WORK AND ENERGY PRACTICE PROBLEMS

Q1

A field in which the work done in moving a body in a closed path is zero is called

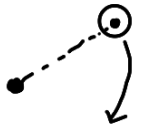
(a) electric field
(b) conservative field
(c) electromagnetic field
(d) gravitational field

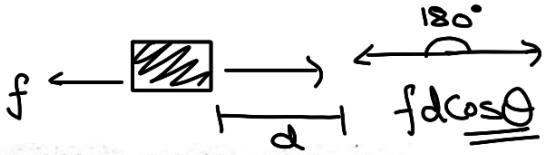
Q2

Which of the following types of force does no work on the particle when it acts on it?

(a) frictional force → $W < 0$
(b) gravitational force
(c) elastic force
(d) centripetal force

$W = \pm \frac{1}{2} k x^2$





Q3

The average power and instantaneous power become equal if work is done at

(a) any rate
(b) variable rate
(c) uniform rate
(d) high rate

$\langle P \rangle = \frac{\langle WD \rangle}{t}$

$P_{inst} = \lim_{\Delta t \to 0} \frac{\Delta WD}{\Delta t} = \frac{\langle W_D \rangle}{t}$

Q4

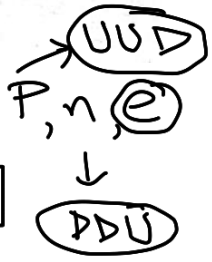
Proton, electron, neutron and α particles have same momentum. Which of them have highest K.E?

(a) proton
(b) electron
(c) neutron
(d) α-particle

$K.E = \frac{p^2}{2m}$

$K.E \propto \frac{1}{m}$

$^4_2\alpha$



Q5

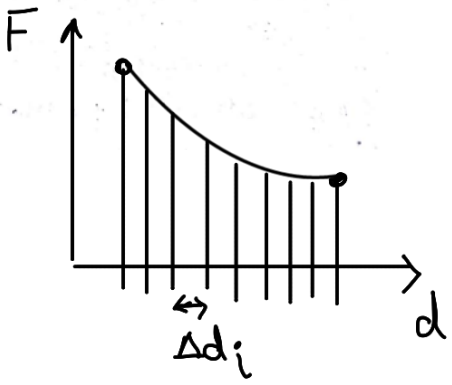
Work done by variable force is determine by dividing

(a) force into small interval

(b) displacement into small interval

(c) both force and displacement into small intervals

(d) force into small and displacement into large intervals



Q6

Gravitational P.E of a body can be found by

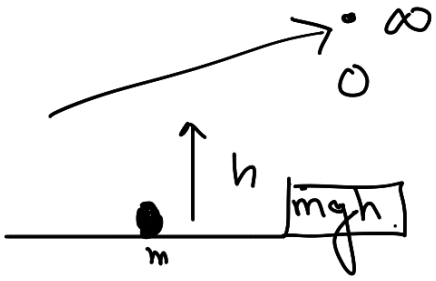
(a) $\frac{Gm}{r}$

(b) mgh

(c) $-\frac{Gm}{r}$

(d) both "b" and "c" ✓

$U = -\frac{Gm}{r}$



Q7

All the food we eat in one day has about the same energy as:

A) One liter of petrol

B) $\frac{1}{2}$ liter of petrol

C) $\frac{1}{3}$ liter of petrol

D) $\frac{1}{4}$ liter of petrol

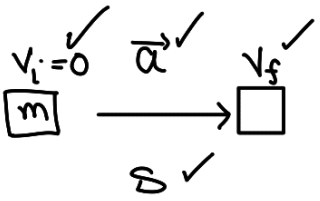
Q8

The kinetic energy acquired by a body of mass m is travelling some distance s, starting from rest under the actions of a constant force, is directly proportional to

A) m^0 ✓
B) m^2
C) m
D) $m^{1/2}$

$F = ma \Rightarrow a = \frac{F}{m}$ ✓

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



$v_f^2 - v_i^2 = 2as$ $\quad K.E = \frac{1}{2}mv^2 = \frac{1}{2}m \cdot \frac{2FS}{m}$

$v_f^2 = 2as = \frac{2FS}{m}$

$K.E = FS.$

Q9

An engine pulls a car of mass 1500 kg on a level road at a constant speed of 5 ms^{-1}. If the frictional force is 500 N, what power does the engine generate?

A) 5.0 kW
B) 2.5 Kw ✓
C) 10 kW
D) 12.5 kW

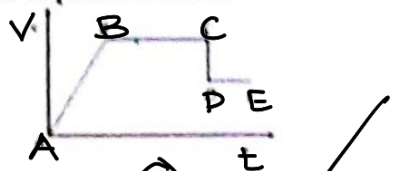
$$P = \vec{F} \cdot \vec{V} = f \cdot V = 500N \times 5\frac{m}{s} = 2500\frac{Nm}{s}$$

$$= 2.5\,KN\frac{m}{s}$$

$2.5kW.$

Q10

The adjoining diagram shows the velocity versus time plot for a particle. The work done by the force on the particle is positive from



A) B to C
B) D to E
C) A to B ✓
D) C to D