

# NCERT/CBSE PHYSICS CLASS 11 textbook

<http://www.TutorBreeze.com>

Answers to NCERT/CBSE PHYSICS Class 11(Class XI)textbook Exercise and Additional exercise

CHAPTER SIX WORK, ENERGY AND POWER

## EXERCISES

(For simplicity in numerical calculations, take  $g = 10 \text{ m s}^{-2}$ )

6.24 A bullet of mass  $0.012 \text{ kg}$  and horizontal speed  $70 \text{ m s}^{-1}$  strikes a block of wood of mass  $0.4 \text{ kg}$  and instantly comes to rest with respect to the block. The block is suspended from the ceiling by means of thin wires. Calculate the height to which the block rises. Also, estimate the amount of heat produced in the block.

6.24

Solution:

Initial speed of bullet,  $u = 70 \text{ ms}^{-1}$

Let the final speed of block and bullet which move together =  $V \text{ ms}^{-1}$

According to law of conservation of momentum,

$$mu = (m+M)V$$

$$V = \frac{mu}{(M+m)} = \frac{0.012 \times 70}{0.412} = 2.04 \text{ ms}^{-1}$$

Let block rises to a height  $h$  after collision.

Now,

Loss in K.E. of block and bullet = Gain in P.E. after collision.

$$\frac{1}{2}(m+M)V^2 = (m+M)gh$$

$$\Rightarrow h = \frac{V^2}{2g} = \frac{(2.04)^2}{2 \times 9.8} = 0.212 \text{ m}$$

Heat produced in the block = loss of K.E. = K.E. of bullet - K.E. of block and bullet

$$\begin{aligned} &= \frac{1}{2}mu^2 - \frac{1}{2}(m+M)V^2 \\ &= \frac{1}{2}(0.012)(70)^2 - \frac{1}{2}(0.412)(2.04)^2 = 28.543 \text{ J} \end{aligned}$$

©TutorBreeze.com

Please do not copy the answer given here

[Write to us for help in understanding the solution](#)