CONVERSION FACTORS

Mass
$$1 \text{ kg} = 10^3 \text{ g}$$
$$1 \text{ g} = 10^{-3} \text{ kg}$$
$$1 \text{ u} = 1.66 \times 10^{-24} \text{ g} = 1.66 \times 10^{-27} \text{ kg}$$
$$1 \text{ slug} = 14.6 \text{ kg}$$
$$1 \text{ metric ton} = 1000 \text{ kg}$$

Length
$$1 \text{ Å} = 10^{-10} \text{ m}$$
$$1 \text{ nm} = 10^{-9} \text{ m}$$
$$1 \text{ cm} = 10^{-2} \text{ m} = 0.394 \text{ in.}$$
$$1 \text{ yd} = 3 \text{ ft}$$
$$1 \text{ m} = 10^{-3} \text{ km} = 3.281 \text{ ft} = 39.4 \text{ in.}$$
$$1 \text{ km} = 10^3 \text{ m} = 0.621 \text{ mi}$$
$$1 \text{ in.} = 2.54 \text{ cm} = 2.54 \times 10^{-2} \text{ m}$$
$$1 \text{ ft} = 0.305 \text{ m} = 30.5 \text{ cm}$$
$$1 \text{ mi} = 5280 \text{ ft} = 1609 \text{ m} = 1.609 \text{ km}$$
$$1 \text{ ly (light year)} = 9.46 \times 10^{12} \text{ km}$$
$$1 \text{ pc (parsec)} = 3.09 \times 10^{13} \text{ km}$$

Area
$$1 \text{ cm}^2 = 10^{-4} \text{ m}^2 = 0.1550 \text{ in.}^2$$
$$= 1.08 \times 10^{-3} \text{ ft}^2$$
$$1 \text{ m}^2 = 10^4 \text{ cm}^2 = 10.76 \text{ ft}^2 = 1550 \text{ in.}^2$$
$$1 \text{ in.}^2 = 6.94 \times 10^{-3} \text{ ft}^2 = 6.45 \text{ cm}^2$$
$$= 6.45 \times 10^{-4} \text{ m}^2$$
$$1 \text{ ft}^2 = 144 \text{ in.}^2 = 9.29 \times 10^{-2} \text{ m}^2 = 929 \text{ cm}^2$$

Volume
$$1 \text{ cm}^3 = 10^{-6} \text{ m}^3 = 3.35 \times 10^{-5} \text{ ft}^3$$
$$= 6.10 \times 10^{-2} \text{ in.}^3$$
$$1 \text{ m}^3 = 10^6 \text{ cm}^3 = 10^3 \text{ L} = 35.3 \text{ ft}^3$$
$$= 6.10 \times 10^4 \text{ in.}^3 = 264 \text{ gal}$$
$$1 \text{ liter} = 10^3 \text{ cm}^3 = 10^{-3} \text{ m}^3 = 1.056 \text{ qt}$$
$$= 0.264 \text{ gal}$$
$$1 \text{ in.}^3 = 5.79 \times 10^{-4} \text{ ft}^3 = 16.4 \text{ cm}^3$$
$$= 1.64 \times 10^{-5} \text{ m}^3$$
$$1 \text{ ft}^3 = 1728 \text{ in.}^3 = 7.48 \text{ gal} = 0.0283 \text{ m}^3$$
$$= 28.3 \text{ L}$$
$$1 \text{ qt} = 2 \text{ pt} = 946 \text{ cm}^3 = 0.946 \text{ L}$$
$$1 \text{ gal} = 4 \text{ qt} = 231 \text{ in.}^3 = 0.134 \text{ ft}^3 = 3.785 \text{ L}$$

Time
$$1 \text{ h} = 60 \text{ min} = 3600 \text{ s}$$
$$1 \text{ day} = 24 \text{ h} = 1440 \text{ min} = 8.64 \times 10^4 \text{ s}$$
$$1 \text{ y} = 365 \text{ days} = 8.76 \times 10^3 \text{ h}$$
$$= 5.26 \times 10^5 \text{ min} = 3.16 \times 10^7 \text{ s}$$

Speed
$$1 \text{ m/s} = 3.60 \text{ km/h} = 3.28 \text{ ft/s}$$
$$= 2.24 \text{ mi/h}$$
$$1 \text{ km/h} = 0.278 \text{ m/s} = 0.621 \text{ mi/h}$$
$$= 0.911 \text{ ft/s}$$
$$1 \text{ ft/s} = 0.682 \text{ mi/h} = 0.305 \text{ m/s}$$
$$= 1.10 \text{ km/h}$$
$$1 \text{ mi/h} = 1.467 \text{ ft/s} = 1.609 \text{ km/h}$$
$$= 0.447 \text{ m/s}$$
$$60 \text{ mi/h} = 88 \text{ ft/s}$$

Force
$$1 \text{ N} = 0.225 \text{ lb}$$
$$1 \text{ lb} = 4.45 \text{ N}$$
Equivalent weight of a mass of 1 kg
$$\text{on Earth's surface} = 2.2 \text{ lb} = 9.8 \text{ N}$$
$$1 \text{ dyne} = 10^{-5} \text{ N} = 2.25 \times 10^{-6} \text{ lb}$$

Pressure
$$1 \text{ Pa} = 1 \text{ N/m}^2 = 1.45 \times 10^{-4} \text{ lb/in.}^2$$
$$= 7.5 \times 10^{-3} \text{ mm Hg}$$
$$1 \text{ mm Hg} = 133 \text{ Pa}$$
$$= 0.02 \text{ lb/in.}^2 = 1 \text{ torr}$$
$$1 \text{ atm} = 14.7 \text{ lb/in.}^2 = 101.3 \text{ kPa}$$
$$= 30 \text{ in. Hg} = 760 \text{ mm Hg}$$
$$1 \text{ lb/in.}^2 = 6.89 \text{ kPa}$$
$$1 \text{ bar} = 10^5 \text{ Pa} = 100 \text{ kPa}$$
$$1 \text{ millibar} = 10^2 \text{ Pa}$$

Energy
$$1 \text{ J} = 0.738 \text{ ft} \cdot \text{lb} = 0.239 \text{ cal}$$
$$= 9.48 \times 10^{-4} \text{ Btu} = 6.24 \times 10^{18} \text{ eV}$$
$$1 \text{ kcal} = 4186 \text{ J} = 3.968 \text{ Btu}$$
$$1 \text{ Btu} = 1055 \text{ J} = 778 \text{ ft} \cdot \text{lb} = 0.252 \text{ kcal}$$
$$1 \text{ cal} = 4.186 \text{ J} = 3.97 \times 10^{-3} \text{ Btu}$$
$$= 3.09 \text{ ft} \cdot \text{lb}$$
$$1 \text{ ft} \cdot \text{lb} = 1.36 \text{ J} = 1.29 \times 10^{-3} \text{ Btu}$$
$$1 \text{ eV} = 1.60 \times 10^{-19} \text{ J}$$
$$1 \text{ kWh} = 3.6 \times 10^6 \text{ J}$$
$$1 \text{ erg} = 10^{-7} \text{ J} = 7.38 \times 10^{-6} \text{ ft} \cdot \text{lb}$$

Power
$$1 \text{ W} = 1 \text{ J/s} = 0.738 \text{ ft} \cdot \text{lb/s}$$
$$= 1.34 \times 10^{-3} \text{ hp} = 3.41 \text{ Btu/h}$$
$$1 \text{ ft} \cdot \text{lb/s} = 1.36 \text{ W} = 1.82 \times 10^{-3} \text{ hp}$$
$$1 \text{ hp} = 550 \text{ ft} \cdot \text{lb/s} = 745.7 \text{ W}$$
$$= 2545 \text{ Btu/h}$$

Mass–Energy Equivalents
$$1 \text{ u} = 1.66 \times 10^{-27} \text{ kg} \leftrightarrow 931.5 \text{ MeV}$$
$$1 \text{ electron mass} = 9.11 \times 10^{-31} \text{ kg}$$
$$= 5.49 \times 10^{-4} \text{ u} \leftrightarrow 0.511 \text{ MeV}$$
$$1 \text{ proton mass} = 1.673 \times 10^{-27} \text{ kg}$$
$$= 1.007\,267 \text{ u} \leftrightarrow 938.28 \text{ MeV}$$
$$1 \text{ neutron mass} = 1.675 \times 10^{-27} \text{ kg}$$
$$= 1.008\,665 \text{ u} \leftrightarrow 939.57 \text{ MeV}$$

Temperature
$$T_F = \tfrac{9}{5}T_C + 32$$
$$T_C = \tfrac{5}{9}(T_F - 32)$$
$$T_K = T_C + 273.15$$

Angle
$$1 \text{ rad} = 57.3°$$

$1° = 0.0175$ rad	$60° = \pi/3$ rad
$15° = \pi/12$ rad	$90° = \pi/2$ rad
$30° = \pi/6$ rad	$180° = \pi$ rad
$45° = \pi/4$ rad	$360° = 2\pi$ rad

$$1 \text{ rev/min} = (\pi/30) \text{ rad/s} = 0.1047 \text{ rad/s}$$