A bullet of mass 0.04kg moving with a speed of 90meters per second square enters a heavy wooden block and is stopped after a distance of 60 cm. what is the average resistive force exerted by the block on the bullet?

Solution:

$V = 90\frac{m}{sec}, m = 0.04\ kg, L = 0.6m$

Kinetic energy of the bullet at the beginning and end of the movement:

$$E_1 = \frac{mV^2}{2}$$

$$E_2 = \frac{mV_2^2}{2} = 0(bullet\ stopped, velocity\ is\ zero, then\ the\ kinetic\ energy\ is\ also\ zero)$$

The theorem on the change of kinetic energy: change of kinetic energy of the system is the work of all internal and external forces acting on the body system.

$$E_2 - E_1 = A\ (1)$$

The only force that acts on the bullet - the resistance force of wooden block:

$$A = \overrightarrow{F_{res}} * \vec{s} = -F_{res}L\ (2)$$

$$(minus\ sign\ because\ direction\ of\ the\ force\ against\ the\ motion\ bullet)$$

$$(2) in\ (1): 0 - \frac{mV^2}{2} = -F_{res}L$$

$$\frac{mV^2}{2} = F_{res}L$$

$$F_{res} = \frac{mV^2}{2L} = \frac{0.04\ kg * (90\frac{m}{sec})^2}{2 * 0.6m} = 270N$$

Answer: $F = 270N$