Answer on Question #66195, Physics / Mechanics | Relativity

A bullet of mass 20 g, travelling at a speed of 350 m/s, strikes a steel plate at an angle of 30 degree with the plane of plate. it ricochets off at the same angle, at a speed of 320 m/s. What is the magnitude of the impulse that the steel plate gives to the projectile ?If the collision with the plate takes place over a time delta t=10^3 s, what is the average force exerted by the plate on the bullet?

Find: Δp – ? ΔF – ?

Given:

$m=20\times10^{-3}$ kg

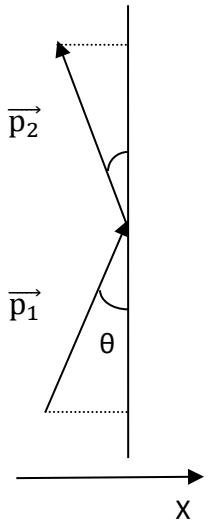
$\theta=30°$

$v=350$ m/s

$u=320$ m/s

$\Delta t=10^{-3}$ s

Solution:



Magnitude of the impulse Δp:

$\Delta p = p_1 + p_2$ (1)

Magnitude of the impulse p_1:

$p_1 = mv\sin\theta$ (2)

Magnitude of the impulse p_2:

$p_2 = mu\sin\theta$ (3)

(2) and (3) in (1):

$\Delta p = m\sin\theta(v+u)$ (4)

Of (4) $\Rightarrow$ $\Delta p=6.7$ kg×m/s

Average force:

$\Delta F = \frac{\Delta p}{\Delta t}$ (5)

Of (5) $\Rightarrow$ ΔF=6700 N

Answer:

6.7 kg×m/s

6700 N