Kinematics
Motion & Force

4.3:- A bullet of mass 50 g travelling with a speed of 15 ms-1 penetrates into a bag of sand and is uniformly brought to rest in 0.05 secs.
Find (a) How far the bullet will penetrate into the bag of sand?
(b) The average force exerted by the sand?

DATA:-

Mass = 50 g $\Rightarrow$ $\dfrac{50}{1000}$ $\Rightarrow$ 0.05 kg

Initial Velocity = 15 ms-1
Final Velocity = 0 ms-1
Time Taken = 0.05 secs
Acceleration = ?
Force = ?

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SOLUTION:-

(a) for acceleration:-

$v_f = v_i + at$

$a = \dfrac{v_f - v_i}{t}$

$a = \dfrac{0 - (15)}{0.05}$

$a = \dfrac{-15}{0.05} \Rightarrow -300$ (Deceleration)

(b) for Force:-

$F = ma$

$F = 0.05 \times (-300)$

$F = -15 \ N$