

Formulário:

$$n_1 \operatorname{sen} \theta_1 = n_2 \operatorname{sen} \theta_2$$

$$m = \frac{h'}{h} = -\frac{q}{p}$$

$$\frac{1}{p} + \frac{1}{q} = \frac{2}{R} = \frac{1}{f}$$

$$\frac{n_1}{p} + \frac{n_2}{q} = \frac{n_2 - n_1}{R}$$

$$\frac{1}{f} = (n-1) \left(\frac{1}{R_A} - \frac{1}{R_B} \right)$$

$$\omega = \sqrt{\frac{g}{L}}$$

$$y(t) = A \cos(\omega t + \varphi)$$

$$\omega = \sqrt{\frac{K}{M}}$$

$$y(t) = A e^{-(b/2m)t} \cos(\omega t + \phi)$$

$$\omega = \sqrt{\omega_0^2 - \left(\frac{b}{2m}\right)^2}$$

$$F = F_0 \cos(\omega_f t)$$

$$Y(t) = A \cos(\omega_f t + \varphi)$$

$$A = \frac{F_0/m}{\sqrt{\left(\omega_f^2 - \omega_0^2\right)^2 + \left(\frac{b \omega_f}{m}\right)^2}}$$

$$y(t) = 2 A \cos\left(\frac{\omega_1 - \omega_2}{2}t\right) \operatorname{sen}\left(\frac{\omega_1 + \omega_2}{2}t\right)$$

$$y(x, t) = 2 A \cos\frac{\varphi}{2} \operatorname{sen}\left(kx - \omega t + \frac{\varphi}{2}\right)$$

$$Y(x, t) = A \operatorname{sen}(kx \pm \omega t + \delta)$$

$$P = \frac{1}{2} \rho_{linear} \omega^2 A^2 V_{propagação}$$

$$V_{propagação} = \sqrt{\frac{F}{\rho_{linear}}}$$

$$y(x, t) = 2 A \operatorname{sen}(kx) \cos(\omega t)$$

$$y(x, t) = 2 A \cos(kx) \cos(\omega t)$$

$$a \operatorname{sen} \theta = n\lambda$$

$$a \operatorname{sen} \theta = (2n+1) \frac{\lambda}{2}$$

$$f' = f \frac{\frac{V_0}{V_s}}{\frac{V_f}{V_s}}$$

$$N = N_0 e^{-\lambda t}$$

$$T_{1/2} = \frac{\ln 2}{\lambda}$$

$$a = \left| \frac{dN}{dt} \right| = N_0 \lambda e^{-\lambda t}$$

$$a = a_0 e^{-\lambda t}$$

$$E = m c^2$$

$$E_n = -\frac{mk^2 Z^2 e^4}{2\hbar^2} \frac{1}{n^2}$$

$$\lambda_n = \frac{\hbar}{p_n}$$

$$E = h f - W$$

$$\lambda' - \lambda_0 = \frac{h}{mc} (1 - \cos \theta)$$

Grandezas físicas, conversões e fórmulas:

$$N_A = 6,022140857 \times 10^{23} \text{ moléculas/mol}$$

$$h = 6,626070040 \times 10^{-34} \text{ J} \cdot \text{s} = 4,135667662 \times 10^{-15} \text{ eV} \cdot \text{s}$$

$$\hbar = h/2\pi = 1,054571800 \times 10^{-34} \text{ J} \cdot \text{s} = 6,582119514 \times 10^{-16} \text{ eV} \cdot \text{s}$$

$$\varepsilon_0 = 8,854187817 \times 10^{-12} \text{ F/m}$$

$$k = 1/4\pi\varepsilon_0 = 8,98755188 \times 10^9 \text{ N} \cdot \text{m}^2/\text{C}^2$$

$$m_e = 9,10938356 \times 10^{-31} \text{ kg}$$

$$m_p = 1,67262 \times 10^{-27} \text{ kg} = 1836.151 m_e \quad 1 \text{ amu} = 1,660539040 \times 10^{-27} \text{ kg}$$

$$m_n = 1,67493 \times 10^{-27} \text{ kg}$$

$$c = 299792,458 \text{ km/s} = 2,99792458 \times 10^8 \text{ m/s}$$

$$e = 1,602176208 \times 10^{-19} \text{ C}$$

$$1 \text{ \AA} = 10^{-10} \text{ m}$$

$$\pi = 3,14159265$$

dioptria = inverso da distância focal medida em metros

$$\text{Ci} = 3,7 \times 10^{10} \text{ Bq}$$

Transformações Trigonométricas

$$\sin(-x) = -\sin(x)$$

$$\cos(-x) = +\cos(x)$$

$$\sin\left(x \pm \frac{\pi}{2}\right) = \pm \cos(x)$$

$$\cos\left(x \pm \frac{\pi}{2}\right) = \mp \sin(x)$$

$$\sin(x \pm y) = \sin x \cos y \pm \cos x \sin y$$

$$\cos(x \pm y) = \cos x \cos y \mp \sin x \sin y$$

$$\sin^2 x = \frac{1}{2} - \frac{1}{2} \cos 2x$$

$$\cos^2 x = \frac{1}{2} + \frac{1}{2} \cos 2x$$

$$\sin x \pm \sin y = 2 \cos\left(\frac{x \mp y}{2}\right) \sin\left(\frac{x \pm y}{2}\right)$$

$$\cos x + \cos y = 2 \cos\left(\frac{x+y}{2}\right) \cos\left(\frac{x-y}{2}\right)$$

$$\cos x - \cos y = 2 \sin\left(\frac{x+y}{2}\right) \sin\left(\frac{x-y}{2}\right)$$