MISCELLANEOUS FACTORS

1 centimeter = 0.3937 inch; 1 inch = 2.54 cm
1 micron (μm) = 10^{-6} m
1 meter = 3.28 ft; 1 foot = 12 in. = 30.48 cm
1 hectare (ha) = 10,000 m^2 = 2.471 acres
1 acre = 43,560 ft^2 = 0.4047 ha
1 liter = 1000 cm^3 = 0.264 gal
1 gallon = 0.1337 ft^3 = 3.885 liter
1 acre foot = 325,804 gallons
1 cord = 128 ft^3 = 3.624 m^3
1 barrel (bbl) = 42 gal = 159.1 liter
1 kilogram = 2.2046 lb; 1 pound = 16 oz = 0.454 kg
1 therm = 100,000 Btu
1 watt = 1 J/sec = 3.41 Btu/hr
1 kilowatt = 1000 J/sec = 239 cal/sec = 3413 Btu/hr = 1.341 hp
1 horsepower = 550 ft · lb/sec = 746 W
1 year = 3.15×10^7 sec
density of water = 1 g/cm^3 = 62.4 lb/ft^3
density of gasoline = 0.70 to 0.78 g/cm^3; average = 0.72 g/cm^3
density of diesel fuel = 0.82 to 0.95 g/cm^3; average = 0.85 g/cm^3
density of propane = 0.50 g/cm^3
density of air at STP = 1.293 kg/m^3
heat capacity of air = 1000 J/kg·K = 0.019 Btu/ft^3·°F

ASTRONOMICAL DATA

Mean radius of earth	6.371×10^6 m
Mass of earth	5.975×10^{24} kg
Surface temperature of earth	290 K
Mean distance from earth to sun	1.49×10^{11} m
Mass of sun	1.99×10^{30} kg
Surface temperature of sun	6000 K
Radius of moon	1.741×10^6 m
Mass of moon	7.35×10^{22} kg
Mean distance of moon from earth	3.84×10^8 m

Energy Unit Conversion Factors

		J	kWh	Btu
1 Joule (J)	equals	1	2.78×10^{-7}	9.49×10^{-4}
1 kilowatt hour (kWh)	equals	3.60×10^{6}	1	3413
1 calorie (cal)	equals	4.184	1.16×10^{-6}	3.97×10^{-3}
1 British thermal unit (Btu)	equals	1055	2.93×10^{-4}	1
1 foot-pound (ft·lb)	equals	1.36	3.78×10^{-7}	1.29×10^{-3}
1 electron-volt (eV)	equals	1.60×10^{-19}	4.45×10^{-26}	1.52×10^{-22}

Energy Equivalents

	J	kWh	Btu
Crude petroleum (42 gallon barrel)	6.12×10^{9}	1700	5.80×10^{6}
Bituminous coal (1 ton[a])	2.81×10^{10}	7800	2.66×10^{7}
Natural gas (1000 cubic feet[b])	1.09×10^{9}	303	1.035×10^{6}
Gasoline (1 gallon[c])	1.32×10^{8}	36.6	1.25×10^{5}
Uranium-235 (1 gram)	8.28×10^{10}	2.30×10^{4}	7.84×10^{7}
Deuterium (1 gram)	2.38×10^{11}	6.60×10^{4}	2.25×10^{8}

[a]1 ton = 2000 lb = 0.907 tonne.
[b]At STP.
[c]The U.S. gallon is used in this text. The Imperial gallon used in Canada and Great Britain equals 1.201 U.S. gallons

FUNDAMENTAL CONSTANTS

Gravitational acceleration on earth (g)	9.81 m/sec^2, 32.2 ft/sec^2
Volume of mole of ideal gas at STP	22.4 liters
Avogadro's number	6.023×10^{23}
Atomic mass unit (amu)	1.66×10^{-27} kg
Boltzmann's constant (k)	1.38×10^{-23} J/K
Wien's constant	2.898×10^{-3} m · K
Speed of light (c)	3.00×10^{8} m/sec
Charge of the electron (qe)	1.60×10^{-19} C
Planck's constant (h)	6.63×10^{-34} J · sec
Mass energy of 1 amu	931 MeV
Stefan–Boltzmann constant (σ)	5.67×10^{-8} W/K^4 · m^2
Proton mass	1.673×10^{-27} kg
Neutron mass	1.675×10^{-27} kg
Deuteron mass	3.34×10^{-27} kg
Alpha particle mass	6.64×10^{-27} kg
Electron mass	9.109×10^{-31} kg
Pi (π)	3.14159
Base of natural logarithms (e)	2.71828

USEFUL FORMULAS FROM GEOMETRY

Circle of radius r

Circumference	$2\pi r$
Area	πr^2

Sphere of radius r

Surface area	$4\pi r^2$
Volume	$\frac{4}{3}\pi r^3$

NUMERICAL PREFIXES

exa	E	10^{18}
peta	P	10^{15}
tera	T	10^{12}
giga	G	10^{9}
mega	M	10^{6}
kilo	k	10^{3}
milli	m	10^{-3}
micro	μ	10^{-6}
nano	n	10^{-9}
pico	p	10^{-12}
femto	f	10^{-15}
atto	a	10^{-18}

COMMON NUMERICAL DESIGNATIONS

Thousand	10^{3}
Million	10^{6}
Billion	10^{9}
Trillion	10^{12}
Quadrillion	10^{15}
Quintillion	10^{18}