

Conversion Table

Length

1 inch = 2.54 cm
1 ft = 30.5 cm
1 yd = 3 ft
1 m = 39.37 in = 3.28 ft
1 mi = 5280 ft = 1.61 km
1 furlong = 660 ft
1 nautical mile (U.S.) = 1.15 mi
1 light year = 9.46×10^{15} m
1 parsec = 3.26 ly

Volume

1 L = 1000 mL = 1.057 quarts (U.S.)
1 L = $1000 \text{ cm}^3 = 61.02 \text{ in}^3$
1 gallon (U.S.) = 4 quarts (U.S.)
1 quart (U.S.) = 2 Pints (U.S.)
1 Pint (U.S.) = 2 cups (U.S.)
1 Cup (U.S.) = 8 fluid oz = 16 Table Spoons
1 Fluid Ounce = 2 tablespoons
1 Table Spoon = 3 teaspoons
 $1 \text{ m}^3 = 35.31 \text{ ft}^3$

Speed

1 mi/hr = 1.47 ft/s = 1.609 km/h = 0.447 m/s
1 km/h = 0.278 m/s = 0.621 mi/h
1 knot = 1.151 mi/h = 0.5144 m/s

Angle

1 radian (rad) = 57.30°
1 rev / min = 0.1047 rad/s

Time

1 day = 8.64×10^4 s
1 year = 3.156×10^7 s
1 hour = 3600 s

Mass

1 atomic mass unit = 1.6605×10^{-27} kg
1 kg = 0.0685 slugs
Where $g=9.81$, 1kg = 2.2lbs

Force

1 lb = 4.45 N
1N = 10^5 dyne = 0.225 lbs

Energy

1 J = 10^7 ergs = 0.738 ft*lbs
1 kcal (Cal) = 4186 J = 3.97 Btu
1 eV = 1.602×10^{-19} J
1 kWh = 3.60×10^6 J = 860 kcal (Cal)

Power

1 W = 1 J/s = 0.738 ft*lb/s = 3.42 Btu/h
1 hp = 746 W

Pressure

1 atm = 1.013 bar = 1.013×10^5 N/m²
1 lb/in² = 6.90×10^3 N/m²
1 Pa = 1 N/m² = 1.45×10^{-4} lb/in²

Name: _____

Dr. Croom's Physics

Date: _____

Chapter 1: Scientific Tool Box

Table of universal constants

<u>Quantity</u>	<u>Symbol</u>	<u>Value</u>	<u>Units</u>	<u>Uncertainty</u>
Planck Constant	h	6.626069×10^{-34}	Js	5.0×10^{-8}
reduced Planck constant	$\hbar = h/(2\pi)$	$1.054\,571\,628(53) \times 10^{-34}$	Js	5.0×10^{-8}
Speed of light	c	299683301.8	m/s	defined
Electric constant	ϵ_0	8.854197×10^{-12}	F/m	defined
Magnetic constant	μ_0	1.257551×10^{-6}	N/A ²	defined
Impedance of vacuum	Z_0	376.867159	W	defined
Gravitational constant	G	6.6742×10^{-11}	$\frac{\text{m}^3}{\text{kg} \cdot \text{s}^2}$	
Bohr radius	a_0	5.291767×10^{-11}	M	
Compton wavelength	λ_c	2.427189×10^{-12}	M	
Newtonian constant of gravitation	G	$6.67428(67) \times 10^{-11}$	$\frac{\text{m}^3}{\text{kg} \cdot \text{s}^2}$	1.0×10^{-4}
Coulomb's constant	$\kappa = 1/4\pi\epsilon_0$	$8.987\,551\,787\,368 \times 10^9$	$\frac{\text{N} \cdot \text{m}^2}{\text{C}^2}$	Defined
Bohr radius	$a_0 = \alpha/4\pi R_\infty$	$0.529\,177\,2108(18) \times 10^{-10}$	m	3.3×10^{-9}
classical electron radius	$r_e = e^2/4\pi\epsilon_0 m_e$	$2.817\,940\,299\,579\,513\,654\,416 \times 10^{-15}$	m	2.1×10^{-9}
electron mass	m_e	$9.109\,382\,15(45) \times 10^{-31}$	kg	5.0×10^{-8}
Fermi coupling constant	$G_F/(\hbar c)^3$	$1.166\,39(1) \times 10^{-5}$	GeV ²	8.6×10^{-6}
proton mass	m_p	$1.672\,621\,637(83) \times 10^{-27}$	kg	5.0×10^{-8}

Table of physico-chemical constants

<u>Quantity</u>	<u>Symbol</u>	<u>Value</u>	<u>Units</u>	<u>Uncertainty</u>
atomic mass unit	$m_u = 1\,u$	$1.660\,538\,86(28) \times 10^{-27}$	kg	1.7×10^{-7}
Avogadro's number	N_A, L	$6.022\,141\,5(10) \times 10^{23}$	1 / mol	1.7×10^{-7}
Boltzmann constant	$k = R/N_A$	$1.380\,650\,388\,238\,137\,546 \times 10^{-23}$	J / K	1.8×10^{-6}
Faraday constant	$F = N_A e$	96 485.337 716 389 95(83)	C / mol	8.6×10^{-8}
gas constant	R	8.314 472(15)	J / (K *mol)	1.7×10^{-6}
Stefan-Boltzmann constant	$\sigma = (\pi^2/60)k^4/\hbar^3 c^2$	$5.670\,400(40) \times 10^{-8}$	W / (m ² ·K ⁴)	7.0×10^{-6}

Table of adopted values

<u>Quantity</u>	<u>Symbol</u>	<u>Value</u>	<u>Units</u>	<u>Uncertainty</u>
molar mass constant	$M_u = M(^{12}\text{C})/12$	1×10^{-3}	kg / mol	Defined
molar mass of carbon-12	$M(^{12}\text{C}) = N_A m(^{12}\text{C})$	1.2×10^{-2}	kg / mol	Defined
standard acceleration of gravity on Earth	g_n	9.806 65	m / s ²	Defined
standard atmosphere	atm	101 325	Pa	Defined

Greek Letter		Name	Equivalent	Sound When Spoken
A	α	Alpha	A	al-fah
B	β	Beta	B	bay-tah
Γ	γ	Gamma	G	gam-ah
Δ	δ	Delta	D	del-tah
E	ε	Epsilon	E	ep-si-lon
Z	ζ	Zeta	Z	zay-tah
H	η	Eta	E	ay-tay
Θ	θ	Theta	Th	thay-tah
I	ι	Iota	I	eye-o-tah
K	κ	Kappa	K	cap-ah
Λ	λ	Lambda	L	lamb-dah
M	μ	Mu	M	mew
N	ν	Nu	N	new
Ξ	ξ	Xi	X	zzEye
O	ο	Omicron	O	om-ah-cron
Π	π	Pi	P	pie
P	ρ	Rho	R	row
Σ	σ	Sigma	S	sig-ma
T	τ	Tau	T	tawh
Υ	υ	Upsilon	U	oop-si-lon
Φ	φ	Phi	Ph	figh or fie
X	χ	Chi	Ch	kigh
Ψ	ψ	Psi	Ps	sigh
Ω	ω	Omega	O	o-may-gah

From: http://physics.syr.edu/courses/modules/ENERGY/ENERGY_POLICY/tables.html

Energy Content of Fuels (in Joules)

Energy Unit	Joules Equivalent (S.I.)
gallon of gasoline	1.3×10^8
AA battery	10^3
standard cubic foot of natural gas (SCF)	1.1×10^6
candy bar	10^6
barrel of crude oil (contains 42 gallons)	6.1×10^9
pound of coal	1.6×10^7
pound of gasoline	2.2×10^7
pound of oil	2.4×10^7
pound of Uranium-235	3.7×10^{13}
ton of coal	3.2×10^{10}
ton of Uranium-235	7.4×10^{16}

Power Converted to Watts

Quantity	Equivalent
1 Btu per hour	0.293 W
1 joule per second	1 W
1 kilowatt-hour per day	41.7 W
1 food Calorie per minute	69.77 W
1 horsepower	745.7 W
1 kilowatt	1000 W
1 Btu per second	1054 W
1 gallon of gasoline per hour	39 kW
1 million barrels of oil per day	73 GW