

A 38g bullet is traveling at 428m/s when it strikes a block of wood. If the block of wood exerts a force of 50,000 N opposing the motion of the bullet, how far will the bullet penetrate the block of wood?

Solution.

$$m = 38g = 0.038kg, 428 \frac{m}{s}, F = 50000N;$$

$$l = ?$$

Work of the force opposing the motion of the bullet the block of wood exerts is equal change of the kinetic energy of the bullet:

$$A = -\Delta E_k.$$

$$A = Fl.$$

$$\Delta E_k = E_2 - E_1 = \frac{mv_2^2}{2} - \frac{mv_1^2}{2}.$$

$$v_2 = 0.$$

$$\Delta E_k = -\frac{mv_1^2}{2}.$$

$$A = \frac{mv_1^2}{2};$$

$$Fl = \frac{mv_1^2}{2};$$

$$l = \frac{mv_1^2}{2F}.$$

$$l = \frac{0.038 \cdot 428^2}{2 \cdot 50000} = 0.069(m).$$

Answer: $l = 0.069m$.