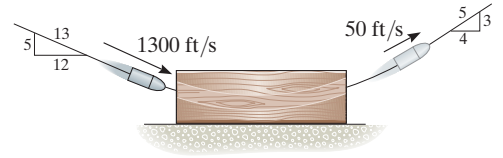


15-42.

A 0.03-lb bullet traveling at 1300 ft/s strikes the 10-lb wooden block and exits the other side at 50 ft/s as shown. Determine the speed of the block just after the bullet exits the block. Also, determine the average normal force on the block if the bullet passes through it in 1 ms, and the time the block slides before it stops. The coefficient of kinetic friction between the block and the surface is $\mu_k = 0.5$.



SOLUTION

$$(\rightarrow) \quad \Sigma m_1 v_1 = \Sigma m_2 v_2$$

$$\left(\frac{0.03}{32.2}\right)(1300)\left(\frac{12}{13}\right) + 0 = \left(\frac{10}{32.2}\right)v_B + \left(\frac{0.03}{32.2}\right)(50)\left(\frac{4}{5}\right)$$

$$v_B = 3.48 \text{ ft/s}$$

Ans.

$$(+\uparrow) \quad mv_1 + \Sigma \int F dt = mv_2$$

$$-\left(\frac{0.03}{32.2}\right)(1300)\left(\frac{5}{13}\right) - 10(1)(10^{-3}) + N(1)(10^{-3}) = \left(\frac{0.03}{32.2}\right)(50)\left(\frac{3}{5}\right)$$

$$N = 504 \text{ lb}$$

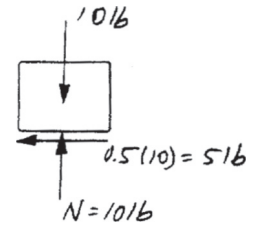
Ans.

$$(\rightarrow) \quad mv_1 + \Sigma \int F dt = mv_2$$

$$\left(\frac{10}{32.2}\right)(3.48) - 5(t) = 0$$

$$t = 0.216 \text{ s}$$

Ans.



Ans:

$$v_B = 3.48 \text{ ft/s}$$

$$N_{\text{avg}} = 504 \text{ lb}$$

$$t = 0.216 \text{ s}$$