Learning Enhancement Team

University of East Anglia

STUDENT SUPPORT SERVICE

Factsheet: SI Units

There are seven basic units used in scientific notation as defined by the **International System of Units** (SI). The following tables describe these basic units and their use in common physical concepts.

Quantity	SI System Unit		Definition[3]
	Name	Symbol	
Length	meter	m	1 meter = distance travelled by light in 1/299 792 458 s.
Time	second	s	1 second = 9 192 631 770periods of the radiation equal to the transition between the two hyperfine ground state levels of the ^{133}Cs atom.
Mass[1]	kilogram	kg	1 kg = mass of the international Pt/Ir prototype of the kilogram.
Electric Current	ampere	A	1 A produces a force of 2×10^{-7} N between two, straight, parallel conductors of infinite length and negligible circular cross-section, placed 1 m apart in vacuum.
Thermodynamic Temperature[2]	kelvin	K	1 K = 1/273.16 of the thermodynamic temperature of the triple point of water.
Amount of Substance	mole	mol	1 mol = the amount of C atoms in 0.012 kg ^{12}C.
Luminous Intensity	candela	cd	1 Cd = the luminous intensity, of a source emitting monochromatic radiation of frequency 540×10^{12} Hz in a given direction that has radiant intensity of 1/683 W sr^{-1}.

Notes:

1. The SI unit of mass is the kilogram = 1000 grams. No other SI unit has a prefix in its basic form.
2. The SI unit of temperature is the kelvin, not degrees Celsius.
3. http://physics.nist.gov/cuu/Units

Other basic concepts have units comprising the seven fundamental SI units.

Quantity	Unit
Area	m^2
Volume	m^3
Density	kg m^{-3}
Velocity, Speed	m s^{-1}
Acceleration	m s^{-2}
Wave Number	m^{-1}
Molar Mass	kg mol^{-1}
Luminance	cd m^{-2}

All other quantities have units comprising the basic seven. Take some other well-known units.

Quantity	Unit		SI Unit Form	
	Name	**Symbol**	**Derived**	**Pure**
Force	newton	N	-	$kg\ m\ s^{-2}$
Frequency	hertz	Hz	-	s^{-1}
Electric Charge	coulomb	C	-	$A\ s$
Energy, Work	joule	J	$N\ m$	$kg\ m^2\ s^{-2}$
Pressure	pascal	Pa	$N\ m^{-2}$	$kg\ m^{-1}\ s^{-2}$
Potential Difference	volt	V	$J\ C^{-1}$	$m^2 \cdot kg \cdot s^{-3} \cdot A^{-1}$
Power	watt	W	$J\ s^{-1}$	$kg\ m^2\ s^{-3}$
Capacitance	farad	F	$C\ V^{-1}$	$m^{-2} \cdot kg^{-1} \cdot s^4 \cdot A^2$
Electrical Resistance	ohm	Ω	$V\ A^{-1}$	$m^2 \cdot kg \cdot s^{-3} \cdot A^{-2}$
Magnetic Flux	weber	Wb	$V\ s$	$m^2 \cdot kg \cdot s^{-2} \cdot A^{-1}$
Magnetic Flux Density	tesla	T	$Wb\ m^{-2}$	$kg \cdot s^{-2} \cdot A^{-1}$

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