

4. A cricket ball of mass 150 g moving with a speed of 126 km/h hits at the middle of the bat, held firmly at its position by the batsman. The ball moves straight back to the bowler after hitting the bat. Assuming that collision between ball and bat is completely elastic and the two remain in contact for 0.001s, the force that the batsman had to apply to hold the bat firmly at its place would be

- 1) 10.5 N
- 2) 2.1×10^4 N
- 3) 1.05×10^4 N
- 4) 21 N

Sol. 3) 1.05×10^4 N

Here, We havw given that

mass = 150 g = 0.15 kg

time = 0.001 s

speed (v) = 126 km /h = 35 m /s

Force = $\frac{\text{change in momentum}}{\text{time}}$

$$= \frac{mv - (-mv)}{t} = \frac{2mv}{t}$$

$$= \frac{2(0.15\text{kg})(35\text{m/s})}{0.001\text{s}}$$

$$= 10500 \text{ N} = 1.05 \times 10^4 \text{ N}$$