A. $m_1 v_1 + m_2 \cancel{v_2}^{0} = m_1 \cancel{v_3}^{0} + m_2 v_f$

$m_1 v_1 = m_2 v_f$

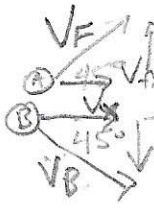
$v_f = \frac{m_1 v_1}{m_2} = \frac{(.450\,kg)(3.00\,m/s)}{.900\,kg} = \boxed{1.50\,m/s}$

B. $m_1 \cancel{v_1}^{0} + m_2 v_2 = (m_1 + m_2) v_3$

$m_2 v_2 = (m_1 + m_2) v_3$

$v_3 = \frac{m_2 v_2}{(m_1 + m_2)} = \frac{(3.0\,kg)(4.2\,kg)}{(61 + 3.0\,kg)} = \boxed{0.20\,m/s}$

C.



$m_A V_1 + m_B 0 = m_A V_{xA} + m_B V_{xB}$

$-m_A V_{xA} = m_B V_{xB}$

$m_A = m_B$

$m_A V_1 = 2 m_A V_x$

$-V_{A1} = V_{BF}$

$\frac{V_1}{2} = V_x$

$V_x = \frac{4.8\,m/s}{2} = 2.4\,m/s$

$V_F = \frac{V_x}{\cos\theta}$

$V_F = \frac{2.4\,m/s}{\cos 45} = \boxed{3.4\,m/s\ NE\ 45°}$

D. $Power = \frac{Work}{t}$

$Work = \Delta E$

$P = \frac{mgh}{t_a} = \frac{(4.8\,kg)(9.81\,m/s^2)(9.2\,m)}{\sqrt{\frac{2(9.2\,m)}{9.81\,m/s^2}}}$

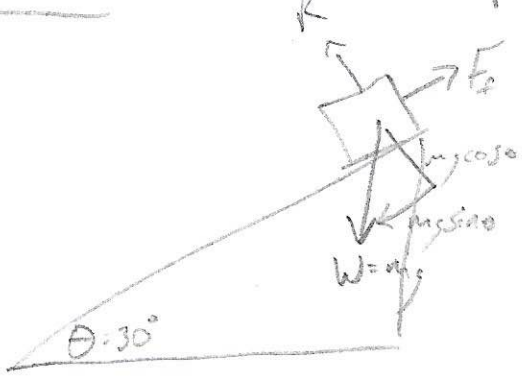
or

$h = vt + \frac{1}{2} g t^2$ or

$\sqrt{\frac{2h}{g}} = t$

$\boxed{P = 316\,W}$

E.



$F_{net} = 0 = mg\sin\theta - F_f$

$F_f = mg\sin\theta$

$W_{all} = F_f \cdot s$

$W = mg\sin\theta\, s$

$W = 45\,kg\,(9.81\,m/s^2)(\sin 30)(11\,m$

$W = 2427.975$

$\boxed{W = 2000\,J}$