YAKEEN NEET 2.0

2026

Work, Energy and Power

PHYSICS | Lecture 05

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Todays Goal

-
- V.C.M.

Questions practice

- % change in $y = \frac{y_f - y_i}{y_i} \times 100$

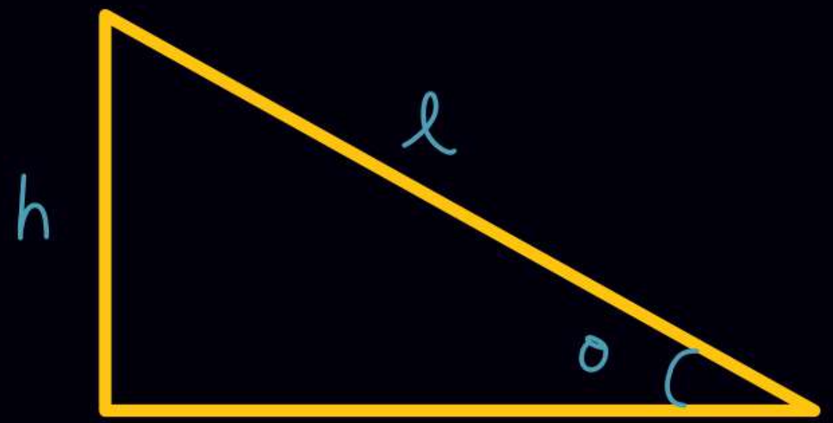
- $KE = \frac{1}{2}mv^2$ $\qquad KE = \frac{p^2}{2m}$

Q $p \longrightarrow$ double $\Longrightarrow$ $(KE) \longrightarrow$ 4 times
$m \longrightarrow$ same $\Longrightarrow$ $(KE)\uparrow$ by 300%.

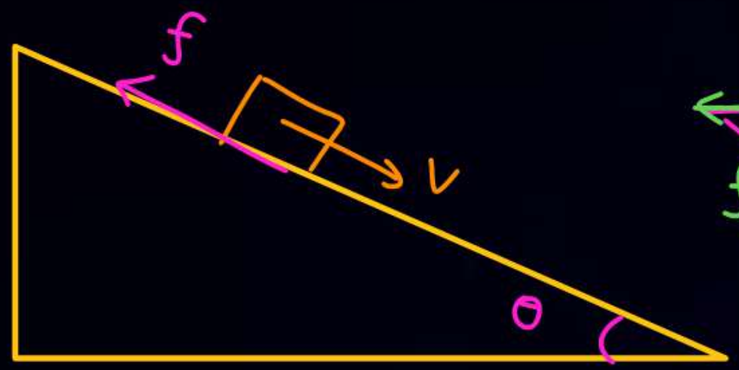
$$\%\,(KE) = \frac{4K - K}{K} \times 100 = 300\%$$

$p \xrightarrow{p \text{ is increase by } 100\%} 2p$

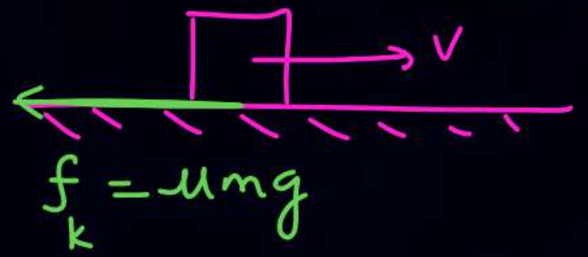
$p \xrightarrow[p \text{ is increase by } 300\%.]{p \text{ is increase to}} 4p$

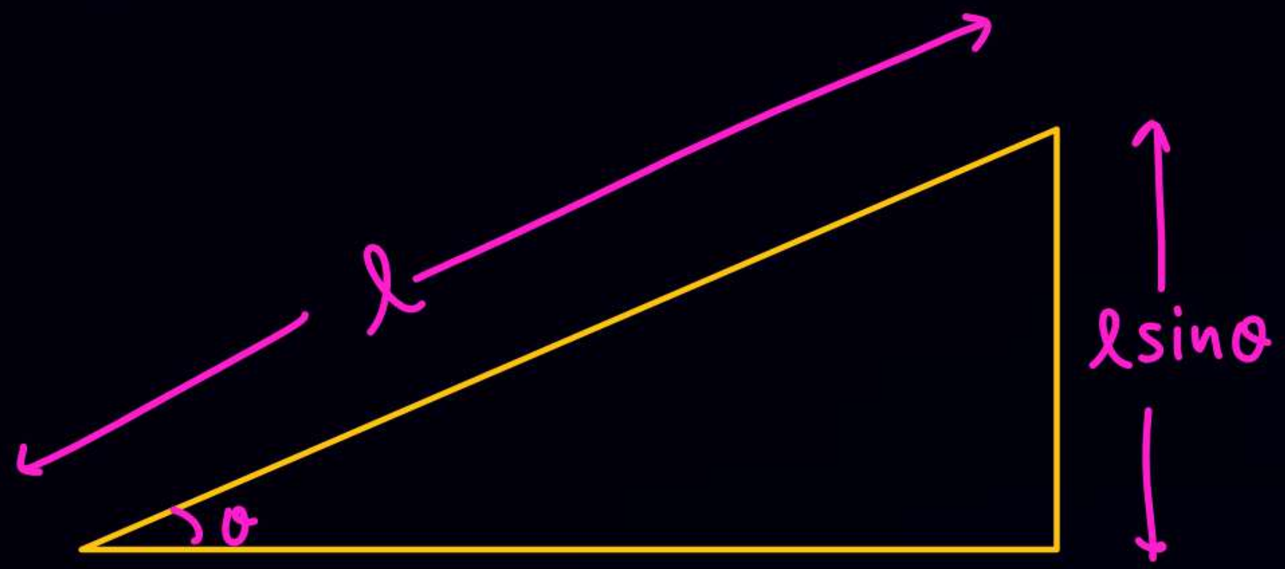


$\ell \sin\theta = h$



$f_k = \mu mg\cos\theta$

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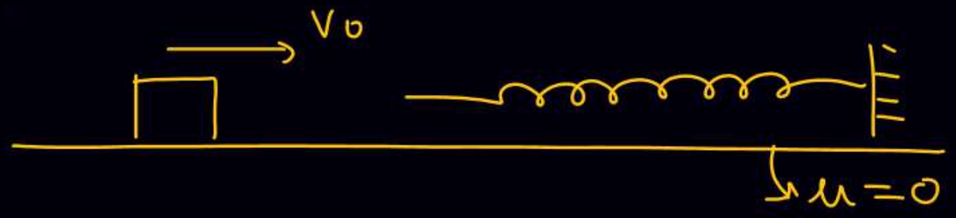


max compression कितना होगा

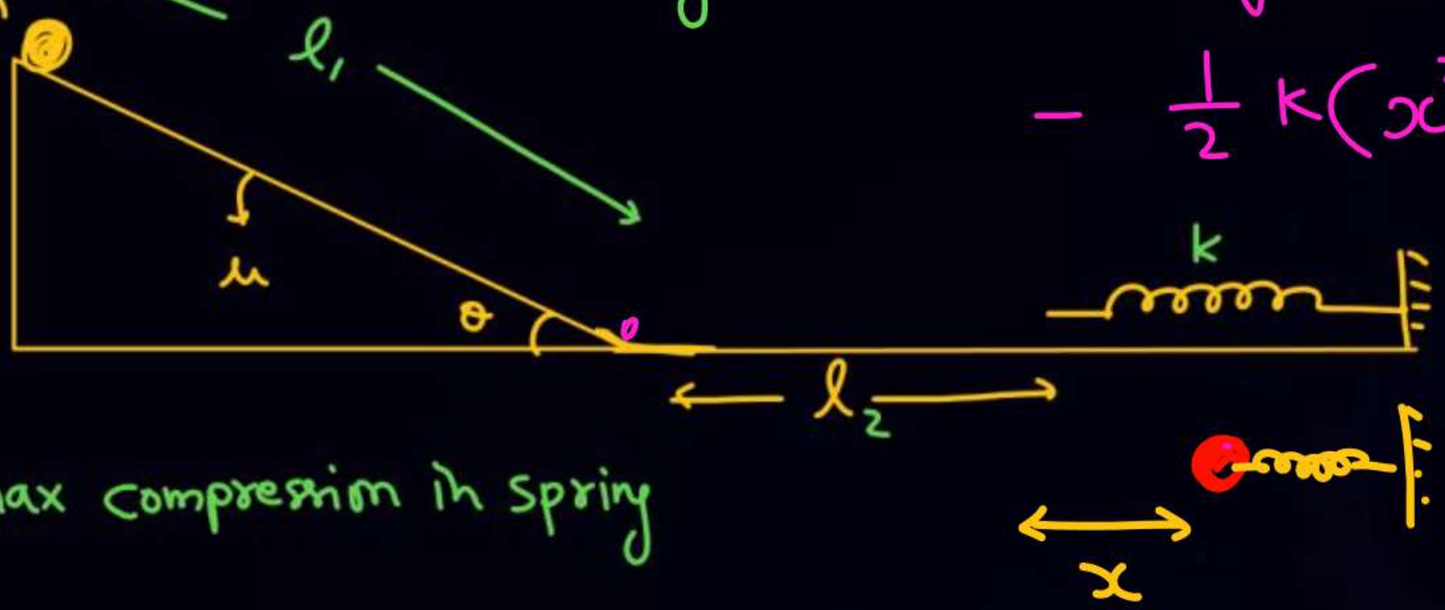
$$\frac{1}{2}mV_0^2 = \frac{1}{2}Kx^2$$

$W_g + W_N + W_f + W_{sp} = \Delta K.E.$

Q drop

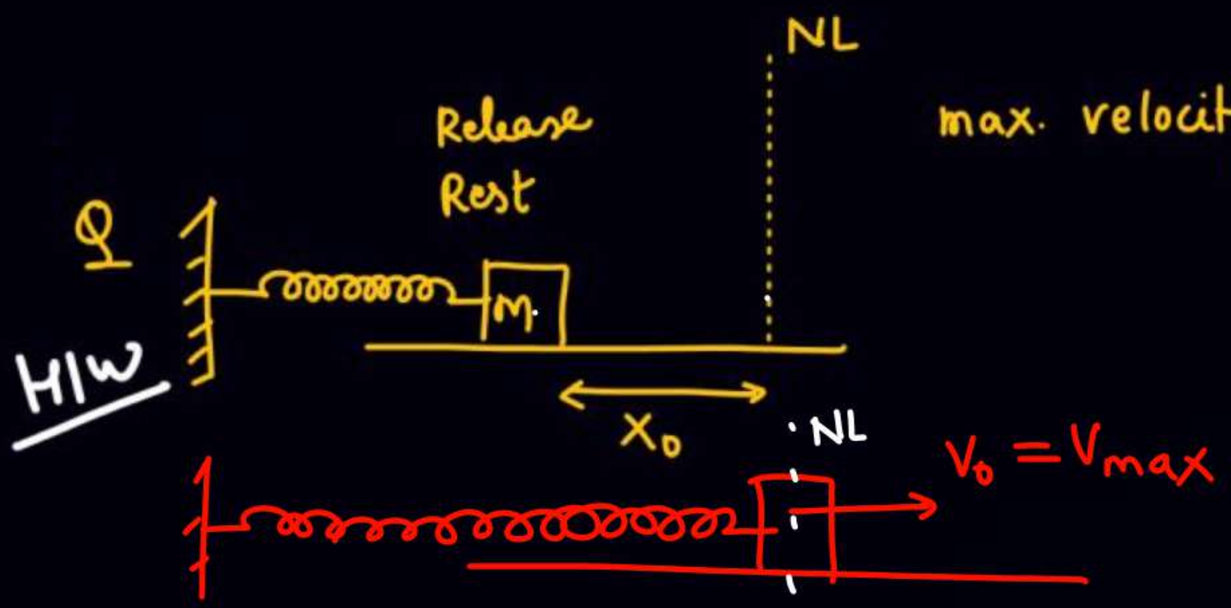
H/W

Rough copy



max compression in spring

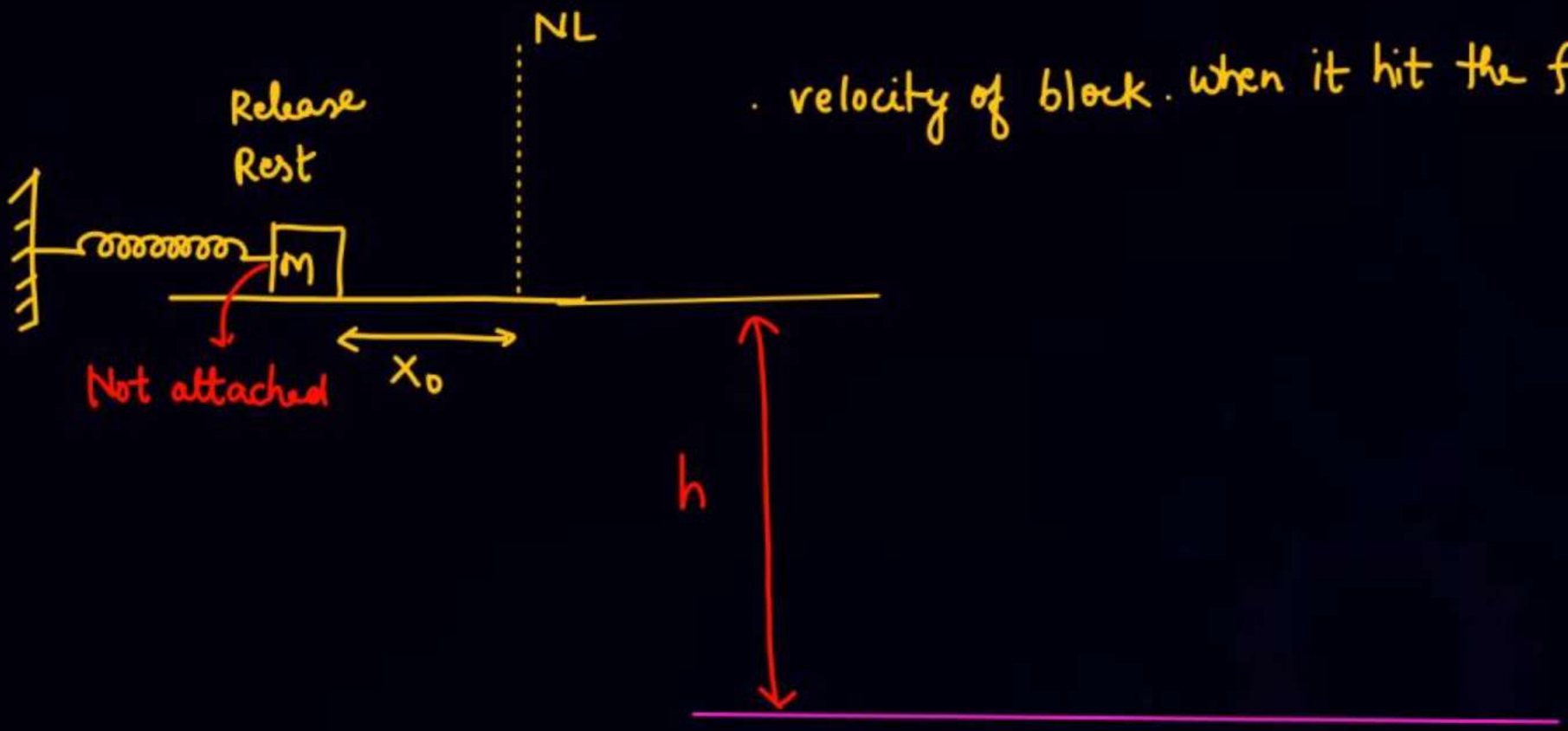
$$mg\,l_1\sin\theta + 0 - \mu mg\cos\theta\, l_1 - \mu mg(l_2 + x) - \frac{1}{2}k(x^2 - 0^2) = 0 - 0$$



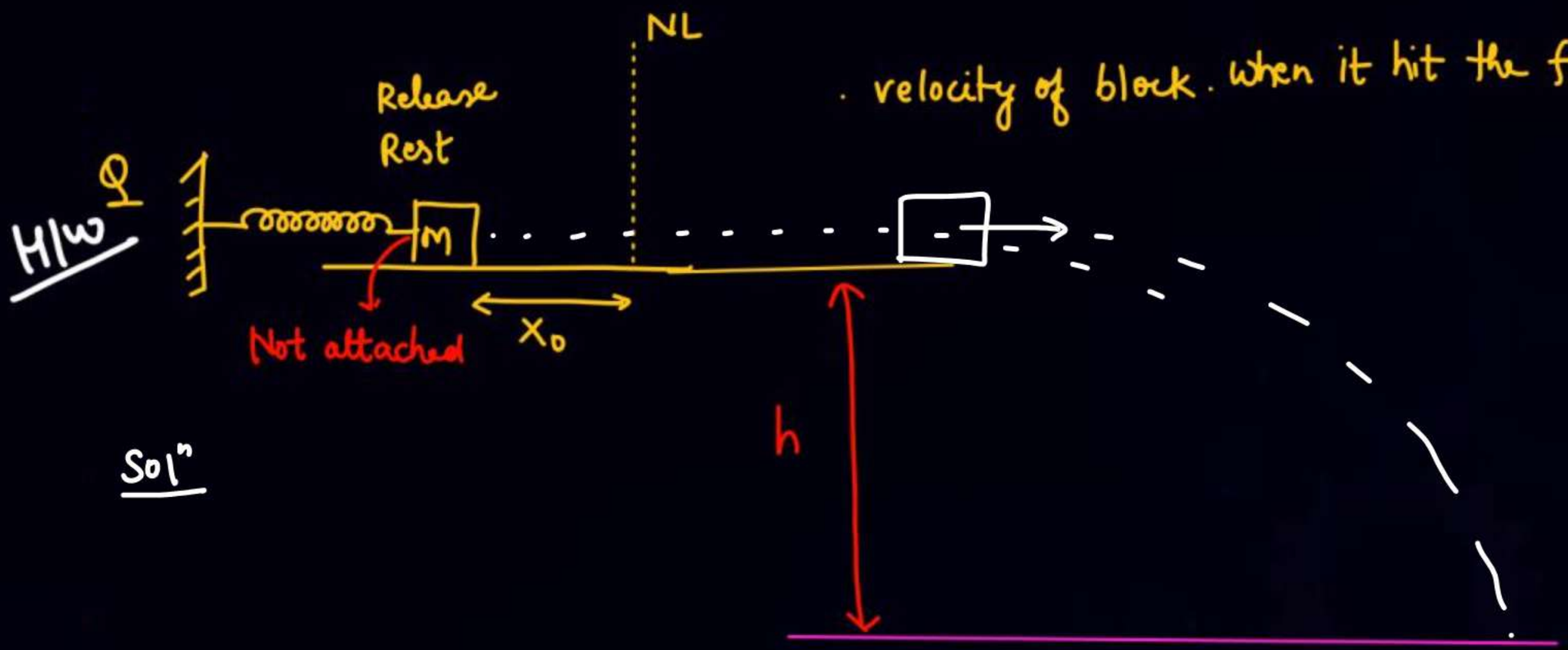
$$0 + 0 - \frac{1}{2}k(0^2 - x_0^2) = \frac{1}{2}mV_{max}^2 - 0^2$$

$$\frac{1}{2}kx_0^2 = \frac{1}{2}mV_0^2$$

H/w 9



. velocity of block. when it hit the floor.



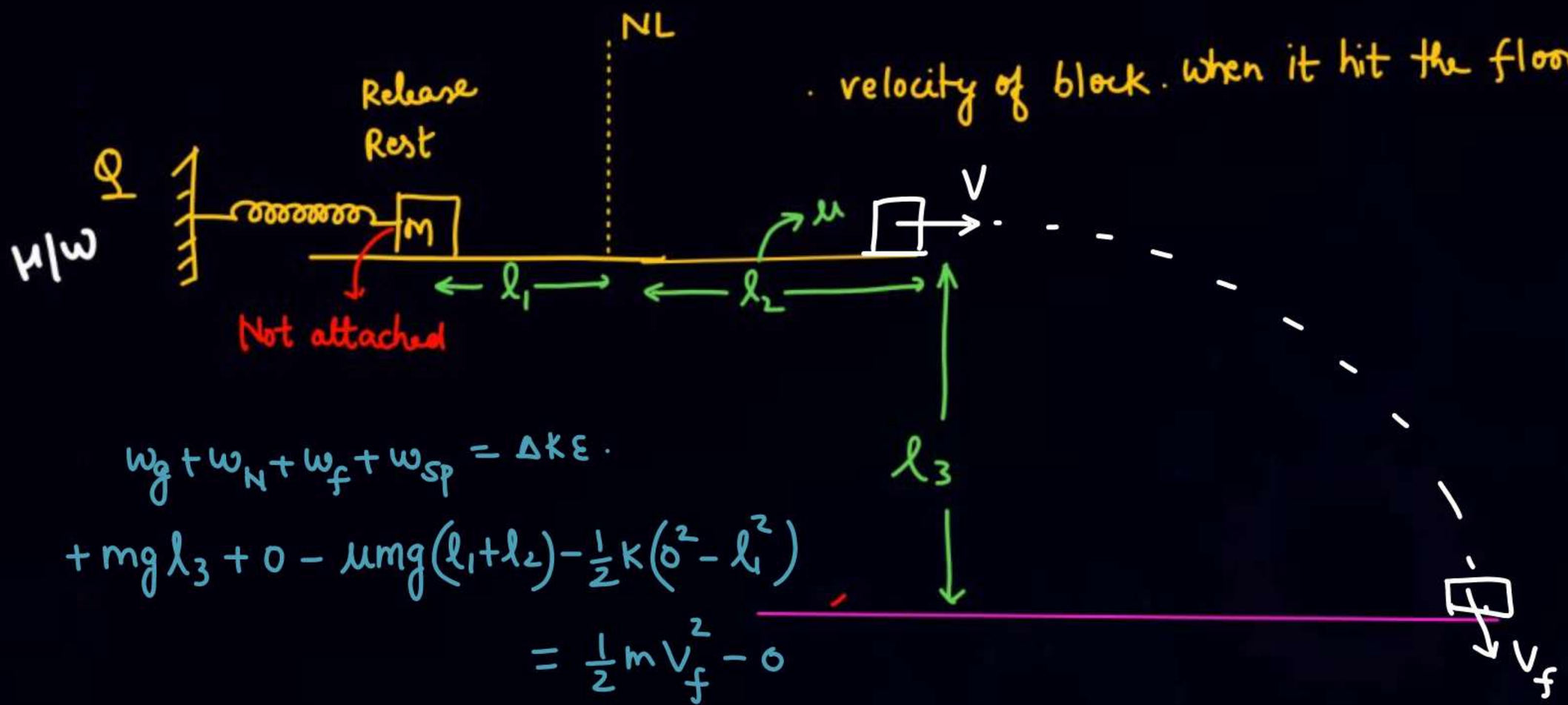
H/W Q

. velocity of block. when it hit the floor.

Sol^n

$$W_g + W_N + W_{sp} = \Delta KE$$

$$mgh + 0 - \frac{1}{2}k\left(0^2 - x_0^2\right) = \frac{1}{2}mv_f^2 - 0$$

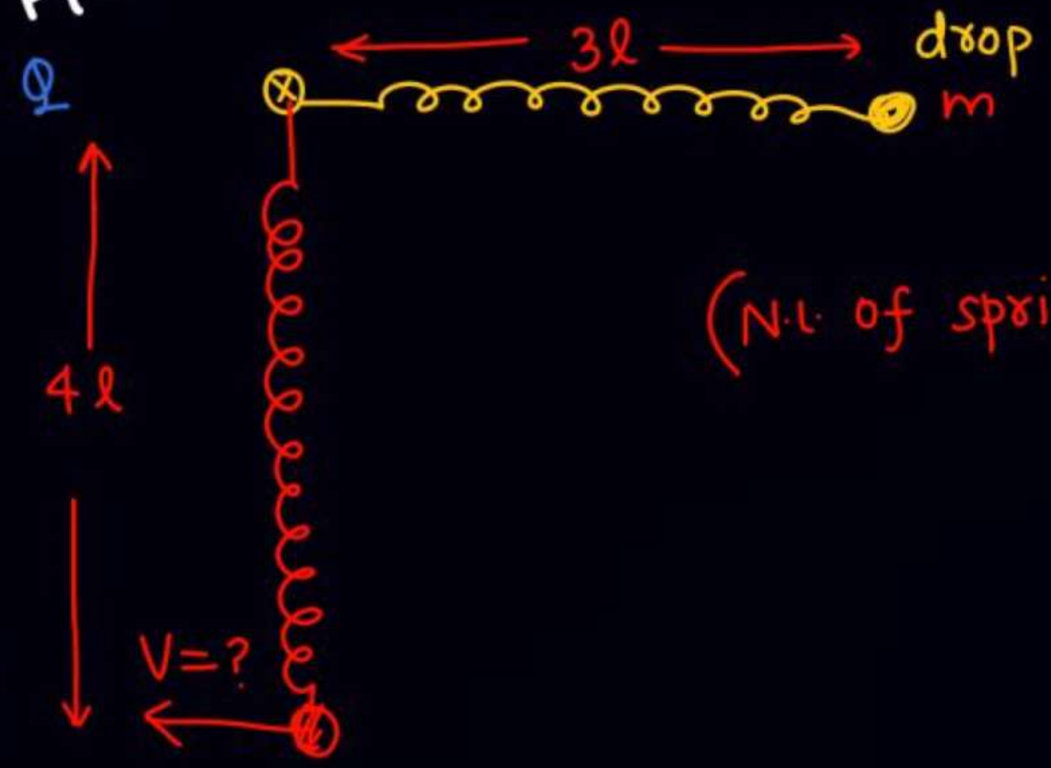


$$W_g + W_N + W_f + W_{sp} = \Delta KE$$

$$+mgl_3 + 0 - \mu mg(l_1+l_2) - \frac{1}{2}k(0^2 - l_1^2)$$

$$= \frac{1}{2}mV_f^2 - 0$$

H/W



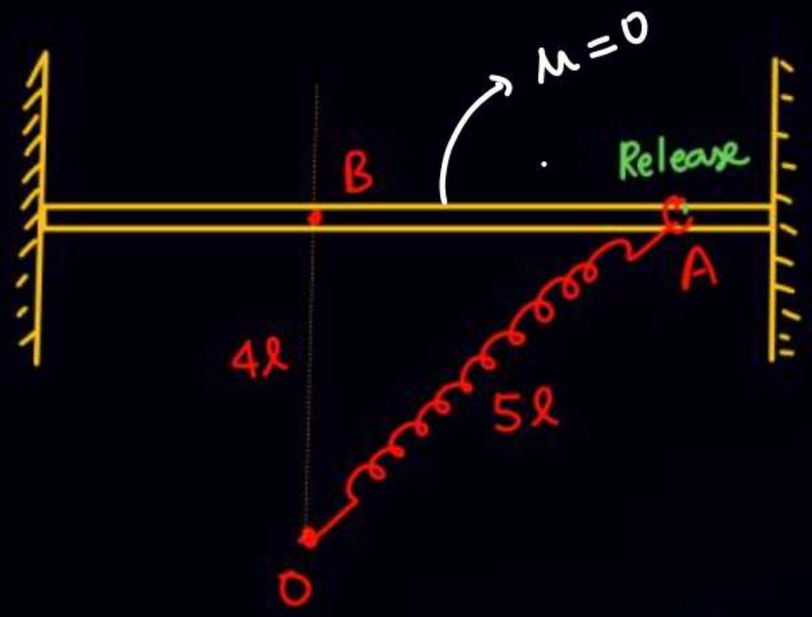
(N.L. of spring = 2ℓ)

$$W_g + W_{sp} = \Delta K.E.$$

$$+mg4\ell - \frac{1}{2}k\left((2\ell)^2 - \ell^2\right) = \frac{1}{2}mV_0^2 - 0$$

H/W

Q



Natural length of spring = ℓ

OA = 5ℓ

OB = 4ℓ

find v_{ring} at 'B'

$x_i = 4\ell$

$x_f = 3\ell$

$$W_g + W_N + W_f + W_{sp} = \Delta KE$$

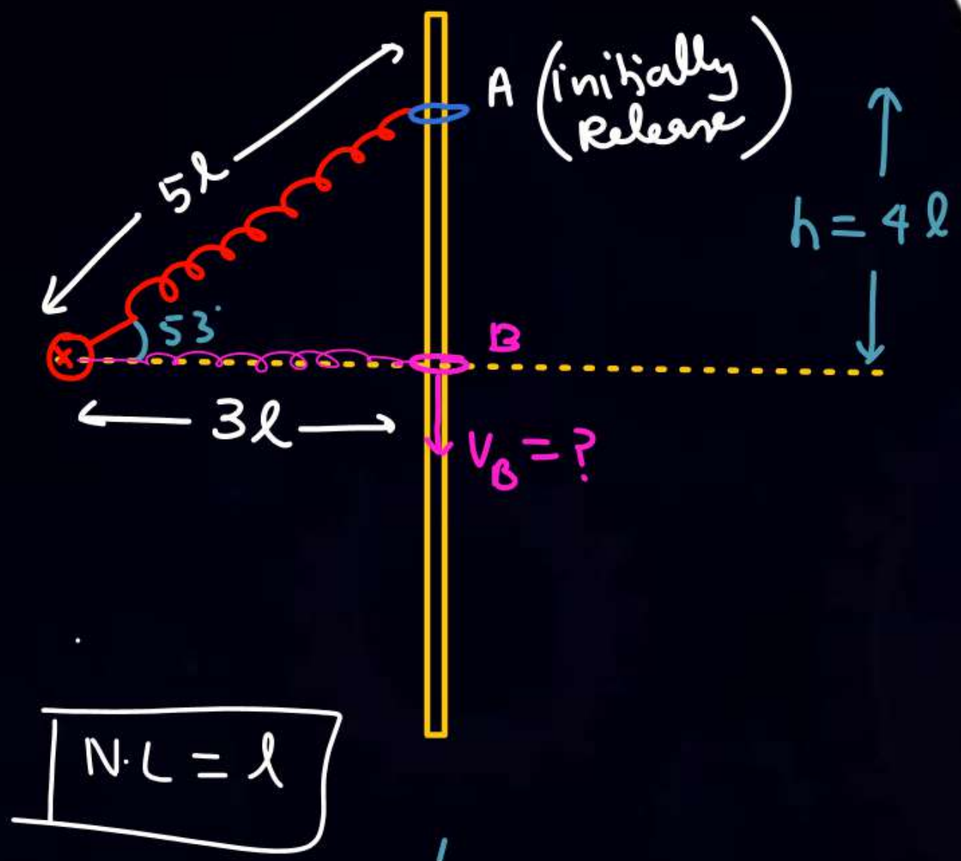
$$0 + 0 + 0 - \frac{1}{2}K\left((3\ell)^2 - (4\ell)^2\right)$$

$$= \frac{1}{2}mV_0^2 - 0$$

Q $V_B = ?$

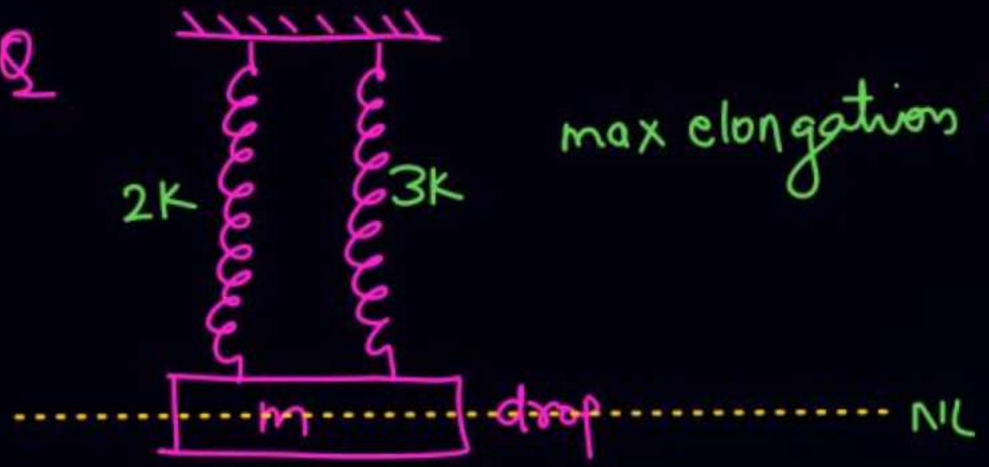
$$W_g + W_N + W_{sp} = \Delta K.E.$$

$$+mgh + 0 - \frac{1}{2}K\left[(2\ell)^2 - (4\ell)^2\right] = \frac{1}{2}mv^2 - 0$$



H/W

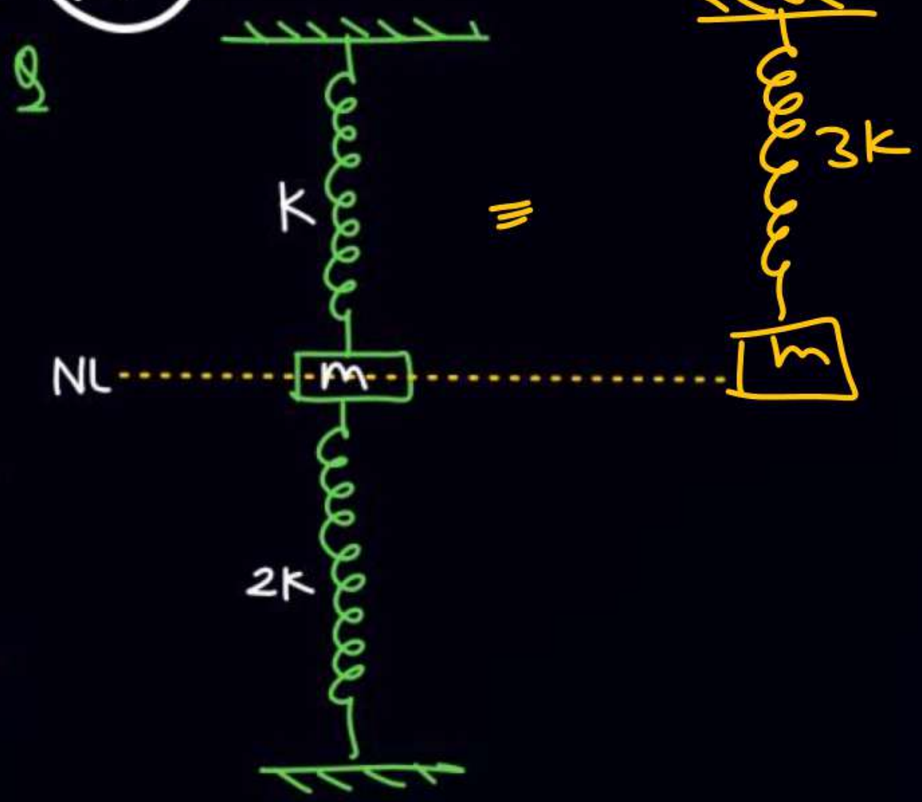
Q



max elongation in Spring

$$x_{max} = \frac{2mg}{(5K)}$$

H/W



note

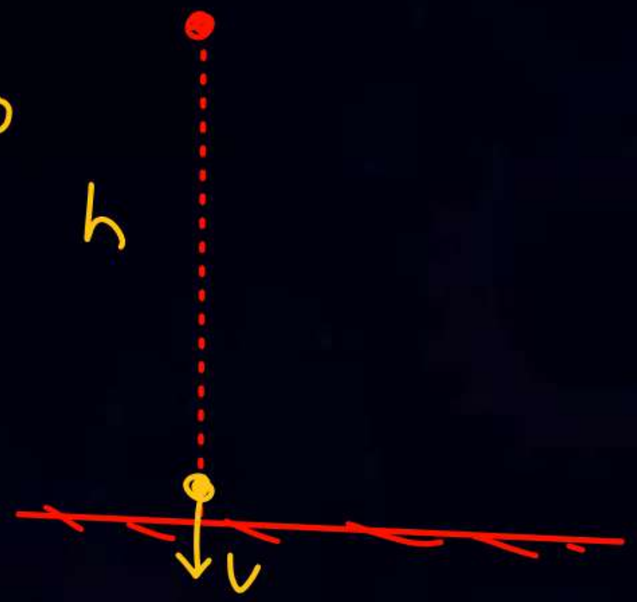
5. *A body dropped from a height H reaches the ground with a speed of* $1{\cdot}2\sqrt{gH}$. *Calculate the work done by air-friction.*

$W_g + W_{air} = \Delta K.E. = K_f - K_i$

$mgh + W_{air} = \frac{1}{2}m\left(1{\cdot}2\sqrt{gH}\right)^2 - 0$

$W_{air} = \frac{1{\cdot}44\,mgh}{2} - mgh$

$= -{\cdot}28\,mgh$



48. A small block of mass 100 g is pressed against a horizontal spring fixed at one end to compress the spring through 5·0 cm (figure 8-E11). The spring constant is 100 N/m. When released, the block moves horizontally till it leaves the spring. Where will it hit the ground 2 m below the spring ?

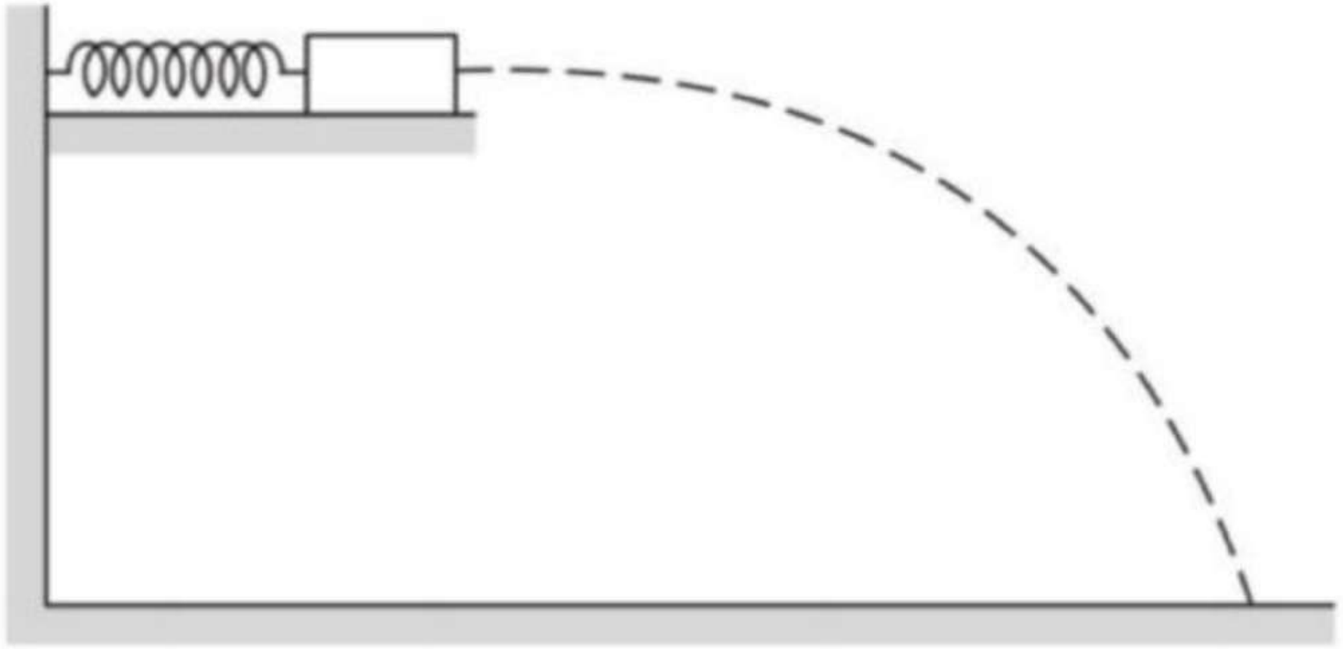


Figure 8-E11

QUESTION

Consider a drop of rain water having mass 1 g falling from a height of 1 km. It hits the ground with a speed of 50 ms^{-1}. Take g constant with a value 10 ms^{-2}. The work done by the (i) gravitational force and the (ii) resistive force of air is: **[NEET - 2017]**

1. (i) 1.25 J (ii) –8.25 J
2. (i) 100 J (ii) 8.75 J
3. (i) 10 J (ii) –8.75 J
4. (i) –10 J (ii) –8.25 J

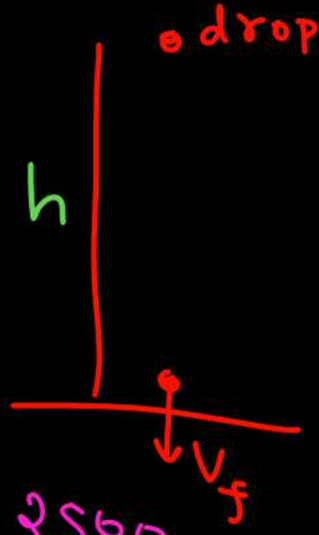
① mgh

$= \frac{1}{1000} \times 10 \times 1000$

$= 10$

$W_g + W_{air} = \Delta KE$

$10 + W_{air} = \frac{1}{2} \times \frac{1}{1000} \times 2500$



Ans: (3)

QUESTION

HW

A particle moves from a point $(-2\hat{\imath} + 5\hat{\jmath})$ to $(4\hat{\jmath} + 3\hat{k})$ when a force of $(4\hat{\imath} + 3\hat{\jmath})$N is applied. How much work has been done by the force? **[NEET-II 2016]**

1. 8 J
2. 11 J
3. 5 J
4. 2 J

Ans: (3)

QUESTION

A uniform force of $(3\hat{\imath} + \hat{\jmath})$ newton acts on a particle of mass 2 kg. Hence the particle is displaced from position $(2\hat{\imath} + \hat{k})$ metre to position $(4\hat{\imath} + 3\hat{\jmath} - \hat{k})$ metre. The work done by the force on the particle is: **[NEET 2013]**

1. 13 J
2. 15 J
3. 9 J
4. 6 J

Ans: (3)

QUESTION

A body moves a distance of 10 m along a straight line under the action of a 5 N force. If the work done is 25 J, then angle between the force and direction of motion of the body is:

[NEET 1997]

$W.D = F\,d\cos\theta$

$25 = 5 \times 10 \times \cos\theta$

1. 60°
2. 75°
3. 30°
4. 45°

Ans: (1)

QUESTION

A body, constrained to move in y-direction, is subjected to a force given by $\vec{F} = (-2\hat{\imath} + 15\hat{\jmath} + 6\hat{k})$N. The work done by this force in moving the body through a distance of $10\hat{\jmath}$ m along y-axis, is: **[NEET 1994]**

1. 150 J
2. 20 J
3. 190 J
4. 160 J

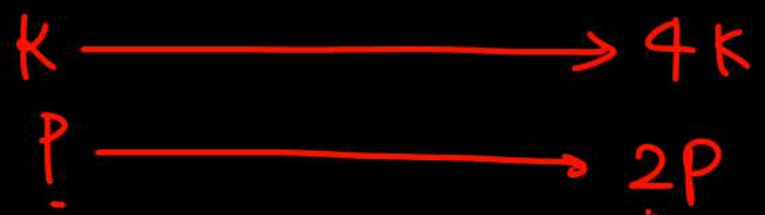
Ans: (1)

QUESTION

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

If kinetic energy of a body is increased by 300% then percentage change in momentum will be:

[NEET - 2002]



1. 100%
2. 150%
3. 265%
4. 73.2%

Ans: (1)

QUESTION

A particle is projected making an angle of 45° with horizontal having kinetic energy K. The kinetic energy at highest point will be: **[NEET - 2001, 1997]**

1. $\frac{K}{\sqrt{2}}$
2. $\frac{K}{2}$
3. $2K$
4. K

Ans: (2)

QUESTION

Two bodies with kinetic energies in the ratio of 4 : 1 are moving with equal linear momentum. The ratio of their masses is: **[NEET - 1999]**

1. 4 : 1
2. 1 : 1
3. 1 : 2
4. 1 : 4

Ans: (4)

QUESTION

Two bodies of masses m and $4m$ are moving with equal kinetic energies. The ratio of their linear momenta is:

[NEET - 1998, 1997, 1989]

$KE = \frac{p^2}{2m}$

1. 1 : 2
2. 1 : 4
3. 4 : 1
4. 1 : 1

Ans: (1)

QUESTION

A mass m is attached to a thin wire and whirled in a vertical circle. The wire is most likely to break when. **[NEET - 2019]**

1. inclined at an angle of 60° from vertical
2. the mass is at the highest point
3. the wire is horizontal
4. the mass is at the lowest point

Ans: (4)

QUESTION

What is the minimum velocity with which a body of mass m must enter a vertical loop of radius R so that it can complete the loop? **[NEET-I, 2016]**

1. $\sqrt{3gR}$
2. $\sqrt{5gR}$
3. $\sqrt{gR}$
4. $\sqrt{2gR}$

Ans: (2)

QUESTION

The potential energy of a long spring when stretched by 2 cm is U. If the spring is stretched by 8 cm, potential energy stored in it will be: **[NEET - 2023]**

1. 8U
2. 16U
3. 2U
4. 4U

Ans: (2)

QUESTION

A block of mass M is attached to the lower end of a vertical spring. The spring is hung from a ceiling and has force constant value k. The mass is released from rest with the spring initially unstretched. The maximum extension produced in the length of the spring will be:

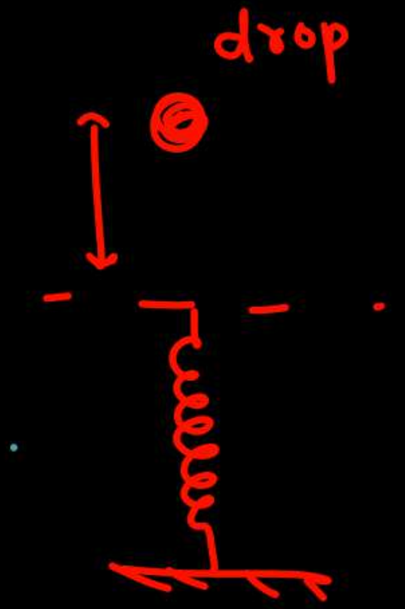
[NEET - 2009]

1. $2Mg/k$
2. $4Mg/k$
3. $Mg/2k$
4. Mg/k

Ans: (1)

QUESTION

A vertical spring with force constant k is fixed on a table. A ball of mass m at a height h above the free upper end of the spring falls vertically on the spring so that the spring is compressed by a distance d. The net work done in the process is: **[NEET - 2007]**



1. $mg(h+d)-\frac{1}{2}kd^2$
2. $mg(h-d)-\frac{1}{2}kd^2$
3. $mg(h-d)+\frac{1}{2}kd^2$
4. $mg(h+d)+\frac{1}{2}kd^2$

Ans: (1)

QUESTION

The potential energy of a long spring when stretched by 2 cm is U. If the spring is stretched by 8 cm the potential energy stored in it is: [NEET - 2006]

$$U = \frac{1}{2} k x^2$$

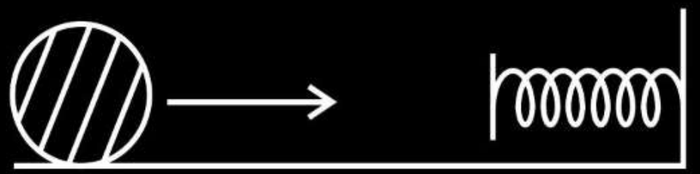
1. U/4
2. 4U
3. 8U
4. 16U

Ans: (4)

QUESTION

A mass of 0.5 kg moving with a speed of 1.5 m/s on a horizontal smooth surface, collides with a nearly weightless spring of force constant k = 50 N/m. The maximum compression of the spring would be:

[NEET - 2004]



1. 0.15 m
2. 0.12 m
3. 1.5 m
4. 0.5 m

Ans: (1)

QUESTION

A body of mass 1 kg is thrown upwards with a velocity 20 m/s. It momentarily comes to rest after attaining a height of 18 m. How much energy is lost due to air friction? (g = 10 m/s^2): **[NEET - 2009]**

1. 30 J
2. 40 J
3. 10 J
4. 20 J

Ans: (4)

QUESTION

300 J of work is done in sliding a 2 kg block up an inclined plane of height 10 m. Work done against friction is (Take $g = 10\ m/s^2$). [NEET - 2006]

1. 1000 J
2. 200 J
3. 100 J
4. Zero

$$W_g + W_N + W_f + W_F = \Delta KE$$

$$-2 \times 10 \times 10 + 0 + W_f + 300 = 0 - 0$$

$$W_f = -100$$

Ans: (3)

Question

A small bob tied at one end of a thin string of length 1 m is describing a vertical circle so that the maximum and minimum tension in the string are in the ratio 5:1. The velocity of the bob at the height position is m/s.(Take $g = 10\ \text{m/s}^2$)

[JEE Mains 2021]

Ans. (5)

Question

A ball of mass 4 kg, moving with a velocity of 10 ms^{-1}, collides with a spring of length 8 m and force constant 100Nm^{-1}. The length of the compressed spring is x m. The value of x, to the nearest integer, is [JEE Mains 2021]

Ans. (6)

Question

A pendulum bob has a speed of 3 m/s at its lowest position. The pendulum is 50 cm long. The speed of bob, when the length makes an angle of 60° to the vertical will be ($g = 10\ \text{m/s}^2$) m/s. [JEE Mains 2021]

Ans. (2)

Question

A body of mass 8 kg and another of mass 2 kg are moving with equal kinetic energy. The ratio of their respective momenta will be : [JEE Mains 2022]

A 1 : 1

B 2 : 1

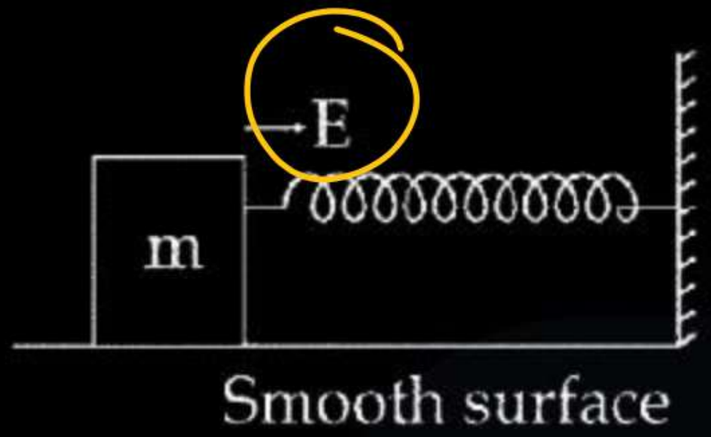
C 1 : 4

D 4 : 1

Ans. (B)

Question

A block of mass 'm' (as shown in figure) moving with kinetic energy E compresses a spring through a distance 25 cm when, its speed is halved. The value of spring constant of used spring will be $nE\text{Nm}^{-1}$ for $n =$ [JEE Mains 2022]



Ans. (24)

Question

If momentum of a body is increased by 20%, then its kinetic energy increase by

[JEE Mains 2022]

A 36%

B 40%

C 44%

D 48%

Ans. (C)

Question

A ball of mass 100 g is dropped from a height $h = 10$ cm on a platform fixed at the top of vertical spring (as shown in figure). The ball stays on the platform and the platform is depressed by a distance $\frac{h}{2}$. The spring constant is_____ Nm^{-1}. (Use $g = 10\ \text{ms}^{-2}$)

[JEE Mains 2022]

Ans. (120)

Question

A stone of mass m, tied to a string is being whirled in a vertical circle with a uniform speed. The tension in the string is : [JEE Mains 2022]

A the same throughout the motion

B minimum at the highest position of the circular path

C minimum at the lowest position of the circular path

D minimum when the rope is in the horizontal position

Ans. (B)

Question

A pendulum is suspended by a string of length 250 cm. The mass of the bob of the pendulum is 200 g. The bob is pulled aside until the string is at 60° with vertical as shown in the figure. After releasing the bob. the maximum velocity attained by the bob will be (if $g = 10\ \text{m/s}^2$) [JEE Mains 2022]

Ans. (5)

% दील ques

$$KE = \frac{p^2}{2m}$$

QUESTION

Three bodies A, B and C have equal kinetic energies and their masses are 400 g, 1.2 kg and 1.3 kg respectively. The ratio of their linear momenta is: **[8 April, 2024 (I)]**

1. $1 : \sqrt{3} : 2$
2. $1 : \sqrt{3} : \sqrt{2}$
3. $\sqrt{2} : \sqrt{3} : 1$
4. $\sqrt{3} : \sqrt{2} : 1$

Ans : (1)

QUESTION

Four particles A, B, C, D of mass $m/2$, m, $2m$, $4m$ have same momentum, respectively. The particle with maximum kinetic energy is: **[6 April, 2024 (I)]**

1. D
2. C
3. A
4. B

Ans : (3)

QUESTION

When kinetic energy of a body becomes 36 times of its original value, the percentage increase in the momentum of the body will be: **[6 April, 2024 (II)]**

1. 500%
2. 600%
3. 6%
4. 60%

Ans : (1)

QUESTION

Two bodies of mass 4 g and 25 g are moving with equal kinetic energies. The ratio of magnitude of their linear momentum is: [27 Jan, 2024 (I)]

1. 3 : 5
2. 5 : 4
3. 2 : 5
4. 4 : 5

Ans : (3)

QUESTION

Two bodies are having kinetic energies in the ratio 16 : 9. If they have same linear momentum, the ratio of their masses respectively is: **[13 April, 2023 (I)]**

1. 4 : 3
2. 3 : 4
3. 16 : 9
4. 9 : 16

Ans : (4)

QUESTION

The momentum of a body is increased by 50%. The percentage increase in the kinetic energy of the body is ____ %.

[8 April, 2023 (I)]

Ans : (125)

QUESTION

If momentum of a body is increased by 20%, then its kinetic energy increases by:

[29 July, 2022 (II)]

1. 36%
2. 40%
3. 44%
4. 48%

Ans : (3)

QUESTION

If the Kinetic energy of a moving body becomes four times its initial Kinetic energy, then the percentage change in its momentum will be: **[20 July, 2021 (II)]**

1. 100%
2. 200%
3. 300%
4. 400%

Ans : (1)

QUESTION

Two particles having masses 4 g and 16 g respectively are moving with equal kinetic energies. The ratio of the magnitudes of their momentum is n : 2. The value of n will be.

[25 Feb, 2021 (II)]

Ans : (1)

QUESTION

Two solids A and B of mass 1 kg and 2 kg respectively are moving with equal linear momentum. The ratio of their kinetic energies $(K.E.)^A : (K.E.)_B$ will be A/2, so the value of A will be _____.

[24, Feb, 2021 (II)]

Ans : (2)

QUESTION

A force $F = \alpha + \beta x^2$ acts on an object in the x-direction. The work done by the force is 5 J when the object is displaced by 1 m. If the constant $\alpha = 1$ N then β will be:

[24 Jan. 2025 - Shift 1]

1. $15\ N/m^2$
2. $12\ N/m^2$
3. $8\ N/m^2$
4. $10\ N/m^2$

$$W_D = 5 = \int_0^1 (\alpha + \beta x^2)\, dx$$

Ans : (2)

QUESTION

A force $f = x^2y\hat{i} + y^2\hat{j}$ acts on a particle in a plane $x + y = 10$. The work done by this force during a displacement from (0, 0) to (4m, 2m) is _____ Joule. (round off to the nearest integer).

[23 Jan. 2025 - Shift 1]

$y = 10 - x$

$$W_D = \int_0^4 x^2 y\,dx + \int_0^2 y^2\,dy$$

Ans : (152)

QUESTION

A force $\vec{F} = 2\hat{i} + b\hat{j} + \hat{k}$ is applied on a particle and it undergoes a displacement $\hat{i} - 2\hat{j} - \hat{k}$. What will be the value of b, if work done on the particle is zero.

[22 Jan. 2025 - Shift 2]

1. 0
2. 1/2
3. 2
4. 1/3

Ans : (2)

QUESTION

A particle of mass m moves on a straight line with its velocity increasing with distance according to the equation $v = \alpha\sqrt{x}$, where α is a constant. The total work done by all the forces applied on the particle during its displacement from $x = 0$ to $x = d$, will be:

[09 April 2024 - Shift 1]

$\frac{1}{2}m(\alpha\sqrt{d})^2$

1. $\frac{m}{2\alpha^2 d}$
2. $\frac{md}{2\alpha^2}$
3. $2m\alpha^2 d$
4. $\frac{m\alpha^2 d}{2}$

Ans : (4)

QUESTION

A force $(3x^2 + 2x - 5)$ displaces a body from $x = 2$ m to $x = 4$ m. Work done by this force is ____ J.

[09 April 2024 - Shift 2]

$$\int_2^4 (\quad)\, dx$$

Ans : (58)

QUESTION

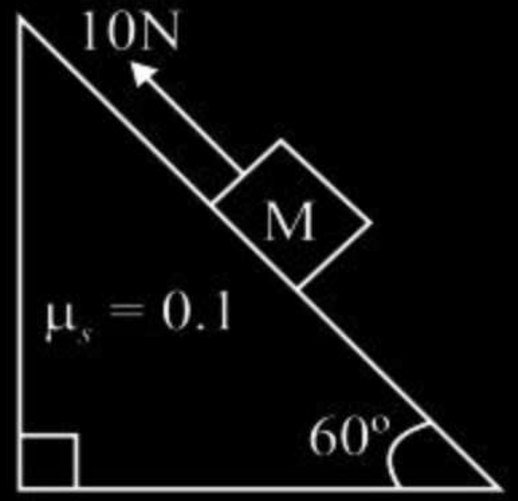
A block of mass 1 kg is pushed up a surface inclined to horizontal at an angle of 60° by a force of 10 N parallel to the inclined surface as shown in figure. When the block is pushed up by 10 m along inclined surface, the work done against frictional force is:
$[g = 10\ m/s^2]$

[30 Jan, 2024 (II)]

$\mu mg\cos\theta \times 10$

$= 0.1 \times 10 \times \frac{1}{2} \times 10$

$= 5$



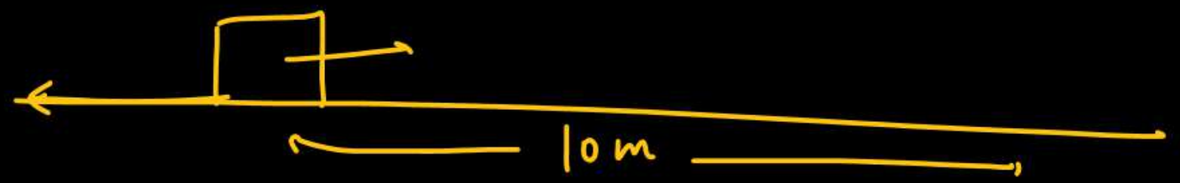
1. $5\sqrt{3}$J
2. 5 J
3. 5×10^3 J
4. 10 J

Ans : (2)

QUESTION

A block of mass 100 kg slides over a distance of 10 m on a horizontal surface. If the co-efficient of friction between the surfaces is 0.4, then the work done against friction (in J) is:

[29 January 2024 - Shift 1]



$\mu mg \times 10$

1. 4200
2. 3900
3. 4000
4. 4500

Ans : (3)

QUESTION

Identify the correct statements from the following:

(A) Work done by a man in lifting a bucket out of a well by means of a rope tied to the bucket is negative.

(B) Work done by gravitational force in lifting a bucket out of a well by a rope tied to the bucket is negative.

(C) Work done by friction on a body sliding down an inclined plane is positive.

(D) Work done by an applied force on a body moving on a rough horizontal plane with uniform velocity in zero.

(E) Work done by the air resistance on an oscillating pendulum in negative.

Choose the correct answer from the options given below: **[29 January 2023 - Shift 2]**

1. B and E only
2. A and C only
3. B, D and E only
4. B and D only

Ans : (1)

QUESTION

A body of mass 0.5 kg travels on straight line path with velocity $v = (3x^2 + 4)$ m/s. The net workdone by the force during its displacement from $x = 0$ to $x = 2$ m is:

[25 July, 2022]

1. 64 J
2. 60 J
3. 120 J
4. 128 J

$K_i = \checkmark$

$K_f = \checkmark$

Ans : (2)

QUESTION

A particle of mass 500 gm is moving in a straight line with velocity $\upsilon = bx^{5/2}$. The work done by the net force during its displacement from $x = 0$ to $x = 4$ m is:
(Take $b = 0.25\ m^{-3}/2s^{-1}$).

[29 June, 2022(I)]

1. 2 J
2. 4 J
3. 8 J
4. 16 J

Ans : (4)

QUESTION

$mg\,3x\sin\theta = \mu mg\cos\theta\, x$

A small block starts slipping down from a point B on an inclined plane AB, which is making an angle θ with the horizontal section BC is smooth and the remaining section CA is rough with a coefficient of friction μ. It is found that the block comes to rest as it reaches the bottom (point A) of the inclined plane. If BC = 2AC, the coefficient of friction is given by $\mu = k\tan\theta$. The value of k is _____.

[2 Sep. 2020 (I)]

$AC = x$

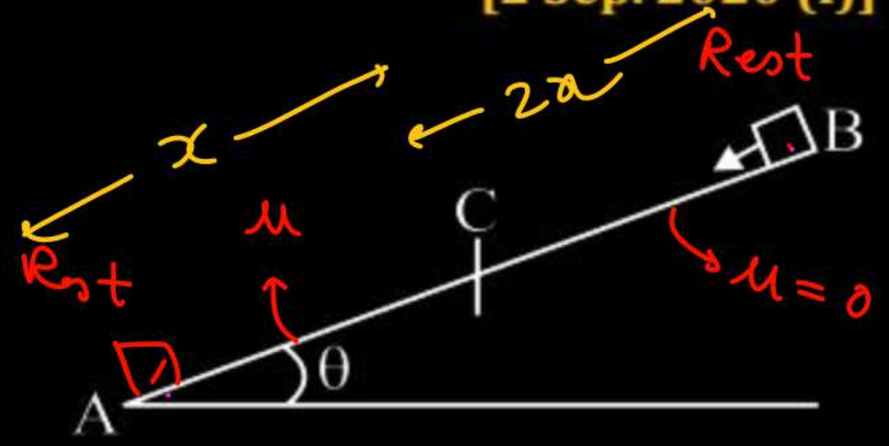
$BC = 2x$

$W_g + W_f = \Delta KE$

$mg\,3x\sin\theta + (0 - \mu mg\cos\theta\, x) = 0 - 0$

$3\sin\theta = \mu\cos\theta$

$\mu = 3\tan\theta$



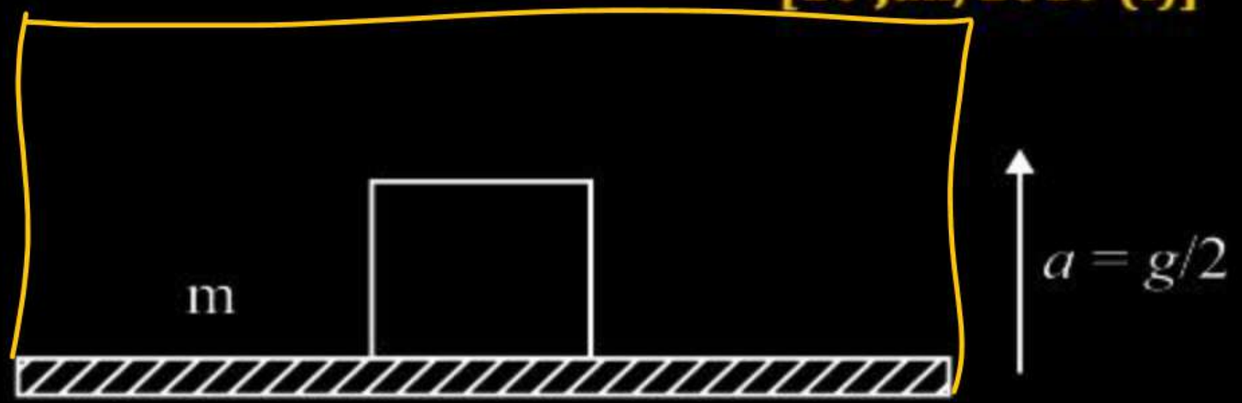
Ans : (3)

QUESTION

H/W

A block of mass m is kept on a platform which starts from rest with constant acceleration $g/2$ upward, as shown in fig. work done by normal reaction on block in time t is:

[10 Jan, 2019 (I)]



1. $-\frac{mg^2t^2}{8}$
2. $\frac{mg^2t^2}{8}$
3. 0
4. $\frac{3mg^2t^2}{8}$

Ans : (4)

QUESTION

A spring of spring constant 5×10^3 N/m is stretched initially by 5 cm from the unstretched position. Then the work required to stretch it further by another 5 cm is:

[2003]

$x_i = 5$

$x_f = 10$

$\frac{1}{2} k (10^2 - 5^2)$

1. 12.50 N-m
2. 18.75 N-m
3. 25.00 N-m
4. 6.25 N-m

Ans : (2)

QUESTION

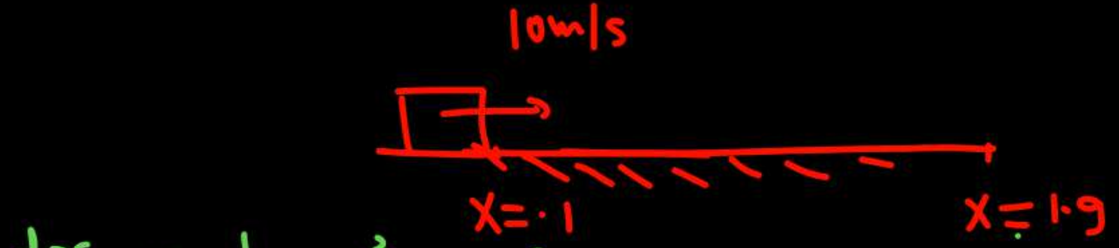
$\mu = \mu_0 x$

A block of mass 1 kg, moving along x with speed v_i = 10 m/s enters a rough region ranging from x = 0.1m to x = 1.9 m. The retarding force acting on the block in this range is $F_r = -kx$ N, with k = 10 N/m. then the final speed of the block as it crosses rough region is:

$50 - \frac{2 \times 1.8 \times 5}{2} = \frac{v^2}{2}$

[3 April, 2025 (II)]

1. 10 m/s
2. 4 m/s
3. 6 m/s
4. 8 m/s



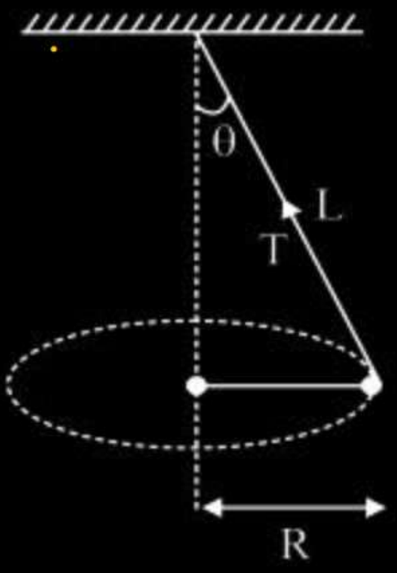
$$\int_{.1}^{1.9} -kx\,dx = \frac{1}{2}mv^2 - \frac{1}{2}m \times 10^2$$

$$-10\,\frac{(1.9)^2-(.1)^2}{2} + \frac{1}{2} \times 1 \times 100 = \frac{1}{2} \times 1 \times v^2$$

Ans : (4)

QUESTION

A string of length L is fixed at one end and carries a mass of m at the other end. The mass makes $(3/\pi)$rotations per second about the vertical axis passing through end of the string as shown. The tension in the string is _____ ML. **[24 Jan, 2025 (II)]**



Ans : (36)

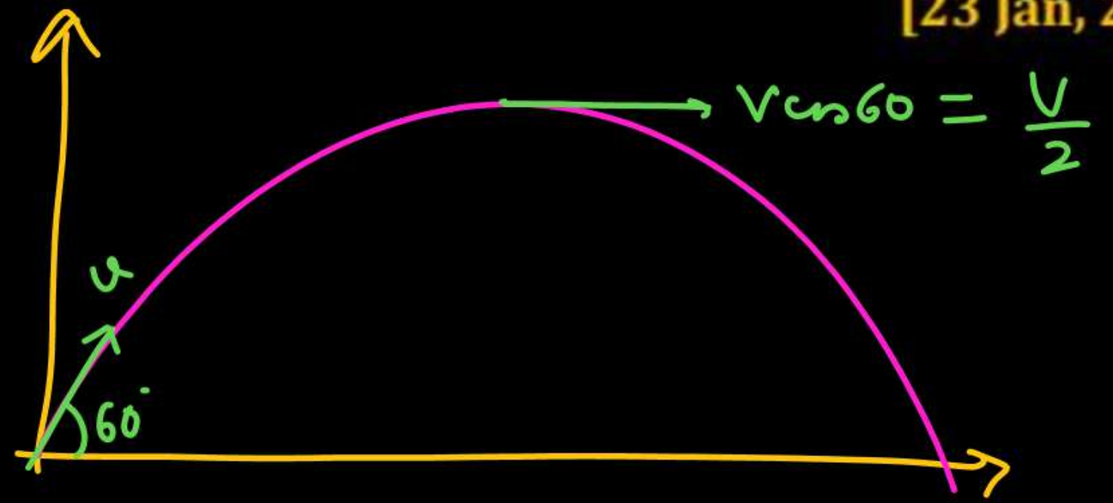
QUESTION

(5 वर JEE main में)

A ball having kinetic energy KE, is projected at an angle of 60° from the horizontal. What will be the kinetic energy of ball at the highest point of its flight?

[23 Jan, 2025 (II)]

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



1. $\frac{(KE)}{8}$
2. $\frac{(KE)}{2}$
3. $\frac{(KE)}{16}$
4. $\frac{(KE)}{4}$

Ans : (4)

QUESTION

A ball of mass 100 g is projected with velocity 20 m/s at 60° with horizontal. The decrease in kinetic energy of the ball during the motion from point of projection to highest point is:

[22 Jan, 2025 (II)]

1. 20 J
2. 15 J
3. Zero
4. 5 J

Ans : (2)

QUESTION

A bullet of mass 50 g is fired with a speed 100 m/s on a plywood and emerges with 40 m/s. The percentage loss of kinetic energy is: **[06 April 2024 - Shift 1]**

1. 84%
2. 16%
3. 32%
4. 14%

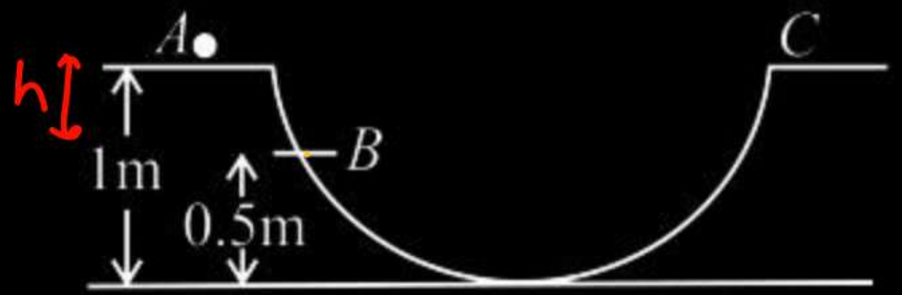
Ans : (1)

QUESTION

A particle is placed at the point A of a frictionless track ABC as shown in figure. It is gently pushed toward right. The speed of the particle when it reaches the point B is: (Take $g = 10\ m/s^2$).

[30 Jan, 2024 (I)]

$\sqrt{2gh} = \sqrt{2 \times 10 \times .5}$



1. 20 m/s
2. $\sqrt{10}$ m/s
3. $2\sqrt{10}$ m/s
4. 10 m/s

Ans : (2)

QUESTION

$W_D = \int \vec{F} \cdot d\vec{s}$

An object of mass '*m*' initially at rest on a smooth horizontal plane starts moving under the action of force F = 2 N. In the process of its linear motion, the angle θ (as shown in figure) between the direction of force and horizontal varies as θ = *kx*, where *k* is a constant and *x* is the distance covered by the object from its initial position. The expression of kinetic energy of the object will be $E = \frac{n}{k}\sin\theta$. The value of *n* is:

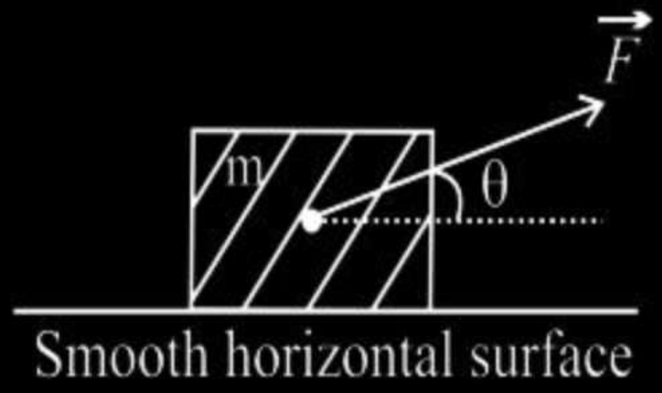
[25 Jan, 2023 (I)]

$\int \vec{F} \cdot d\vec{x} = \Delta K \cdot \varepsilon$

$n = 2$

$\Delta K\varepsilon = \int 2 \cdot dx \cdot \cos kx =$

$= 2\int \cos kx\, dx = \frac{2}{k}(\sin kx)$



Ans : (2)

QUESTION

A ball is projected with kinetic energy e, at an angle of 60° to the horizontal. The kinetic energy of this ball at the highest point of its flight will become: [29 July, 2022 (I)]

1. Zero
2. E/2
3. E/4
4. E

Ans : (3)

QUESTION

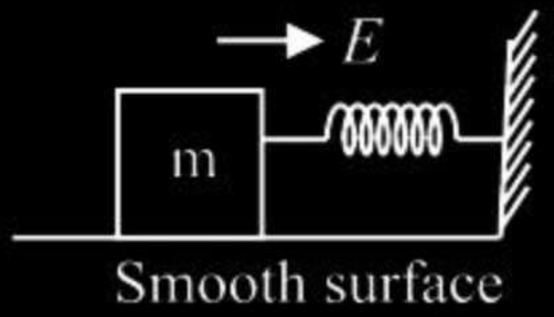
A block of mass '*m*' (as shown in figure) moving with kinetic energy *E* compresses a spring through a distance 25 cm when, its speed is halved. The value of spring constant of used spring will be nE Nm^{-1} for n = _____.

[28 July, 2022 (I)]

$\frac{K}{4}$

$W_g + W_N + W_{sp} = \Delta K.E.$

$0 + 0 - \frac{1}{2}K\left((.25)^2 - 0^2\right) = \frac{E}{4} - E$



Ans : (24)

QUESTION

A body of mass 8 kg and another of mass 2 kg are moving with equal kinetic energy. The ratio of their respective momenta will be:

[26, July, 2022 (I)]

1. 1 : 1
2. 2 : 1
3. 1 : 4
4. 4 : 1

Ans : (2)

QUESTION

Two bodies A and B of masses 5 kg and 8 kg are moving such that the momentum of body B is twice that of the body A. The ratio of their kinetic energies will be:

[30 June, 2022 (I)]

1. 4 : 5
2. 2 : 5
3. 5 : 4
4. 5 : 2

Ans : (2)

QUESTION

hcv

A body of mass 'm' dropped from a height 'h' reaches the ground with a speed of $0.8\sqrt{gh}$. The value of workdone by the air-friction is: **[1 Sep, 2021 (II)]**

1. $-0.68mgh$
2. mgh
3. $1.64mgh$
4. $0.64mgh$

Ans : (1)

QUESTION

As shown in the figure, a particle of mass 10 kg is placed at a point A. When the particle is slightly displaced to its right, it starts moving and reaches the point B. The speed of the particle at B is x m/s.

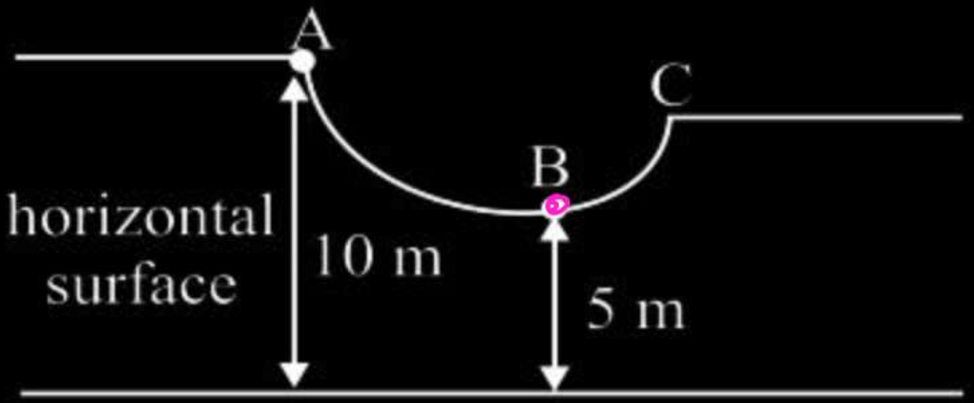
(Take $g = 10$ m/s^2) The value of 'x' to the nearest integer is _____. **[18 March, 2021 (I)]**

$mgx5 = \frac{1}{2}mv^2$

$v^2 = 2gx5$

$v = \sqrt{2x10x5}$

$v = 10$



Ans : (10)

QUESTION

***

440V

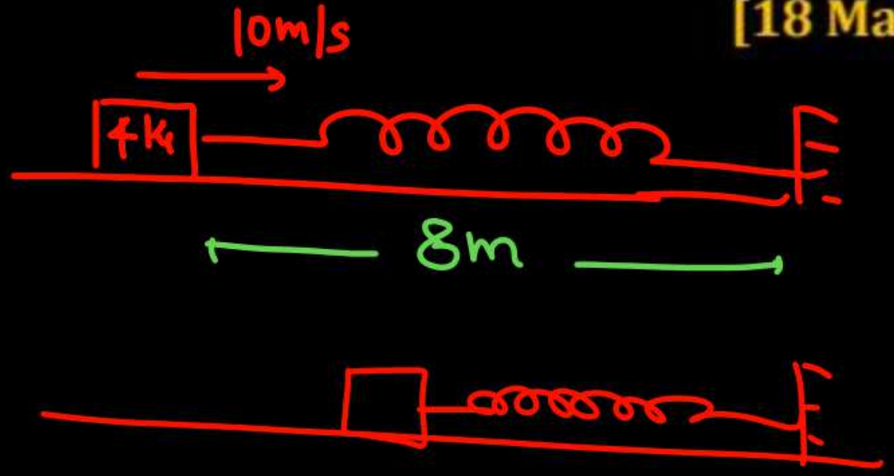
Ans 8-x

A ball of mass 4 kg, moving with a velocity of 10 ms^{-1}, collides with a spring of length 8 m and force constant 100 Nm^{-1}. The length of the compressed spring is x m. The value of x, to the nearest integer, is _____.

[18 March, 2021 (II)]

copy

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



Ans : (6)

QUESTION

A particle is projected at 60° to the horizontal with a kinetic energy K. the kinetic energy at the highest point. [2007]

1. K/2
2. K
3. Zero
4. K/4

Ans : (4)

QUESTION

A particle of mass 100 g is thrown vertically upwards with a speed of 5 m/s. The work done by the force of gravity during the time the particle goes up is: [2006]

1. –0.5 J
2. –1.25 J
3. 1.25 J
4. 0.5 J

Ans : (2)

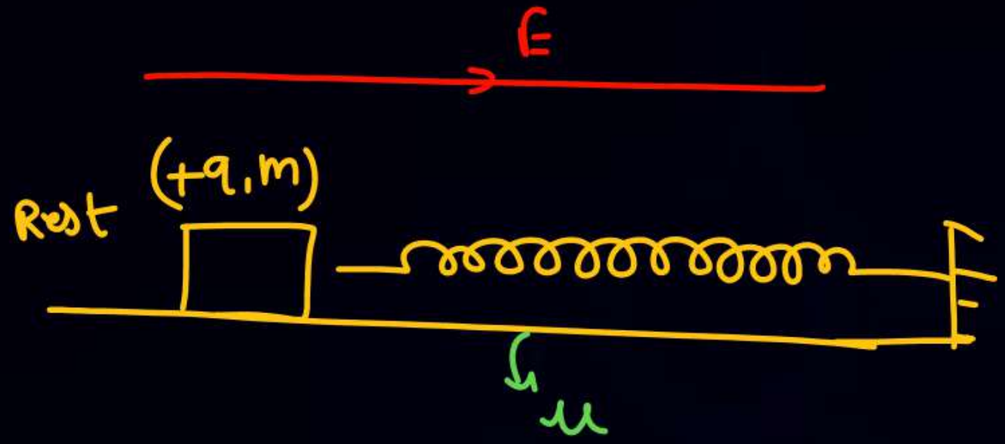
QUESTION

A particle is acted upon by a force of constant magnitude which is always perpendicular to the velocity of the particle, the motion of the particle takes place in a plane. It follows that. [2004]

1. Its kinetic energy is constant
2. Its acceleration is constant
3. Its velocity is constant
4. It moves in a straight line

Ans : (1)

Q find max compression in spring

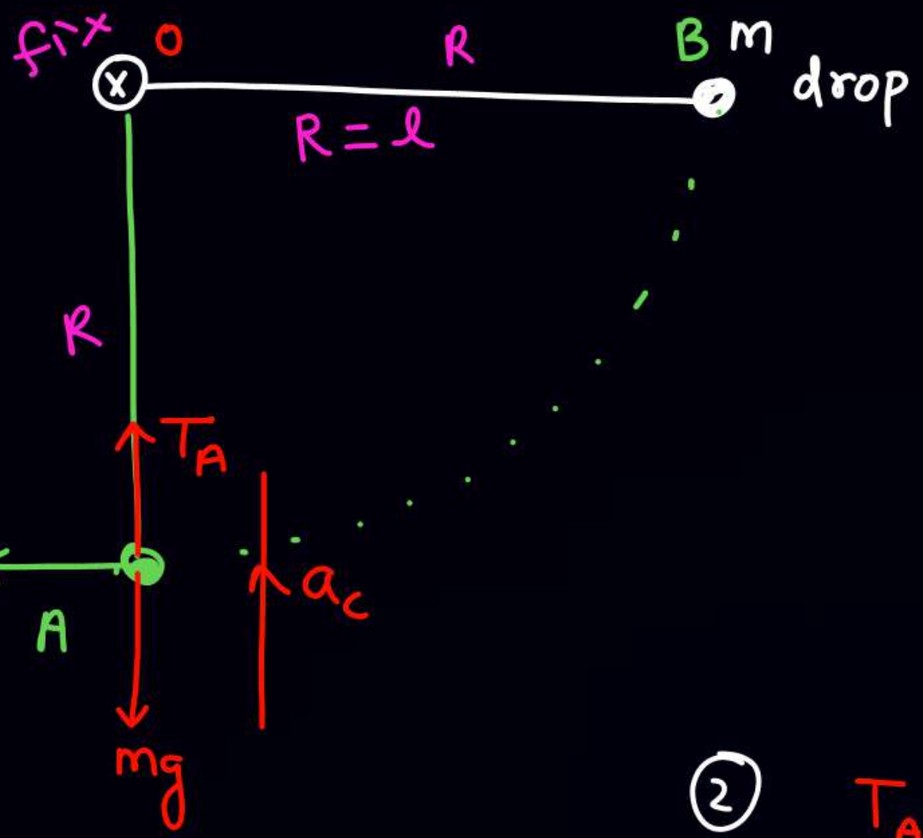


Sol^n

$$W_g + W_N + W_f + W_{sp} + W_{E.F.} = \Delta KE$$

$$0 + 0 - \mu mgx - \frac{1}{2}k(x^2 - 0^2) + qE.x = 0 - 0$$

$E = \sigma/2\epsilon_0$



① ①

Soln

B ⟶ A

$W_g + W_T = \Delta K.E.$

$+mgR + 0 = \frac{1}{2}mV^2 - 0$

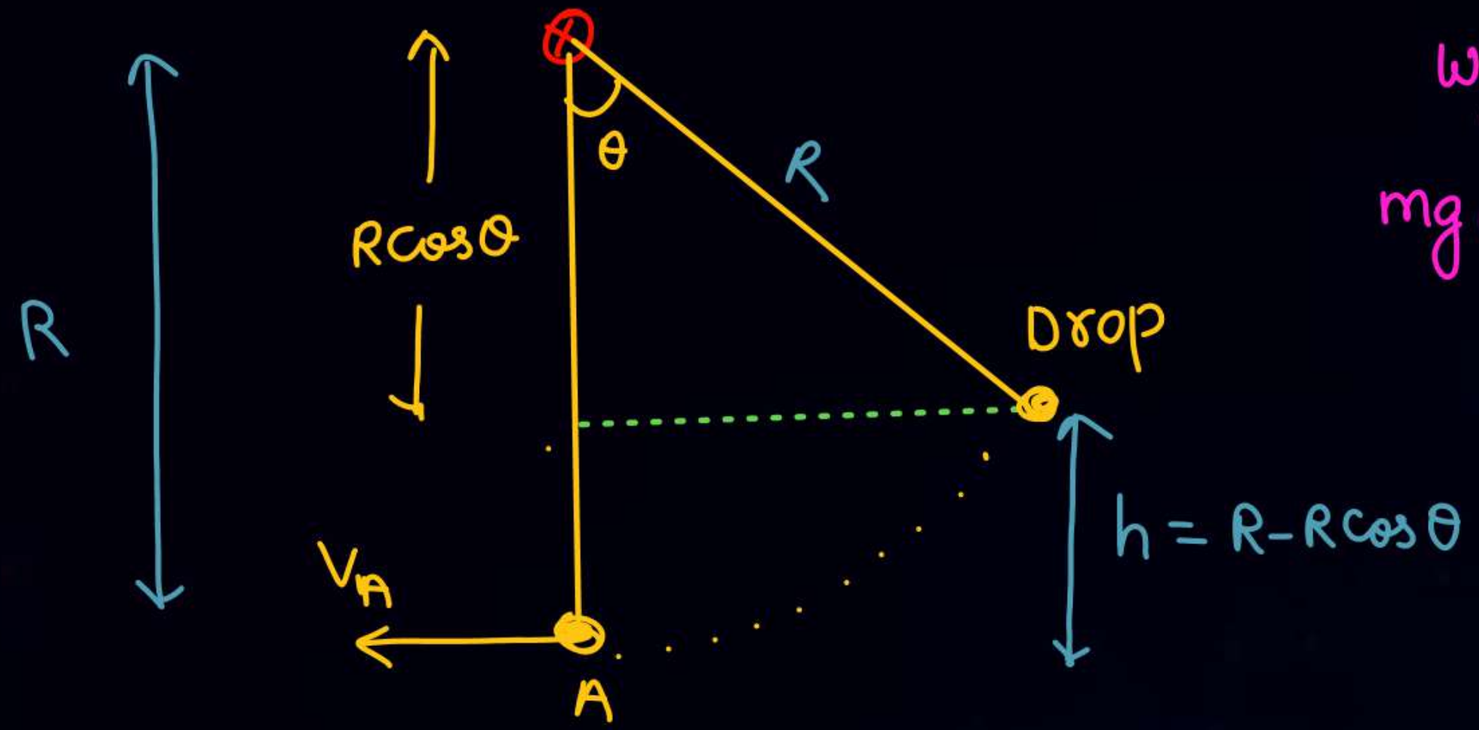
$V = \sqrt{2gR}$

find V_A & T_A

② $T_A - mg = \frac{mV^2}{R}$

$\boxed{T_A = 3mg}$

Q



$V_A = ?$

$W_g + W_T = \Delta KE$

$mg(R - R\cos\theta) + 0 = \frac{1}{2}mV_A^2 - 0$

Q Find min velocity at 'A' so that particle reaches at 'B'.

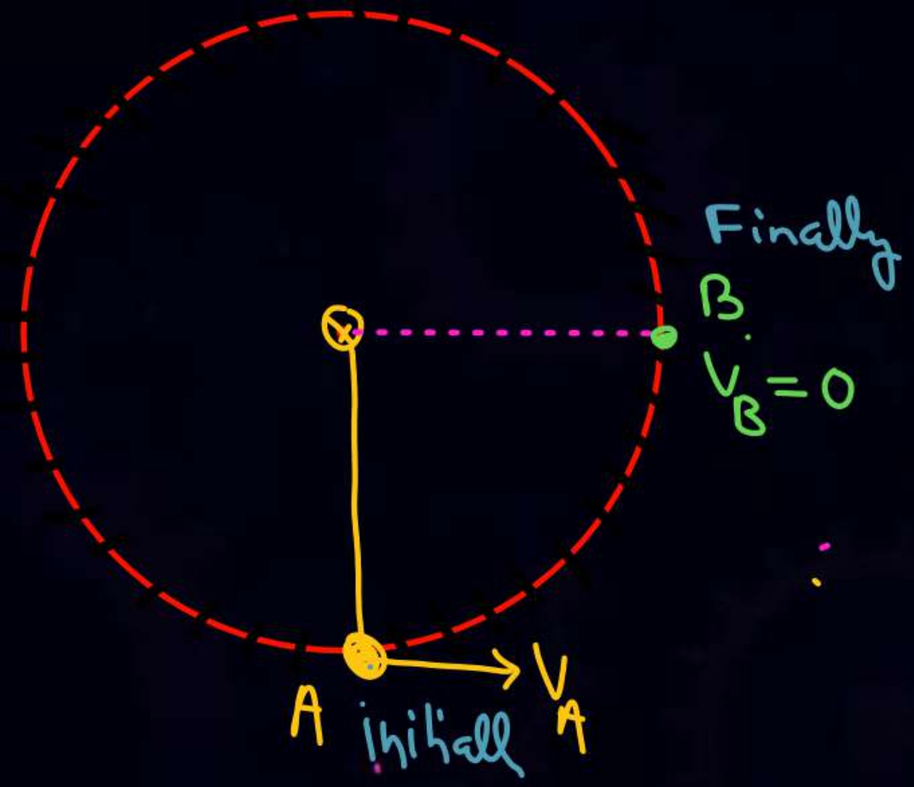
or

Find velocity at A so that string becom horizontal.

Sol' $W_g + W_T = \Delta K.E.$

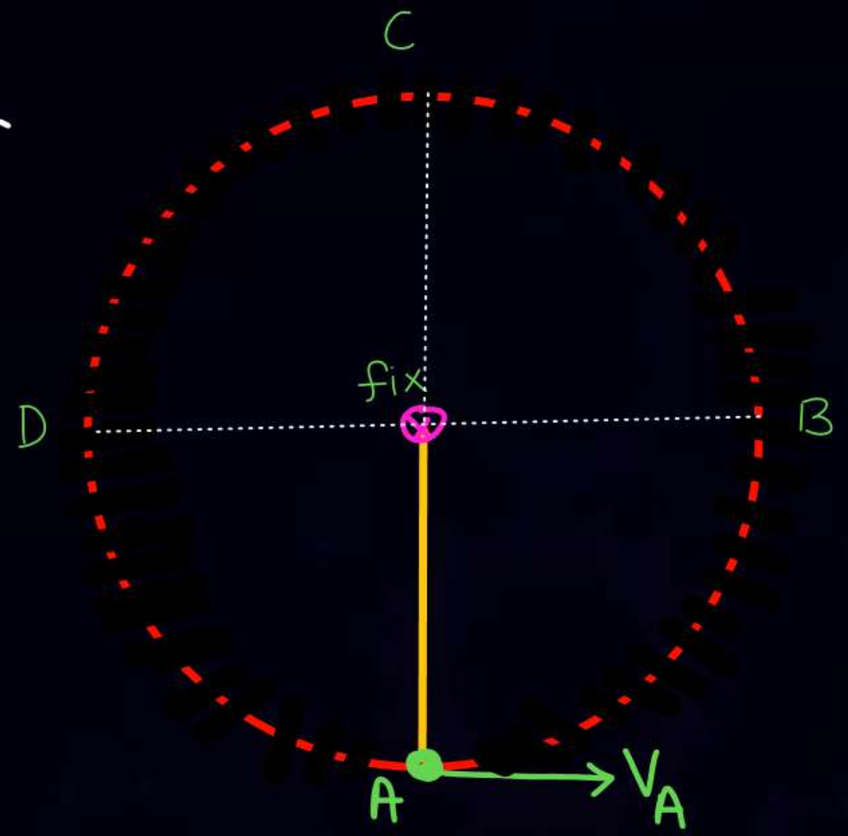
$$-mgR + 0 = 0 - \frac{1}{2}mV_A^2$$

$$\boxed{V_A = \sqrt{2gR}}$$



Q Find min velocity at 'A' so that it complete vertical circular motion.

Sol^{n} Ans $v_A = \sqrt{5gR}$



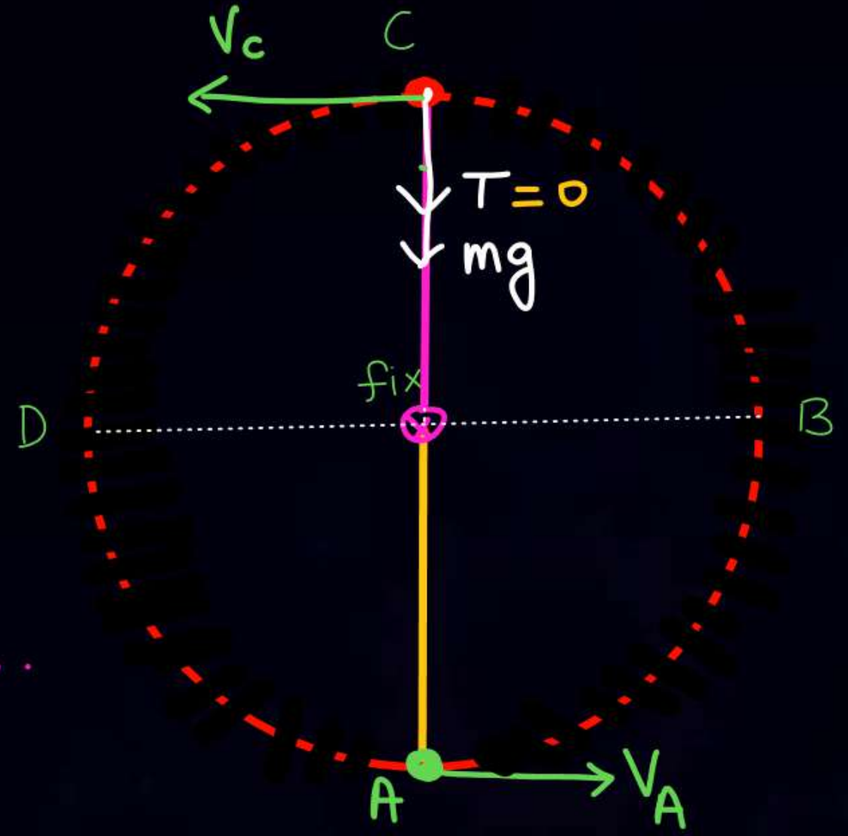
At C

$$mg + T = \frac{mV_c^2}{R}$$

At highest Point $T = 0$

$$mg = \frac{mV^2}{R}$$

$V_c = \sqrt{gR} = (V_{min})_{at\ C}$ so that V.C.M. complete.



$(A \longrightarrow C)$ W.E.T

$$W_g + W_T = \Delta KE$$

$$-mg2R + 0 = \frac{1}{2}m\left(\sqrt{gR}\right)^2 - \frac{1}{2}mV_A^2$$

$$\boxed{V_A = \sqrt{5gR} = (V_{min})_A}$$

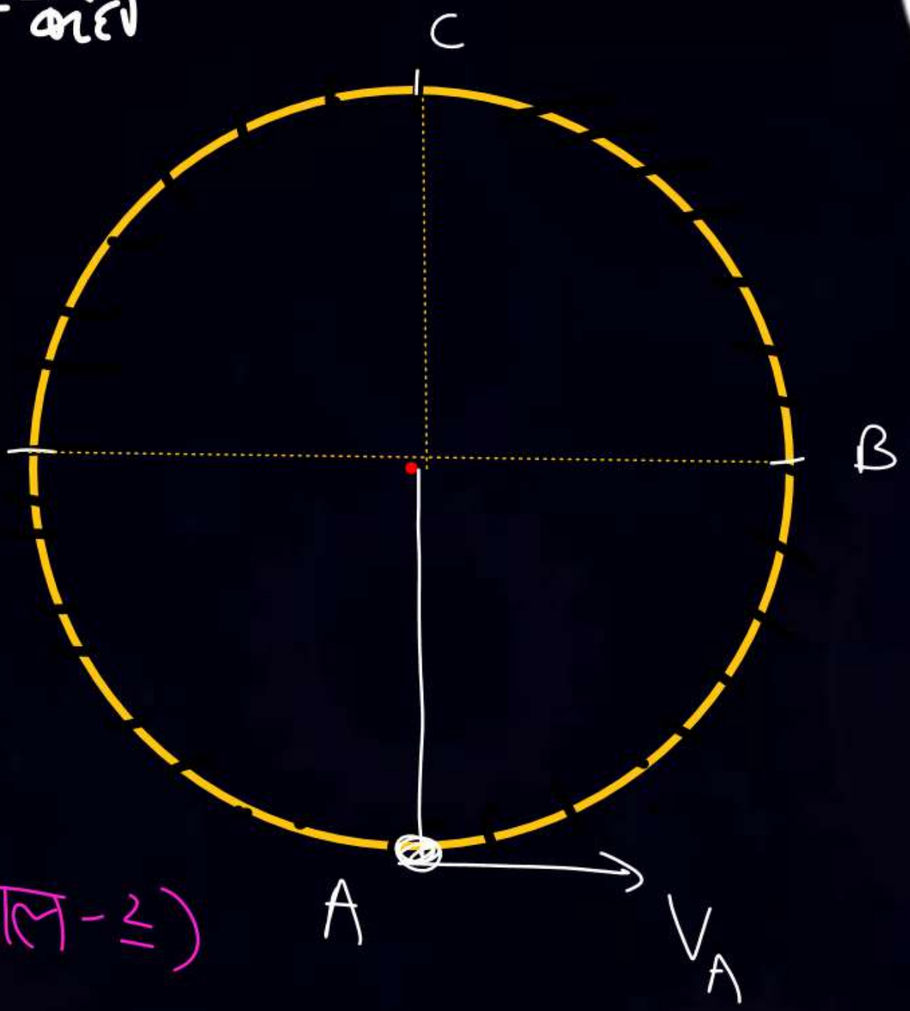
$v_A < \sqrt{2gR}$ ⟶ B तक नहीं पहुँचेगा
$v = 0$, B से पहले ही कहीं

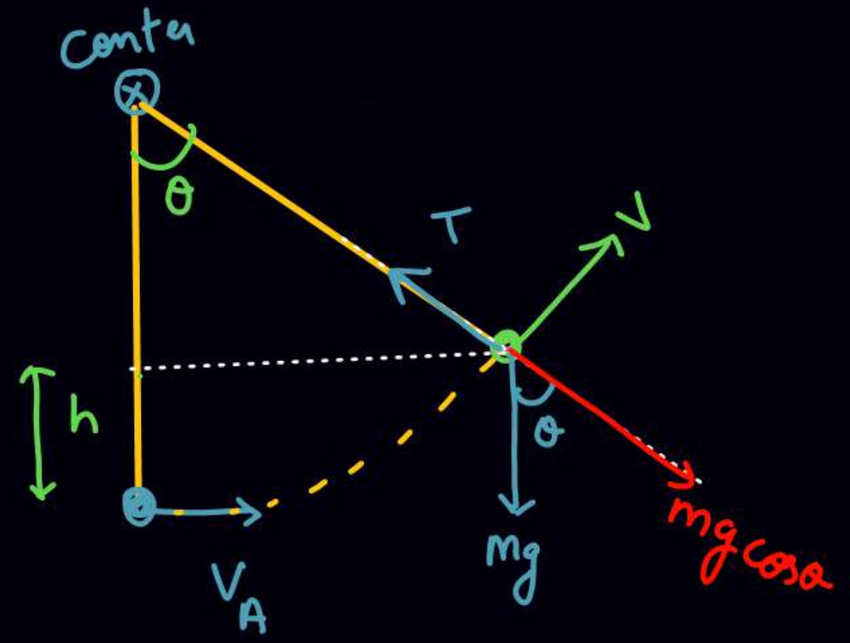
$v_A = \sqrt{2gR}$ ⟶ B tak pahuchega
$V_B = 0$

$\sqrt{2gR} < v < \sqrt{5gR}$ ⟶ V.C.M. Complete X
B को Cross.
↳ b/w B & C $T = 0$

$V_A = \sqrt{5gR}$ V.C.M. just Complete
mg ने इज्जत बचा ली
$T_C = 0$, $v_C = \sqrt{gR}$ (वाल-2)

$V_A > \sqrt{5gR}$ ⟶ चमचमाता हुआ V.C.M.





SKC

- jaise-2 particle upar jayega...
  speed ↓, T ↓

$$W_g + W_T = \Delta KE$$

$$-mgh + 0 = \frac{1}{2}mV^2 - \frac{1}{2}mV_A^2$$

$$\boxed{V^2 = V_A^2 - 2gh}$$

$$T - mg\cos\theta = \frac{mV^2}{R}$$

$$\boxed{T = mg\cos\theta + \frac{mV^2}{R}}$$

Home work

- Complete Circular motion 50 qus KPP ASAP
  soln vedio is uploaded
- Solve today qus attached in ppt (JM+NEET PYQ
- KPP (Basic level for your calculation & speed)
  → will be uploaded today evening

Thank you