



STEPPING STONE
SCHOOL (HIGH)

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Class : 10

Sub : Physics

Chapter : Work ,Energy and Power (Part5)

Date : 03.06.2020

Day : 8

Worksheet : 8

Topic : Different forms of Energy (Numericals)

Please read the notes carefully and on the basis of it copy down the questions and solve them on a clean sheet of paper arranged data wise and keep the worksheet ready in a file to be submitted on the opening day.

Solved Numericals

Problem : 1

A truck weighing $5 \times 10^3 \text{kgf}$ and a cart weighing 500kgf are moving with the same speed. Compare their kinetic energies.

Sol:

Mass of truck $m_1 = 5 \times 10^3 \text{kgf}$

Mass of cart $m_2 = 500 \text{kgf}$

Since speeds are same, kinetic energy is directly proportional to the mass.

$$k_1/k_2 = m_1/m_2$$

$$= (5 \times 10^3) / 500 = 10/1$$

Therefore, $k_1:k_2 = 10:1$

Problem:2

A bullet of mass 5g travels with a speed of 500m/s. If it penetrates a fixed target which offers a constant resistive force of 100N to the motion of the bullet, find i) The initial kinetic energy of the bullet

ii) The distance through which the bullet has penetrated before coming to rest, and

iii) The speed with which the bullet emerges out of the target if the target is of thickness 0.5m

Sol: i) Kinetic Energy of the bullet $= \frac{1}{2}mv^2$

$$= \frac{1}{2} \times 5 \times 10^{-3} \times 500^2$$

$$= 625\text{J}$$

ii) Let the bullet penetrates through a distance S in the target.

Workdone by the bullet against the material of the target

$$= \text{Resistive force} \times \text{distance}$$

$$= 1000 \times S\text{J}$$

This work is obtained from the initial kinetic energy of the bullet

$$1000S = 625$$

$$\text{Or } S = 625/1000 = 0.625\text{m}$$

Hence, the distance penetrated by the bullet is = 0.625m

Exercise:

- 1) A box of 150kgf has gravitational potential energy stored in it =14700J. Find the height of the box above the ground.
- 2) A boy weighing 25kgf climbs up from the first floor at a height of 3m above the ground to the third floor at a height of 9m above the ground. What will be the increase in his gravitational potential energy? [g=10N/kg]
- 3) Two bodies of equal masses are moving with uniform velocities v and $2v$. Find the ratio of their kinetic energy.
- 4) A man of mass 50kg climbs up a ladder of height 10m. Calculate
 - i) The work done by the man.
 - ii) The increase in his potential energy. [$g = 9.8\text{ms}^{-2}$]
- 5) Two bodies have masses in the ratio 5:1 and Kinetic Energies in the ratio 125:9. Calculate the ratio of their velocities.
- 6) A bullet of mass 50g is moving with a velocity of 500ms^{-1} . It penetrates 100m into a still target and comes to rest.
Calculate
 - i) The Kinetic energy possessed by the bullet.
 - ii) The average retarding force offered by the target.
- 7) A cannon ball of mass 500g is fired with a speed of 15m/s. Find
 - i) It's kinetic energy.
 - ii) The momentum.

