



**INDIAN SCHOOL MUSCAT**  
**SENIOR SECTION**  
**DEPARTMENT OF PHYSICS**  
**CLASS XI**  
**WORK , ENERGY AND POWER**  
**WORKSHEET - 4**

---

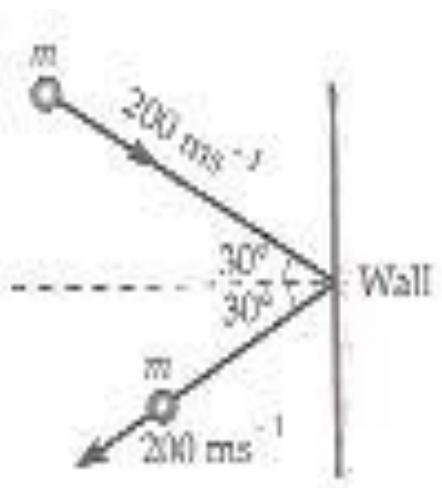
**SECTION – A CONCEPTUAL AND APPLICATION TYPE QUESTIONS**

1. A body is moving at constant speed over a frictionless horizontal surface . What is the work done by gravitational force ? 1
2. Does the work done in raising a suitcase on to a platform depend upon how fast it is raised up ? 1
3. Is it possible that a body be in accelerated motion under a force acting on the body , yet no work is being done by the force ? Explain with an example. 1
4. A light body and a heavy body have same kinetic energy . Which one has greater linear momentum ? 1
5. How does KE of a body change if its momentum is doubled ? 1
6. Is work done by a non conservative force always negative ? Comment . 1
7. Can a body have momentum without energy ? 1
8. What happens to the potential energy :
  - a) Two dissimilar charges are brought near each other
  - b) A body is taken away against the gravitational force .2
9. Two coolies lift same load from the road to the roof of a bus . One of them takes 1 minute and the other takes 2 minutes to do the same job . who has done more work and whose power is more ? 1
10. Name the process in which
  - (i) Momentum is conserved but KE is not conserved ?
  - (ii) Momentum changes but KE does not change ?2
11. Difference between conservative and non – conservative forces. 1
12. Show that power is equal to dot product of force and velocity . 1
13. What are head – on and oblique collisions ? 1
14. Is total energy conserved in an inelastic collision ? 1
15. Why does a pilot looping a vertical loop not fall down even at the highest point ? 1

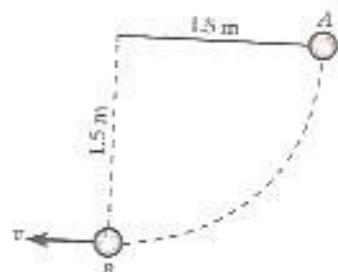
## SECTION – B      NUMERICAL PROBLEMS

1. In a ballistics demonstration a police officer fires a bullet of mass 50 g with speed 200 m/s through a soft plywood of thickness 2 cm . The bullet emerges with only 10 % of its KE . What is the emergent speed of the bullet ? 2
2. A bullet of mass 50 g moving with velocity of 400 m/s strikes a wall and goes out from the other side with a velocity of 100 m/s . Calculate the work done in passing through the wall ? 2
3. The momentum of a body is increased by 100 % .What is the percentage increase in its KE ? 2
4. A train of mass 2000 quintal is drawn up an inclined plane of 2 in 100 at the rate of 72 km/h .If the resistance due to friction is 3000 N , calculate the power of the engine . 2
5. A ball is dropped from rest at a height of 12 m . If it loses 25 % of KE on striking the ground , what is the height to which it bounces ? 2
6. A mass of 2 kg attached to a spring is vibrated horizontally by displacing the mass 40 cm from its equilibrium position and releasing it . Find the maximum velocity of the mass . Spring constant is 24.5 N/m 2
7. A pump on the ground floor of a building can pump up water to fill a tank of volume  $30\text{m}^3$  in 15 min . If the tank is 40 m above the ground , the efficiency of the pump is 30 % ,how much electric power is consumed by the pump ? 2
8. A bullet of mass 0.012 kg and horizontal speed 70 m/s strikes a block of wood of mass 0.41 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. 2
9. A metal ball of mass 2 kg moving with speed of 36 km/h has a head on collision with a stationary ball of mass 3 kg . If after collision both the balls move as a single mass , what will be the loss in kinetic energy due to collision ? 2
10. If the kinetic energy of a body increases by 300 % , by what percent will the linear momentum of the body increase ? 2
11. A mass of 4 kg moving with 10 m/s comes to rest , after covering 2m on a horizontal surface . Calculate 3  
(i) coefficient of kinetic friction between surfaces  
(ii) workdone by frictional force  
(iii) workdone by gravitational force.
12. A body of mass 2 kg is resting on a rough horizontal surface . A force of 20 N is now applied to it for 10 seconds , parallel to the surface . If the coefficient of kinetic friction between the surfaces in contact is 0.2 s , calculate 2

- (i) work done by the applied force in 10 s
- (ii) change in kinetic energy of the object in 10 s
13. A girl of mass 50 kg sits in a swing formed by a rope of 8m length. A person pulls the swing to a side so that the rope makes an angle of  $60^{\circ}$  with the vertical . What is the gain in potential energy of the girl ? 2
14. A car of mass 1000 kg accelerates uniformly from rest to a velocity of 54 km/hr in 5 seconds. Calculate 3
- (i) its acceleration
  - (ii) its gain in KE
  - (iii) average power of the engine during this period , neglect friction.
15. A molecule in a gas container hits a horizontal wall with speed 200 m/s and angle  $30^{\circ}$  with the normal , and rebounds with the same speed . 2
- (i) Is momentum conserved in the collision?



- (ii) Is the collision elastic or inelastic ?
16. 2



The bob of a pendulum is released from a horizontal position A as shown . If the length of the pendulum is 1.5 m , what is the speed with which the bob arrives at the lowermost point B , given that it dissipates 5 % of its initial energy against air resistance ?