wood ash to make soap. Smiths learned to combine copper and tin to make bronze. Crafters learned to make glass; leatherworkers tanned hides.

Definition of chemistry

It talks about the branch of science concerned with the substances of which matter is composed, the investigation of their properties and reactions, and the use of such reactions to form new substances.

Modern chemistry

After the discovery by Ernest Rutherford and Niels Bohr of the atomic structure in 1912, and by Marie and Pierre Curie of radioactivity, scientists had to change their viewpoint on the nature of matter. The experience acquired by chemists was no longer pertinent to the study of the whole nature of matter but only to aspects related to the electron cloud surrounding the atomic nuclei and the movement of the latter in the electric field induced by the former (see Born-Oppenheimer approximation).

History of some scientists

Greatest scientists have not contributed to the world by demystifying only but by shaping also how we live in it with their ingenious inventions. From Sir Isaac Newton to Charles Darwin to Albert Einstein and many more brilliant minds, here is a group of famous scientists who have made major advances in the field of science. Antoine Lavoisier was the important scientist in the field of chemistry who invented various laws.

Importance of chemistry

The real importance of chemistry is that it serves as the interface to practically all of the other sciences, as well as to many other areas of human endeavour. For this reason, chemistry is often said (at least by chemists!) to be the "central science".
Chemistry can be "central" in a much more personal way, with a solid background in chemistry, you will find it far easier to migrate into other fields as your interests develop.

Divisions of chemistry

The five main branches of chemistry
1. Organic chemistry
2. Inorganic chemistry
3. Analytical chemistry
4. Physical chemistry
5. Biochemistry

Side effects of progress in chemistry

Antibacterials which are found in deodorants, soaps and hand-washes, kill the protective bacteria of our body increasing the rate of infection.
Butyl acetate is found in nail-strengtheners and nail polishes. It can cause drowsiness and

overusing it may make the skin dry.
Butylated Hydroxy toluene is found in cosmetics and personal care products. It can cause skin and eye irritation.
Diethanolamine acts as an emulsifier and foaming agent in shampoos and body washes. It is absorbed by the skin and acts as a hormone and brain disruptor.
1,4-dioxane is a cancer-causing chemical in animals which is another ingredient in shampoos.
Formaldehyde (HCHO) is a disinfectant & preservative in soaps, adhesives etc. It causes major diseases like cancer, Asthma, genetic damage etc.

Physical quantities

Physical quantity is a physical property that can be quantified. Examples of physical quantities are mass, amount of substance, length, time, temperature, electric current, light intensity, force, velocity, density, and many others.

S.I units

International System of Units (SI) is the unit system adopted by the General Conference on Weights and Measures in 1960 and recommended for use in all scientific and technical fields. It consists of seven base units (meter, kilogram, second, ampere, kelvin, mole, candela) plus derived units and prefixes.

Units

The base units of length and volume are linked in the metric system. By definition, a liter is equal to the volume of a cube exactly 10 cm tall, 10 cm long, and 10 cm wide. Because the volume of this cube is 1000 cubic centimeters and a liter contains 1000 milliliters, 1 milliliter is equivalent to 1 cubic centimeter.

Derived units

Derived units are units, which may be expressed in terms of base units by means of mathematical symbols of multiplication and division, e.g., joule per mole, newton per metre.

Subsidiary unit

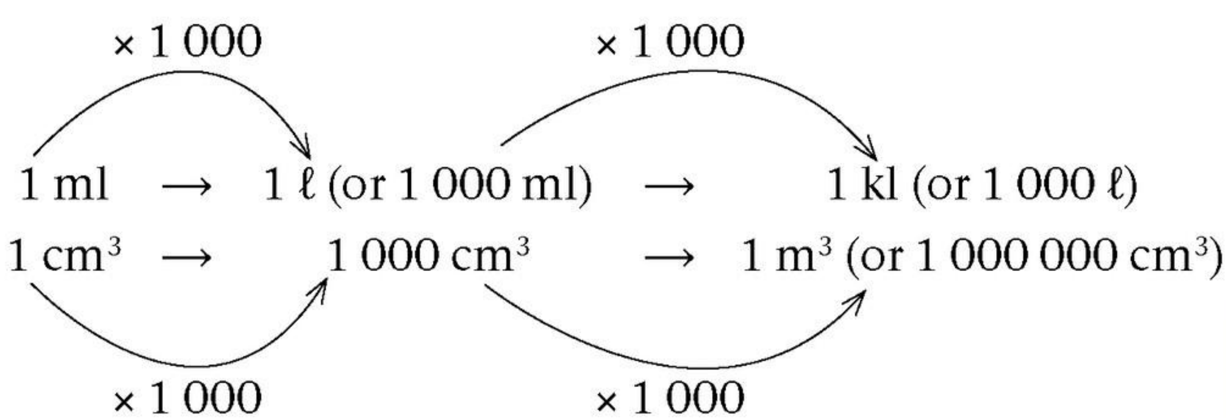
In most systems of units, a single unit is defined as a base unit for the description of a specified quantity. Other units are then defined as fractions and multiples of this base unit. These are called subsidiary units, e.g., the unit of area is m^2, which is derived from the unit of length.

Conversion of temperature to different units

To convert	Use this equation:	Example
Celsius to Fahrenheit °C → °F	$°F = \left(\frac{9}{5} \times °C\right) + 32$	Convert 45°C to °F. $°F = \left(\frac{9}{5} \times 45°C\right) + 32 = 113°F$
Fahrenheit to Celsius °F → °C	$°C = \frac{5}{9} \times (°F - 32)$	Convert 68°F to °C. $°C = \frac{5}{9} \times (68°F - 32) = 20°C$
Celsius to Kelvin °C → K	$K = °C + 273$	Convert 45°C to K. $K = 45°C + 273 = 318\ K$
Kelvin to Celsius K → °C	$°C = K - 273$	Convert 32 K to °C. $°C = 32\ K - 273 = -241°C$

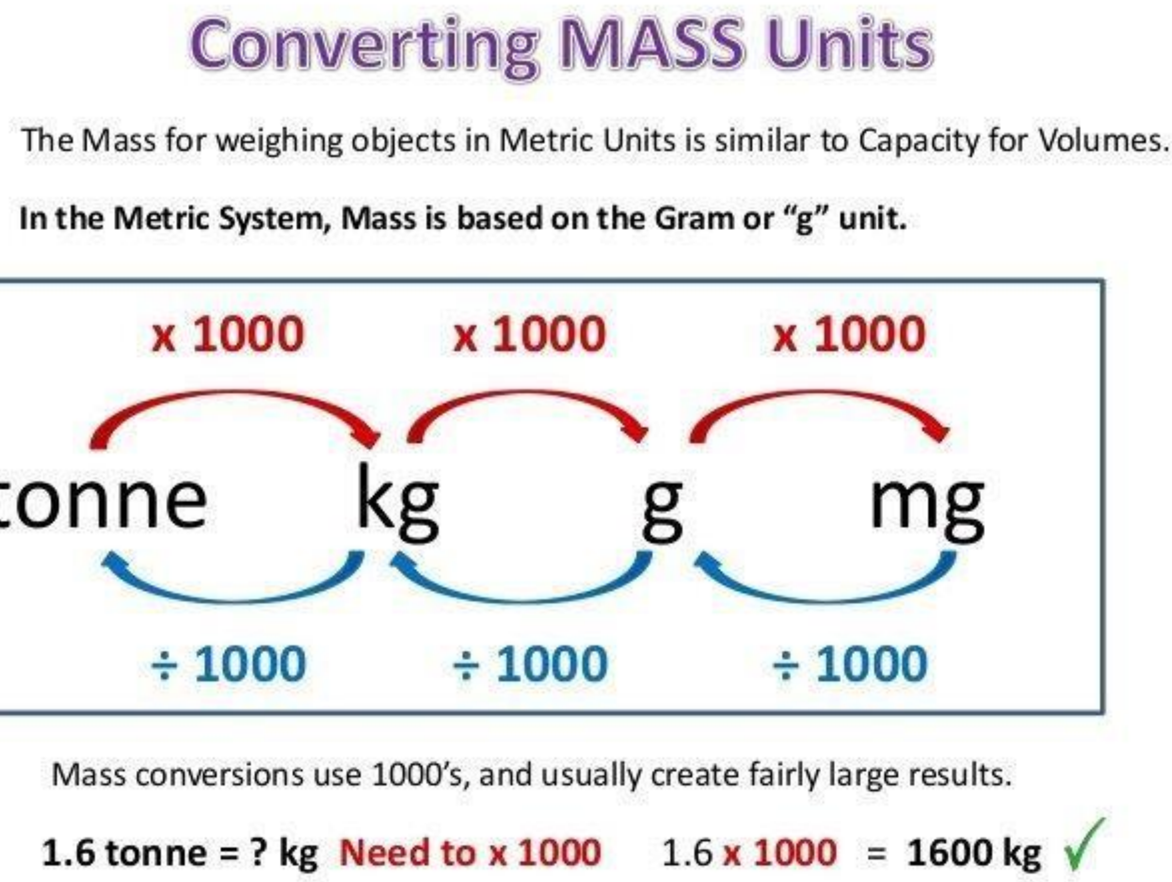
The conversion of temperature into different units is shown in the image.

Conversion of volume



The conversion of volumes into different units is shown in the diagram

Conversion of mass into different units



The conversion of mass into different units is shown in the image.

Conversion of length into different units

Prefix	Abbreviation	Exponential Multiplier	Meaning	Example using Length
giga	G	10^9	1000000000	1 gigameter (Gm) = 1000000000m
mega	M	10^6	1000000	1 megameter (Mm) = 1000000m
kilo	k	10^3	1000	1 kilometer (km) = 1000m
hecto	h	10^2	100	1 hectometer (hm) = 100m
deka	da	10^1	10	1 dekameter (dam) = 10m
			1	1 meter (m)
deci	d	10^{-1}	1/10	1 decimeter (dm) = -0.1m
centi	c	10^{-2}	1/100	1 centimeter (cm) = 0.01m
milli	m	10^{-3}	1/1000	1 millimeter (mm) = 0.001m
micro	µ	10^{-6}	1/1000000	1 micrometer (µm) = 0.000001m
nano	n	10^{-9}	1/1000000000	1 nanometer (nm) = 0.000000001m
pico	p	10^{-12}	1/1000000000000	1 picometer (pm) = 0.000000000001m

The conversion of length into different units is shown in the image.

Discrete variables

Variables that can only take on a finite number of values are called "discrete variables." All qualitative variables are discrete. Some quantitative variables are discrete, such as performance rated as 1,2,3,4, or temperature rounded to the nearest degree.