Equation Table:

$$c = 3.00\times10^{8}\ m/s$$
$$k = 1.38\times10^{-23}\ J/K$$
$$h = 6.626\times10^{-34}\ J\cdot s$$
$$\hbar = \frac{h}{2\pi}$$

$$\gamma = \frac{1}{\sqrt{1-\frac{v^2}{c^2}}}$$

$$m_e = 9.11\times10^{-31}\,kg$$
$$1eV = 1.602\times10^{-19}\,J$$
$$1MeV/c^2 = 1.780\times10^{-30}\,kg$$
$$hc = 1240eV\cdot nm$$
$$a_0 = 0.0529nm$$
$$R = 1.0973732\times10^{7}\,m^{-1}$$

$$L = \frac{L_0}{\gamma}$$
$$t = \gamma t_0$$

$$x' = \gamma(x - ut)$$
$$y' = y$$
$$z' = z$$
$$t' = \gamma\left(t - \frac{u}{c^2}x\right)$$

$$x = \gamma(x' + ut')$$
$$y = y'$$
$$z = z'$$
$$t = \gamma\left(t' + \frac{u}{c^2}x'\right)$$

$$\Delta x' = \gamma(\Delta x - u\Delta t)$$
$$\Delta y' = \Delta y$$
$$\Delta z' = \Delta z$$
$$\Delta t' = \gamma\left(\Delta t - \frac{u}{c^2}\Delta x\right)$$

$$v_x' = \frac{v_x - u}{1 - \frac{v_x u}{c^2}}$$
$$v_{y,z}' = \frac{v_{y,z}}{\gamma\left(1 - \frac{v_x u}{c^2}\right)}$$

$$\mathbf{p} = \gamma m\mathbf{v}$$
$$E = \gamma mc^2$$
$$KE = \gamma mc^2 - mc^2$$
$$E^2 - c^2p^2 = (mc^2)^2$$

$$f = \sqrt{\frac{c+u}{c-u}}\,f_0$$
$$E = hf$$
$$f\lambda = c$$
$$E = cp$$

$$K_{\max} = eV_0$$
$$K_{\max} = hf - \phi$$

$$\lambda' - \lambda = \frac{h}{m_e c}(1 - \cos\phi)$$
$$\lambda_C = \frac{h}{m_e c} = 2.43\times10^{-3}\,nm$$

$$hf = E_i - E_f$$
$$E_n = -\frac{hcR}{n^2} = -\frac{13.606}{n^2}eV$$
$$\frac{1}{\lambda} = \frac{E_i - E_f}{hc} = R\left(\frac{1}{n_f^2} - \frac{1}{n_i^2}\right)$$
$$R = \frac{m_e e^4}{8\varepsilon_0^2 h^3 c}$$

$$I(\lambda) = \frac{2\pi hc^2}{\lambda^5\left(e^{hc/\lambda kT} - 1\right)}$$
$$I = \sigma T^4$$
$$\lambda = \frac{h}{p} = \frac{h}{mv}$$

$$\Delta x \Delta p_x \geq \hbar / 2$$
$$\Delta y \Delta p_y \geq \hbar / 2$$
$$\Delta z \Delta p_z \geq \hbar / 2$$
$$\Delta E \Delta t \geq \hbar / 2$$

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$$\int_{-\infty}^{\infty} |\psi|^2 \, dx = 1$$
$$\langle x \rangle = \int_{-\infty}^{\infty} x |\psi|^2 \, dx$$
$$\langle f(x) \rangle = \int_{-\infty}^{\infty} f(x) |\psi|^2 \, dx$$

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$$k = \frac{2\pi}{\lambda}$$
$$\omega = 2\pi f$$

$$\Psi(x, y, z, t) = \psi(x, y, z) e^{-iEt/\hbar}$$
$$-\frac{\hbar^2}{2m} \frac{d^2 \psi(x)}{dx^2} + U\psi(x) = E\psi(x)$$

$$\psi(x) = \sqrt{\frac{2}{L}} \sin\left(\frac{n\pi x}{L}\right), \quad n = 1, 2, 3, \cdots$$
$$E_n = \frac{p_n^2}{2m} = \left(\frac{h^2}{8mL^2}\right) n^2 = \left(\frac{\pi^2 \hbar^2}{2mL^2}\right) n^2, \quad n = 1, 2, 3, \cdots$$
$$E_n = \left(n + \frac{1}{2}\right) \hbar\omega, \quad n = 0, 1, 2, 3, \cdots$$
