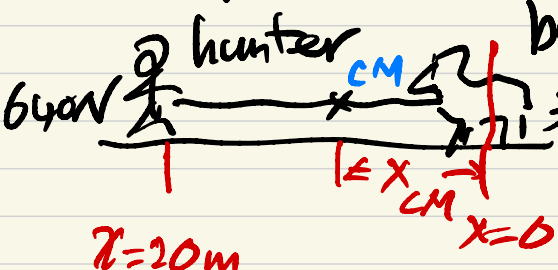


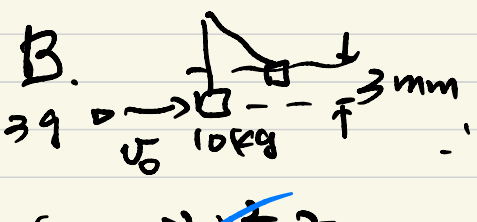
# PD Chap8 Q2 Solution

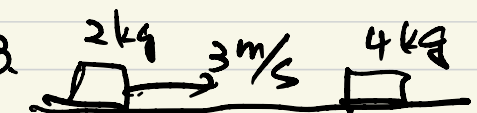
1. B.  bear  $\therefore$  No  $\vec{F}_{ext} \Rightarrow$  CM  $\nabla \vec{v}$   $\Rightarrow$   $x_{CM} = \frac{3200 \times 0 + 6400 \times 20}{3200 + 6400} = 3.4 \text{ m}$

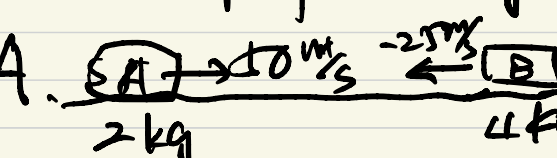
$\therefore$  they meet at CM  $\therefore$  bear moves 3.4 m.

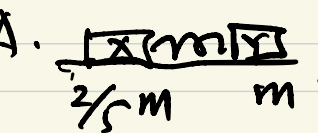
2. A.  $\int F dt = \Delta p = m \Delta v \Rightarrow \frac{4 \times 2}{2} = 5 \text{ kg } \Delta v \Rightarrow \Delta v = \frac{4}{5} = 0.8$

3. C.  $F = 0.71t + 1.2t^2 \Rightarrow \int_0^2 F dt = I = \frac{0.71}{2} t^2 + \frac{1.2}{3} t^3 \Big|_0^2 = 4.6$

4. B.   $P_{bullet} = 3 \times 10^{-3} v_0 = P_{(bullet + wood)}$   
 $\therefore k(bullet + wood) = \frac{P_{bullet}^2}{2(10 \text{ kg} + 0.003 \text{ kg})}$   
 $= \frac{(3 \times 10^{-3})^2 v_0^2}{2 \times 10 \text{ kg}} = mgh = 10 \text{ kg} \times 9.8 \times 3 \times 10^{-3} \text{ m}$   
 $\therefore v_0^2 = \frac{10 \times 9.8 \times 2 \times 10}{3 \times 10^{-3}} = 65.3 \times 10^4$   
 $\therefore v_0 = 808 \text{ m/s}$

5. B.   $\Rightarrow$  P conserved  $\therefore 2 \times 3 = (2+4) v_f \therefore v_f = 1$   
 $\therefore \Delta p \text{ for } 2 \text{ kg} = 2 \times (1-3) = -4 = I \therefore |I| = 4$

6. A.  After:  $v_A = \frac{2-4}{2+4} \times 10 + \frac{2 \times 4}{2+4} (-25) = -10$   
 $\therefore \Delta K_A = \frac{1}{2} \times 2 \times (-10)^2 - \frac{1}{2} \times 2 \times 10^2 = 0$

7. A.   $\therefore P_x = P_y \therefore K_x = \frac{P_x^2}{2 \times \frac{2}{5} \text{ m}} = 50 \text{ J}$   
 for  $K_y = \frac{P_y^2}{2 \text{ m}} = \frac{P_x^2}{2 \text{ m}} = 50 \times \frac{2}{5} = 20$

8. B.  $v_f - v_i = v_0 \ln\left(\frac{m_0}{m}\right) = 1500 \ln(1-0.8) = 2400 \text{ m/s}$   
 fuel = 0.8  $m_0 \therefore$  all burnt out  $\Rightarrow$  remaining 0.2  $m_0$