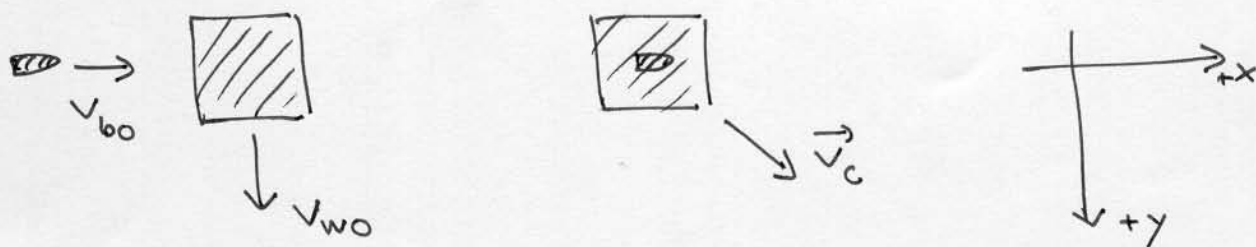


Problem 2



sys = bullet + block

During collision neglect gravity

$\Rightarrow$ momentum approximately conserved

$$p_{ix} = p_{fx} \Rightarrow m_b v_{b0} = (m_b + m_w) v_{cx}$$

$$v_{cx} = \frac{m_b}{m_b + m_w} v_{b0} = 4.28 \text{ m/s}$$

$$p_{iy} = p_{fy} \Rightarrow m_w v_{w0} = (m_b + m_w) v_{cy}$$

$$v_{cy} = \frac{m_w}{m_b + m_w} v_{w0} = 11.9 \text{ m/s}$$

Falls to ground:
Conservative forces only $\Rightarrow$

$$E_i = E_f$$

$$(\cancel{m_b + m_w}) gh + \frac{1}{2} (\cancel{m_b + m_w}) (v_{cx}^2 + v_{cy}^2)$$

$$= \frac{1}{2} (\cancel{m_b + m_w})^2 v_f^2$$

$$v_f^2 = 2gh + v_{cx}^2 + v_{cy}^2 \Rightarrow v_f = 13.9 \text{ m/s}$$