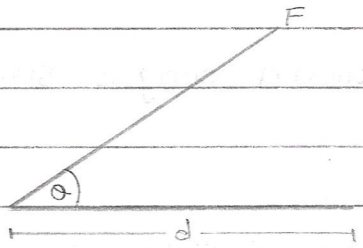
Work Energy & Power

Q-1) What is work done?

> Work done is the product of force and the distance moved in direction of the force.

WORK DONE = FORCE × DISTANCE

W.D = F × d.



$W_D = F\cos\theta \times d.$

* IF F is not constant, then WD = Area under graph.

Work Done = Energy transferred.

1 Joule = 1 Newton × 1 metre

1J = 1 Nm.

Q-2) Work done in expansion of a gas at constant pressure.

A = area of cross-section, s = distance moved

F = pressure × area.

= P × A

W.D = F × d = P × A × s.

= P × (increased volume).

= P × dV

= P × ΔV

= pressure × change in volume.

Q-3) Potential energies?

> Potential energy is the energy possessed by a body due to its position or shape.

> Gravitational potential energy is the energy possessed by a mass when placed in a gravitational field.

g.p.e = F x d

Δgpe. = m x g x h.

> Elastic p.e is the energy possessed when a body is stretched or compressed.

> Electric p.e. is the energy possessed by a charge when placed in an electric field.

Q-4) Kinetic energy?

> Kinetic energy is the energy possessed by a body due to its motion.

$v^2 = u^2 + 2as$ → $u = 0$

$v^2 = 2as$

$v^2/2 = as$

→ multiply both sides by m.

$\frac{1}{2}mv^2 = mas$ → $ma = F$

$\frac{1}{2}mv^2 = Fs$ → $Fs = W.D.$

$WD = \frac{1}{2}mv^2$

WD = energy transferred as k.e.

$\Delta k.e = \frac{1}{2}mv^2$

Q-5) ~~Power~~ What is power?

> Power is the rate at which work is done.

$$\text{Power} = \frac{\text{work done}}{\text{time}}.$$

$$1\,W = \frac{1\,J}{1\,s}. \quad (1 \text{ Joule per second}).$$

Q-6) Conservation of energy.

> Energy can neither be created nor destroyed.
It can only be converted from one form to another.
It is constant in the universe.

$$\%\ \text{efficiency} = \frac{\text{useful output energy}}{\text{total energy input}} \times 100.$$