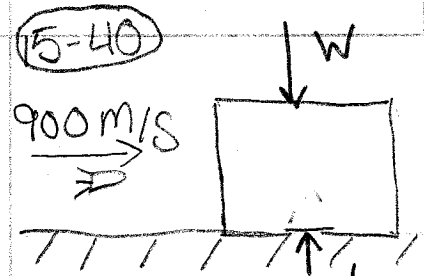
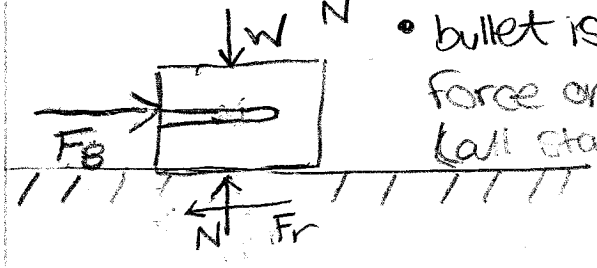
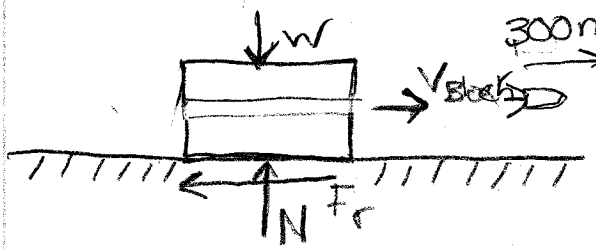
15-40



- bullet initially fired only weight and normal force acts on block



- bullet is inside the block creating a force force on it. Now 4 forces act on box. (all stated)



- bullet leaves the box with reduced velocity. Box has gained some velocity in same direction due to the impulsive force.

Assume: conservation of momentum and friction between the box and bullet negligable. loss of block mass negligable

Given: $\mu_K = 0.2$ between floor and block

$m_{block} = 15kg$ $m_{bullet} = .2kg$ $V_{i\,bullet} = 900 m/s$

$V_{f\,bullet} = 300 m/s$

Find: How long does the block slide

$$(V_i m_{bullet}) = V_f m_{bullet} + V_{block} m_{block}$$

$$(900 m/s)(0.2kg) = (300 m/s)(0.2kg) + (V_{block})(15kg)$$

$$V_{block} = 8 m/s$$

$$\int_{t_1}^{t_2} \Sigma F dt = mdv$$

$$\Sigma F_{block} = F_B - F_r$$

$$F_r = N_{block} \mu_K \qquad F_r = 29.43N$$

$$N_{block} = 15kg(9.81 m/s) \qquad N_{block} = 147.15N$$