

Answer on Question #40895, Physics, Mechanics

IN A FREE SPACE, A RIFLE OF MASS M SHOOTS A BULLET OF MASS m AT A STATIONARY MASS M DISTANCE D AWAY FROM IT. WHEN THE BULLET HAS MOVED THROUGH A DISTANCE d TOWARDS THE BLOCK, THE CENTRE OF MASS OF BLOCK - BULLET SYSTEM IS AT A DISTANCE OF?

Solution

If x is distance moved by rifle when bullet has traveled through a distance d , then –

$$Mx = md \rightarrow x = \frac{md}{M}.$$

So, distance of bullet from block is $D - d$ and distance between block and rifle is $D + x$.

Distance of center of mass from block is

$$r = \frac{M \cdot 0 + m(D - d)}{m + M} = \frac{m(D - d)}{m + M}.$$

Answer: $\frac{m(D-d)}{m+M}$ from the block.