

EQUATION SHEET -- PHYSICS 133

Interim Version - 4/2/06 WAVES

Wave speed on stretched string: $v_{string} = \sqrt{T_s / \mu}$ (20.2, 20.26))

Wave Relations and Definitions:

$$v = \frac{\lambda}{T} = \lambda f \quad (20.7, 20.8) \quad k \equiv 2\pi / \lambda \quad (20.12) \quad \omega = vk = 2\pi / T = 2\pi f \quad (20.13)$$

Sinusoidal Traveling Waves: $y(x, t) = A \sin(kx - \omega t + \phi_0)$ (20.14, 20.16))

Index of refraction: $n \equiv c/v$ (20.29)

Intensity: $I = P/a$ (20.31)

Doppler Effect (sound): $f_{\pm} = f_0 \frac{v \pm v_D}{v \pm v_S}$ (20.38, 20.39)

Doppler Effect (light): $\lambda_{red} = \sqrt{\frac{1+v_s/c}{1-v_s/c}} \lambda_0$ $\lambda_{blue} = \sqrt{\frac{1-v_s/c}{1+v_s/c}} \lambda_0$ 20.40

Standing Waves: $D(x, t) = [2a \sin kx] \cos \omega t$ (21.6, 21.7)

Interference: $D(x, t) = [2a \cos \Delta\phi / 2] \sin(kx_{avg} - \omega t + (\phi_0)_{avg})$ (21.26)

Wavelength of light in medium of index n : $\lambda_n = \lambda / n$