Greenwood Public School

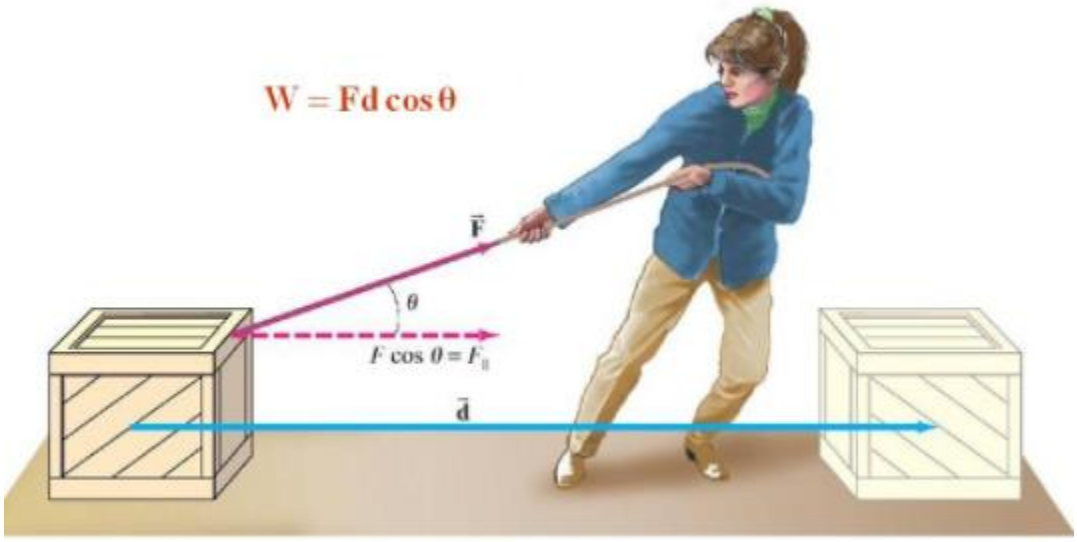
Work Energy And Power

Class 9th Notes

Work Done

Work done on an object is defined as the product of the magnitude of the force acting on the body and the displacement in the direction of the force. W = F.s

If a force acting on a body causes no displacement, the work done is 0. For example, pushing a wall.



Energy

Energy is defined as the ability to do work. Its unit is the same as that of work.

SI unit of energy or work = Joule (Nm) or Kgm^2s^{-2}.

Energy has different forms: Light, heat, chemical, electrical or mechanical.

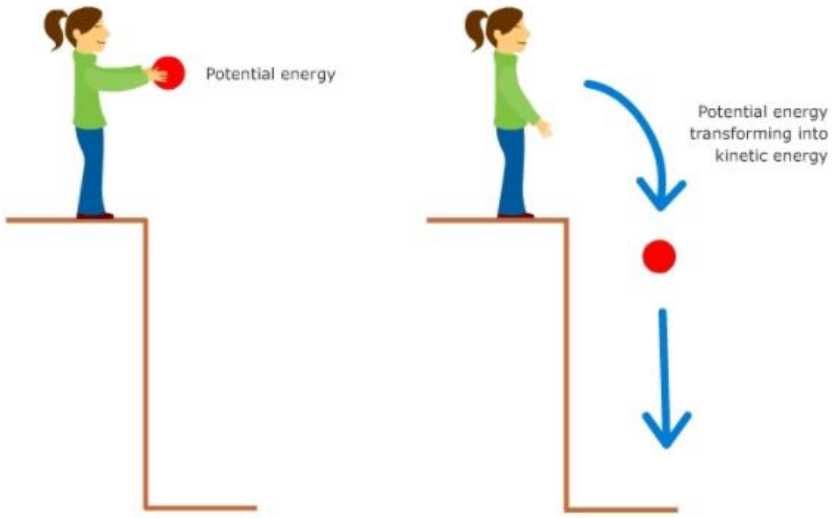
Mechanical energy is the sum of:
(i) Kinetic energy (K.E)
(ii) Potential energy (P.E)

Kinetic Energy

Objects in motion possess energy and can do work. This energy is called Kinetic Energy.
F = ma.
Also W = F.s
⇒ From the 2nd equation of motion $v^2-u^2=2as$,

⇒ we get s = $\frac{v^2-u^2}{2a}$ ⇒ Substituting equation for work done by a moving body,
⇒ we get W =m.a * $\frac{v^2-u^2}{2a}$
Or

⇒ Kinetic Energy = K.E= $\frac{1}{2}$ mv^2 (taking initial velocity u=0)
When two identical bodies are in motion, the body with a higher velocity has more K.E.



Work-energy theorem

The work-energy theorem states that the net work done by a moving body can be calculated by finding the change in KE.

⇒ $W_{net} = KE_{final} - KE_{initial}$

⇒ $W_{net} = \frac{1}{2} m[v^2-u^2]$

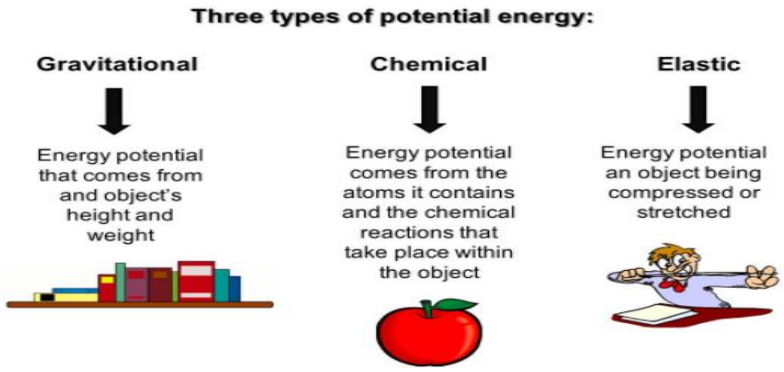
actors affecting kinetic energy

- Mass
- Velocity
- Momentum.

Potential Energy

Energy can get stored in an object when work is done on it.

For example, stretching a rubber string. The energy that is possessed by a body by virtue of its configuration or change in position is known as Potential Energy.



The potential energy of an object at a height.
When an object is raised to a certain height, work is done against gravity to change its position. This energy is stored as Potential Energy.

$\Rightarrow W = F.s$

$\Rightarrow F = ma$
In the case of increasing the height, $F = mg$
Therefore $W (P.E) = mgh$
$\Rightarrow \Delta PE = mg(h_{final} - h_{initial})$