

1. Units and conversion

1.1 Commonly used mechanical units

Quantity	CGS (Centimetre-Gram-Second)	SI (International System of units)
Length	Centimetre (cm)	Metre (m)
Mass	Grams (g)	Kilograms (kg)
Time	Second (s)	Second (s)
Force	Dyne (dyn)	Newton (N) = kilogram-metre/(second) ²
Work, Energy	Erg (erg)	Joule (J) = Newton-metre
Power	-	Watt (W) = Joule/second

1.2 Mechanical quantities, fundamental units of dimensions MLT (mass, length, time) and their SI units

Quantity	Dimensions	Units
Acceleration	LT^{-2}	Metre/second ²
Angle	0	Radian
Angular acceleration	T^{-2}	Radian/second ²
Angular momentum	ML^2T^{-1}	Kilogram-metre ² /second
Angular velocity	T^{-1}	Radian/second
Area	L^2	Metre ²
Energy	ML^2T^{-2}	Joule
Force	MLT^{-2}	Newton
Frequency	T^{-1}	Cycle/second
Gravitational field strength	LT^{-2}	Newton/kilogram
Mass density	ML^{-3}	Kilogram/metre ³
Momentum	MLT^{-1}	Kilogram-metre/second
Power	ML^2T^{-3}	Watt
Pressure	$ML^{-1}T^{-2}$	Newton/metre ²
Torque	ML^2T^{-2}	Newton-metre
Velocity	LT^{-1}	Metre/second
Work	ML^2T^{-2}	Joule

1.3 Multiples and sub-multiples of SI units

Prefix	Symbol	Equivalent
exa	E	10^{18}
peta	P	10^{15}
tera	T	10^{12}
giga	G	10^9
mega	M	10^6
kilo	k	10^3
hecto	h	10^2
deca	da	10
deci	d	10^{-1}

centi	c	10^{-2}
milli	m	10^{-3}
micro	μ	10^{-6}
nano	n	10^{-9}
pico	p	10^{-12}
femto	f	10^{-15}
atto	a	10^{-18}

1.4 Conversion factors of some commonly used units

1.4.1 Length: 1m in other units of length

Milli metres	Centi metres	Metres	Kilo metres	Inches	Feet	Yards	Miles
mm	cm	m	km	in	ft	yd	mi
1000	100	1	0.001	39.37008	3.28084	1.093613	0.000621

1.4.2 Area: 1m² in other units of area

Millimetre ²	Centimetre ²	Metre ²	Inch ²	Foot ²	Yard ²
mm ²	cm ²	m ²	in ²	ft ²	yd ²
1000000	10000	1	1550.003	10.76391	1.19599

1.4.3 Volume: 1m³ in other units of volume

Centimetre ³	Metre ³	Litre	Inch ³	Foot ³
cm ³	m ³	Ltr	in ³	ft ³
1000000	1	1000	61024	35

1.4.4 Mass: 1kg in other units of mass

Grams	Kilograms	Metric tonnes	Pounds	Ounces
g	kg	Tonne	lb	oz
1000	1	0.001	2.204586	35.27337

1.4.5 Density

Gram/millimetre	Kilogram/metre cube	Pound/foot cube	Pound/inch cube
g/ml	kg/m ³	lb/ft ³	lb/in ³
0.001	1	0.062422	0.000036

1.4.6 Speed

Metre/second	Kilometre/hour	Feet/second	Miles/hour
m/s	km/hr	ft/s	mi/hr
1	3.599712	3.28084	2.237136

1.4.7 Torque

Newton metre	Kilogram force metre	Foot pound	Inch pound
Nm	Kgfm	ftlb	inlb
1	0.101972	0.737561	8.850732

1.4.8 Temperature conversion formulas

Degree Celsius (°C)	$(^{\circ}\text{F} - 32) \times 5/9$
	$(\text{K} - 273.15)$
Degree Fahrenheit (°F)	$(^{\circ}\text{C} \times 9/5) + 32$
	$(1.8 \times \text{K}) - 459.67$
Kelvin (K)	$(^{\circ}\text{C} + 273.15)$
	$(^{\circ}\text{F} + 459.67) / 1.8$

Resources:

1. https://www.isa.org/uploadedFiles/Content/Training_and_Certifications/ISA_Certification/CCST-Conversions-document.pdf
2. <https://www.its.caltech.edu/~culick/Roschke.pdf>
3. <https://www.youtube.com/watch?v=HZ9weUkSdoY>
4. <https://www.youtube.com/watch?v=7N0lRJLwpPI>
5. <https://www.youtube.com/watch?v=LdZ00OFAfaQ>
6. <https://www.youtube.com/watch?v=BKsPi-VXp5U>
7. https://www.youtube.com/watch?v=w0nqd_HXHPQ&t=87s