**MP3T2 - Repetitive Motion Review Questions [Solutions]**

1. **Ch. 8**
   - \( P_{\text{total}_0} = P_{\text{total}} \)
   - \( P_1 + P_2 = P_{\text{total}} \)
   - \( \Delta V_1 + m_1 \Delta V_2 = (m_1 + m_2) \Delta V_f \)
   - \( \text{ANSWER} \)
   - \( \text{should be negative due to direction} \)
   - \( J_1 = \Delta p_1 = m_1 \Delta V_1 \)
   - \( \text{ANSWER} \)
   - \( J_2 = \Delta p_2 = m_2 \Delta V_2 = F_2 t \)
   - \( \text{ANSWER} \)
   - \( \text{should be equal but opposite} F_2 \) due to Newton's 3rd Law

2. **Ch. 9**
   - \( W_0 = 18 \text{ rad/see} \)
   - \( \alpha = 0 \text{ rad/see} \)
   - \( V = 0.5 \text{ m} \)
   - \( \text{ANSWER} \)
   - \( \text{should be negative because blob slows down} \)
   - \( \frac{\alpha}{V} = \frac{\alpha}{V} \)
   - \( \text{ANSWER} \)
   - \( \frac{\alpha}{V} = F_c = F_f \)

3. **Ch. 10**
   - \( M_1 = 3 \text{ kg} \)
   - \( M_2 = 0.25 \text{ kg} \)
   - \( d_1 \leq 0.5 \text{ m} \)
   - \( d_2 \leq 0.5 \text{ m} \)
   - \( \text{ANSWER} \)
   - \( \text{ANYTHING GREATER WON'T WORK} \)
   - \( \text{because you are out of material} \)
   - \( \text{since the fulcrum is at the halfway point of the lever stick} \)
   - \( |F_1 \sin \theta_1| = |F_2 \sin \theta_2| \)
   - \( m_1 \, d_1 = m_2 \, d_2 \)
   - \( (0.25) \, d_1 = (3) \, d_2 \)
   - \( \text{ANSWER: Any combination of} \, d_1 \, \& \, d_2 \)
   - \( \text{that satisfies the equations with the red boxes above. Example:} \, d_2 = 0.04 \text{ m} \)
   - \( d_1 = 0.12 \text{ m} \)

\( \Delta \)
As you decrease \( r \), angular momentum \( (l) \) is conserved.

\[ l_{\text{total}} = l_{\text{total}} \]

\[ I_o \omega_o = I_f \omega_f \]

\[ \frac{v^2}{2} \omega_o = \frac{v_f^2}{2} \omega_f \]

\[ \frac{v^2}{2} \omega_o = \left( \frac{1}{2} r_o \right)^2 \omega_f \]

\[ v_o^2 \omega_o = \frac{1}{4} r_o^2 \cdot 4 \omega_o \]

If \( \omega_o = 4 \omega_f \), therefore

\[ \frac{\Delta \omega}{\Delta t} = \frac{\Delta \omega}{\Delta t} \]

\[ F_c = m \frac{v^2}{r} \]

(acceleration is constant, you speed up the same amount each second)