

Physics 101 Rec  
Quiz # 7c & 8c

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Key

Id:

Section:

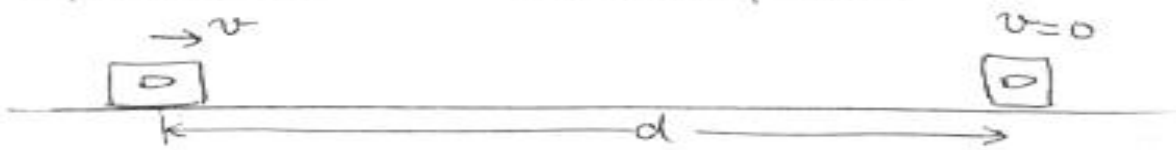
Chapter 10

A 10.0 g bullet is fired horizontally into a 5.0 kg wooden block resting on a horizontal surface. The bullet remains embedded into the block which is observed to slide along the rough surface a distance of 25 cm and stops. If the coefficient of kinetic friction between the block and the surface is 0.40, calculate

a) The velocity of the block+bullet after the collision

after collision

$m$ : mass of bullet  
 $M$ : mass of block



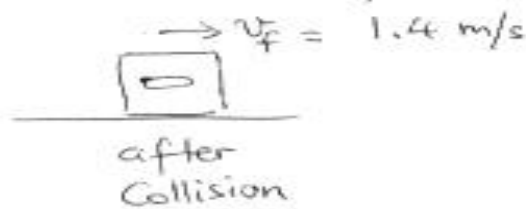
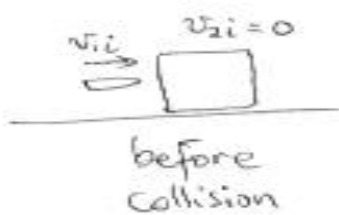
$$\Delta K + \Delta U_g = -f_k d = -\mu_k (m+M) g d$$

$$\left[ 0 - \frac{1}{2} (m+M) v^2 \right] = -\mu_k (m+M) g d$$

$$v = \sqrt{2\mu_k g d} = 1.4 \text{ m/s}$$

This is the velocity of the block+bullet after collision

b) The initial velocity of the bullet (before collision with the block).



Conservation of linear momentum

$$m v_{ii} + 0 = (M+m) v_f$$

$$v_{ii} = \frac{M+m}{m} v_f = \boxed{701.4 \text{ m/s}}$$

velocity of the bullet before collision