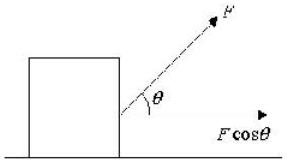
WORK-POWER-ENERGY

1. When every body is displaced in the directions the force acting on the body, work is said to be done
Units: S.I. system - Joule
C.G.S- Erg
1Joule = 10^{+7} ergs

2. If a force F acts on a body at an angle θ and displaces the body through a distance 'S' work done, $w = (F\cos\theta)s = \vec{F}.\vec{S}$



When $\theta = 90^0, W = 0$

3. a. The work done is independent of path followed by the body and time taken.
   b. If the work done in moving a body between two given points is independent of path choosen, the force acting on it is a conservative force.
   c. The work done by a conservative force in coming back to same point in closed loop is equal to zero.
   d. If the work done in moving a body between two points is dependent on the path choosen, the force acting on it is called a non-conservative force.
   e. Work done by a non conservative force is equal to force x distance i.e., work done by a non conservation force in a closed loop incoming back to same point it not equal to zero.

4. a. $P = \frac{Fs}{t}$
   b. $P = \frac{w}{t}$
   c. $P = F \times V$
   d. $P = \vec{F} \cdot \vec{V}$
   Power is a scalar. The units of power in SI system are watt.
   1 Horse Power H. P. = 746 watt

5. The power of a machine gun firing 'n' bullets, each of mass 'm' in one second with velocity is $p = \frac{1}{2}mnv^2$

6. The capacity of doing work is called energy. It is a scalar, its units are same as those of work.
   SI - Joule
   C. G. S - Erg
   1 K. W. H = $3.6 \times 10^6 J$

7. Energy possesed by a body by virtue of its position or state is known as potential energy.
   a. The P. E. of a body at a height h
   P. E. = mgh, where h is small
   b. The elastic P.E. stored in a compresed spring is
   $$P.E. = \frac{1}{2}kx^2 = \frac{1}{2}Fx = \frac{1}{2}.\frac{F^2}{K}$$

8. The energy possessed by a body by virtue of its motion is called K.E.
   A flying bird, moving aeroplane, freely falling body, a body moving on an incline, oscillating pendulum posses both P. E. and K. E.

9. The K.E. of a body of mass 'm' moving with velocity 'v' is $E = \frac{P^2}{2m}$
   $E \alpha P^2$ for a given body and $p \alpha \sqrt{E}$

10. If bodies of unequal masses have equal kinetic energies, the heavier body has greater momentum $p^2 \alpha m$ when E is same

11. If bodies of unequal masses have equal momentum the lighter body has greater K. E. $E \alpha \frac{1}{m}$ when P is same.

12. According to law of conservation of energy the total energy of a closed system is constant.
    For a body projected vertically up, the K. E. of projection is equal to P. E. at the maximum height.

13. A body falling from a height 'h' rebounds to a height 'h' from a hard surfac. Energy lost in collision = $mg(h - h^1)$.

14. In perfectly elastic collisions both K. E. and linear momentum is conserved and K. E. is not conserved.

15. A body can have energy without momentum but it cannot have momentum without energy.