



Target : JEE Main

Chapter :

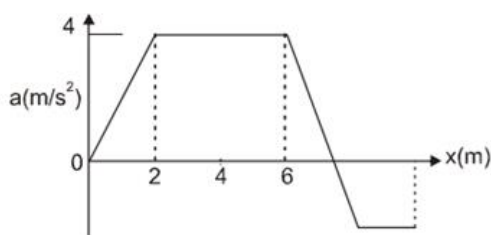
Physics

DPP

Daily Practice Problems

1

Graph shows the acceleration of a 3 kg particle as an applied force moves it from rest along x axis. The total work done by the force on the particle by the time the particle reaches $x = 6$ m, is equal to

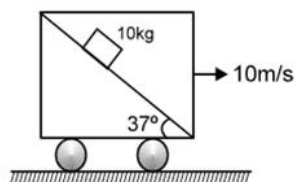


(A) 20 J
(C) 40 J

(B) 30 J
(D) 60 J

2

A block of mass 10 kg is released on a fixed wedge inside a cart which is moved with constant velocity 10 m/s towards right. Take initial velocity of block with respect to cart zero. Then work done by normal reaction (with respect to ground) on block in two second will be: ($g = 10 \text{ m/s}^2$).



(A) zero
(C) 1200 J

(B) 960 J
(D) none of these

3

A chain is held on a frictionless table with $L/4$ hanging over. Knowing total mass of the chain is M and total length is L , the work required to slowly pull hanging part back to the table is :

(A) $\frac{MgL}{16}$

(B) $\frac{MgL}{8}$

(C) $\frac{MgL}{32}$

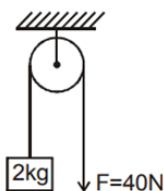
(D) $\frac{MgL}{24}$

4	A bucket tied to a string is lowered at a constant acceleration of $g/4$. If the mass of the bucket is M and is lowered by a distance d, the work done by the string on bucket will be (assume the string to be massless) (A) $(1/4) mg d$ (B) $(-3/4) mgd$ (C) $(-4/3) mgd$ (D) $(4/3) mgd$
5	Starting at rest, a 10 kg object is acted upon by only one force as indicated in figure. Then the total work done by the force is (A) 90 J (B) 125 J (C) 245 J (D) 490 J
6	Block A in the figure is released from rest when the extension in the spring is x_0 ($x_0 < mg/k$). The maximum downward displacement of the block is (there is no friction) : (A) $\frac{2Mg}{K} - 2x_0$ (B) $\frac{Mg}{2K} + x_0$ (C) $\frac{2Mg}{K} - x_0$ (D) $\frac{2Mg}{K} + x_0$
7	The minimum work done required to accelerate a truck on a horizontal road from rest to speed v (A) is less than that required to accelerate it from v to $2v$. (B) is equal than that required to accelerate it from v to $2v$. (C) is more than that required to accelerate it from v to $2v$. (D) may be any one of the above since it depends on the force acting on the truck and the distance over which it acts.

8

A block of mass 2 kg is hanging over a smooth and light pulley through a light string. The other end of the string is pulled by a constant force $F = 40$ N. At $t = 0$ the system is at rest as shown. Then in the time interval from

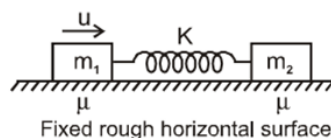
$t = 0$ to $t = \frac{2}{\sqrt{10}}$ seconds, pick up the correct statement (s) : ($g = 10 \text{ m/s}^2$)



- (A) tension in the string is 40 N (B) work done by gravity is -20 J
 (C) work done by tension on block is 80 J (D) None of these

9

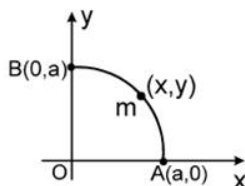
The blocks of mass $m_1 = 1 \text{ kg}$ and $m_2 = 2 \text{ kg}$ are connected by an ideal spring, rest on a rough horizontal surface. The spring constant of spring is $K = 2 \text{ N/m}$. The coefficient of friction between blocks and horizontal surface is $\mu = \frac{1}{2}$. Now the left block is imparted a velocity u towards right as shown. The largest value of u (in m/s) such that the block of mass m_2 never moves is (Take $g = 10 \text{ m/s}^2$)



- A. 10 m/s
 B. 15 m/s
 C. 5 m/s
 D. 20 m/s

10

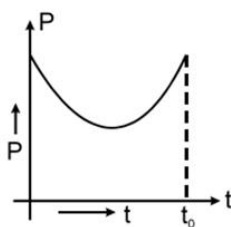
A particle of mass ' m ' moves along the quarter section of the circular path whose centre is at the origin. The radius of the circular path is ' a '. A force $\vec{F} = y\hat{i} - x\hat{j}$ newton acts on the particle, where x, y denote the coordinates of position of the particle. Calculate the work done by this force in taking the particle from point A ($a, 0$) to point B ($0, a$) along the circular path.



- A. $-\frac{\pi a^2}{2}$
 B. $+\frac{\pi a^2}{2}$
 C. 0
 D. $-\frac{3\pi a^2}{2}$

11

Power versus time graph for a given force is given below. Work done

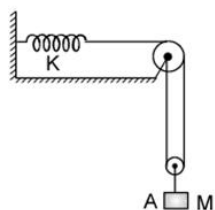


by the force upto time $t(\leq t_0)$.

- (A) First decreases then increases
 (B) First increases then decreases
 (C) Always increases
 (D) Always decreases

12

Block A in the figure is released from the rest when the extension in the spring is x_0 . The maximum downward displacement of the block will be :



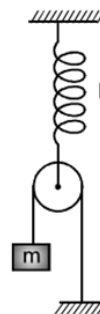
- (A) $Mg/2k - x_0$ (B) $Mg/2k + x_0$ (C) $2 Mg/k - x_0$ (D) $2 Mg/k + x_0$

13

Block m is released from rest when spring is in its natural length (assume pulley is ideal and block does not strike on ground during it's motion in vertical plane)

than :

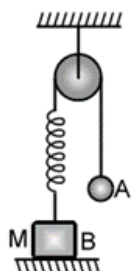
- (A) maximum elongation in spring is $4 mg/k$
 (B) maximum elongation in spring is $2 mg/k$
 (C) maximum speed of block is $2g\sqrt{\frac{m}{k}}$
 (D) maximum speed of block is $g\sqrt{\frac{m}{k}}$



14

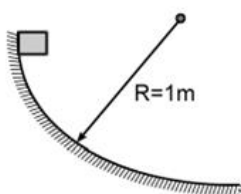
In the Figure, the ball A is released from rest when the spring is at its natural length. For the block B, of mass M to leave contact with the ground at some stage, the minimum mass of A must be:

- (A) $2M$ (B) M (C) $M/2$
(D) A function of M and the force constant of the spring.



15

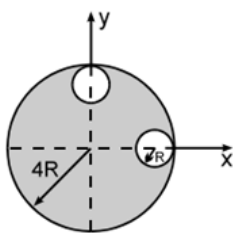
A block of mass 1 kg slides down a vertical curved track that is one quadrant of a circle of radius 1m. Its speed at the bottom is 2 m/s. The work done by frictional force is :



- (A) 8 J (B) - 8 J (C) 4 J (D) - 4 J

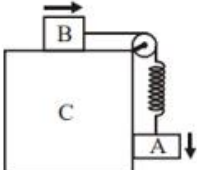
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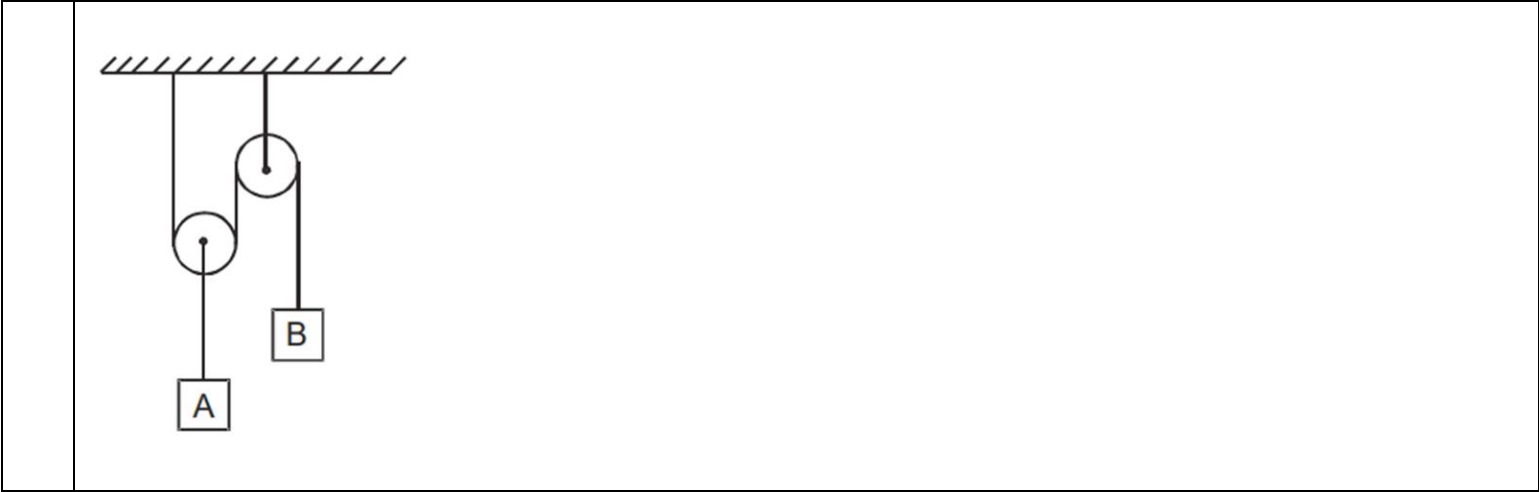
From the uniform disc of radius $4R$ two small disc of radius R are cut off. The centre of mass of the new structure will be : (Centre of lower circular cavity lies on x-axis and centre of upper circular cavity lies on y-axis)



- (A) $\hat{i}\frac{R}{5} + \hat{j}\frac{R}{5}$ (B) $-\hat{i}\frac{R}{5} + \hat{j}\frac{R}{5}$
(C) $-\hat{i}\frac{R}{5} - \hat{j}\frac{R}{5}$ (D) $-\frac{3R}{14}(\hat{i} + \hat{j})$

17	Two semicircular rings of linear mass densities λ and 2λ and of radius 'R' each are joined to form a complete ring. The distance of the center of the mass of complete ring from its geometrical centre is : (A) $\frac{3R}{8\pi}$ (B) $\frac{2R}{3\pi}$ (C) $\frac{3R}{4\pi}$ (D) none of these
18	The centre of mass of a non uniform rod of length L whose mass per unit length λ varies as $\lambda = \frac{kx^2}{L}$ where k is a constant & x is the distance of any point on rod from its one end, is (from the same end) (A) $\frac{3}{4}L$ (B) $\frac{1}{4}L$ (C) $\frac{k}{L}$ (D) $\frac{3k}{L}$
19	A body of mass m was slowly hauled up the hill as shown in figure by a force F which at each point was directed along a tangent to the trajectory. Find the work performed by this force, if the height of the hill is h, the length of its base ℓ, and the coefficient of friction k. A. mgh B. mgh + mgkl C. mgkl D. None of these
20	A particle of mass 2kg starts to move at position $x = 0$ and time $t = 0$ under the action of force $F = (10 + 4x)$ N along the x-axis on a frictionless horizontal track. Find the power delivered by the force in watts at the instant the particle has moved by the distance 5m. A. 300 B. 100 C. 50 D. 200

21	An object of mass 1 kg moves under the action of a force F in a straight line with its velocity V, changing with displacement x as $v = 2\sqrt{x}$. Find the work done in a displacement from $x = 0$ to $x = 2$. [in Joule
22	Two blocks A and B are connected to each other by a string and a spring; the string passes over a frictionless pulley as shown in the figure. Block B slides over the horizontal top surface of a stationary block C and the block A slides along the vertical side of C, both with the same uniform speed. The coefficient of friction between the surface and blocks is 0.5. $K = 2000 \text{ N/m}$. If mass of A is 2 kg calculate mass of B. 
23	A particle of mass m moves along a circle of radius R with a normal acceleration varying with time as $a_n = bt^2$, where b is a constant. Find the time dependence of the power developed by all the forces acting on the particle, and the mean value of this power averaged over the first 2 seconds after the beginning of motion. ($m = 1$, $v = 2$, $r = 1$)
24	A block of mass 2kg is pulled by a constant power 100W is placed on a rough horizontal plane. The frictional coefficient between block and surface is 1. Find the maximum velocity of block.
25	A particle of mass m moves along a circle of radius R with a normal acceleration varying with time as $a_n = bt^2$, where b is a constant. Find the time dependence of the power developed by all the forces acting on the particle, and the mean value of this power averaged over the first 2 seconds after the beginning of motion. ($m = 1$, $v = 2$, $r = 1$)



Answers Key:

1	2	3	4	5	6	7	8	9	10
D	B	C	B	B	A	A	C	A	A
11	12	13	14	15	16	17	18	19	20
C	A	C	C	B	D	B	A	B	A
21	22	23	24	25					
4	4	4	5	2					