Physical Quantities

	Quantity	Definition	Formula	Units	Dimensions
MECHANICAL	**Length or Distance**	*fundamental*	d	m (meter)	*L (Length)*
	Time	*fundamental*	t	s (second)	*T (Time)*
	Mass	*fundamental*	m	kg (kilogram)	*M (Mass)*
	Area	distance^2	$A = d^2$	m^2	L^2
	Volume	distance^3	$V = d^3$	m^3	L^3
	Density	mass / volume	$d = m/V$	kg/m^3	M/L^3
	Velocity	distance / time	$v = d/t$	m/s	L/T
	Acceleration	velocity / time	$a = v/t$	m/s^2	L/T^2
	Momentum	mass × velocity	$p = mv$	kg·m/s	ML/T
	Force Weight	mass × acceleration mass × (accel. of grav.)	$F = ma$ $W = mg$	N (newton) = $kg·m/s^2$	ML/T^2
	Pressure or Stress	force / area	$p = F/A$	Pa (pascal) = $N/m^2 = kg/(m·s^2)$	M/LT^2
	Energy or Work Kinetic Energy Potential Energy	force × distance mass × velocity^2 / 2 mass × (accel. of grav.) × height	$E = Fd$ $KE = mv^2/2$ $PE = mgh$	J (joule) = N·m = $kg·m^2/s^2$	ML^2/T^2
	Power	energy / time	$P = E/t$	W (watt) = J/s = $kg·m^2/s^3$	ML^2/T^3
	Impulse	force × time	$I = Ft$	N·s = kg·m/s	ML/T
	Action	energy × time momentum × distance	$A = Et$ $A = pd$	J·s = $kg·m^2/s$	ML^2/T
ANGULAR	**Angle**	*fundamental*	θ	° (degrees) or rad (radians) 360° = 2π rad	*dimensionless*
	Cycles	*fundamental*	n	cyc (cycles)	*dimensionless*
	Frequency	cycles / time	$f = n/t$	Hz (hertz) = cyc/s = 1/s	$1/T$
	Angular Velocity	angle / time	$ω = θ/t$	rad/s = 1/s	$1/T$
	Angular Acceleration	angular velocity / time	$α = ω/t$	$rad/s^2 = 1/s^2$	$1/T^2$
	Moment of Inertia	mass × radius^2	$I = mr^2$	$kg·m^2$	ML^2
	Angular Momentum	radius × momentum (mom. of inert.) × (ang. vel.)	$L = rp$ $L = Iω$	$kg·m^2/s$	ML^2/T
	Torque	radius × force (mom. of inert.) × (ang. accel.)	$T = rF$ $T = Iα$	$N·m = kg·m^2/s^2$	ML^2/T^2

THERMAL	**Temperature**	*fundamental*	T	°C (celsius) or K (kelvin)	*K (Temp.)*
	Heat	heat energy	Q	J (joule) = $kg \cdot m^2/s^2$	ML^2/T^2
	Entropy	heat / temperature	$S = Q/T$	J/K	ML^2/T^2K
ELECTROMAGNETIC	**Electric Charge (+/-)**	*fundamental*	q	C (coulomb)	*C (Charge)*
	Current	charge / time	$i = q/t$	A (amp) = C/s	*C/T*
	Voltage or Potential	energy / charge	$V = E/q$	V (volt) = J/C	ML^2/CT^2
	Resistance	voltage / current	$R = V/i$	Ω (ohm) = V/A	ML^2/C^2T
	Capacitance	charge / voltage	$C = q/V$	F (farad) = C/V	C^2T^2/ML^2
	Inductance	voltage / (current / time)	$L = V/(i/t)$	H (henry) = V·s/A	ML^2/T^2
	Electric Field	voltage / distance force / charge	$E = V/d$ $E = F/q$	V/m = N/C	ML/CT^2
	Electric Flux	electric field × area	$\varphi_E = EA$	$V \cdot m = N \cdot m^2/C$	ML^3/CT^2
	Magnetic Field	force / (charge × velocity)	$B = F/qv$	T (tesla) = Wb/m^2 = N·s/(C·m)	*M/CT*
	Magnetic Flux	magnetic field × area	$\varphi_M = BA$	Wb (weber) = V·s = J·s/C	ML^2/CT

Mass, energy, momentum, angular momentum, and charge are conserved, which means the the total amount doesn't change in an isolated system.

Keith Enevoldsen's Think Zone