Formulas

You need all of these at least 126 times☺

$\vec{A}\cdot\vec{B}=|A||B|\cos\theta$, $x=\dfrac{-b\pm\sqrt{b^2-4ac}}{2a}$, $\sin\theta=\dfrac{o}{h}$, $\sum\vec{F}=m\vec{a}$

$\sin 30°=0.5=\cos 60°, \cos 30°=0.866=\sin 60°$, $\tan 45°=1$

$\ln\frac{1}{50}\cong-3.9, \ln\frac{1}{100}\cong-4.6, \ln\frac{1}{200}\cong-5.3, \ln\frac{1}{300}\cong-5.7, \ln\frac{1}{400}\cong-6, \ln\frac{1}{500}\cong-6.2, \ln\frac{1}{1000}\cong-6.9,$

$\sin 45°=0.707=\cos 45°$, use $g=10\dfrac{m}{\sec^2}$, $C=2\pi r$, $A=\pi r^2$

$n_1\sin\theta_1=n_2\sin\theta_2$, $n=\dfrac{c}{v}$, $\sin\theta_c=\dfrac{n_2}{n_1}$, $n_1\lambda_1=n_2\lambda_2$

$\dfrac{1}{p}+\dfrac{1}{i}=\dfrac{1}{f}$, $M=\dfrac{h'}{h}=-\dfrac{i}{p}$, $\dfrac{1}{f}=(n-1)(\dfrac{1}{R_1}-\dfrac{1}{R_2})$

$d\sin\theta=m\lambda$, $y_m=\dfrac{m\lambda D}{d}$ (small angles), $d\sin\theta=(m+\dfrac{1}{2})\lambda$

$I = I_0 \cos^2(\phi/2)$, $\phi = 2\pi\delta/\lambda = 2\pi\, d(\sin\theta)/\lambda$

$a\sin\theta=p\lambda$, $I=I_0\left(\dfrac{\sin(\alpha)}{\alpha}\right)^2$, $\alpha=\dfrac{\pi a\sin\theta}{\lambda}$, $I=I_0\cos^2\beta\left(\dfrac{\sin(\alpha)}{\alpha}\right)^2$,

$\beta=\dfrac{\pi d\sin\theta}{\lambda}$, $\theta_{\min}=1.22\dfrac{\lambda}{D}$, $R=\dfrac{(\lambda_1+\lambda_2)/2}{(\lambda_1-\lambda_2)}$, $R=Nm$, $I = I_0\cos^2(\theta)$

$$-\frac{\hbar^2}{2m}\frac{1}{r^2}\frac{\partial}{\partial r}\left(r^2\frac{\partial\psi}{\partial r}\right)-\frac{\hbar^2}{2m}\frac{1}{r^2}\left[\frac{1}{\sin\theta}\frac{\partial}{\partial\theta}\left(\sin\theta\frac{\partial\psi}{\partial\theta}\right)+\frac{1}{\sin^2\theta}\frac{d^2\psi}{d\phi^2}\right]+U\psi=E\psi$$

$$-\frac{\hbar^2}{2m}\frac{d^2\psi}{dx^2}+U\psi=E\psi, \quad -\frac{\hbar^2}{2m}\frac{\partial^2\psi(x,t)}{\partial x^2}+U(x)\psi(x,t)=i\hbar\frac{\partial\psi(x,t)}{\partial t}$$

$$k^2=\frac{2m(E-U)}{\hbar^2}, \quad \alpha^2=\frac{2m(U-E)}{\hbar^2}, \quad \int_{-\infty}^{\infty}|\psi|^2=1$$

$$\Delta t=\Delta t_0\gamma, \quad L=\frac{L_0}{\gamma}, \quad \gamma=\frac{1}{\sqrt{1-\beta^2}}, \quad \beta=\frac{v}{c}, \quad f=f_0\sqrt{\frac{1-\beta}{1+\beta}}$$

$$x'=\gamma(x-vt), \quad y'=y, \quad z'=z, \quad t'=\gamma\left(t-{vx}/{c^2}\right)$$

$$p=\gamma mv, \quad K=mc^2(\gamma-1), \quad E=\gamma mc^2=mc^2+K,$$

$$(pc)^2=2Kmc^2+K^2, \quad E^2=(pc)^2+(mc^2)^2$$

$$E=hf, \quad hf=K_{\max}+\Phi, \quad \lambda=\frac{h}{p}, \quad p=\frac{h}{\lambda}=\hbar k, \quad E=hf=\hbar\omega$$

$$\Delta x\Delta p\geq\hbar, \quad \Delta E\Delta t\geq\hbar$$

$$\hbar=\frac{h}{2\pi}=\frac{6.64\times10^{-34}\,J\cdot s}{2\pi}, \quad h=6.64\times10^{-34}\,J\cdot s=4.14\times10^{-15}\,eV\cdot s$$

$$E_n=-\frac{13.6eV}{n^2}, \quad N=N_0e^{-\lambda t}, \quad \lambda=\frac{\ln 2}{T_{1/2}}=\frac{.69}{T_{1/2}}, \quad R=\lambda N$$