SI UNIT DEFINITIONS (D6)

Base Units

Base Unit	**Base Symbol**	**Base Quantity**	**Typical Symbol**	**Formal Definition**	**Equation**
Second	s	Time	t	The second, symbol s, is the SI unit of time. It is defined by taking the fixed numerical value of the caesium frequency, $\Delta\nu_{\mathrm{Cs}}$, the unperturbed ground-state hyperfine transition frequency of the caesium 133 atom, to be $9\ 192\ 631\ 770$ when expressed in the unit Hz, which is equal to s^{-1}.	$1\ \mathrm{s} = \frac{9\ 192\ 631\ 770}{\Delta\nu_{\mathrm{Cs}}}$
Metre	m	Length	$\mathrm{l}, \mathrm{x}, \mathrm{r}$, etc.	The metre, symbol m, is the SI unit of length. It is defined by taking the fixed numerical value of the speed of light in vacuum, c, to be $299\ 792\ 458$ when expressed in the unit $\mathrm{m\ s^{-1}}$, where the second is defined in terms of the caesium frequency $\Delta\nu_{\mathrm{Cs}}$.	$1\ \mathrm{m} = \left(\frac{\mathrm{c}}{299\ 792\ 458}\right)\mathrm{s}$
Kilogram	kg	Mass	m	The kilogram, symbol kg, is the SI unit of mass. It is defined by taking the fixed numerical value of the Planck constant, h, to be $6.626\ 070\ 15 \times 10^{-34}$ when expressed in the unit $\mathrm{J\ s}$, which is equal to $\mathrm{kg\ m^2\ s^{-1}}$, where the metre and the second are defined in terms of c and $\Delta\nu_{\mathrm{Cs}}$.	$1\ \mathrm{kg} = \left(\frac{\mathrm{h}}{6.626\ 070\ 15 \times 10^{-34}}\right)\mathrm{m^{-2}s}$
Ampere	A	Electric Current	I, i	The ampere, symbol A, is the SI unit of electric current. It is defined by taking the fixed numerical value of the elementary charge, e, to be $1.602\ 176\ 634 \times 10^{-19}$ when expressed in the unit C, which is equal to $\mathrm{A\ s}$, where the second is defined in terms of $\Delta\nu_{\mathrm{Cs}}$.	$1\ \mathrm{A} = \left(\frac{\mathrm{e}}{1.602\ 176\ 634 \times 10^{-19}}\right)\mathrm{s^{-1}}$
Kelvin	K	Thermodynamic Temperature	T	The kelvin, symbol K, is the SI unit of thermodynamic temperature. It is defined by taking the fixed numerical value of the Boltzmann constant, k, to be $1.380\ 649 \times 10^{-23}$ when expressed in the unit $\mathrm{J\ K^{-1}}$, which is equal to $\mathrm{kg\ m^2\ s^{-2}}$	$1\ \mathrm{K} = \left(\frac{1.380\ 649 \times 10^{-23}}{\mathrm{k}}\right)\mathrm{kg\ m^2\ s^{-2}}$

Base Unit	Base Symbol	Base Quantity	Typical Symbol	Formal Definition	Equation
				K^{-1}, where the kilogram, metre and second are defined in terms of h, c and $\Delta\nu_{Cs}$.	
Mole	mol	Amount of Substance	n	The mole, symbol mol, is the SI unit of amount of substance. One mole contains exactly $6.022\ 140\ 76 \times 10^{23}$ elementary entities. This number is the fixed numerical value of the Avogadro constant, N_A, when expressed in the unit mol^{-1} and is called the Avogadro number. The amount of substance, symbol n, of a system is a measure of the number of specified elementary entities. An elementary entity may be an atom, a molecule, an ion, an electron, any other particle or specified group of particles.	$1\ mol = \left(\frac{6.022\ 140\ 76 \times 10^{23}}{N_A}\right)$
Candela	cd	Luminous Intensity	I_V	The candela, symbol cd, is the SI unit of luminous intensity in a given direction. It is defined by taking the fixed numerical value of the luminous efficacy of monochromatic radiation of frequency 540×10^{12} Hz, K_{cd}, to be 683 when expressed in the unit $lm\ W^{-1}$, which is equal to $cd\ sr\ W^{-1}$, or $cd\ sr\ kg^{-1}\ m^{-2}\ s^{3}$, where the kilogram, metre and second are defined in terms of h, c and $\Delta\nu_{Cs}$.	$1\ cd = \left(\frac{K_{cd}}{683}\right) kg\ m^2\ s^{-3}\ sr^{-1}$

Sources:

- Base Unit [1]
- Base Symbol [1]
- Base Quantity [1]
- Typical Symbol [1]
- Formal Definition [1]
- Equation [1]

Derived Units

Derived Unit	**Unit Symbol**	**Derived Quantity**	**Equation Expressed in Terms of SI Base Units**	**Equation Expressed in Terms of Other SI Units**
Radian	rad	Plane Angle	$\mathrm{rad} = \mathrm{m}/\mathrm{m}$	-
Steradian	sr	Solid Angle	$\mathrm{sr} = \mathrm{m}^2/\mathrm{m}^2$	-
Hertz	Hz	Frequency	$\mathrm{Hz} = \mathrm{s}^{-1}$	-
Newton	N	Force	$\mathrm{N} = \mathrm{kg\ m\ s}^{-2}$	-
Pascal	Pa	Pressure, Stress	$\mathrm{Pa} = \mathrm{kg\ m}^{-1}\ \mathrm{s}^{-2}$	-
Joule	J	Energy, Work, Amount of Heat	$\mathrm{J} = \mathrm{kg\ m}^2\ \mathrm{s}^{-2}$	$\mathrm{J} = \mathrm{N\ m}$
Watt	W	Power, Radiant Flux	$\mathrm{W} = \mathrm{kg\ m}^2\ \mathrm{s}^{-3}$	$\mathrm{W} = \mathrm{J/s}$
Coulomb	C	Electric Charge	$\mathrm{C} = \mathrm{A\ s}$	-
Volt	V	Electric Potential Difference	$\mathrm{V} = \mathrm{kg\ m}^2\ \mathrm{s}^{-3}\ \mathrm{A}^{-1}$	$\mathrm{V} = \mathrm{W/A}$
Farad	F	Capacitance	$\mathrm{F} = \mathrm{kg}^{-1}\ \mathrm{m}^{-2}\ \mathrm{s}^4\ \mathrm{A}^2$	$\mathrm{F} = \mathrm{C/V}$
Ohm	Ω	Electric Resistance	$\Omega = \mathrm{kg\ m}^2\ \mathrm{s}^{-3}\ \mathrm{A}^{-2}$	$\Omega = \mathrm{V/A}$
Siemens	S	Electric Conductance	$\mathrm{S} = \mathrm{kg}^{-1}\ \mathrm{m}^{-2}\ \mathrm{s}^3\ \mathrm{A}^2$	$\mathrm{S} = \mathrm{A/V}$
Weber	Wb	Magnetic Flux	$\mathrm{Wb} = \mathrm{kg\ m}^2\ \mathrm{s}^{-2}\ \mathrm{A}^{-1}$	$\mathrm{Wb} = \mathrm{V\ s}$
Tesla	T	Magnetic Flux Density	$\mathrm{T} = \mathrm{kg\ s}^{-2}\ \mathrm{A}^{-1}$	$\mathrm{T} = \mathrm{Wb/m}^2$
Henry	H	Inductance	$\mathrm{H} = \mathrm{kg\ m}^2\ \mathrm{s}^{-2}\ \mathrm{A}^{-2}$	$\mathrm{H} = \mathrm{Wb/A}$

Derived Unit	**Unit Symbol**	**Derived Quantity**	**Equation Expressed in Terms of SI Base Units**	**Equation Expressed in Terms of Other SI Units**
Degree Celsius	$°\mathrm{C}$	Celsius Temperature	$°\mathrm{C} = \mathrm{K}$, where $-273.15\ °\mathrm{C} = 0\ \mathrm{K}$	-
Lumen	lm	Luminous Flux	$\mathrm{lm} = \mathrm{cd\ sr}$	$\mathrm{lm} = \mathrm{cd\ sr}$
Lux	lx	Illuminance	$\mathrm{lx} = \mathrm{cd\ sr\ m^{-2}}$	$\mathrm{lx} = \mathrm{lm/m^2}$
Becquerel	Bq	Activity Referred to a Radionuclide	$\mathrm{Bq} = \mathrm{s^{-1}}$	-
Gray	Gy	Absorbed Dose, Kerma	$\mathrm{Gy} = \mathrm{m^2\ s^{-2}}$	$\mathrm{Gy} = \mathrm{J/kg}$
Sievert	Sv	Dose Equivalent	$\mathrm{Sv} = \mathrm{m^2\ s^{-2}}$	$\mathrm{Sv} = \mathrm{J/kg}$
Katal	kat	Catalytic Activity	$\mathrm{kat} = \mathrm{mol\ s^{-1}}$	-

Sources:

- Derived Unit [2]
- Unit Symbol [2]
- Derived Quantity [2]
- Equation Expressed in Terms of SI Base Units [2]
- Equation Expressed in Terms of Other SI Units [2]