

1.5 Dimensions

The following table lists the dimensions of common physical quantities, together with their conventional symbols and the SI units in which they are usually quoted. The dimensional basis used is length (L), mass (M), time (T), electric current (I), temperature (Θ), amount of substance (N), and luminous intensity (J).

<i>physical quantity</i>	<i>symbol</i>	<i>dimensions</i>	<i>SI units</i>
acceleration	a	$L T^{-2}$	$m s^{-2}$
action	S	$L^2 M T^{-1}$	J s
angular momentum	L, J	$L^2 M T^{-1}$	$m^2 kg s^{-1}$
angular speed	ω	T^{-1}	$rad s^{-1}$
area	A, S	L^2	m^2
Avogadro constant	N_A	N^{-1}	mol^{-1}
bending moment	G_b	$L^2 M T^{-2}$	N m
Bohr magneton	μ_B	$L^2 I$	$J T^{-1}$
Boltzmann constant	k, k_B	$L^2 M T^{-2} \Theta^{-1}$	$J K^{-1}$
bulk modulus	K	$L^{-1} M T^{-2}$	Pa
capacitance	C	$L^{-2} M^{-1} T^4 I^2$	F
charge (electric)	q	$T I$	C
charge density	ρ	$L^{-3} T I$	$C m^{-3}$
conductance	G	$L^{-2} M^{-1} T^3 I^2$	S
conductivity	σ	$L^{-3} M^{-1} T^3 I^2$	$S m^{-1}$
couple	G, T	$L^2 M T^{-2}$	N m
current	I, i	I	A
current density	J, j	$L^{-2} I$	$A m^{-2}$
density	ρ	$L^{-3} M$	$kg m^{-3}$
electric displacement	D	$L^{-2} T I$	$C m^{-2}$
electric field strength	E	$L M T^{-3} I^{-1}$	$V m^{-1}$
electric polarisability	α	$M^{-1} T^4 I^2$	$C m^2 V^{-1}$
electric polarisation	P	$L^{-2} T I$	$C m^{-2}$
electric potential difference	V	$L^2 M T^{-3} I^{-1}$	V
energy	E, U	$L^2 M T^{-2}$	J
energy density	u	$L^{-1} M T^{-2}$	$J m^{-3}$
entropy	S	$L^2 M T^{-2} \Theta^{-1}$	$J K^{-1}$
Faraday constant	F	$T I N^{-1}$	$C mol^{-1}$
force	F	$L M T^{-2}$	N
frequency	ν, f	T^{-1}	Hz
gravitational constant	G	$L^3 M^{-1} T^{-2}$	$m^3 kg^{-1} s^{-2}$
Hall coefficient	R_H	$L^3 T^{-1} I^{-1}$	$m^3 C^{-1}$
Hamiltonian	H	$L^2 M T^{-2}$	J
heat capacity	C	$L^2 M T^{-2} \Theta^{-1}$	$J K^{-1}$
Hubble constant ¹	H	T^{-1}	s^{-1}
illuminance	E_v	$L^{-2} J$	lx
impedance	Z	$L^2 M T^{-3} I^{-2}$	Ω

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¹The Hubble constant is almost universally quoted in units of $km s^{-1} Mpc^{-1}$. There are about 3.1×10^{19} kilometres in a megaparsec.



<i>physical quantity</i>	<i>symbol</i>	<i>dimensions</i>	<i>SI units</i>
impulse	I	$L M T^{-1}$	N s
inductance	L	$L^2 M T^{-2} I^{-2}$	H
irradiance	E_e	$M T^{-3}$	$W m^{-2}$
Lagrangian	L	$L^2 M T^{-2}$	J
length	L, l	L	m
luminous intensity	I_v	J	cd
magnetic dipole moment	m, μ	$L^2 I$	$A m^2$
magnetic field strength	H	$L^{-1} I$	$A m^{-1}$
magnetic flux	Φ	$L^2 M T^{-2} I^{-1}$	Wb
magnetic flux density	B	$M T^{-2} I^{-1}$	T
magnetic vector potential	A	$L M T^{-2} I^{-1}$	$Wb m^{-1}$
magnetisation	M	$L^{-1} I$	$A m^{-1}$
mass	m, M	M	kg
mobility	μ	$M^{-1} T^2 I$	$m^2 V^{-1} s^{-1}$
molar gas constant	R	$L^2 M T^{-2} \Theta^{-1} N^{-1}$	$J mol^{-1} K^{-1}$
moment of inertia	I	$L^2 M$	$kg m^2$
momentum	p	$L M T^{-1}$	$kg m s^{-1}$
number density	n	L^{-3}	m^{-3}
permeability	μ	$L M T^{-2} I^{-2}$	$H m^{-1}$
permittivity	ϵ	$L^{-3} M^{-1} T^4 I^2$	$F m^{-1}$
Planck constant	h	$L^2 M T^{-1}$	J s
power	P	$L^2 M T^{-3}$	W
Poynting vector	S	$M T^{-3}$	$W m^{-2}$
pressure	p, P	$L^{-1} M T^{-2}$	Pa
radiant intensity	I_e	$L^2 M T^{-3}$	$W sr^{-1}$
resistance	R	$L^2 M T^{-3} I^{-2}$	Ω
Rydberg constant	R_∞	L^{-1}	m^{-1}
shear modulus	μ, G	$L^{-1} M T^{-2}$	Pa
specific heat capacity	c	$L^2 T^{-2} \Theta^{-1}$	$J kg^{-1} K^{-1}$
speed	u, v, c	$L T^{-1}$	$m s^{-1}$
Stefan-Boltzmann constant	σ	$M T^{-3} \Theta^{-4}$	$W m^{-2} K^{-4}$
stress	σ, τ	$L^{-1} M T^{-2}$	Pa
surface tension	σ, γ	$M T^{-2}$	$N m^{-1}$
temperature	T	Θ	K
thermal conductivity	λ	$L M T^{-3} \Theta^{-1}$	$W m^{-1} K^{-1}$
time	t	T	s
velocity	v, u	$L T^{-1}$	$m s^{-1}$
viscosity (dynamic)	η, μ	$L^{-1} M T^{-1}$	Pa s
viscosity (kinematic)	ν	$L^2 T^{-1}$	$m^2 s^{-1}$
volume	V, v	L^3	m^3
wavevector	k	L^{-1}	m^{-1}
weight	W	$L M T^{-2}$	N
work	W	$L^2 M T^{-2}$	J
Young modulus	E	$L^{-1} M T^{-2}$	Pa

