PHYS 201 Formula Sheet

Chapters 1—5 (Exam 1)

Constant acceleration equations:

$$v_x = v_{0x} + a_x t \qquad x = x_0 + v_{0x} t + \tfrac{1}{2} a_x t^2$$

$$v_x^2 = v_{0x}^2 + 2a_x(x - x_0) \qquad x - x_0 = \left(\frac{v_{0x} + v_x}{2} \right) t$$

$$g = 9.80 \text{ m/s}^2 \qquad w = mg$$

$$\sum F_x = ma_x \qquad \sum F_y = ma_y$$

$$f_k = \mu_k n \qquad f_s \le \mu_s n$$

$$F_{spr} = -kx$$

quadratic formula: The equation $ax^2 + bx + c = 0$ has solutions $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

Chapters 6—8 (Exam 2)

$$a_{rad} = \frac{v^2}{R} \qquad v = \frac{2\pi R}{T}$$

$$F_g = G\frac{m_1 m_2}{r^2} \qquad G = 6.67 \times 10^{-11} \text{ N} \cdot \text{m}^2/\text{kg}^2 \qquad T = \frac{2\pi r^{3/2}}{\sqrt{G m_E}}$$

$$W = F_{\|} s = (F \cos\phi) s \qquad W_{total} = K_f - K_i = \Delta K$$

$$U_{grav} = mgy \qquad K = \tfrac{1}{2} m v^2 \qquad U_{el} = \tfrac{1}{2} k x^2$$

$$K_f + U_f = K_i + U_i + W_{other}$$

$$P_{av} = \frac{W}{t} \qquad P = F_{\|} v$$

$$\vec{p} = m\vec{v} \qquad \Delta\vec{p} = \vec{F}_{av}(t_f - t_i) = \vec{J}$$

$$x_{cm} = \frac{m_A x_A + m_B x_B + m_C x_C + \ldots}{m_A + m_B + m_C + \ldots} \qquad y_{cm} = \frac{m_A y_A + m_B y_B + m_C y_C + \ldots}{m_A + m_B + m_C + \ldots}$$

$$v_{cm,x} = \frac{m_A v_{A,x} + m_B v_{B,x} + m_C v_{C,x} + \ldots}{m_A + m_B + m_C + \ldots} \qquad v_{cm,y} = \frac{m_A v_{A,y} + m_B v_{B,y} + m_C v_{C,y} + \ldots}{m_A + m_B + m_C + \ldots}$$

$$M\vec{v}_{cm} = \vec{P} \qquad \sum \vec{F}_{ext} = m\vec{a}_{cm}$$