TEXT PROBLEM SET III MOMENTUM

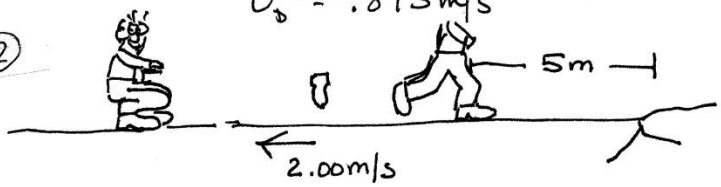
① 

$P_{F+D} = P_D + P_F$

$(m_F + m_D)v_{F+D} = m_D v_D' + m_F v_F'$

$(70kg + 40kg)(0) = (40kg)v_D' + (70kg)(0.5m/s)$

$v_D' = -.875 m/s$

② 

$P = P_s + P_p$

$0 = m_s v_s' + m_p v_p'$

$0 = (.150kg)(-2m/s) + 69.85kg\, v_p'$

$v_p' = .0043 m/s$

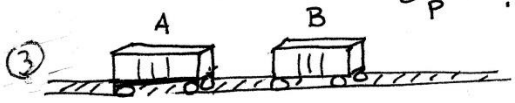
$v = \frac{d}{t}$

$d = vt$

$t = \frac{d}{v} = \frac{5.0m}{.0043m/s}$

1164 sec

$t = 19.4$ MINUTES

③ 

Ⓐ $P_A + P_B = P'_{A+B}$

$m_A v_A + m_B v_B = (m_A + m_B)v_{A+B}'$

$(1)(10km/hr) + 1(0) = (1+1)v_{A+B}'$

$v_{A+B}' = 5km/hr$

Ⓑ $P_A + P_B = P'_{A+B}$

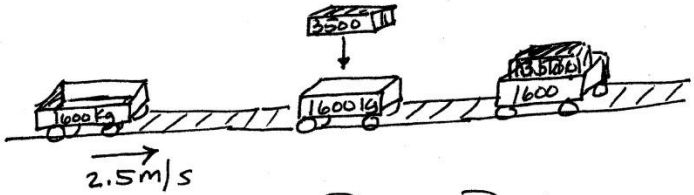
$(1)(20km/h) + (1)(-15km/hr) = (2)v_{A+B}'$

$v_{A+B}' = 2.5 m/s$

Ⓒ $P_A + P_B = P'_{A+B}$

$(1)(20km/h) + (1)(15km/h) = (2)v_{A+B}'$

$v_{A+B}' = 17.5 m/s$

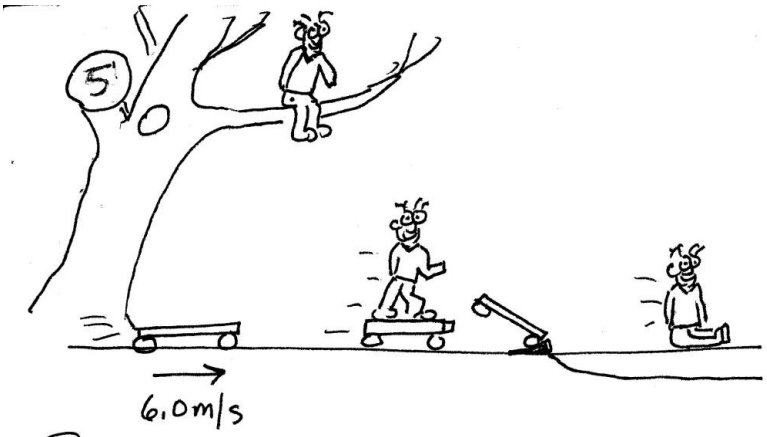
④ 

$P_A + P_B = P_{A+B}'$

$m_A v_A + m_B v_B = (m_A + m_B)v_{A+B}'$

$(1600kg)(2.5m/s) + 3500(0) = (1600kg + 3500kg)v_{A+B}'$

$v_{A+B}' = 0.78 m/s$



(A) $P_{sm} + P_m = P_{sm+m}$

$m_{sm}v_{sm} + m_m v_m = (m_{sm}+m_m)v'_{sm+m}$

$(75kg)(0) + (50kg)(6.0m/s) + (75kg+50kg)(v'_{sm+m})$

$v'_{sm+m} = 2.4 m/s$

(B) IF $f=0$

$\Sigma F = 0 \quad \therefore a = 0$

NO CHANGE IN HIS VELOCITY.

$v_{MAN} = 2.4 m/s$

MOMENTUM of SLED IMPARTS IMPULSE ON MAN