

A 250g bullet moving at 330m/s hits and travels through a 1.2 kg block of wood, 0.30 m long. If the bullet's speed upon leaving the block is 120 m/s, find...

- a) the impulse applied to the block
- b) the impulse applied to the bullet
- c) the time the bullet spent in the wood
- d) the force applied to the bullet

Solution:

a) the impulse applied to the block= $MV = m(V_f - V_i) = 0.25 \times (330 - 120) = 52,5 \frac{kg \cdot m}{s}$

b) the impulse applied to the bullet= $m(V_f - V_i) = 0.25 \times (330 - 120) = 52,5 \frac{kg \cdot m}{s}$

d) the force applied to the bullet

$$Fl = \frac{mV_f^2}{2} - \frac{mV_i^2}{2} = 0.25 \times 0.5 \times (330^2 - 120^2) = 11812,5 J \gg F = 39375 N$$

c) the time period the bullet spent in the wood

$$Ft = m(V_f - V_i) = 0.25 \times (330 - 120) = 52,5 \frac{kg \cdot m}{s} \gg t = 0,00133 s \approx 1 ms$$