

Phys 218 – Fall 2016

All Sections

Physics 218 – Exam III

- Short Answer:**
- 1) $\vec{v}_f = 42.1 \hat{i} \text{ m/s}$
 - 2) $I_O = 5mL^2$
 - 3) -0.130 rad/s^2 clockwise
 - 4) $\omega_f = \frac{\frac{v}{R} + \frac{M}{2m}\omega}{1 + \frac{M}{2m}}$

- Problem 1:**
- (a) $a_A = \frac{kd}{M_A}$ to the left, and $a_B = \frac{kd}{M_B}$ to the right
 - (b) $v_B = \sqrt{\frac{kd^2}{M_A(1 + \frac{M_A}{M_B})}}$ and $v_B = \frac{M_A}{M_B} \sqrt{\frac{kd^2}{M_A(1 + \frac{M_A}{M_B})}}$

- Problem 2:**
- (a) $W_{\text{fric}} = -2.26 \times 10^5 \text{ J}$
 - (b) $v_S = 11.8 \text{ m/s}$ and $v_H = 21.0 \text{ m/s}$

- Problem 3:**
- (a) $x_f = \frac{2mg}{k}$
 - (b) $\alpha = \frac{kx_f - mg}{(\frac{1}{2}M + m)R}$
 - (c) $\omega = \frac{g}{R} \sqrt{\frac{m}{k(1 + \frac{M}{2m})}}$

- Problem 4:**
- (a) $\omega_f = 3.33 \text{ rad/s}$
 - (b) $P = 66.7 \text{ W}$
 - (c) $\omega_{f'} = 1.67 \text{ rad/s}$
 - (d) No, $\Delta K = -500 \text{ J}$, so kinetic energy is lost. The collision of the child with the merry-go-round is completely inelastic (they stick together), so kinetic energy cannot be conserved.