

Orders of Magnitude

Order of magnitude	Prefix	Symbol
10^{18}	Exa	E
10^{15}	Peta	P
10^{12}	Tera	T
10^9	Giga	G
10^6	Mega	M
10^3	Kilo	k
10^2	hecto	h
10^1	Deca	da
10^0	----	-----
10^{-1}	Deci	d
10^{-2}	Centi	c
10^{-3}	Milli	m
10^{-6}	Micro	μ
10^{-9}	Nano	n
10^{-12}	Pico	p
10^{-15}	Femto	f
10^{-18}	Atto	A

Units & Dimensions

Quantity	Formula	Dimensions	Unit
Area	length x breadth	$M^0L^2T^0$	m^2
Volume	length x breadth x height	$M^0L^3T^0$	m^3
Density	mass/volume	$M^1L^{-3}T^0$	$kg\ m^{-3}$
Specific gravity	density of body/density of water at 4°C	$M^0L^0T^0$	No units
Speed or velocity	displacement/time	$M^0L^1T^{-1}$	$M\ s^{-1}$
Linear momentum	mass x velocity	$M^1L^1T^{-1}$	$kg\ m\ s^{-1} = N\ s$
Acceleration	change in velocity/time taken	$M^0L^1T^{-2}$	$m\ s^{-2}$
Acceleration due to gravity	Force of gravity/mass of object	$M^0L^1T^{-2}$	$m\ s^{-2}$
Force	mass x acceleration	$M^1L^1T^{-2}$	N (newton)
Impulse	force x time	$M^1L^1T^{-1}$	N s
Pressure	force/area	$M^1L^{-1}T^{-2}$	$N\ m^{-2} = Pa$
Universal gravitational constant(G)	$G = Fr^2/m_1m_2$	$M^{-1}L^3T^{-2}$	$N\ m^2 / kg^{-2}$
Work	force x distance	$M^1L^2T^{-2}$	J (joule)
Energy (including PE, KE etc)	work	$M^1L^2T^{-2}$	J
Torque or Moment of force	force x distance	$M^1L^2T^{-2}$	N m
Power	work/time	$M^1L^2T^{-3}$	W (watt)
Surface tension	force/length	$M^1L^0T^{-2}$	$N\ m^{-1}$
Force constant	force/displacement	$M^1L^0T^{-2}$	$N\ m^{-1}$
Thrust	force	$M^1L^1T^{-2}$	N
Tension	force	$M^1L^1T^{-2}$	N
Stress	force/area	$M^1L^{-1}T^{-2}$	$N\ m^{-2}$
Coefficient of elasticity	stress/strain	$M^1L^{-1}T^{-2}$	$N\ m^{-2}$
Radius of gyration (K)	distance	$M^0L^1T^0$	m
Moment of inertia (I)	mass x (distance) ²	$M^1L^2T^0$	$kg\ m^2$
Angle (θ)	length/radius	$M^0L^0T^0$	radian
Surface energy	Energy/area	$M^1L^0T^{-2}$	$J\ m^{-2}$
Strain	change in configuration/original configuration	$M^0L^0T^0$	No units
Angular velocity (ω)	Angle / time	$M^0L^0T^{-1}$	$rad\ s^{-1}$
Angular acceleration (α)	change in angular velocity / time taken	$M^0L^0T^{-2}$	$rad\ s^{-2}$
Angular momentum	$I\omega$	$M^1L^2T^{-1}$	$kg\ m^2\ s^{-1}$
Torque	$I\alpha$	$M^1L^2T^{-2}$	N m
Wavelength (λ)	length of one wave	$M^0L^1T^0$	m
Frequency (ν)	number of vibrations / sec	$M^0L^0T^{-1}$	Hz (hertz)

Speed of light in vacuum (c)	distance travelled / time taken	$M^0L^1T^{-1}$	$m s^{-1}$
Velocity gradient	Velocity / distance	$M^0L^0T^{-1}$	s^{-1}
Rate of flow	Volume / time	$M^0L^3T^{-1}$	$m^3 s^{-1}$
Planck's constant (h)	energy (E) / frequency (ν)	$M^1L^2T^{-1}$	$J s^{-1}$
Mass of unit length (m)	mass / length	$M^1L^{-1}T^0$	$kg m^{-1}$
Distance travelled in n th second	Distance / time	$M^0L^1T^{-1}$	$m s^{-1}$
Avogadro's number (N)	Number of entities	$M^0L^0T^0$	mole ⁻¹
Reynolds number (NR)	$\rho Dv / \eta$	$M^0L^0T^0$	No units
Rydberg constant	$2\pi^2mK^2e^4/ch^3$	$M^0L^{-1}T^0$	m^{-1}
Coefficient of viscosity (η)	$F r / A v$	$M^1L^{-1}T^{-1}$	Pa sec
Kinematic viscosity	meter square per second	$M^0L^2T^{-1}$	$m^2 s^{-1}$
Specific volume	Volume / mass	$M^{-1}L^3T^0$	$m^3 kg^{-1}$
Gravitational potential	joule per kilogram	$M^0L^2T^{-2}$	$m^2 s^{-2}$
Heat (Q)	Energy	$M^1L^2T^{-2}$	J (joule)
Internal energy (U)	Energy	$M^1L^2T^{-2}$	J (joule)
Mechanical equivalent of heat (J)	W / Q	$M^0L^0T^0$	No units
Temperature (θ)	Fundamental Quantity	$M^0L^0T^0K^1$	K
Latent heat (L)	heat / mass	$M^0L^2T^{-2}$	$J kg^{-1}$
Heat capacity (C or S)	Energy / Temperature	$ML^2T^{-2}K^{-1}$	$J K^{-1}$
Specific heat capacity (c or s)	Heat capacity / mass	$M^0L^2T^{-2}K^{-1}$	$J kg^{-1} K^{-1}$
Gas constant (R)	PV / nT	$M^1L^2T^{-2}K^1mol^{-1}$	$J K^{-1} mol^{-1}$
Avogadro's number (N_A)	Total count / moles count = N/n	mol^{-1}	mol^{-1}
Boltzmann constant (k)	Gas Constant / Avogadro's number	$M^1L^2T^{-2}K^{-1}$	$J K^{-1}$
Entropy (C or S)	Energy / Temperature	$ML^2T^{-2}K^{-1}$	$J K^{-1}$
Coefficient of thermal conductivity (K)	$K = \Delta Q \Delta x / \Delta T \Delta t A$	$M^1L^1T^{-3}K^{-1}$	$W m^{-1} K^{-1}$
Wien's constant (b)	$b = \lambda_m T$	$M^0L^1T^0K^1$	m K
Stefan's constant (σ)	$\sigma = E/T^4$	$M^1L^0T^{-3}K^{-4}$	$W m^{-2} K^{-4}$
Electric current (I)	Fundamental Quantity	$M^0L^0T^0A^1$	A (ampere)
Current density	Current per unit area	$M^0L^{-2}T^0A^1$	A / m^2
Charge (q)	current x time	$M^0L^0T^1A^1$	C (coulomb)
Electric potential	Work / charge	$M^1L^2T^{-3}A^{-1}$	V (volt)
EMF (e)	Voltage = Work/charge	$M^1L^2T^{-3}A^{-1}$	V
Electric Field intensity (E)	Force / Charge	$M^1L^1T^{-3}A^{-1}$	NC^{-1}
Permittivity of free space (ϵ_0)	$F = q_1q_2/4\pi\epsilon_0r^2$	$M^{-1}L^{-3}T^4A^2$	$C^2J^{-1} m^{-1}$
Dielectric constant (k) or Relative permittivity (ϵ_r)	k or $\epsilon_r = \epsilon/\epsilon_0$	$M^0L^0T^0$	No units
Coefficient of self-inductance (L)	$L = (W/q) dt/ di$	$M^1L^2T^{-2}A^{-2}$	H (henry)
Coefficient of mutual inductance (M)	$e = Mdi/dt$	$M^1L^2T^{-2}A^{-2}$	H (henry)
Magnetic flux (ϕ)	$e = -d\phi/dt$	$ML^2T^{-2}A^{-1}$	Wb (weber)

Magnetic induction (B)	$F = Bqv$	$MT^{-2}A^{-1}$	T (tesla)
Magnetic Intensity (H)	$B = \mu_0 H$	AL^{-1}	$A m^{-1}$
Magnetic moment (M)	$M = IA$	$M^0 L^2 T^0 A^1$	$A m^2$
Pole strength (m)	$m = M/2I$	$M^0 L^1 T^0 A^1$	Am
Permeability of free space (μ_0)	$F r^2 / m_1 m_2$	$M^1 L^1 T^{-2} A^{-2}$	H/m
Resistance (R)	potential difference / current	$M^1 L^2 T^{-3} A^{-2}$	Ω (ohm)
Capacitance (C)	Charge / potential difference	$M^{-1} L^{-2} T^4 A^2$	F (farad)
Surface charge density	$\sigma = \text{charge} / \text{area}$	$M^0 L^{-2} T^1 A^1$	$C m^{-2}$
Electric dipole moment (P)	$q \times (2a)$	$M^0 L^1 T^1 A^1$	C m
Specific resistance or resistivity (ρ)	Resistance x length	$M^1 L^3 T^{-3} A^{-2}$	Ωm
Conductance (G)	1/Resistance	$M^{-1} L^{-2} T^3 A^2$	Ω^{-1}
Conductivity	1/Resistivity	$M^{-1} L^{-3} T^3 A^2$	$\Omega^{-1} m^{-1}$
Luminous flux (or luminous power)	visible light energy emitted per sec.	$M^1 L^2 T^{-3}$	lm (lumen)
Illuminance (or intensity of illumination)	Luminous flux on per unit area	$M^1 L^0 T^{-3}$	lux (or lm/m^2)
Luminous intensity	Luminous flux per solid angle	$M^1 L^2 T^{-3} \text{steradian}^{-1}$	Cd (Candela)
Luminance or Brightness	Luminous flux from per unit area	$M^1 L^0 T^{-3}$	lambert

Vectors & Tensors

Pressure	Tensor
Moment of inertia (I)	Tensor
Stress	Tensor
Area	Vector
velocity	Vector
Linear momentum	Vector
Acceleration	Vector
Acceleration due to gravity	Vector
Force	Vector
Impulse	Vector
Moment of force or Torque	Vector
Angle (θ)	Vector
Angular velocity (ω)	Vector
Angular acceleration (α)	Vector
Angular momentum	Vector
Torque	Vector
Current density	Vector
Electric intensity (E)	Vector
Electric dipole moment (P)	Vector
Thrust	Vector
Tension	Vector
Magnetic induction (B)	Vector