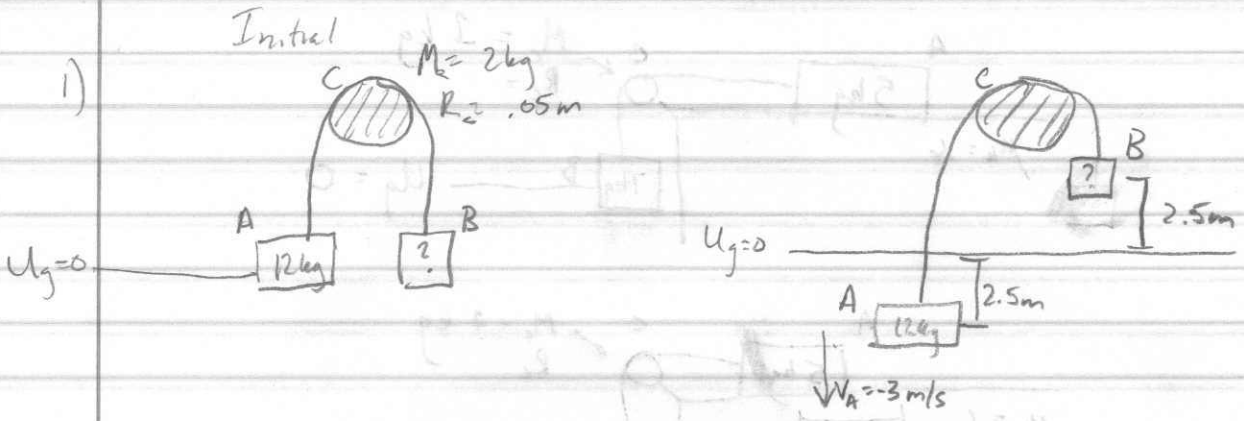
Solutions

1)



As before, both blocks have gained kinetic energy, while one has gained potential and the other lost it. However the pulley has also gained rotational kinetic energy.

$$W_{OTHER}^{\emptyset} = \Delta K + \Delta U_g + \Delta U_{ela}^{\emptyset}$$

$$0 = \frac{1}{2} m_A v_{Af}^2 + \frac{1}{2} m_B v_{Bf}^2 + \frac{1}{2} I_c \omega_c^2 - 0 + (m_B - m_A) g h - 0$$

$$I_c = \frac{1}{2} M_c R_c^2, \quad v_{Af} = v_{Bf} = \omega_c R_c$$

$$0 = \frac{1}{2} m_A v_{Af}^2 + \frac{1}{2} m_B v_{Af}^2 + \frac{1}{4} M_c R_c^2 \frac{v_{Af}^2}{R_c^2} + m_B g h - m_A g h$$

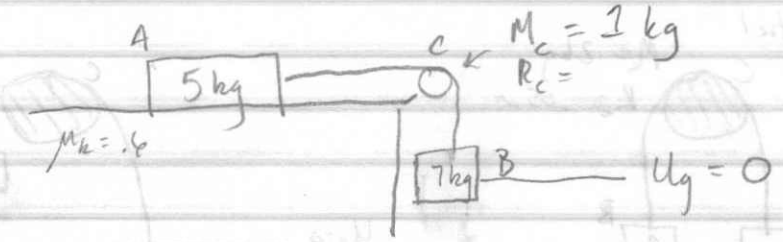
$$m_A g h - \frac{1}{2} m_A v_{Af}^2 - \frac{1}{4} M_c v_{Af}^2 = \frac{1}{2} m_B v_{Af}^2 + m_B g h$$

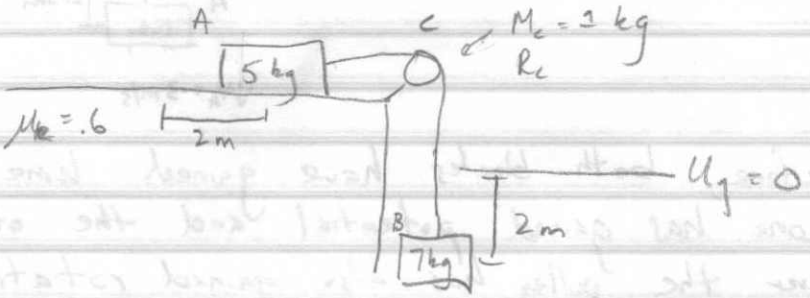
$$m_B = \frac{m_A g h - \frac{1}{2} m_A v_{Af}^2 - \frac{1}{4} M_c v_{Af}^2}{\frac{1}{2} v_{Af}^2 + g h}$$

$$m_B = 8.12\ kg$$

Solutions

2)





$$W_{OTHER} = \Delta K + \Delta U_g + \Delta U_{ela}^{\nearrow \emptyset}$$

$$-\mu_k m_A g h = \tfrac{1}{2} M_A V_{Af}^2 + \tfrac{1}{2} m_B V_{Bf}^2 + \tfrac{1}{2} I_c \omega_{cf}^2 - \emptyset - m_B g h - \emptyset$$

$$I_c = M_c R_c^2 \qquad V_{Af} = V_{Bf} = \omega_{cf} R_c$$

$$-\mu_k m_A g h = \tfrac{1}{2} m_A V_{Bf}^2 + \tfrac{1}{2} m_B V_{Bf}^2 + \tfrac{1}{2} M_c R_c^2 \left(\frac{V_{Bf}}{R_c}\right)^2 - m_B g h$$

$$2(m_B g h - \mu_k m_A g h) = m_A V_{Bf}^2 + m_B V_{Bf}^2 + M_c V_{Bf}^2$$

$$V_{Bf} = \sqrt{\frac{2(m_B g h - \mu_k m_A g h)}{(m_A + m_B + M_c)}}$$

$$V_{Bf} = 3.47 \text{ m/s}$$