Formler för Fysik för Ingenjörer I del 1b

$$y = f(x \pm vt)$$

$$v = \sqrt{\frac{T}{\mu}}$$

$$y = A\sin(kx - \omega t + \phi)$$

$$v = \frac{\omega}{T}$$

$$k \equiv \frac{2\pi}{\lambda}$$

$$\omega \equiv \frac{2\pi}{T}$$

$$f = \frac{1}{T}$$

$$\bar{P} = \frac{1}{2}\omega^2 A^2 v$$

$$\frac{\partial^2 y}{\partial x^2} = \frac{1}{v^2}\frac{\partial^2 y}{\partial t^2}$$

$$v = \sqrt{\frac{B}{\rho}}$$

$$s(x,t) = s_{\max}\cos(kx - \omega t)$$

$$\Delta P = \Delta P_{\max}\sin(kx - \omega t)$$

$$\Delta P_{\max} = \rho v \omega s_{\max}$$

$$I = \frac{\Delta P_{\max}^2}{2\rho v}$$

$$\beta = 10\log\left(\frac{I}{I_0}\right)$$

$$\psi(r,t) = \frac{s_0}{r}\sin(kr - \omega t)$$

$$\Delta r = \frac{\lambda}{2\pi}\phi$$

$$y = 2A\sin kx\cos\omega t$$

$$\lambda = \frac{2L}{n}$$

$$\theta_r = \theta_i$$

$$n \equiv \frac{c}{v}$$

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

$$\sin\theta_c = \frac{n_2}{n_1}$$

$$d\sin\theta = m\lambda$$

$$d\sin\theta = (m + \frac{1}{2})\lambda$$

$$I = I_{\max}\cos^2\left(\frac{\pi d\sin\theta}{\lambda}\right)$$

$$\sin\theta = m\frac{\lambda}{a}$$

$$I = I_{\max}\left(\frac{\sin(\pi a\sin\theta/\lambda)}{\pi a\sin\theta/\lambda}\right)^2$$

$$\theta_{\min} = \frac{\lambda}{a}$$

$$\theta_{\min} = 1.22\frac{\lambda}{D}$$

$$d\sin\theta = m\lambda$$

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

$$\Delta t = \gamma\Delta t_p$$

$$L = \frac{L_p}{\gamma}$$

$$x' = \gamma(x - vt)$$

$$y' = y, z' = z$$

$$t' = \gamma(t - \frac{v}{c^2}x)$$

$$u'_x = \frac{u_x - v}{1 - \frac{u_x v}{c^2}}$$

$$\vec{p} \equiv \gamma m\vec{u}$$

$$\vec{F} \equiv \frac{d\vec{p}}{dt}$$

$$E = \gamma mc^2 = K + mc^2$$

$$I(\lambda,T)=\frac{2\pi hc^2}{\lambda^5(e^{hc/\lambda k_BT}-1)}$$

$$E=hf$$

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

$$\frac{1}{\lambda}=R(\frac{1}{n_f}-\frac{1}{n_i})$$

$$E_n=-\frac{k_e e^2}{2a_0}(\frac{1}{n^2})$$

$$\lambda=\frac{h}{p}$$

$$\Delta x\Delta p_x\geq\frac{\hbar}{2}$$

$$\Delta E\Delta t\geq\frac{\hbar}{2}$$

$$P(x)dx=|\psi|^2dx$$

$$\int_{-\infty}^{\infty}|\psi|^2dx=1$$

$$P_{ab}=\int_a^b|\psi|^2dx$$

$$\psi(x)=A\sin(\frac{n\pi x}{L})$$

$$E_n=(\frac{h^2}{8mL^2})n^2$$

$$\frac{d^2\psi}{dx^2}=-\frac{2m}{\hbar}(E-U)\psi$$

$$\psi_{1s}(r)=\frac{1}{\sqrt{\pi a_0^3}}e^{-r/a_0}$$

$$P_{1s}(r)=(\frac{4r^2}{a_0^3})e^{-2r/a_0}$$

$$L=\sqrt{l(l+1)}\hbar$$

$$L_z=m_l\hbar$$

$$S=\sqrt{s(s+1)}\hbar$$

$$S_z=m_s\hbar=\pm\frac{1}{2}\hbar$$

$$f(E)=\frac{1}{e^{(E-E_F)/k_BT}+1}$$

$$N(E)dE=C\frac{E^{1/2}dE}{e^{(E-E_F)/k_BT}+1}$$

$$a_0=0.529X10^{-10}\,m$$

$$k_B=1.38X10^{-23}\,J/K$$

$$k_e=8.988X10^9\,Nm^2/C^2$$

$$m_e=9.109X10^{-31}\,kg$$

$$e=1.602X10^{-19}\,C$$

$$h=6.63X10^{-34}\,Js$$

$$\hbar=h/2\pi$$

$$R=1.097X10^7\,m^{-1}$$

$$c=2.9979X10^8\,m/s$$

$$I_0=1.00X10^{-12}\,W/m^2$$

$$\sin a+\sin b=2\cos(\frac{a-b}{2})\sin(\frac{a+b}{2})$$

$$2\sin a\cos b=\cos(a+b)-\cos(a-b)$$