

The Metric System of Measurements

Base Units

Meter (m) for length: The length of the path traveled by light in a vacuum during a time interval of $1/299,792,458$ of a second.

Kilogram (kg) for mass: Equal to the mass of the international prototype of the kilogram.

Second (s) for time: The duration of 9,192,631,770 periods of radiation corresponding to the transition between the two hyperfine levels of the ground state of the cesium 133 atom.

Ampere (A) for electric current: A constant current which, if maintained in two straight parallel conductors of infinite length, of negligible circular cross-section, and placed 1 meter apart in a vacuum, would produce between these conductors a force equal to 2×10^{-7} newton per meter of length.

Kelvin (K) for thermodynamic temperature: The fraction $1/273.16$ of the thermodynamic temperature of the triple point of water.

Candela (cd) for luminous intensity: A source that emits monochromatic radiation of frequency 540×10^{12} hertz and that has a radiant intensity in that direction of $1/683$ watt per steradian.

Mole (mol) for quantity of matter: The amount of substance of a system which contains as many elementary entities as there are atoms in 0.012 kilogram of carbon 12.

Non-SI Units Commonly Used

Ångström (Å) for measure of displacement: Equal to 0.0000000001 meter (10^{-10} m). Used to express wavelengths of visible light, UV light, gamma rays, and x-rays.

Liter (L) for volume: Equal to 1000 cm³.

SI Derived Units

Derived Quantity	Name	Symbol	Expression in Terms of Other SI Units	Expression in Terms of SI Base Units
plane angle	radian	rad	-	$m \cdot m^{-1} = 1$
solid angle	steradian	sr	-	$m^2 \cdot m^{-2} = 1$
frequency	hertz	Hz	-	s^{-1}
force	newton	N	-	$m \cdot kg \cdot s^{-2}$
pressure, stress	pascal	Pa	N/m ²	$m^{-1} \cdot kg \cdot s^{-2}$
energy, work, quantity of heat	joule	J	Nm	$m^2 \cdot kg \cdot s^{-2}$
power, radiant flux	watt	W	J/s	$m^2 \cdot kg \cdot s^{-3}$
electric charge, quantity of electricity	coulomb	C	-	$s \cdot A$
electric potential, difference, electromotive force	volt	V	W/A	$m^2 \cdot kg \cdot s^{-3} \cdot A^{-1}$
capacitance	farad	F	C/V	$m^{-2} \cdot kg^{-1} \cdot s^4 \cdot A^2$
electric conductance	siemens	S	A/V	$m^{-2} \cdot kg^{-1} \cdot s^3 \cdot A^2$
electric resistance	ohm	Ω	V/A	$m^2 \cdot kg \cdot s^{-3} \cdot A^{-2}$
magnetic flux	weber	Wb	Vs	$m^2 \cdot kg \cdot s^{-2} \cdot A^{-1}$
magnetic flux density	tesla	T	Wb/m ²	$kg \cdot s^{-2} \cdot A^{-1}$
inductance	henry	H	Wb/A	$m^2 \cdot kg \cdot s^{-2} \cdot A^{-2}$
Celsius temperature	degree Celsius	°C	-	K
luminous flux	lumen	lm	cd·sr	$m^2 \cdot m^{-2} \cdot cd = cd$
illuminance	lux	lx	lm/m ²	$m^2 \cdot m^{-4} \cdot cd = m^{-2} \cdot cd$
activity (of a radionuclide)	becquerel	Bq	-	s^{-1}
absorbed dose, specific energy (imparted), kerma	gray	Gy	J/kg	$m^2 \cdot s^{-2}$
dose equivalent	sievert	Sv	J/kg	$m^2 \cdot s^{-2}$
catalytic activity	katal	kat	-	$s^{-1} \cdot mol$

SI Prefixes

Prefix	Symbol	Factor	Decimal
yocto	y	10^{-24}	.000000000000000000000001
zepto	z	10^{-21}	.00000000000000000000001
atto	a	10^{-18}	.0000000000000000000001
femto	f	10^{-15}	.0000000000000001
pico	p	10^{-12}	.000000000001
nano	n	10^{-9}	.000000001
micro	μ	10^{-6}	.000001
milli	m	10^{-3}	.001
centi	c	10^{-2}	.01
deci	d	10^{-1}	.1
base unit		10^0	1
deca	da	10^1	10
hecto	h	10^2	100
kilo	k	10^3	1000
mega	M	10^6	1000000
giga	G	10^9	1000000000
tera	T	10^{12}	1000000000000
peta	P	10^{15}	1000000000000000
exa	E	10^{18}	1000000000000000000
zetta	Z	10^{21}	1000000000000000000000
yotta	Y	10^{24}	1000000000000000000000000