

# Harold's Physics Units of Measure Cheat Sheet

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## The 7 Base Units of Measure

Quantity Name	Symbol	Metric Units (SI)	Imperial Units (English)
1. Length / Distance	l, x, y, z	meter (m)	foot (ft)
2. Mass	m, M	kilogram (kg)	slug (or lb)
3. Time	t	second (s)	
4. Temperature	T	Kelvin (K) Celsius (°C)	Fahrenheit (°F)
5. Electrical Current	i	Ampere (A)	
6. Amount of Substance	M, $\chi$	mole (mol)	1 mol $\approx$ 6.02214076 $\times$ 10 <sup>23</sup>
7. Luminous Intensity	lv	Candela (cd)	
<b>Note:</b> The 7 base units are mutually independent from each other. <u>All</u> other units of measurement can be derived from them.			

## Derived Units of Measure – Mechanics

Quantity Name	Symbol	Metric Units (SI)	Imperial Units (English)
Length / Displacement	s, d, h	meter (m)	foot (ft)
Area	A, S		ft <sup>2</sup>
Volume	V	liter (l)	fluid ounce (fl) ft <sup>3</sup>
Velocity / Speed	v, s		ft/s
Acceleration	a, g	$g = -9.81 \text{ m/s}^2$	$g = -32.2 \text{ ft/s}^2$
Jerk / Jolt	J		ft/s <sup>3</sup>
Impulse	I		lb·ft/s
Linear Momentum	p		lb·ft/s
Force	F	Newton (N)	pound (lb) slug·ft/s <sup>2</sup>
Energy / Work / Heat	E, W, KE or K, U <sub>g</sub> , U <sub>s</sub> , U <sub>E</sub> , Q	Joule (J)	calorie (cal) ft·lb
Power	P	Watt (W)	horsepower (hp) ft·lb/s

Surface Tension	T		N/m kg/s <sup>2</sup>		lb/ft
Pressure / Stress	P	Pascal (Pa) bar	N/m <sup>2</sup> kg/m·s <sup>2</sup>	atmosphere (atm)	lb·ft/s <sup>2</sup>
Density	ρ		kg/m <sup>3</sup>		slug/m <sup>3</sup>

### Derived Units of Measure – Kinematics

Quantity Name	Symbol	Unit Name	SI Units	SI Base Units
Wavelength	λ		m	
Frequency	F, ν	Hertz (Hz)	cycles/s	1/s
Time Period	T		s	
Angular Displacement / Plane Angle	θ	radian (rad)	m/m	1
Solid Angle	Ω, sr	Steradian (sr)	m <sup>2</sup> /m <sup>2</sup>	1
Angular Velocity / Frequency	ω		rad/s	
Angular Acceleration	α		rad/s <sup>2</sup>	
Moment of Inertia	I		kg·m <sup>2</sup>	
Angular Momentum	J, L		kg·m <sup>2</sup> ·rad/s	kg·m <sup>2</sup> /s
Torque (Moment of Force)	τ		N·m	
Angular Impulse	J		N·m·s	

### Derived Units of Measure – Electromagnetics

Quantity Name	Symbol	Unit Name	SI Units	SI Base Units
Electric Charge	Q, q, e	Coulomb (C)	s·A F·V	
Current Density	J		A/m <sup>2</sup>	
Electric Potential / Electromotive Force (EMF) / Voltage	V, ℰ	Volt (V)	W/A J/C	kg·m <sup>2</sup> /s <sup>3</sup> ·A
Electric Field	E		V/m	
Electric Flux	l <sub>e</sub>		V·m	
Electric Resistance	R	Ohm (Ω)	V/A 1/S	kg·m <sup>2</sup> /s <sup>3</sup> ·A <sup>2</sup>
Electric Capacitance	C	Farad (F)	C/V s/Ω	s <sup>4</sup> ·A <sup>2</sup> /kg·m <sup>2</sup>
Electric Field Strength	E		V/m	N/C
Electric Conductance	S	Siemens	1/Ω A/V	s <sup>3</sup> ·A <sup>2</sup> /kg·m <sup>2</sup>

<b>Magnetic Flux</b>	$\Phi_B$	Weber (Wb)	V·s J/A T·m <sup>2</sup>	kg·m <sup>2</sup> /s <sup>2</sup> ·A
<b>Magnetic Field / Flux Density</b>	B	Tesla (T)	Wb/m <sup>2</sup> V·s/m <sup>2</sup> N/A·m	kg/s <sup>2</sup> ·A
<b>Magnetic Induction</b>	$I_m$	Henry (H)	Wb/A V·s/A $\Omega$ ·s	kg·m <sup>2</sup> /s <sup>2</sup> ·A <sup>2</sup>

### Derived Units of Measure – Photometry

Quantity Name	Symbol	Unit Name	SI Units	SI Base Units
<b>Illuminance / Illumination</b>	lx	Lux (lx)	lm/m <sup>2</sup>	cd/m <sup>2</sup>
<b>Luminous Flux</b>	$\Phi$	Lumen (lm)	J/s cd·sr	Candela (cd)

## SI Unit Prefixes

Prefix	Symbol	Decimal	Base 10	English
googolplex-		(too long)	$10^{1000}$	googolplex
googol-		(too long)	$10^{100}$	googol
Quetta-	Q	1 000 000 000 000 000 000 000 000 000	$10^{30}$	nonillion
Ronna-	R	1 000 000 000 000 000 000 000 000 000	$10^{27}$	octillion
Yotta-	Y	1 000 000 000 000 000 000 000 000	$10^{24}$	septillion
Zetta-	Z	1 000 000 000 000 000 000 000	$10^{21}$	sextillion
Exa-	E	1 000 000 000 000 000 000	$10^{18}$	quintillion
Peta-	P	1 000 000 000 000 000	$10^{15}$	quadrillion
Tera-	T	1 000 000 000 000	$10^{12}$	trillion
Giga-	G	1 000 000 000	$10^9$	billion
Mega-	M	1 000 000	$10^6$	million
kilo-	k	1 000	$10^3$	thousand
hecto-	h	100	$10^2$	hundred
deca-	da	10	$10^1$	ten
		1	$10^0$	one
deci-	d	0.1	$10^{-1}$	tenth
centi-	c	0.01	$10^{-2}$	hundredth
milli-	m	0.001	$10^{-3}$	thousandth
micro-	$\mu$	0.000 001	$10^{-6}$	millionth
nano-	n	0.000 000 001	$10^{-9}$	billionth
pico-	p	0.000 000 000 001	$10^{-12}$	trillionth
femto-	f	0.000 000 000 000 001	$10^{-15}$	quadrillionth
atto-	a	0.000 000 000 000 000 001	$10^{-18}$	quintillionth
zepto-	z	0.000 000 000 000 000 000 001	$10^{-21}$	sextillionth
yocto-	y	0.000 000 000 000 000 000 000 001	$10^{-24}$	septillionth
ronto-	r	0.000 000 000 000 000 000 000 000 001	$10^{-27}$	octillionth
quecto-	q	0.000 000 000 000 000 000 000 000 000 001	$10^{-30}$	nonillionth
Googolth-		(too long)	$10^{-100}$	googolth
Googolplexth-		(too long)	$10^{-1000}$	googolplexth