Homework

① (4) $\frac{1}{2} \frac{m v^2}{t_1^2} t^2$

② (4) $\frac{2F^2}{m}$

(2) (1) 2KW

(4) Total energy of the ball = mgh
= mg10
= 100m kgm^{2}s^{-2}
Energy with which it moves up the ground after striking = 60% of the total energy
E = $\frac{60}{100}$ × 100m kgm^{2}s^{-2}
Height to which the ball will bounce back
h = $\frac{E}{m \times g}$ = 6m.

(5) (a) The law of conservation of energy states that energy can neither be created nor be destroyed although, it may be transformed from one form to another. Ex:- In a torch, the chemical energy of the batteries is converted into electrical energy which is converted into light & heat energy.

(b) Weight of each girl = mg = 400N
Height climbed by each girl = h = 8m
Power = $\frac{\text{work done}}{\text{Time taken}}$ And,
Work done = Force × Distance
= m × g × h

Ajit A:-

Power: $\frac{\text{Work done}}{\text{Time taken}} = \frac{m \times g \times h}{t} = \frac{40 \times 8}{20}$

$= 20 \times 8$

$= 160\ W$.

Ajit B:- Power = $\frac{\text{Work done}}{\text{Time taken}} = \frac{m \times g \times h}{t} = \frac{40 \times 8}{50}$

$= 64\ W$.

Thus, Power expended by Ajit A is 160W.
Power expended by Ajit B is 64W.

(c) Energy consumed by an electric heater can be obtained with the help of the expression, $P = W/t$.
Where,
Power rating of the heater (P) = 1500.
W = 1.5 KW = 1500W.
Time for which the heater has operated (T) = 10h
Work done = Energy consumed by the heater
∴ Energy consumed = Power × Time
Energy consumed = 1500 × 10 = 15000W.
Hence, the energy consumed by the heater in 1h is 15KWH.

(6) (a) Given, m = 1500 kg.
u = 36 kmph^{-1} = 10 m/s
v = 72 kmph^{-1} = 20 m/s.
W = ??

Work done = Change in kinetic energy =
$\frac{1}{2} m (v^2 - u^2) =$
$\frac{1}{2} \times 1500 \times (20^2 - 10^2)$
$= 225000\ J$.

The work done is positive.

∴ It has maximum potential energy at its extreme positio & maximum kinetic energy at the mean position.

(b) The potential energy of an oscillating pendulum is maximum at its extreme positions. In this position, the pendulum bob has zero velocity. Hence, all its total energy at this position is the P.E The kinetic position of the pendulum is maximum at the mean position.

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