Answer on Question#57174 - Physics - Classical Mechanics

A bullet fired from a rifle loses 20% of its speed while passing through a wooden plank. Then minimum number of wooden planks required to completely stop the bullet is?

Solution:

Initial kinetic energy of the bullet:

$$E_k^i = \frac{mv^2}{2}$$

It's given that the speed of the bullet after passing through the plank is $v_f = 0.8v$, thus the loss of kinetic energy is

$$\Delta E_k = \frac{mv^2}{2} - \frac{mv_f^2}{2} = \frac{mv^2}{2} - \frac{m(0.8v)^2}{2} = 0.36\frac{mv^2}{2} = 0.36E_k^i$$

Passing each plank bullet will lose the same amount of kinetic energy ΔE_k. To stop the bullet we need 3 planks, since $3\Delta E_k = 1.08E_k^i > E_k^i$.

Answer: 3.