

Answer on Question#69875 –Physics– Mechanics – Relativity

A 100g mass moving with velocity of 20m/s strikes a wall and is brought to rest in 0.15s. Find the impulse due to the force exerted on body by the wall. Calculate the average stopping force on the body.

Solution. According to the condition of the problem $m = 0.1\text{kg}$ – mass body; $v_i = 20\frac{\text{m}}{\text{s}}$ – the initial velocity of the body; $v_f = 0\frac{\text{m}}{\text{s}}$ – the final velocity of the body; $\Delta t = 0.15\text{s}$ – the interaction time. Considering the body wall as a closed system use the law of conservation of momentum as

$$m\Delta v = F\Delta t$$

(using the scalar form), where F – the average stopping force on the body. Therefore impulse due to the force exerted on body by the wall

$$F\Delta t = 0.1 \cdot |0 - 20| = 2\text{kg}\frac{\text{m}}{\text{s}}$$

and average stopping force on the body

$$F = \frac{m\Delta v}{\Delta t} = \frac{2}{0.15} = \frac{40}{3}\text{N}$$

Answer. $2\text{kg}\frac{\text{m}}{\text{s}}$; $\frac{40}{3}\text{N}$.

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