

Possibly useful relations:

$$T(K) = T(^{\circ}C) + 273.15$$

$$\Delta V = \beta V_0 \Delta T$$

$$\bar{K} = \frac{1}{2} m \bar{v}^2 = \frac{3}{2} kT$$

$$f(v) = 4\pi N \left(\frac{m}{2\pi kT}\right)^{\frac{3}{2}} v^2 e^{(\frac{1}{2}mv^2/kT)}$$

$$Q = mc\Delta T$$

$$Q = mL_f$$

$$\text{adiabatic: } PV^\gamma = \text{const.}$$

$$\epsilon_{\text{Carnot}} = 1 - \frac{T_L}{T_H}$$

$$CP_{\text{ref}}^{\text{Carnot}} = T_L / (T_H - T_L)$$

$$\Delta S = \int \left(\frac{dQ}{T}\right)_{\text{reversible}}$$

$$F = k \frac{Q_1 Q_2}{r^2}$$

$$E = k \frac{Q}{r^2}$$

$$E = \sigma / \epsilon_0$$

$$U = -\vec{p} \cdot \vec{E}$$

$$V = U/q$$

$$V = \sum_i V_i$$

$$C = K\epsilon_0 \frac{A}{d}$$

$$\frac{1}{C_s} = \frac{1}{C_1} + \frac{1}{C_2} + \dots$$

$$I = \frac{dQ}{dt}$$

$$\rho = \rho_0(1 + \alpha\Delta T)$$

$$P = \frac{V^2}{R} = I^2 R$$

$$V = V_0 \sin(2\pi ft)$$

$$T(^{\circ}F) = \frac{9}{5}T(^{\circ}C) + 32^{\circ}$$

$$PV = nRT$$

$$\text{monoatomic: } E_{\text{int}} = \frac{3}{2}nRT$$

$$Q = \int_{T_1}^{T_2} mc \, dT$$

$$Q = \Delta E_{\text{int}} + W$$

$$\gamma = C_P / C_V$$

$$CP_{\text{ref}} = \frac{Q_L}{W}$$

$$CP_{\text{hp}}^{\text{Carnot}} = 1 / (1 - T_L / T_H)$$

$$\Delta S_{\text{closed}} \geq 0$$

$$\vec{F}_1 = \vec{F}_{12} + \vec{F}_{13} + \dots$$

$$E = 2k\lambda/r$$

$$\vec{p} = Q\vec{l}$$

$$\int \vec{E} \cdot d\vec{A} = Q_{\text{encl}} / \epsilon_0$$

$$V_B - V_A = - \int \vec{E} \cdot d\vec{l}$$

$$E = -\frac{dV}{dl}$$

$$U = \frac{QV}{2} = \frac{CV^2}{2} = \frac{Q^2}{2C}$$

$$C_p = C_1 + C_2 + \dots$$

$$V = IR$$

$$\sigma = 1/\rho$$

$$P_{\text{ave}} = \frac{1}{2}I_0V_0 = I_{\text{rms}}V_{\text{rms}}$$

$$I = I_0 \sin(2\pi ft)$$

$$\Delta L = \alpha L_0 \Delta T$$

$$PV = NkT$$

$$v_{\text{rms}} = \sqrt{\frac{3kT}{m}}$$

$$\Delta N = f(v)dv$$

$$Q = mL_V$$

$$dW = PdV$$

$$\epsilon = \frac{|W|}{|Q_H|} = 1 - \frac{|Q_L|}{|Q_H|}$$

$$CP_{\text{hp}} = \frac{Q_H}{W}$$

$$dS = \frac{dQ}{T}$$

$$S = k \ln W$$

$$\vec{E} = \frac{\vec{F}}{q}$$

$$E = 2\pi k\sigma$$

$$\vec{\tau} = \vec{p} \times \vec{E}$$

$$\phi_E = \int \vec{E} \cdot d\vec{A}$$

$$V = \frac{kQ}{r}$$

$$Q = CV$$

$$C = KC_0$$

$$u = \frac{1}{2}\epsilon_0 E^2$$

$$R = \rho \frac{L}{A}$$

$$P = IV$$

$$I = neAv_d$$

$$I_{\text{rms}} = \frac{I_0}{\sqrt{2}}; V_{\text{rms}} = \frac{V_0}{\sqrt{2}}$$

$$k = 1.38 \times 10^{-23} \text{ J/K}$$

$$R = kN_A = 0.0821 \frac{\text{atm}\cdot\text{L}}{\text{mol}\cdot\text{K}}$$

$$1 \text{ cal} = 4.186 \text{ J}$$

$$k = 9.00 \times 10^9 \text{ Nm}^2/\text{C}^2$$

$$\cos \theta = \text{adjacent/hypotenuse}$$

$$N_A = 6.022 \times 10^{23}$$

$$\text{one atmosphere} = 760 \text{ mm Hg} = 10^5 \text{ Pa}$$

$$1 \text{ eV} = 1.60 \times 10^{-19} \text{ J}$$

$$\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2/\text{Nm}^2$$

$$\sin \theta = \text{opposite/hypotenuse}$$

$$R = 8.315 \text{ J/mol}\cdot\text{K}$$

$$q_e = -1.60 \times 10^{-19} \text{ C}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\tan \theta = \sin \theta / \cos \theta$$