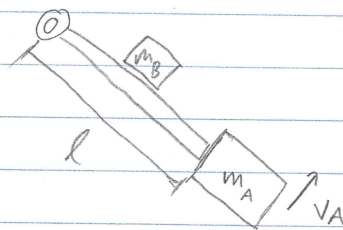


20-P-MOM-DY-29

A $m = 1 \text{ kg}$ block is attached to the end of a $l = 1.5$ rigid rod with negligible mass. The other end of the rod is connected to a pivot which allows the rod to rotate in the horizontal plane. If the mass is traveling at the velocity $v = 2 \text{ m/s}$ before the rod has a completely inelastic collision with a 0.5 kg mass at the middle of the rod, determine the velocity of the block after the collision.



Solution: $H_1 + \int_{t_1}^{t_2} M dt = H_2$

$$r_B m_B v_B + r_A m_A v_A + 0 = r_A m_A v_{A2} + r_B m_B v_{B2}$$

$$v_{A2} = \omega_2 r_A$$

$$v_{B2} = \omega_2 r_B$$

$$r_A m_A v_A = r_A m_A \omega_2 r_A + r_B m_B \omega_2 r_B = \omega_2 (r_A^2 m_A + r_B^2 m_B)$$

$$\omega_2 = \frac{r_A m_A v_A}{(r_A^2 m_A + r_B^2 m_B)} = 1.185$$

$$v_{A2} = \omega_2 r_A = 1.77 \text{ m/s}$$