PHYSICS

BOOKS - CAREER POINT

UNIT TEST 2

Physics

1. Figure shows a uniform rod of mass 3 kg and of length 30 cm. The strings shown in figure are pulled by constant forces of 20 N and 32 N

.The acceleration of the rod is-

A. $2m/s^2$

B. $3m/s^2$

C. $4m/s^2$

D. $6m/s^2$

Answer:

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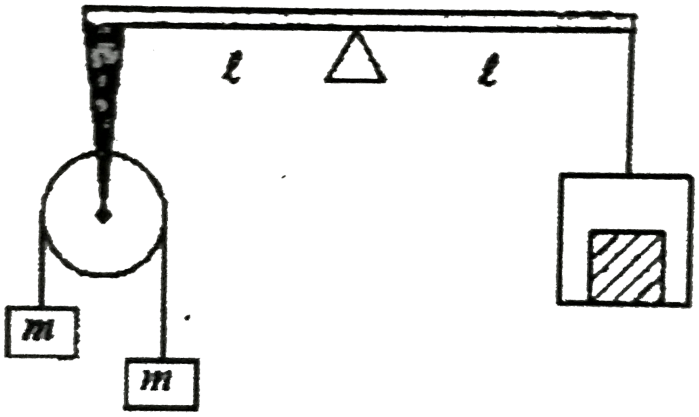
2. A pulley is attached to one arm of a balance and a string passed around it carries two masses m_1 and m_2. The pulley is provided with a clamp due to which m_1 and m_2 do not move. On removing the clamp, m_1 and m_2 start moving. How much change in counter mass has to be made to restore balance ?



A. $\frac{g(m_1 - m_2)^2}{(m_1 + m_2)}$ to be reduced

B. $\frac{g(m_1 - m_2)^2}{(m_1 + m_2)}$ to be increased

C. $\frac{g(m_1 - m_2)}{(m_1 + m_2)}$ to be increased

D. $\frac{g(m_1 - m_2)}{(m_1 + m_2)}$ to be increased

Answer:

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3. A bullet is fired from a gun. The force on the bullet is given by $F = 600 - 2 \times 10^5$ t, where

F is in newtons and t in seconds. The force on the bullet becomes zero as soon as it leaves the barrel. What is the average impulse imparted to the bullet?

A. 9N-s

B. zero

C. 0.9N-s

D. 1.8N-s

Answer:

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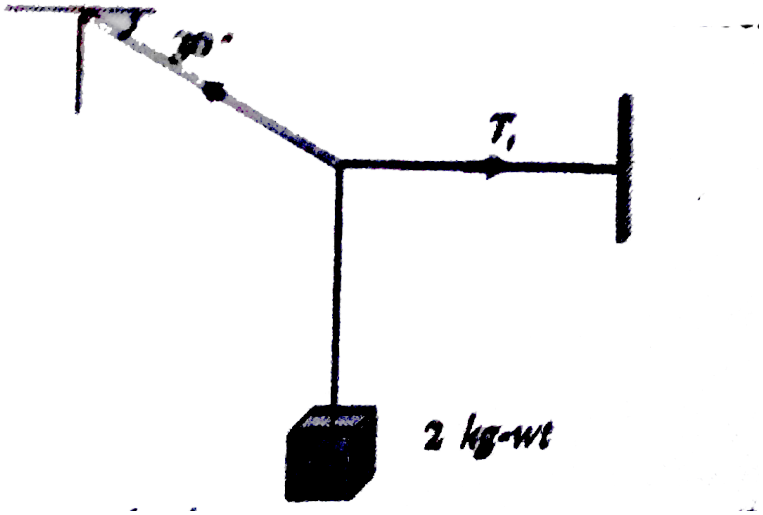
4. A body of weight 2 kg is suspended as shown in the figure. The tension T_1 in the horizontal string (in kg wt) is



A. $2/\sqrt{3}$

B. $\sqrt{3}/2$

C. $2\sqrt{3}$

D. 2

Answer:

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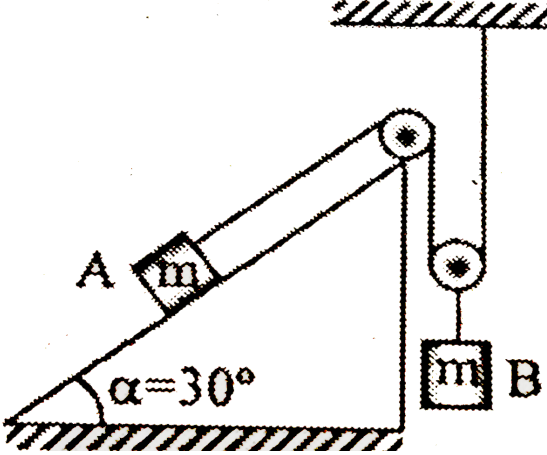
5. In an arrangement shown in the figure, the acceleration of block A and B are given-



A. $g/3, g/6$

B. $g/6, g/3$

C. $g/2, g/2$

D. 0,0

Answer:

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6. The force exerted by the lift on the foot of a person standing in it, is more then his weight then the lift is-

(a) going up and slowing down , (b) going up and speeding up

(c) going down and slowing down , (d) going down and speeding up

A. a,c

B. b,c

C. a,d

D. b,d

Answer:

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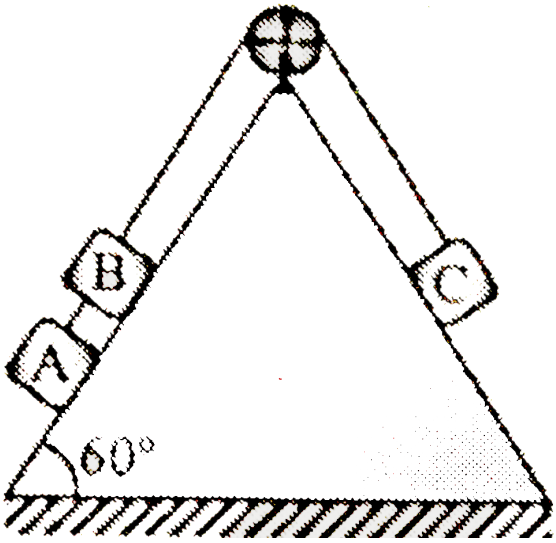
7. As shown in figure A, B and C are 1 kg, 3 kg and 2 kg respectively. The acceleration of the

system is -



A. $5ms^{-2}$

B. $4.11ms^{-2}$

C. $4ms^{-2}$

D. $5.11ms^{-2}$

Answer:

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8. A particle of mass $2kg$ is initially at rest. A force starts acting on it in one direction whose magnitude changes with time. The force time graph is shown in figure. Find the

velocity of the particle at the end of $10s$.

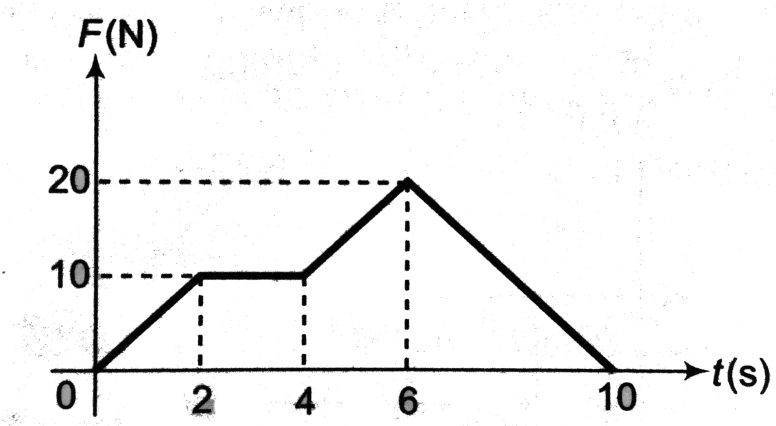

Fig. 11.29

A. $20ms^{-1}$

B. $10ms^{-1}$

C. $75ms^{-1}$

D. $50ms^{-1}$

Answer:

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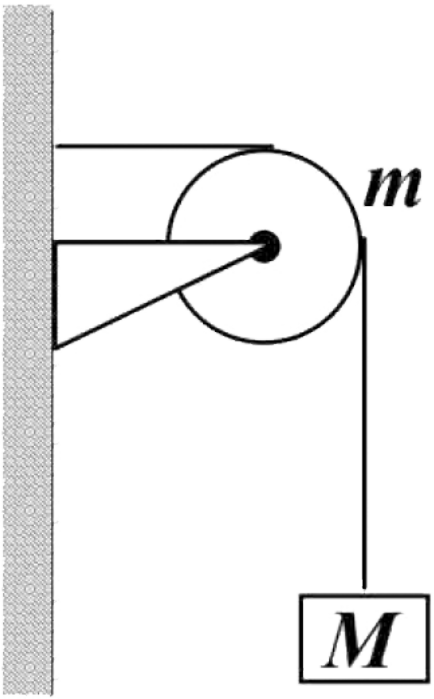
9. A string of negligible mass going over a clamped pulley of mass m supports a block of mass M as shown in the figure. The force on

the pulley by the clamp is given by



A. $\sqrt{2Mg}$

B. $\sqrt{2mg}$

C. $\left(\sqrt{(M+m)^2+m^2}\right)g$

D. $\left(\sqrt{(M+m)^2+M^2}\right)g$

Answer:

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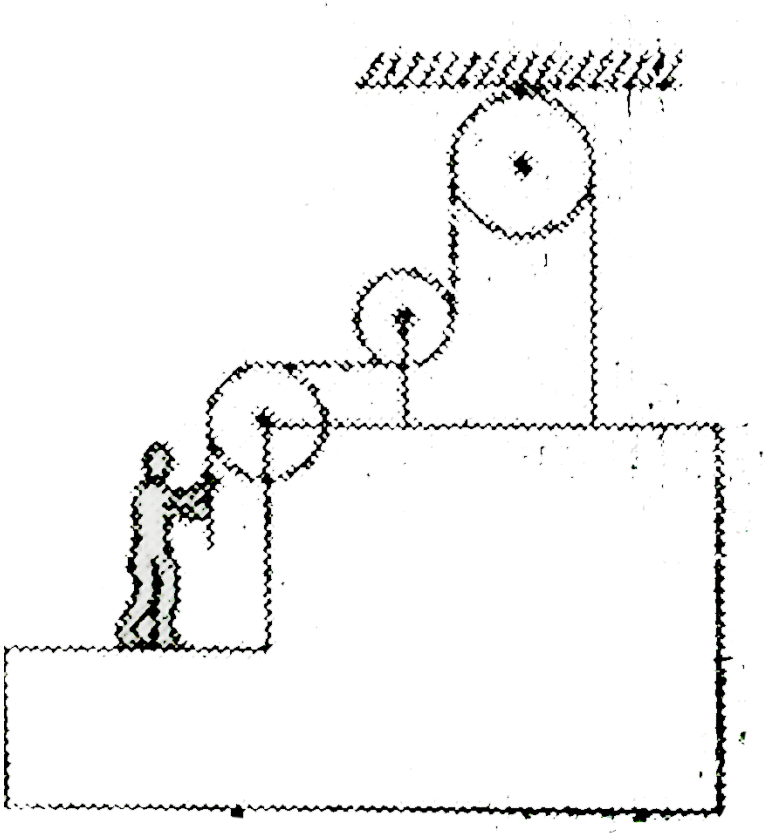
10. A system is shown in the figure. A man standing on the block is pulling the rope. Velocity of the point of string in contact with the hand of the man is $2m/s$ downwards. The

velocity of the block will be [assume that the block does not rotate]



A. $3m/s$

B. $2m/s$

C. $1/2m/s$

D. $1m/s$

Answer:

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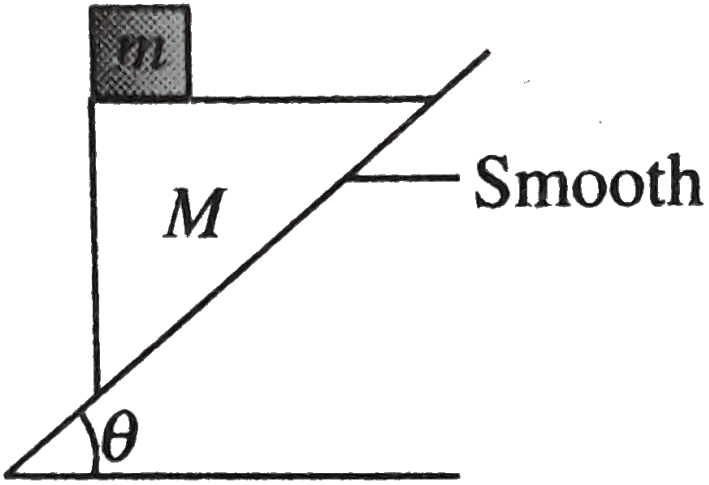
11. A triangular prism of mass m placed on it is released from rest on a smooth inclined plane of inclination θ The block does not slip on the

prism. Then



A. the acceleration of the prism is g cos θ

B. the acceleration of the prism is g tan θ

C. the minimum coefficient of friction between the block and prism is $\mu_{\min} = \tan\theta$

D. the minimum coefficient of friction between block and prism is $\mu_{\min} = \tan\theta$

Answer:

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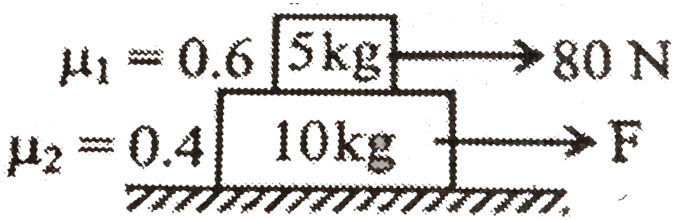
12. A system of two blocks is shown in figure. Friction coefficient between 5 kg and 10 kg block is $\mu = 0.6$ and between 10 kg and ground is $\mu = 0.4$ What will be the maximum

value of force F applied at the lower block so that 5 kg block does not slip w.r.t. 10 kg . $\left(g = 10m/\sec^2\right)$. The force applied at the upper block is having fixed magnitude of 80 N (both forces start to act simultaneously)



A. 160 N

B. 250 N

C. 210 N

D. 310 N

Answer:

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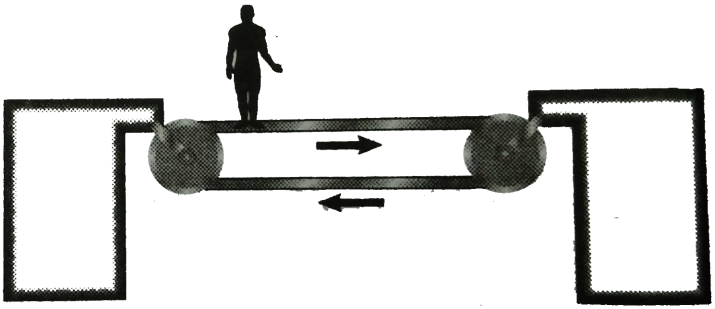
13. Figure shown a man standing stationary with respect to a horizontal converyor belt that is accelerationg with $1m/s^{-2}$. What is the net force on the man?If the coefficient of ststic friction between the man's shoes and the belt is 0.2 upto what maximum acceleration of the belt can the man continue to be stationary relative to the belt? Mass of

the man $= 65kg(g = 9.8m/s^2)$



A. $1.25ms^{-2}$

B. 1.96^{-2}

C. $2.5ms^{-2}$

D. $3.6ms^{-2}$

Answer:

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14. A box of mass $8kg$ placed on a rough inclined plane of inclened θ its downward motion can be prevented by applying an upward pull F and it can be made to slide upward appliying a force $2F$ .The coefficient of friction between the box and the inclined plane is

A. $\frac{1}{3}\tan\theta$

B. $3\tan\theta$

C. $\frac{1}{2}\tan\theta$

D. $2\tan\theta$

Answer:

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15. Starting from rest , a body slides down at 45° inclined plane in twice the time it takes to slide down the same distance in the absence of friction. The coefficient of friction between the body and the inclined plane is

A. 0.33

B. 0.75

C. 0.25

D. 0.8

Answer:

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16. A circular table with smooth horizontal surface is rotating at an angular speed ω about its axis. A groove is made on the surface

along a radius and a small particle is gently placed inside the groove at a distance l from the centre. Find the speed of the particle with respect to the table as its distance from the centre becomes L.

A. $v = \omega l$

B. $v = \omega(l - a)$

C. $v = \frac{\omega(l + a)}{2}$

D. $v = \omega\sqrt{l^2 - a^2}$

Answer:

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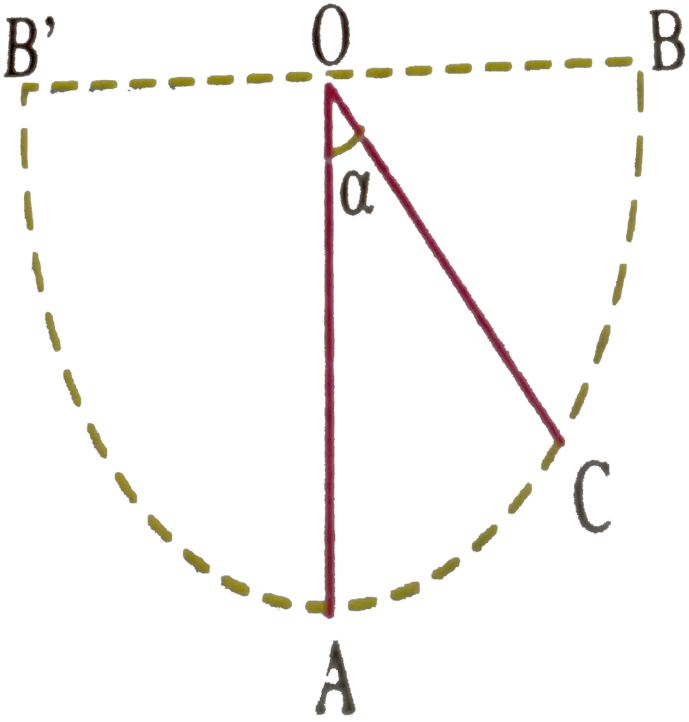
17. A bob of mas M is suspended by a massless string of length L. The horizontal velocity v at position A is just sufficient to make it reach the point B. The angle θ at which the speed of the bob is half of that at A,

satisfies.



A. $\frac{\pi}{4} < \theta < \frac{\pi}{2}$

B. $\frac{\pi}{4} < \theta < \frac{\pi}{2}$

C. $\frac{\pi}{2} < \theta < \frac{3\pi}{4}$

D. $\frac{3\pi}{4} < \theta < \pi$

Answer:

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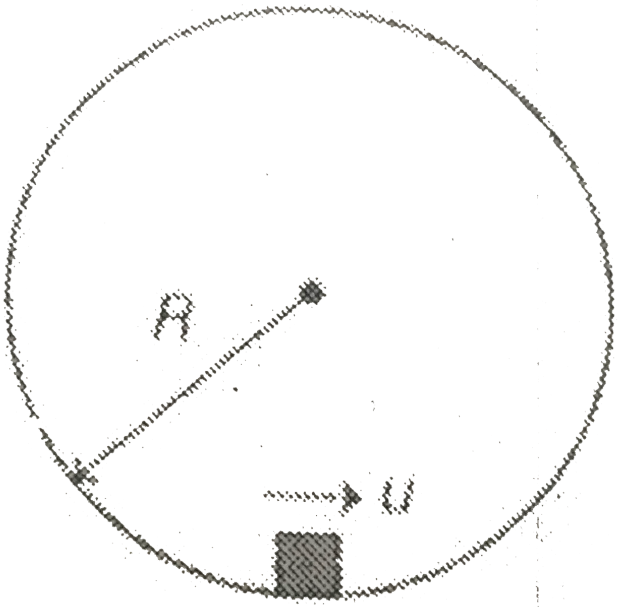
18. A particle is given an initial speed u inside a smooth spherical shell of radius $R = 1$ m such that it is just able to complete the circle. Acceleration of the particle when its velocity is

vertical is



A. $g\sqrt{10}$

B. g

C. $g\sqrt{2}$

D. 3g

Answer:

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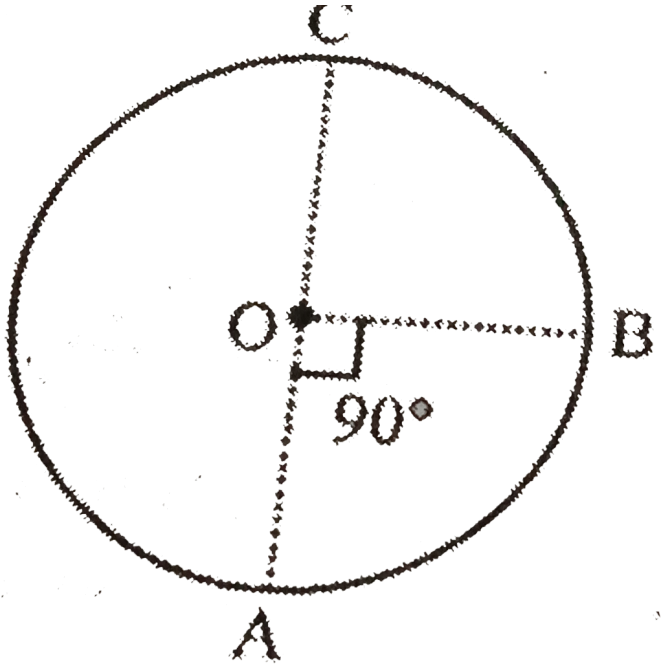
19. A particle crosses the topmost point C of a vertical circle with critical speed , then the

ratio of velocities at points A, B and C is



A. $3:2:1$

B. 5 : 3 : 1`

C. $5^2:3^2:1^2$

D. $\sqrt{5}:\sqrt{3}:\sqrt{1}$

Answer:

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20. A railway track is banked for aspeed v, by making the height of the outer rail 'h' higher than that of the inner rail.The horizontal separation between the rails is d. The radius of curvature of the track is 'r': then which of the following relationis true?

A. $\frac{h}{d} = \frac{v^2}{rg}$

B. $\tan\left\{\left(\sin^{-1}\right)\frac{h}{d}\right\} = \frac{V^2}{rg}$

C. $\tan^{-1}\frac{h}{d} = \frac{v^2}{rg}$

D. $\frac{h}{r} = \frac{v^2}{dg}$

Answer:

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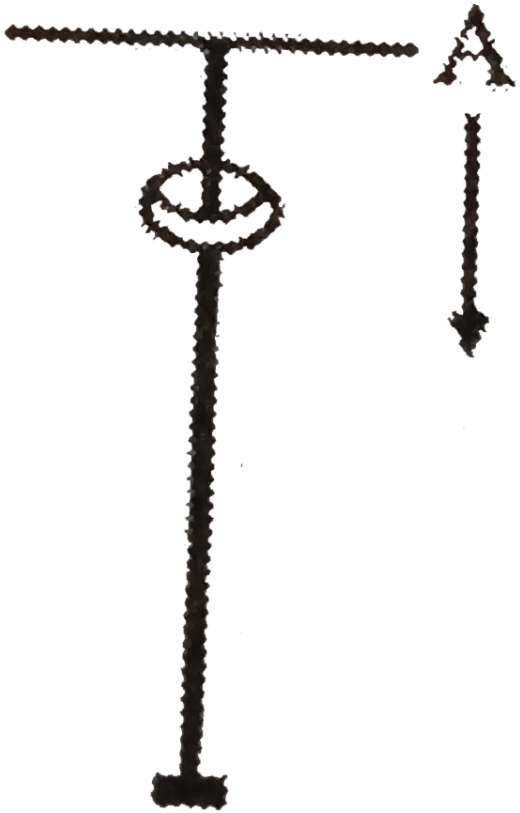
21. An elastic cord of constant K and length L is hung from point A having a massless lock at the other end. A smooth ring of mass M falls from point A , the maximum elongation of

cord is



A. $\frac{mg}{K}\left(1+\frac{1+2KL}{Mg}\right)$

B. $\frac{Mg}{K}\left(1-\left(1-\frac{2KL}{Mg}\right)^{1/2}\right)$

C. $\frac{MgL}{K}$

D. $\frac{Mg}{K}\left(1+\left(1+\frac{2KL}{Mg}\right)^{1/2}\right)$

Answer:

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22. A hammer of mass M falls from height h to drive a pile of mass m into the ground. The hammer makes the pile pentrate in the ground to a distance d, opposition force of penetration is given by -

A. $\frac{M^2gh}{M+md}$

B. $\frac{M^2gh}{(M+m)d} + (M+m)g$

C. $\frac{M^2gh}{M+md}$

D. $\frac{m^2gh}{(m+M)d} - (M+m)g$

Answer:

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23. A varable force, given by the 2- dimensional vector $\overline{F} = \left(3 \times^2 \hat{i} + 4\hat{j}\right)$, acts on a particle. The force is in newton and x is in metre. What is the change in the kinetic energy of the

particle as it moves from the point with coordinates (2,3) to (3,0) (The coornates are in metres)

A. $-7J$

B. zero

C. $+7J$

D. $+19J$

Answer:

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24. A constant power P is applied to a car starting from rest. If v is the velocity of the car at time t, then:

A. $v \propto t$

B. $v \propto \frac{1}{t}$

C. $v \propto \sqrt{t}$

D. $v \propto \frac{1}{\sqrt{t}}$

Answer:

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25. A particle is released from height H. At cartain height from the ground its kinetic energy is twice its gravitational potential energy. Find the height and speed of particle at that height.

A. $\frac{H}{3}, \sqrt{\frac{2gH}{3}}$

B. $\frac{H}{3}, 2\sqrt{\frac{gH}{3}}$

C. $\frac{2H}{3}, \sqrt{\frac{2gH}{3}}$

D. $\frac{2H}{3}, \sqrt{2gH}$

Answer:

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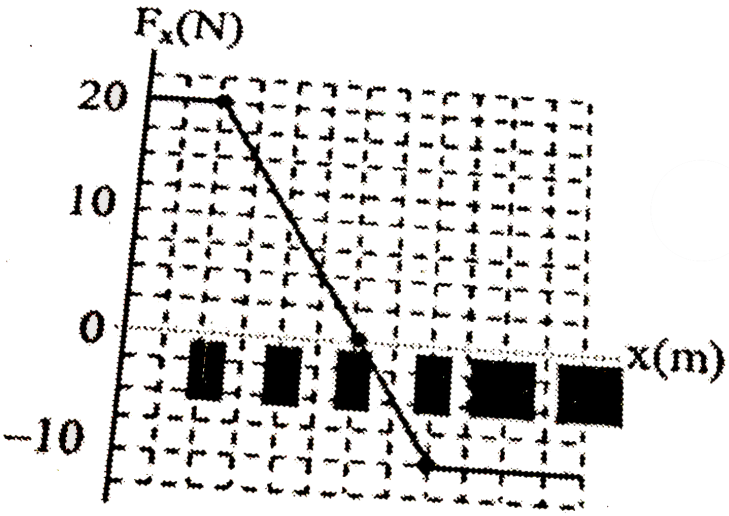
26. An object moving along the x axis is acted upon by a forse F_x that varies with position as shown . How much work is done by this force as the moves from $x = 2m$ to $x = 8am$?



A. $-10J$

B. $+10J$

C. $+30J$

D. $-30J$

Answer:

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27. A man is riding on a cycle with velocity $7.2\frac{km}{hr}$ up a hill having a slope 1 in 20. The

total mass of the man and cycle is 100kg. The power of the man is

A. 200 W

B. 175 W

C. 125 W

D. 98 W

Answer:

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28. The potential energy function for the force between two atoms in a diatomic molecule is approximately given by $U(x) = \frac{a}{x^{12}} - \frac{b}{x^6}$ where a and b are constant and x is the distance between the atoms. Find the dissoociation energy of the molecule which is given as $D = [U(x - \infty) - U_{atequilibrium}]$

A. $x = 6\sqrt{\frac{11a}{5b}}$

B. $x = 6\sqrt{\frac{a}{2b}}$

C. $x = 0$

D. $x = 6\sqrt{\frac{2a}{b}}$

Answer:

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29. When the KE of a particle is increased by 300%, the momentum of the body si increased by :

A. $100\ \%$

B. $150\ \%$

C. $\sqrt{300\ \%}$

D. $175\ \%$

Answer:

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30. A uniform chain has a mass m and length l . It is held on a frictionless table with one - sixth of its length hanging over the edge. The work done in just pulling the hanging part back on the table is :

A. $mg\frac{l}{72}$

B. $\frac{mgl}{36}$

C. $\frac{mgl}{12}$

D. $\frac{mgl}{6}$

Answer:

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