

STEP II, 2016, Q9

- 9 A small bullet of mass m is fired into a block of wood of mass M which is at rest. The speed of the bullet on entering the block is u . Its trajectory within the block is a horizontal straight line and the resistance to the bullet's motion is R , which is constant.
- (i) The block is fixed. The bullet travels a distance a inside the block before coming to rest. Find an expression for a in terms of m , u and R .
- (ii) Instead, the block is free to move on a smooth horizontal table. The bullet travels a distance b inside the block before coming to rest relative to the block, at which time the block has moved a distance c on the table. Find expressions for b and c in terms of M , m and a .



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