

# UNIT CONVERSION FACTORS

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## Length

1 m = 100 cm = 1000 mm =  $10^6 \mu\text{m}$  =  $10^9 \text{ nm}$   
1 km = 1000 m = 0.6214 mi  
1 m = 3.281 ft = 39.37 in.  
1 cm = 0.3937 in.  
1 in. = 2.540 cm  
1 ft = 30.48 cm  
1 yd = 91.44 cm  
1 mi = 5280 ft = 1.609 km  
1 Å =  $10^{-10} \text{ m}$  =  $10^{-8} \text{ cm}$  =  $10^{-1} \text{ nm}$   
1 nautical mile = 6080 ft  
1 light-year =  $9.461 \times 10^{15} \text{ m}$

## Area

1 cm<sup>2</sup> = 0.155 in.<sup>2</sup>  
1 m<sup>2</sup> =  $10^4 \text{ cm}^2$  = 10.76 ft<sup>2</sup>  
1 in.<sup>2</sup> = 6.452 cm<sup>2</sup>  
1 ft<sup>2</sup> = 144 in.<sup>2</sup> = 0.0929 m<sup>2</sup>

## Volume

1 liter = 1000 cm<sup>3</sup> =  $10^{-3} \text{ m}^3$  = 0.03531 ft<sup>3</sup> = 61.02 in.<sup>3</sup>  
1 ft<sup>3</sup> = 0.02832 m<sup>3</sup> = 28.32 liters = 7.477 gallons  
1 gallon = 3.788 liters

## Time

1 min = 60 s  
1 h = 3600 s  
1 d = 86,400 s  
1 y = 365.24 d =  $3.156 \times 10^7 \text{ s}$

## Angle

1 rad =  $57.30^\circ$  =  $180^\circ/\pi$   
1° = 0.01745 rad =  $\pi/180 \text{ rad}$   
1 revolution =  $360^\circ$  =  $2\pi \text{ rad}$   
1 rev/min (rpm) = 0.1047 rad/s

## Speed

1 m/s = 3.281 ft/s  
1 ft/s = 0.3048 m/s  
1 mi/min = 60 mi/h = 88 ft/s  
1 km/h = 0.2778 m/s = 0.6214 mi/h  
1 mi/h = 1.466 ft/s = 0.4470 m/s = 1.609 km/h  
1 furlong/fortnight =  $1.662 \times 10^{-4} \text{ m/s}$

## Acceleration

1 m/s<sup>2</sup> = 100 cm/s<sup>2</sup> = 3.281 ft/s<sup>2</sup>  
1 cm/s<sup>2</sup> = 0.01 m/s<sup>2</sup> = 0.03281 ft/s<sup>2</sup>  
1 ft/s<sup>2</sup> = 0.3048 m/s<sup>2</sup> = 30.48 cm/s<sup>2</sup>  
1 mi/h · s = 1.467 ft/s<sup>2</sup>

## Mass

1 kg = 10<sup>3</sup> g = 0.0685 slug  
1 g =  $6.85 \times 10^{-5} \text{ slug}$   
1 slug = 14.59 kg  
1 u =  $1.661 \times 10^{-27} \text{ kg}$   
1 kg has a weight of 2.205 lb when  $g = 9.80 \text{ m/s}^2$

## Force

1 N = 10<sup>5</sup> dyn = 0.2248 lb  
1 lb = 4.448 N =  $4.448 \times 10^5 \text{ dyn}$

## Pressure

1 Pa = 1 N/m<sup>2</sup> =  $1.450 \times 10^{-4} \text{ lb/in.}^2$  = 0.0209 lb/ft<sup>2</sup>  
1 bar = 10<sup>5</sup> Pa  
1 lb/in.<sup>2</sup> = 6895 Pa  
1 lb/ft<sup>2</sup> = 47.88 Pa  
1 atm =  $1.013 \times 10^5 \text{ Pa}$  = 1.013 bar  
= 14.7 lb/in.<sup>2</sup> = 2117 lb/ft<sup>2</sup>  
1 mm Hg = 1 torr = 133.3 Pa

## Energy

1 J = 10<sup>7</sup> ergs = 0.239 cal  
1 cal = 4.186 J (based on 15° calorie)  
1 ft · lb = 1.356 J  
1 Btu = 1055 J = 252 cal = 778 ft · lb  
1 eV =  $1.602 \times 10^{-19} \text{ J}$   
1 kWh =  $3.600 \times 10^6 \text{ J}$

## Mass–Energy Equivalence

1 kg ↔  $8.988 \times 10^{16} \text{ J}$   
1 u ↔ 931.5 MeV  
1 eV ↔  $1.074 \times 10^{-9} \text{ u}$

## Power

1 W = 1 J/s  
1 hp = 746 W = 550 ft · lb/s  
1 Btu/h = 0.293 W