

Physics 23: Possibly Useful Formula

Waves:

$$y(x, t) = A \sin(kx \pm \omega t + \phi)$$

$$v = f\lambda = \frac{\omega}{k} = \sqrt{\frac{F}{\mu}}$$

$$\langle P \rangle = \frac{1}{2} \mu \omega^2 A^2 v$$

Sound:

$$c_s^2 = \frac{d\mathcal{P}}{d\rho} \quad (\mathcal{P} = p_0 + p)$$

$$p = -c_s^2 \rho_0 \frac{\partial s}{\partial x}$$

$$I = \frac{p_{max}^2}{2c_s \rho_0}$$

$$f_{beat} = |f_1 - f_2|$$

$$f' = \frac{c_s \pm v_0}{c_s \mp v_s} f$$

Coulomb's Law:

$$\vec{F} = \frac{1}{4\pi\epsilon_0} \frac{q_1 q_2}{r^2} \hat{r}$$

$$\frac{1}{4\pi\epsilon_0} \approx 9 \times 10^9 \text{ Nm}^2/\text{C}^2$$

$$e \approx 1.6 \times 10^{-19} \text{ C}$$

General reference:

$$\sin A + \sin B = 2 \sin \frac{A+B}{2} \cos \frac{A-B}{2}$$