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# IDEAL INDIAN SCHOOL, DOHA - QATAR

## SECSSION - 2013 - 2014

## FORMATIVE ASSESSMENT - 3

TOPIC :-

## TO VERIFY THE LAWS OF CONSERVATION OF ENERGY


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# To verify the law of conservation

**Aim:**

An object o mass 20kg is dropped From the height of 5m. Fill in the blanks in the Following Table by computing the potential and kinetic energy in each case.

| S.INO | Height of which object is located (m) | potential Energy Ep: mgh ( ) | kinetic Energy $Ek = \frac{1}{2} mv^2$ (J) | Total Energy Ep + Ek (J) |
|---|---|---|---|---|
| 1 | 5 | ____ | ____ | ____ |
| 2. | 4 | ____ | ____ | ____ |
| 3. | 3 | ____ | ____ | ____ |
| 4. | 2 | ____ | ____ | ____ |
| 5. | 1. | ____ | ____ | ____ |

**Solution:**

Definition OF PE and KE and Formula.

Potential energy: The energy possessed by the body by virtue of its position or state is called potential energy. potential energy = mgh

Kinetic energy: The energy possessed by the body by virtue of its motion. Kinetic energy $= \frac{1}{2} mv^2$.

**Case (i)** At a heigh of 5 m

Given

mass $m = 20kg$

acceleration due to gravity

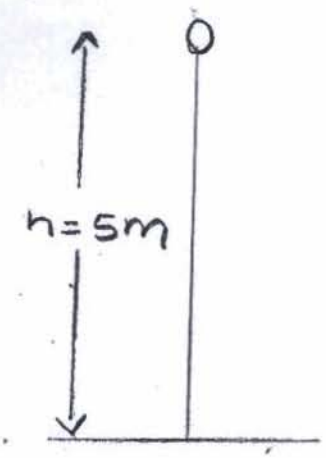
$g = 10m/s^2$

height $h = 5m$

potential energy $Ep = Mgh$

$Ep = 20 \times 10 \times 5$

$Ep = 1000\ J$



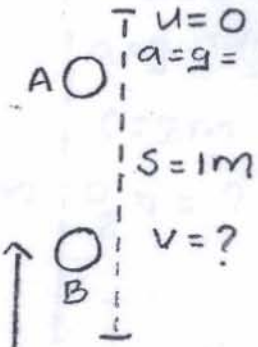

Kinetic Energy $Ek = \frac{1}{2} Mv^2$

$m = 20kg$

$V = 0$

$Ek = \frac{1}{2} \times 20 \times 6^2$

$Ek = 0$




**case (ii)** At a height of 4m

Given

mass $m = 20kg$

acceleration due to gravity

$g = 10m/s^2$

height = 4M

potential energy $Ep = Mgh$

$Ep = 20 \times 10 \times 4$

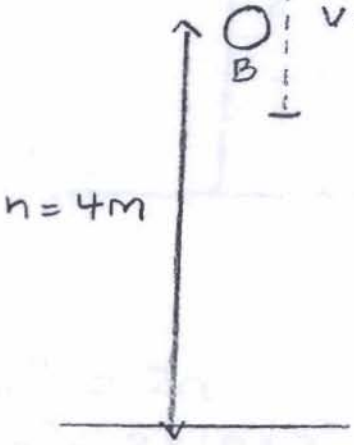
$Ep = 800\ J$

Kinetic energy $Ek = \frac{1}{2} Mv$

$m = 20kg$

$u = 0$

$a = g = 10m/s^2$



$v^2 = y^2 = 2as$

$v^2 = 0^2 = 2 \times 10 \times 1$

$v^2 = 20\ m/s$

$v = \sqrt{20}\ m/s$

$KE = \frac{1}{2} Mv^2$

$= y^{\not 2} \times \overset{10}{\not 20} \times (\sqrt{20})^2$

$= 10 \times 20$

$KE = 200J$

case (iii) At a height of of 3m

Given

mass $m = 20kg$

acceleration due to gravity

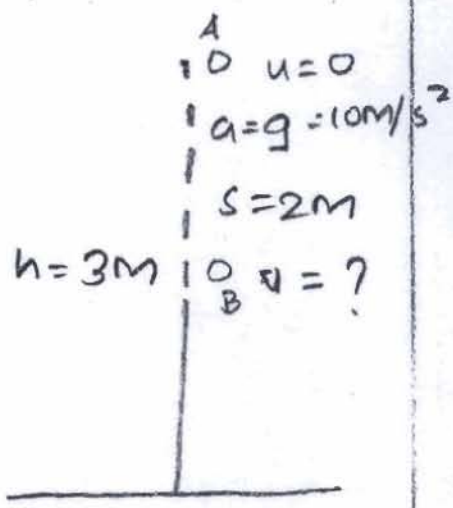
$g = 10m/s^2$

height $h = 3m$

potential energy $= mgh$

$Ep = 20 \times 10 \times 3$

$Ep = 600J$




kinetic energy $Ek = \frac{1}{2} Mv^2$

$M = 20kg$

$u = 0$

$a = g = 10m/s^2$

$s = 2m$

$v = ?$

$v^2 = u^2 = 2a$

$v^2 - 0^2 = 2 \times 10 \times 2$

$v^2 = 40$

$v = \sqrt{40}\ m/s$

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

$v^2 \times \overset{20}{\not 40} \times (\sqrt{20})^2$

$= 20 \times 20$

Case(iv) At a height of 2m

Given

mass $m = 20kg$

Acceleration due to gravity =

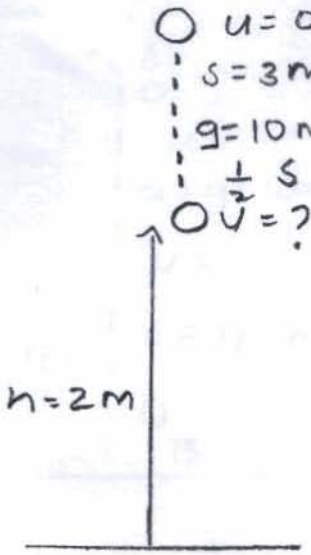
$g = 10ms/s^2$

height $h = 2m$

potential energy $E_p = Mgh$

$E_p = 20 \times 10 \times 2$

$E_p = 400J$




To calculate the kinetic energy

$u=0$; $s=3m$, $g=10m/s^2$; $v=?$

we know that

$v^2 - u^2 = 2as$

$v^2 - 0^2 = 2 \times 10 \times 3$

$v^2 = 60$

$v = \sqrt{60}\ m/s$

Kinetic energy $E_k = \frac{1}{2}Mv^2$

mass $m = 20kg$

Velocity $v = \sqrt{60}m/s$

$E_k = \frac{1}{2} \times 20 \times (\sqrt{60})^2$

$= 10 \times 60$

$E_k = 600J$

Total energy $= E_p + E_k$

$= 400 + 600$

T.E $= 1000\ J$

## Case (V) At a height of 1m

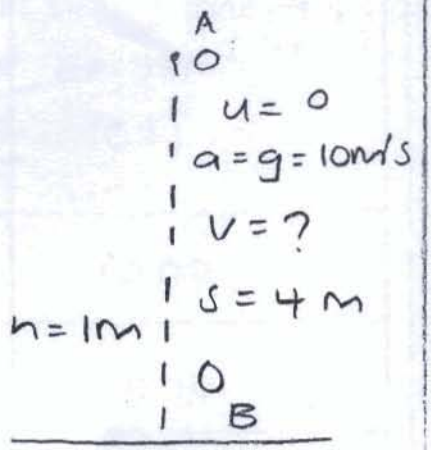
Given

Mass $m = 20kg$

acceleration due to gravity =

$g = 10m/s^2$

height $h = 1m$




Potential energy $E_p = mgh$

$E_p = 20 \times 10 \times 1$

$E_p = 200J$

To calculate the kinetic energy

$u = 0$; $s = 4cm$; $g = 10 m/s^2$, $V = 2$

we know that

$v^2 - u^2 = 2as$

$v^2 - 0^2 = 2 \times 10 \times 4$

$v^2 = 80$

$v = \sqrt{80} m/s$

Kinetic energy $E_K = \frac{1}{2}mv^2$

mass $m = 20kg$

Velocity $v = \sqrt{80} m/s$

$E_K = \frac{1}{2_1} \times \frac{10}{20} \times (\sqrt{80})^2$

$= 10 \times 80$

$E_K = 800 J$

Total energy $= E_p + E_K$

$= 200 + 800 J$

$T.E = 1000 J$

| S.I No | Height of which object is located (m) | potential energy Ep: mgh ( ) | kinetic Energy $Ek = \frac{1}{2} mv^2$ CJ) | Total energy Ep + Ek · CJ) |
|---|---|---|---|---|
| 1 | 5 | 1000 | 0 | 1000 |
| 2 | 4 | 800 | 200 | 1000 |
| 3 | 3 | 600 | 400 | 1000 |
| 4 | 2 | 400 | 600 | 1000 |
| 5 | 1 | 200 | 800 | 1000 |

**Conclusion:-**

The energy is neither created not destroyed, only form of energy is transmitted into another when the body is falling down potential energy is converted into kinetic energy. but the total energy remains same.