Answer on Question 51942, Physics, Other

Question:

A gun of mass M is used to fire a bullet of mass m. The exit velocity of the bullet is v. Find the recoil velocity of the gun:

a) Mv/m

b) mv/M

c) $-Mv/m$

d) $-mv/M$

Solution:

Since, the total initial momentum of the gun and the bullet is zero (both are initially at rest), we applying the law of conservation of momentum obtain:

$$p_{total\,(initial)} = p_{total\,(final)},$$

$$p_{total\,(initial)} = 0,$$

$$Mv_{recoil} + mv = 0,$$

$$Mv_{recoil} = -mv,$$

$$v_{recoil} = -\frac{mv}{M}.$$

The sign minus indicate, that the recoil velocity of the gun directed in the opposite direction to the velocity of the bullet.

Answer:

d) $-mv/M$.