

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, $\Delta\nu_{\text{Cs}}$, 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} .	$1 \text{ s} = \frac{9\,192\,631\,770}{\Delta\nu_{\text{Cs}}}$
Metre	m	Length	$l, x, r,$ 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 m s^{-1} , where the second is defined in terms of the caesium frequency $\Delta\nu_{\text{Cs}}$.	$1 \text{ m} = \left(\frac{c}{299\,792\,458}\right) \text{ s}$
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 J s, which is equal to $\text{kg m}^2 \text{ s}^{-1}$, where the metre and the second are defined in terms of c and $\Delta\nu_{\text{Cs}}$.	$1 \text{ kg} = \left(\frac{h}{6.626\,070\,15 \times 10^{-34}}\right) \text{ m}^{-2} \text{ s}$
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 A s, where the second is defined in terms of $\Delta\nu_{\text{Cs}}$.	$1 \text{ A} = \left(\frac{e}{1.602\,176\,634 \times 10^{-19}}\right) \text{ s}^{-1}$
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 J K^{-1} , which is equal to $\text{kg m}^2 \text{ s}^{-2}$.	$1 \text{ K} = \left(\frac{1.380\,649 \times 10^{-23}}{k}\right) \text{ kg m}^2 \text{ s}^{-2}$

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	<p>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.</p> <p>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.</p>	$1 \text{ mol} = \left(\frac{6.022\,140\,76 \times 10^{23}}{N_A} \right)$
Candela	cd	Luminous Intensity	I_V	<p>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 $\text{cd sr kg}^{-1} \text{ m}^{-2} \text{ s}^3$, where the kilogram, metre and second are defined in terms of h, c and $\Delta\nu_{CS}$.</p>	$1 \text{ cd} = \left(\frac{K_{cd}}{683} \right) \text{ kg m}^2 \text{ s}^{-3} \text{ sr}^{-1}$

Sources:

- Base Unit ^{[1] [2]}
- Base Symbol ^{[1] [2]}
- Base Quantity ^{[1] [2]}
- Typical Symbol ^{[1] [2]}
- Formal Definition ^{[1] [2]}
- Equation ^{[1] [2]}

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

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

Sources:

- Derived Unit ^[1] ^[2]
- Unit Symbol ^[1] ^[2]
- Derived Quantity ^[1] ^[2]
- Equation Expressed in Terms of SI Base Units ^[1] ^[2]
- Equation Expressed in Terms of Other SI Units ^[1] ^[2]