$n_2 \sin\theta_2 = n_1 \sin\theta_1$

$\frac{1}{S} + \frac{1}{S'} = \frac{1}{f}$ $\quad$ $\frac{1}{f} = \frac{n_2 - n_1}{n_1}\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$

$m = \frac{-S'}{S}$ $\quad$ $|m| = \frac{-h'}{h}$ $\quad$ $m = \frac{f_{ob}}{f_{ey}}$

$\vec{E}_{rad} = \frac{1}{4\pi\epsilon_0}\frac{-q\vec{a}_\perp}{c^2 r}$ $\quad$ $\vec{S} = \frac{1}{\mu_0}\vec{E} \times \vec{B}$ $\quad$ $< S >= I = F$ $\quad$ $E = cB$

$I = \frac{1}{2c\mu_0}E_o^2$ $\quad$ $L = 4\pi r^2 F$

$E = E_0 \sin(kx - wt + \epsilon)$ $\quad$ $k = \frac{2\pi}{\lambda}$ $\quad$ $\omega = 2\pi f$

$I = I_0 \cos^2\theta$ $\quad$ $\tan\theta_B = \frac{n_2}{n_1}$

$\phi = \frac{2\pi}{\lambda_0}(n_1 x_1 - n_2 x_2) + (\epsilon_1 - \epsilon_2)$ $\quad$ $\lambda = \frac{\lambda_0}{n}$

$m\lambda = d\sin\theta$ $\quad$ $m\lambda = a\sin\theta$ $\quad$ $\theta_R = 1.22\frac{\lambda}{D}$

$\frac{\vec{S}}{c} = \frac{1}{\mu_0 c}\vec{E} \times \vec{B}$ $\quad$ $pflux = \frac{< S >}{c} = \frac{I}{c}$ $\quad$ $L = 4\pi r^2 F$

$E_N = \frac{-13.6eV}{N^2}$ $\quad$ $E_N = N\hbar\omega_0 + E_0$ $\quad$ $\omega_0 = \sqrt{\frac{k_s}{m}}$

$PV = Nk_B T$ $\quad$ $PV^\gamma = \text{constant}$ $\quad$ $\gamma = 1 + \frac{2}{f}$

$dW = -PdV$ $\quad$ $\Delta U = Q + W$ $\quad$ $Q = cm\Delta T$ $\quad$ $Q = Lm$

$U = \frac{f}{2}Nk_B T$ $\quad$ $\frac{1}{2}mv_{rms}^2 = \frac{3}{2}k_B T$ $\quad$ $P(v) = 4\pi\left(\frac{M}{2\pi k_B T}\right)^{\frac{3}{2}} v^2 e^{\frac{-Mv^2}{2k_B T}}$

$$v_{rms} = \sqrt{\frac{3k_BT}{M}} \qquad v_P = \sqrt{\frac{2k_BT}{M}} \qquad \mathrm{v_{avg}} = \sqrt{\frac{8\mathrm{k_B T}}{\pi \mathrm{M}}}$$

$$\frac{dQ}{dt} = -\kappa A\frac{dT}{dx} \qquad l = \frac{1}{\sqrt{2}An_V} \qquad \lambda_{peak} = \frac{2.9 \times 10^{-3}m - K}{T} \qquad \frac{dQ}{dt} = e\sigma AT^4$$

$$\Omega(\mathrm{N,U}) = \frac{(\mathrm{q} + 3\mathrm{N} - 1)!}{\mathrm{q!}(3\mathrm{N} - 1)!} \qquad q = \frac{U}{\epsilon} \qquad \Omega_{AB} = \Omega_A\Omega_B \qquad \mathrm{Pr(E)} = \frac{1}{\mathrm{Z}}\mathrm{e}^{-\mathrm{E}/\mathrm{k_B T}}$$

$$\mathrm{S} = \mathrm{k_B}\ \ln\ \Omega \qquad \frac{\mathrm{dS}}{\mathrm{dU}} = \frac{1}{\mathrm{T}} \qquad \mathrm{dS} = \frac{\mathrm{dQ}}{\mathrm{T}}$$

$$\mathrm{e} = \frac{|\mathrm{W_{net}}|}{|\mathrm{Q_H}|} = 1 - \frac{\mathrm{Q_C}}{\mathrm{Q_H}} \qquad \mathrm{e} = 1 - \frac{\mathrm{T_C}}{\mathrm{T_H}}$$

Conversions/Constants

$\mathrm{T[K]} = \mathrm{T[^\circ C]} + 273$ $\qquad \mathrm{N_A} = 6.02\mathrm{x}10^{23}$

$k_B = 1.38x10^{-23}\frac{J}{K}$ $\qquad \sigma = 5.6703x10^{-8}\frac{W}{m^2K^4}$

$h = 6.6 \times 10^{-34}J - s$ $\qquad \hbar = 1.05 \times 10^{-34}\mathrm{J} - \mathrm{s}$

$\mu_0 = 4\pi \times 10^{-7}\frac{T - m}{A}$ $\qquad \mathrm{c} = 3 \times 10^8\ \mathrm{m\ s^{-1}}$

$\frac{1}{4\pi\epsilon_0} = 9 \times 10^9\ \mathrm{N \cdot m^2/C^2}$

$1\ \mathrm{eV} = 1.602\mathrm{x}10^{-19}\mathrm{J}$ $\qquad \mathrm{m_{proton}} = 1.67\mathrm{x}10^{-27}\mathrm{kg}$ $\qquad q = 1.6 \times 10^{-19}C$

$1\ \mu\mathrm{m} = 10^{-6}\mathrm{m}$ $\qquad 1\ \mathrm{nm}{=}1\ \mathrm{x}\ 10^{-9}\ \mathrm{m}$

$1^\circ = 3600''$