# PHYSICS

1. A stationary particle explodes into two pieces of masses m_1 and m_2 which move in opposite directions with velocities v_1 and v_2. The ratio of their kinetic energies E_1/E_2 is :

   (a) 1   (b) m_1/m_2

   (c) m_2/m_1 (d) $m_1 v_2/m_2 v_1$

2. A block of mass M is attached to the lower end of a vertical spring. The spring is hung from a ceiling and has force constant value k. The mass is released from rest with the spring initially unstretched. The maximum extension produced in the length of the spring will be :

   (a) $2\,Mg/k$ (b) $4\,Mg/k$

   (c) $Mg/2k$ (d) Mg/k

3. A force F acting on the object varies with distance x as shown here. The force is in N and x in m. The work done by the force in moving the object from x = 0 to $x = 6\,m$ is :

   (a) 18.0 J   (b) 13.5 J

   (c) 9.0 J   (d) 4.5 J
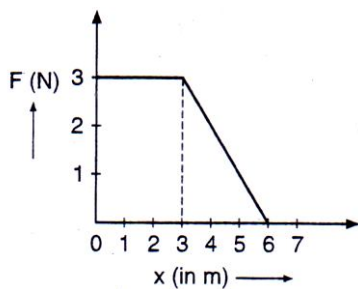
4. A ball of mass m moving with velocity v strikes the bob of a pendulum at rest. The mass of the bob is also m. If the collision is perfectly inelastic, the height to which the bob will rise is given by :

   (a) $\dfrac{v^2}{8g}$ (b) $\dfrac{v^2}{4g}$

   (c) $\dfrac{v^2}{2g}$ (d) $\dfrac{v^2}{g}$

5. 300 J of work is done in sliding a 2 kg block up an inclined plane of height 10 m. Taking $g = 10$ m/s^2, work done against friction is :

   (a) 1000 J   (b) 200 J

   (c) 100 J   (d) zero

6. A mass m moving horizontally with velocity v_0 strikes a pendulum of mass m. If the two masses stick together after the collision, then the maximum height reached by the pendulum is :

   (a) $v_0^2/8g$ (b) $v_0^2/2g$

   (c) $\sqrt{2v_0 g}$ (d) $\sqrt{v_0 g}$

7. A bomb of mass 9 kg explodes into two pieces of masses 3 kg and 6 kg. The velocity of mass 3 kg is 16 m/s. The KE of mass 6 kg (in joule) is :

   (a) 96   (b) 384

   (c) 192   (d) 768

8. Work done by the conservative force on system is equal to :

   (a) the change in kinetic energy of the system

   (b) the change in potential energy of the system

   (c) the change in total mechanical energy of the system

   (d) None of the above

9. The kinetic energy of a body becomes four times its initial value. The new momentum will be :

   (a) same as the initial value

   (b) twice the initial value

   (c) thrice the initial value

   (d) half of its initial value

10. A body of mass 3 kg acted upon by a constant force is displaced by S meter, given by relation $S = \dfrac{1}{3}t^2$, , where t is in second. Work done by the force in 2 seconds is :

    (a) $\dfrac{8}{3}$J   (b) $\dfrac{19}{5}$J

    (c) $\dfrac{5}{19}$J   (d) $\dfrac{3}{8}$J

11. If a porter with a suitcase on his head moves up a staircase, work done by the upward lifting force relative to him will be

    (a) $+\,mgh$ (b) $-\,mgh$

    (c) zero   (d) None of these

12. The kinetic energy acquired by a mass m in travelling a certain distance d, starting from rest under the action of a constant force, is directly proportional to :

    (a) $\sqrt{m}$ (b) independent of m

    (c) $\dfrac{1}{\sqrt{m}}$ (d) m

13. A block of mass 5 kg is resting on a smooth surface. At what angle a force of 20 N be acted on the body so that it will acquired a kinetic energy of 40 J after moving 4 m ?

    (a) 30°   (b) 45°

    (c) 60°   (d) 120°

14. The recoil velocity of a 4.0 kg rifle that shoots a 0.050 kg bullet at a speed of 280 m s^{-1}. is :

    (a) $+ 3.5$ ms^{-1} (b) $- 3.5$ ms^{-1}

    (c) $-\sqrt{3.5}$ ms^{-1} (d) $+\sqrt{3.5}$ ms^{-1}

15. A shell of mass 10 kg is moving with a velocity of 10 ms^{-1} when it blasts and forms two parts of mass 9 kg and 1 kg respectively. If the 1st mass is stationary, the velocity of the 2nd is :

    (a) 1 m/s   (b) 10 m/s

    (c) 100 m/s   (d) 1000 m/s