PHYS 124: Particles and Waves

Formula sheet for Mid-Term Exam, May 15, 2006

$$\sin\theta = \frac{h_o}{h}, \quad \cos\theta = \frac{h_a}{h}, \quad \tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{h_o}{h_a}, \quad h^2 = {h_o}^2 + {h_a}^2$$

$$ax^2 + bx + c = 0 \quad \text{for} \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\bar{\mathbf{v}} = \frac{\Delta \mathbf{r}}{\Delta t}, \quad \mathbf{v} = \lim_{\Delta t \to 0} \frac{\Delta \mathbf{r}}{\Delta t}, \quad \bar{\mathbf{a}} = \frac{\Delta \mathbf{v}}{\Delta t}, \quad \mathbf{a} = \lim_{\Delta t \to 0} \frac{\Delta \mathbf{v}}{\Delta t}$$

$$\mathbf{v} = \mathbf{v}_0 + \mathbf{a}t, \qquad \mathbf{r} = \begin{pmatrix} x \\ y \end{pmatrix}, \ \mathbf{v} = \begin{pmatrix} v_x \\ v_y \end{pmatrix}$$

$$\mathbf{r} = \mathbf{r}_0 + \mathbf{v}_0 t + \tfrac{1}{2}\mathbf{a}t^2$$

$$\mathbf{r} = \mathbf{r}_0 + \tfrac{1}{2}(\mathbf{v}_0 + \mathbf{v})t$$

$$v_x^2 = v_{0x}^2 + 2a_x(x - x_0), \quad v_y^2 = v_{0y}^2 + 2a_y(y - y_0)$$

$$\sum \mathbf{F} = m\mathbf{a}, \quad \mathbf{F}_{AB} = -\mathbf{F}_{BA}, \quad \sum F_x = ma_x, \ \sum F_y = ma_y$$

$$W = mg, \quad g = 9.80 \text{ m/s}^2, \quad F_{\text{g}} = \frac{Gm_1m_2}{r^2}, \quad G = 6.673 \times 10^{-11} \text{ N} \cdot \text{m}^2/\text{kg}^2$$

$$f_K = \mu_K F_N, \quad f_s \leq f_s^{\text{MAX}} = \mu_s F_N$$

$$a_c = \frac{v^2}{r}, \quad F_c = \frac{mv^2}{r}, \qquad v = \frac{2\pi r}{T}$$