Error Propagation in Arithmetic Calculations

Type of Calculation	Example	Standard Deviation of x
Addition or Subtraction	$x = p + q - r$	$s_x = \sqrt{s_p^2 + s_q^2 + s_r^2}$
Multiplication or Division	$x = \dfrac{p \cdot q}{r}$	$s_x = x \sqrt{\left(\dfrac{s_p}{p}\right)^2 + \left(\dfrac{s_q}{q}\right)^2 + \left(\dfrac{s_r}{r}\right)^2}$
Exponentiation	$x = p^y$	$s_x = y \cdot x \dfrac{s_p}{p}$
Logarithm	$x = \log_{10} p$	$s_x = 0.434 \dfrac{s_p}{p}$
Antilogarithm	$x = anti \log_{10} p$	$s_x = 2.303 \cdot x \cdot s_p$

Quantity	Equivalent Values
Mass	$1 kg = 1000 g = 0.001$ metric ton $= 2.20462 lb_m = 35.27392$ oz $1 lb_m = 16$ oz $= 5 \times 10^{-4}$ ton $= 453.593$ g $= 0.453593 kg$
Length	$1 m = 100$ cm $= 1000$ mm $= 10^6$ microns (µm) $= 10^{10}$ angstroms (Å) $= 39.37$ in $= 3.2808$ ft $= 1.0936$ yd $= 0.0006214$ mile
Volume	$1\ m^3 = 1000$ liters $= 10^6\ cm^3 = 10^6$ ml $= 35.3145\ ft^3 = 220.83$ imperial gallons $= 264.17$ $= 1056.68$ qt 1 ft $= 12$ in $= 1/3$ yd $= 0.03048$ m $= 30.48$ cm
Force	$1 N = 1\ kg \cdot m/s^2 = 10^5$ dynes $= 10^5\ g \cdot cm/s^2 = 0.22481\ lb_f$ $1 lb_f = 32.174\ lb_m \cdot ft/s^2 = 4.4482$ N $= 4.4482 \times 10^5$ dynes
Pressure	1 atm $= 1.01325 \times 10^5\ N/m^2$ (Pa) $= 101.325$ kPa $= 1.01325$ bars $= 1.01325 \times 10^6$ dynes/cm^2 $= 760$ mm Hg at 0ºC (torr) $= 10.333$ m H_2O at 4ºC $= 14.696\ lb_f/in^2$ (psi) $= 33.9$ ft H_2O at 4ºC $= 29.921$ in Hg at 0ºC
Energy	$1 J = 1\ N \cdot m = 10^7$ ergs $= 10^7$ dyne $\cdot$ cm $= 2.778 \times 10^{-7}\ kW \cdot h = 0.23901$ cal $= 0.7376\ ft\text{-}lb_f = 9.486 \times 10^{-4}$ Btu
Power	$1\ W = 1$ J/s $= 0.23901$ cal/s $= 0.7376\ ft \cdot lb_f/s = 9.486 \times 10^{-4}$ Btu/s $= 1.341 \times 10^{-3}$ hp