TENDER HEART HIGH SCHOOL, SEC-33'B', CHD.

22.4.24

CLASS- X SUBJECT- PHYSICS

CHAPTER- 2 TEACHER- Charanjeet kaur

Good Morning Students!

This lesson is of class - X, for the subject of 'Physics', Topic - 'Numericals based on Kinetic and Potential Energy', which is covered in Chapter - 2 'Work, Energy and Power', Exercise - 2(B), of your textbook, titled - 'Concise Physics by Selina Publications'. This lesson is submitted to you on 3rd April, 2023. Students, before starting the numericals, let us recall all the formulae which we did last week.

$P.E. = mgh$, $K.E. = \frac{1}{2}mv^2$

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

Now you may all open Page Number - 41 of your textbook and also open your notebook to practice numericals side by side.

NUMERICALS OF EXERCISE - 2 (B)

1.) P.E. for body placed at height 'h' = $mgh = P.E._1$

P.E. for body placed at height '2h' = $2mgh = P.E._2$

$$\frac{P.E._1}{P.E._2} = \frac{mgh}{2mgh} = \frac{1}{2}$$

$P.E._1 : P.E._2 = 1 : 2$

2.) P.E. of mass kept at height = mgh

$P.E. = 1 \times 10 \times 5 = 50\ J$

When a body falls from a height and hits the ground then its P.E. changes into K.E. So, in this case, K.E = P.E. at the height

So, K.E = 50 J

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3.) Weight of box = mg = 150 kgf

As we know that, 1 kgf = g N.

So, Weight = mg = 150 × 9.8 N

P.E. = 14700 J

P.E. = mgh

14700 = 150 × 9.8 × h

$\frac{14700}{150 \times 9.8}$ = h

h = 10 m

4.) (i) $P.E._1 = mgh_1 = 5 \times 10 \times 10 = 500$ J

$P.E._2 = mgh_2 = 5 \times 10 \times 4 = 200$ J

Loss in energy = $P.E._1 - P.E._2 = 500 - 200$

Loss in energy = 300 J

(ii) Total energy will be same as the maximum P.E. possessed by a body at a height.

Thus, total energy = 500 J

(Students you are required to take a break of 10 minutes and do numerical number 5 and 6 in your notebook)

7.) Mass of water, m = 50 Kg , h = 15 m

Using, P.E. = mgh = 50 × 10 × 15

P.E. = 7500 J

Also using the formula of work done due to gravity when the object is at a height is also given by mgh

(Using this concept do numerical 8).

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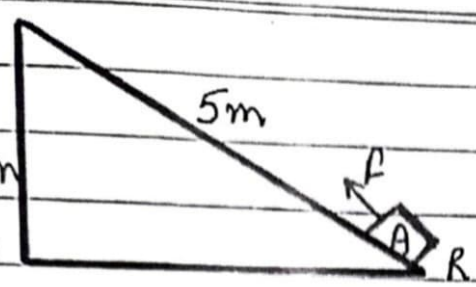
9)



a) Work done by force f = $f \cdot s \cos 0°$

Work done = $100 \times 5 \times 1 = \underline{500 J}$

b) When block is lifted from ground level to point P, then there is increase in height, due to which Potential Energy increases

P.E. = mgh = Weight of block $\times h$

P.E. = $100 \times 3 = \underline{300 J}$

c) Difference in work done and gain in P.E. =

$(500 - 300) J = \underline{200 J}$

This amount of energy is lost while doing work against frictional force when it is moved up and this energy will appear as heat energy.

10) Formula to be used is

$K.E = \frac{1}{2} m v^2$

(Take a break of 5 minutes and solve this numerical).

11) Initial K.E. = $\frac{1}{2} m u^2 = K_1$

Final K.E. = $\frac{1}{2} m v^2 = \frac{1}{2} m \left(\frac{u}{2}\right)^2 = \frac{1}{2} \frac{m u^2}{4} = K_2$

$K_2 = \frac{1}{2} \frac{m u^2}{4} = \frac{K_1}{4}$

K.E. final = one fourth of initial K.E.

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Students again pause this interactive session and do numerical 12 and 13 in your Notebook and then you can resume the session further.

14) $u_1 = 15\ km/h = 15 \times \frac{5}{18}\ m/s$

$K_1 = \frac{1}{2} m \times 15 \times 15$ — (1)

$K_2 = \frac{1}{2} m \times 45 \times 45$ — (2)

Dividing (1) / (2)

$$\frac{K_1}{K_2} = \frac{\frac{1}{2} \times m \times 15 \times 15}{\frac{1}{2} \times m \times 45 \times 45} = \frac{15 \times 15}{45 \times 45}$$

$$\frac{K_1}{K_2} = \frac{1}{9} = 1:9$$

15) HINT- Change in K.E. $= K_{final} - K_{initial}$

(If answer comes negative, then there is decrease in K.E. and change in K.E. comes out to be positive, then there is increase in K.E.)

16) $mass = 500\ g = \frac{500}{1000}\ kg = 0.5\ kg$

i) $K.E. = \frac{1}{2} m v^2 = \frac{1}{2} \times 0.5 \times 15 \times 15 = 56.25\ J$

ii) $p = mv = 0.5 \times 15 = 7.5\ kg\ m/s$

With this I come to an end to this interactive session. You all are required to complete all the numericals which are given as hint in this pdf and try to solve Numericals from 17 to 23. Thank you.

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