PHYSICS

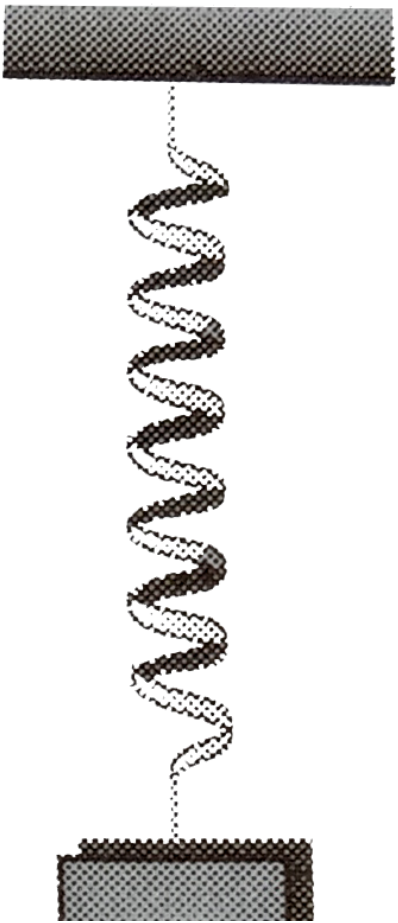
BOOKS - NEET PREVIOUS YEAR (YEARWISE + CHAPTERWISE)

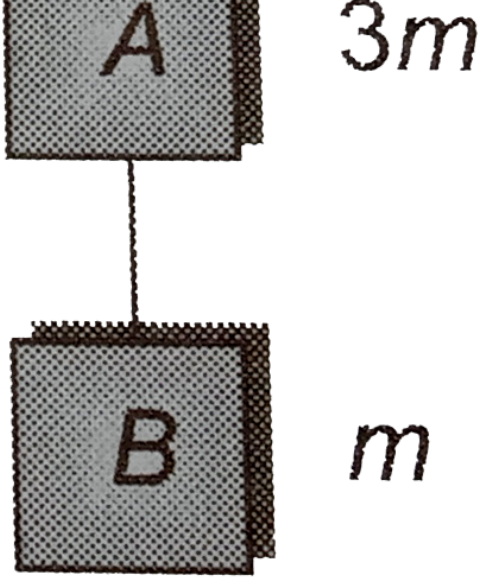
LAWS OF MOTION

Physics

1. Two block A and B of masses $3m$ and m respectively are connected by a massless and

inextensible string. The whole system is suspended by a massless spring as shown in figure. The magnitudes of acceleration of A and B immediately after the string is cut, are respectively





A. $g, \frac{g}{3}$

B. $\frac{g}{3}, g$

C. g, g

D. $\frac{g}{3}, \frac{g}{3}$

Answer: B

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2. One end of string of length l is connected to a particle of mass m and the other end is connected to a small peg on a smooth horizontal table. If the particle moves in circle with speed v the net force on the particle (directed towards centre) will be (T represents the tension in the string):

A. T

B. $T+\frac{mv^2}{l}$

C. $T-\frac{mv^2}{l}$

D. Zero

Answer: A

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3. A rope is wound around a hollow cylinder of mass $3kg$ and radius $40cm$. What is the

angular acceleration of the cylinder if the rope is pulled with a force of $30N$?

A. $25m/s^2$

B. $0.25rad/s^2$

C. $25rad/s^2$

D. $5m/s^2$

Answer: C

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4. A spring of force constant k is cut into lengths of ratio $1:2:3$. They are connected in series and the new force constant is k'. Then they are connected in parallel and force constant is k''. Then k' : k'' is :

A. $1:6$

B. $1:9$

C. $1:11$

D. $1:14$

Answer: C

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5. A uniform circular disc of radius $50cm$ at rest is free to turn about an axis, which is perpendicular to the plane and passes through its centre. It is subjected to a torque which produces a constant angular acceleration of $2.0rad/s^2$. Its net acceleration in m/s^2 at the end of $2.0s$ is approximately

A. 7.0

B. 6.0

C. 3.0

D. 8.0

Answer: D

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6. A car is negotiating a curved road of radius R . The road is banked at an angle theta. The coefficient of friction between the tyres of the car and the road is μ_s . The maximum safe velocity on this road is:

A. $\sqrt{QR\left(\frac{\mu_s + \tan\theta}{1 - \mu_s \tan\theta}\right)}$

B. $\sqrt{\frac{Q}{R}\left(\frac{\mu_s + \tan\theta}{1 - \mu_s \tan\theta}\right)}$

C. $\sqrt{\frac{Q}{R^2}\left(\frac{\mu_s + \tan\theta}{1 - \mu_s \tan\theta}\right)}$

D. $\sqrt{QR^2\left(\frac{\mu_s + \tan\theta}{1 - \mu_s \tan\theta}\right)}$

Answer: A

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7. A particle moves so that its position vector is given by $\vec{r} = \cos\omega t\hat{x} + \sin\omega t\hat{y}$, where ω is

a constant which of the following is true ?

A. Velocity and acceleration both are parellel to r

B. Velocity is perpendicular to r and acceleration is directed towards the origin.

C. Velocity is perpendicular to r and acceleration is directed away from the origin.

D. Velocity and acceleration both are perpendicular to r.

Answer: B

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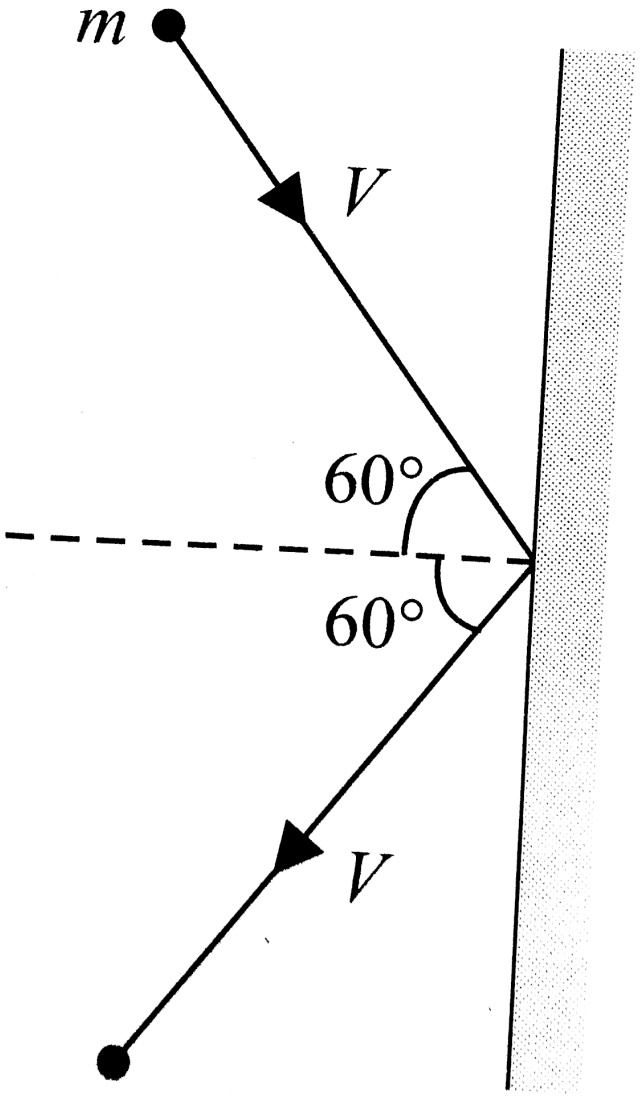
8. A riding ball of mass m strikes a rigid wall at 60° and gets reflected without loss of speed as shown in the figure below. The value of impulse imparted by the wall on the ball will

be.



A. mv

B. 2mv

C. $mv/2$

D. $mv/3$

Answer: A

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9. A bullet of mass $10g$ moving horizontally with a velocity of $400ms^{-1}$ strickes a wooden block of mass $2kg$ which is suspended by a light inextensible string of length $5m$. As a

result, the center ofgravity of the block is found to rise a vertical distance of $10cm$. The speed of the bullet after it emerges out hirizontally from the block will be

A. 100m/s

B. 80 m/s

C. 120 m/s

D. 160 m/s

Answer: C

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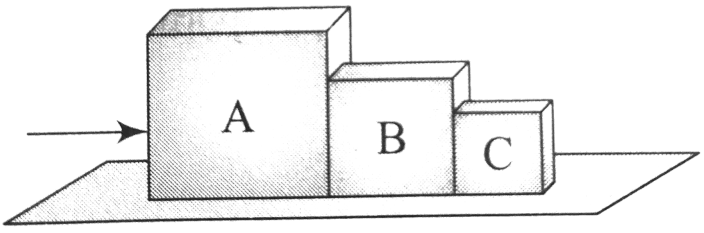
10. Three blocks A , B and C of masses $4kg$, $2kg$ and $1kg$ respectively are in contact on a frictionless surface, as shown. If a force of $14Nisappliedonthe$4kg $block, thenthecontactf$ or $cebetween$A and B` is.



A. 2 N

B. 6 N

C. 8 N

D. 18 N

Answer: B

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11. A block A of mass m_1 rests on a horizontal table. A light string connected to it passes over a frictionless pulley at the edge of table and from its other end another block B of

mass m_2 is suspended. The coefficient of knetic friction between the block and table is μ_k . When the block A is sliding on the table, the tension in the string is.

A. $\frac{(m_2 + \mu_k m_1)g}{m_1 + m_2}$

B. $\frac{(m_2 - \mu_k m_1)g}{m_1 + m_2}$

C. $\frac{m_1 m_2(1 + \mu_k)g}{m_1 + m_2}$

D. $\frac{m_1 m_2(1 - \mu_k)g}{m_1 + m_2}$

Answer: C

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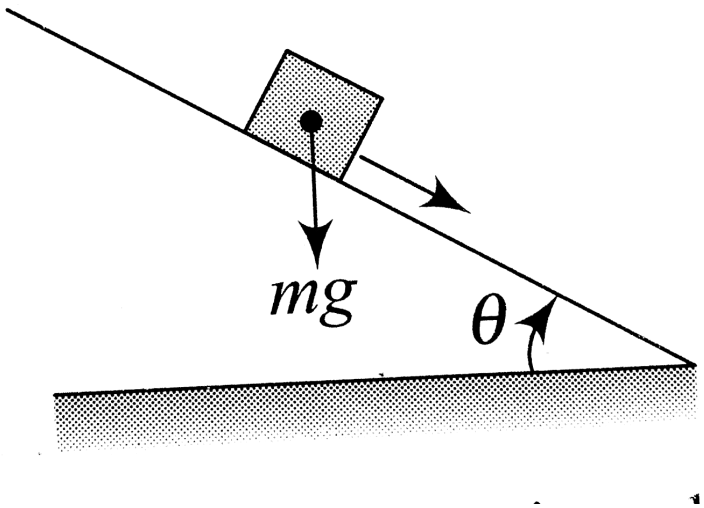
12. A plank with a box on it at one end is gradually raised about the other end. As the angle of inclination with the horizontal reaches 30° , the box starts to slip and slide $4.0m$ down the plank in $4.0s$. The coefficients of static and kinetic friction between the box

and the plank will be, respectively.



A. 0.6 and 0.6

B. 0.6 and 0.5

C. 0.5 and 0.6

D. 0.4 and 0.3

Answer: B

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13. $\vec{F} = a\hat{i} + 3\hat{j} + 6\hat{k}$ and $\vec{r} = 2\hat{i} - 6\hat{j} - 12\hat{k}$. The value of a for which the angular momentum is conserved is

A. -1

B. 2

C. zero

D. 1

Answer: A

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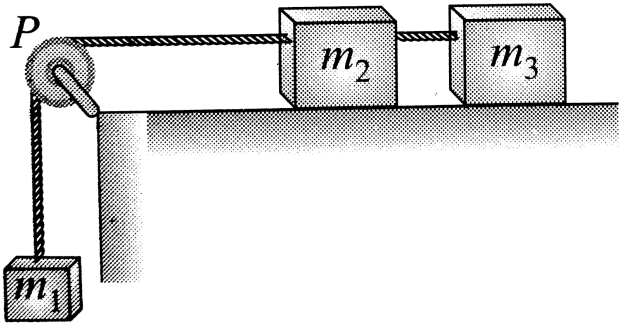
14. A system consists of three masses m_1 , m_1 , m_1 , m_2 and m_3 connected by a string passing over a pulley P . The mass m_1 hangs freely and m_2 and m_3 are on a rough horizontal table (the coefficient of friction=mu) The pulley is frictionless and of negligible mass. The downward acceleration of m1 is (Assume

$m_1 = m_2 = m_3 = m$).



A. $\frac{g(1-g\mu)}{9}$

B. $\frac{2g\mu}{3}$

C. $\frac{g(1-2\mu)}{3}$

D. $\frac{g(1-2\mu)}{2}$

Answer: C

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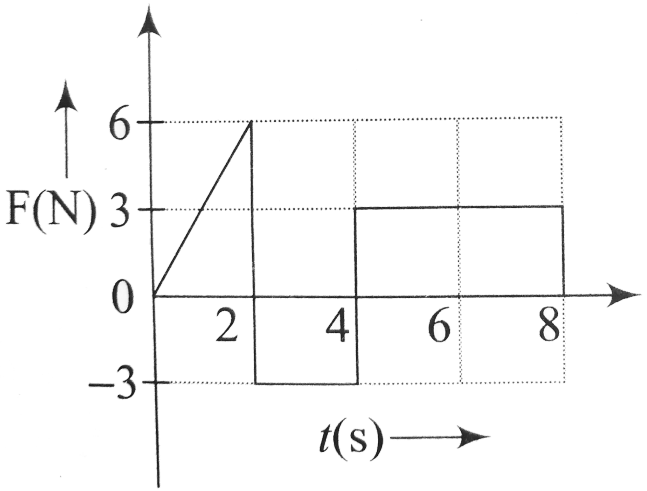
15. The force F acting on a particle of mass m is indicated by the force-time graph shown below. The change in momentum of the particle over time interval from zero to 8 s is.



A. 24 N-s

B. 20 N-s

C. 12 N-s

D. 6 N-s

Answer: C

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16. A balloon with mass m is descending down with an acceleration a (where $a < g$) . How much mass should be removed from it so that it starts moving up with an acceleration a?

A. $\frac{2ma}{g+a}$

B. $\frac{2ma}{g-a}$

C. $\frac{ma}{g+a}$

D. $\frac{ma}{g-a}$

Answer: A

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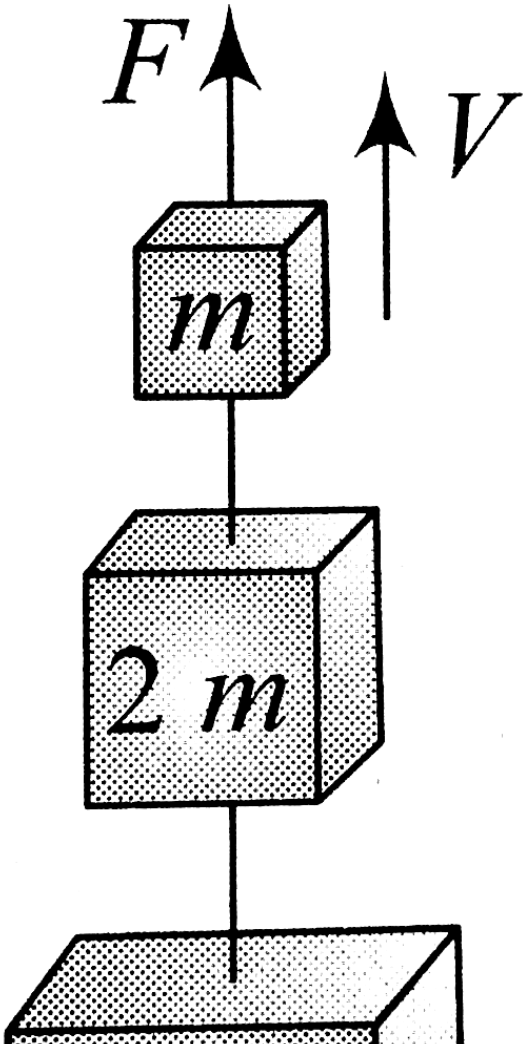
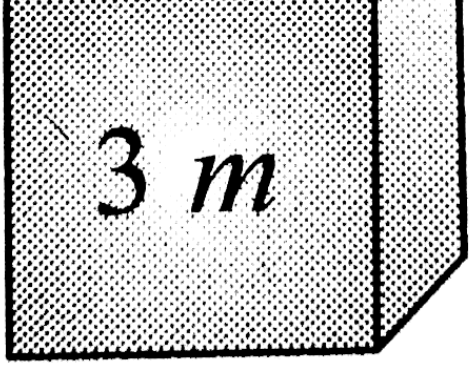
17. Three blocks with masses m , $2m$ and $3m$ are connected by strings, as shown in the figure. After an upward force F is applied on

block m , the masses move upward at costant speed v . What is the net force on the block of mass $2m$? (g is the acceleration due to gravity).





A. Zero

B. 2 mg

C. 3 mg

D. 6 mg

Answer: A

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18. The upper half of an inclined plane with inclination ϕ is perfectly smooth while the lower half is rough. A body starting from rest at the top will again come to rest at the bottom if the coefficient of friction for the lower half is given by

A. $\mu = \dfrac{1}{\tan\phi}$

B. $\mu = \dfrac{2}{\tan\phi}$

C. $\mu = 2\tan\phi$

D. $\mu = \tan\phi$

Answer: C

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19. An explosion blows a rock into three parts. Two parts go off at right angles to each other . These two are $1kg$ first part moving with a velocity of $12ms^{-1}$ and $2kg$ second part moving with a velocity of $8ms^{-1}$. If the third part flies off with a velocity of $4ms^{-1}$. Its mass would be

A. 3kg

B. 5kg

C. 7kg

D. 17kg

Answer: B

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20. A car of mass $1000kg$ negotiates a banked curve of radius $90m$ on a frictionless road. If

the banking angle is 45° the speed of the car is:

A. 20 ms^{-1}

B. 30 ms^{-1}

C. 5 ms^{-1}

D. 10 ms^{-1}

Answer: B

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21. Two sphere A and B of masses m_1 and m_2 respectively collides. A is at rest initially and B is moving with velocity v along x-axis. After collision B has a velocity $\frac{v}{2}$ in a direction perpendicular to the original direction. The mass A moves after collision in the direction.

A. same as that of B

B. opposite to that of θ

C. $\theta = \tan^{-1}\left(\frac{1}{2}\right)$ to the x-axis

D. $\theta = \tan^{-1}\left(\frac{-1}{2}\right)$ to the x-axis

Answer: C

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22. A person of mass $60kg$ is inside a lift of mass $940kg$ and presses the button on control panel. The lift starts moving upward with an acceleration $1.0m/s^2$. If $g = 10m/s^2$, the tension in the supporting cable is.

A. 9680 N

B. 11000 N

C. 1200 N

D. 8600 N

Answer: B

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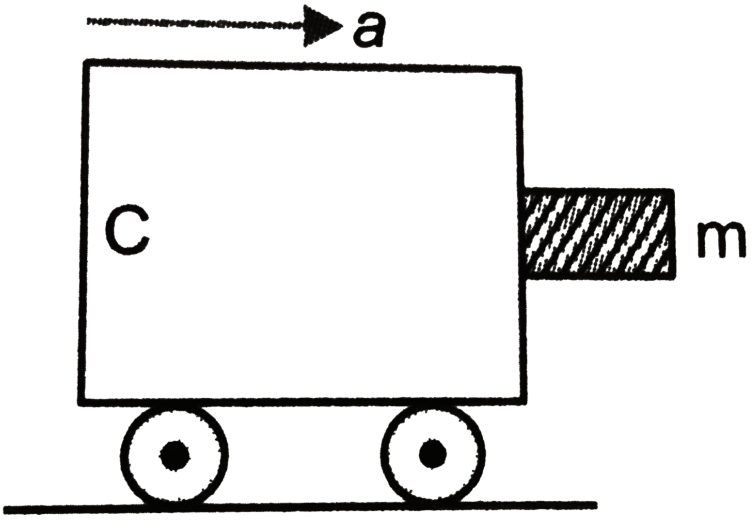
23. A block of mass m is in contact with the cart C as shown in The coefficient of static friction between the block and the cart is μ The acceleration a of the cart that will prevent

the block from falling satisfies



A. $\alpha > \frac{mg}{\mu}$

B. $\alpha > \frac{g}{\mu m}$

C. $a \geq \frac{g}{\mu}$

D. $a < \frac{g}{\mu}$

Answer: C

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24. A ball moving with velocity $2ms^{-1}$ collides head on with another stationary ball of double the mass. If the coefficient of restitution is 0.5, then their velocities (in ms^{-1}) after collision will be

A. 0,1

B. 1,1,

C. 1,0,5

D. 0,2

Answer: A

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25. A man of $50kg$ mass is standing in a gravity free space at a height of $10m$ above the floor. He throws a stone of $0.5kg$ mass downwards with a speed $2m/s$. When the stone reaches the floor, the distance of the man above the floor will be

A. 9.9 m

B. 10.1 m

C. 1.0 m

D. 20m

Answer: B

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26. A body, under the action of a force $F = 6\hat{i} - 8\hat{j} + 10\hat{k}$, acquires a acceleration of $1ms^{-2}$. The mass of this body must be

A. $2\sqrt{10}$ kg

B. 10 kg

C. 20 kg

D. $10\sqrt{2}$ kg

Answer: D

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27. The mass of a lift is $2000kg$. When the tensioon in the supporting cable is $28000N$, then its acceleration is.

A. $30ms^{-2}$ downwards

B. $4ms^{-2}$ upwards

C. $4ms^{-2}$ downwards

D. $14ms^{-2}$ upwards

Answer: B

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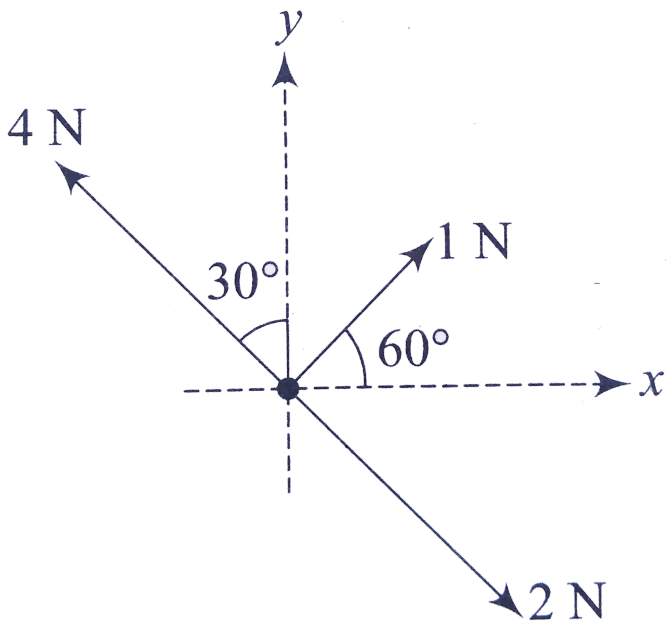
28. Three forces acting on a body are shown in figure. To have the resultant force only along the y-direction, the magnitude of the

minimum additional force needed is



A. 0.5 N

B. 1.5 N

C. $\frac{\sqrt{3}}{4}$ N

D. $\sqrt{3}$ N

Answer: A

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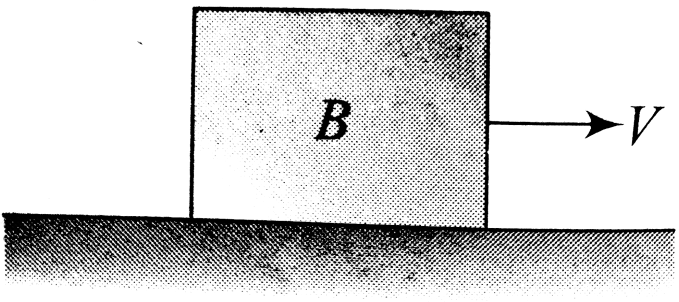
29. A block B is pushed momentarily along a horizontal surface with an initial velocity v . If mu is the coefficient of sliding friction between B and the surface, block B will come to rest after a time:



A. $\frac{v}{g\mu}$

B. $\frac{g\mu}{v}$

C. $\frac{g}{v}$

D. $\frac{v}{g}$

Answer: A

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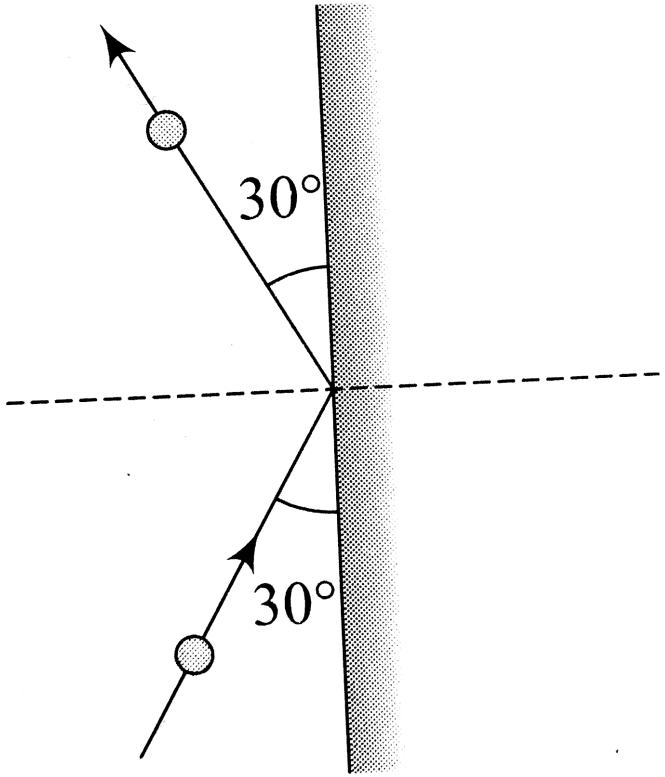
30. A $0.5kg$ ball moving with a speed of $12m/s$ strikes a hard wall at an angle of 30° with the wall. It is reflected with the same

speed and at the same angle . If the ball is in contact with the wall for $0.25s$, the average force acting on the wall is



A. 48 N

B. 24 N

C. 12 N

D. 96 N

Answer: B

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31. A block of mass m is placed on a smooth wedge of inclination θ. The whole system is accelerated horizontally, so that the block does not slip on the wedge. The force exerted

by the wedge on the block (g is acceleration due to gravity) will be

A. $mg\cos\theta$

B. $mg\sin\theta$

C. mg

D. $\frac{mg}{\cos\theta}$

Answer: D

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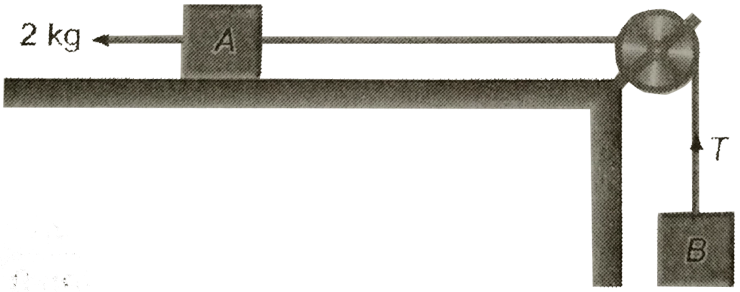
32. The coefficient of static friction, μ_s between block A mass 2kg and the table as shown in the figure, is 0.2. What would be the maximum mass value of block B, so that the two blocks do not move ? The string and the pulley are asseumed to be smooth and massless ($g = 10m/s^2$)



A. 2.0 kg

B. 4.0 kg

C. 0.2 kg

D. 0.4 kg

Answer: D

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33. A monkey of mass $20kg$ is holding a vertical rope. The rope will not break when a mass of $25kg$ is suspended from it but will break it the mass exeeds $25kg$. What is the maximum

acceleration with which the monkey can climb up along the rope? $\left(g = 10m / s^2\right)$.

A. $25m / s^2$

B. $2.5m / s^2$

C. $5m / s^2$

D. $10m / s^2$

Answer: B

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34. A man weighs $80kg$. He stands on a weighing scale in a lift which is moving upwords with a uniform acceleration of $5m/s^2$. What would be the reading on the scale?

A. 800 N

B. 1200 N

C. Zero

D. 400 N

Answer: B

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35. A lift of mass 100 kg is moving upwards with an acceleration of 1 m/s^2. The tension developed in the string, which is connected to lift is ($g = 9.8m/s^2$)

A. 980 N

B. 1080 N

C. 1100 N

D. 1000 N

Answer: B

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36. A block of mass $10kg$ is placed on a rough horizontal surface having coefficient of friction $\mu = 0.5$. If a horizontal force of $100N$ is acting on it, then acceleration of the will be.

A. $15m / s^2$

B. $10m / s^2$

C. $5m / s^2$

D. $0.5m/s^2$

Answer: C

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37. An object of mass $3kg$ is at rest. Now a force of $\vec{F} = 6t^2\hat{I} + 4t\hat{j}$ is applied on the object, the velocity of object at $t = 3s$ is.

A. $18\hat{i} + 3\hat{j}$

B. $18\hat{i} + 6\hat{j}$

C. $3\hat{i} + 18\hat{j}$

D. $19\hat{i} + 4\hat{j}$

Answer: B

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38. A player takes 0.1s I catching a ball of mass 150 g moving with velocity of 20 m/s. The force imparted by the ball on the hands of the player is

A. 0.3 N

B. 3 N

C. 30 N

D. 300 N

Answer: C

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39. A body of mass $1kg$ initially at rest explodes and breaks into threee fragments of masses in the ration breaks into three

fragments of masses in the ration $1:1:3$. The two pieces of equal masses fly off perpendicular to each other with a speed of $30m/s$ each What is the velocity of heavier fragments ? .

A. $\frac{10}{\sqrt{2}}m/s$

B. $10\sqrt{2}m/s$

C. $20\sqrt{2}m/s$

D. $30\sqrt{2}m/s$

Answer: B

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40. A particle of mass 1 kg is thrown vertically upwards with speed 100 m/s. after 5 s, it explodes into two parts. One part of mass 300 g comes back with speed 24 m/s, What is the speed of other part just after explosion?

A. 100 m/s upwards

B. 600 m/s upwards

C. 100 m/s downwards

D. 800 m/s upwards

Answer: A

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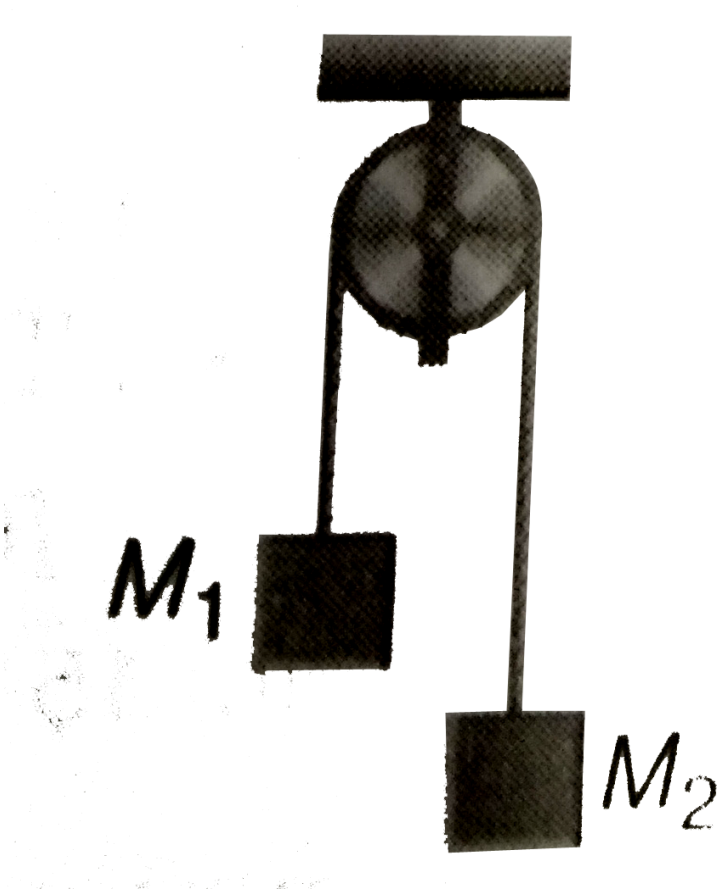
41. Two masses $M_1 = 5kg, M_2 = 10\text{kg}$ are connected at the ends of an inextensible string passing over a frictionless pulley as shown. When masses are released, then

acceleration of masses will be



A. g

B. $\frac{g}{2}$

C. $\frac{g}{3}$

D. $\frac{g}{4}$

Answer: C

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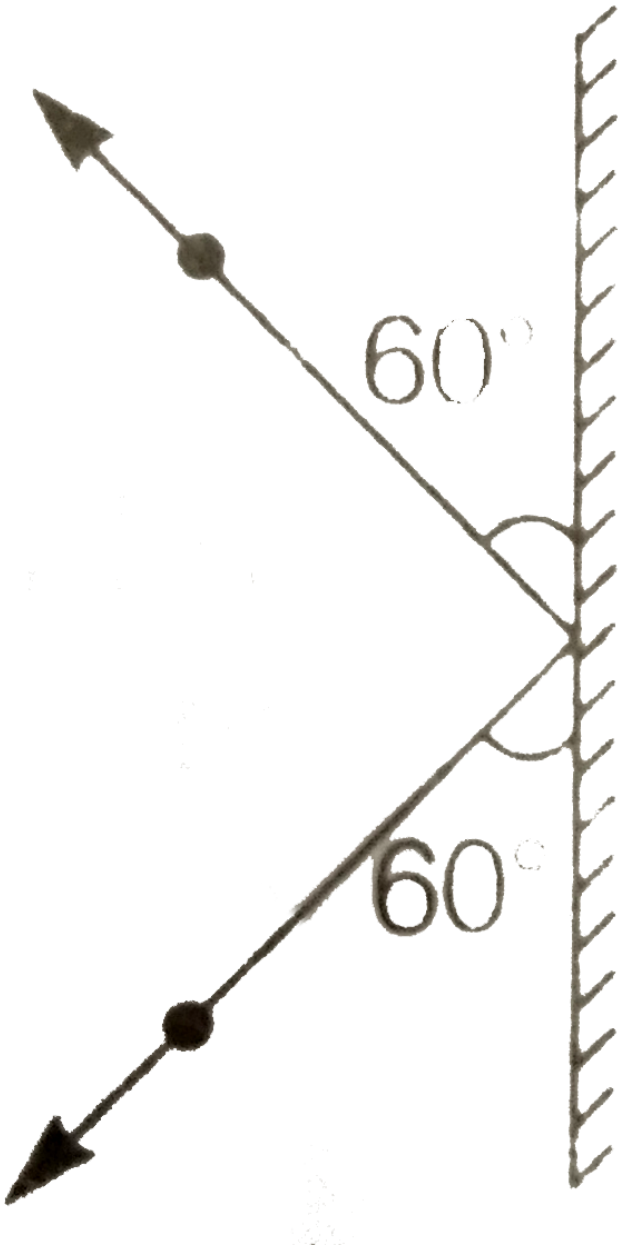
42. A ball of mass 3kg moving with a speed of 100 m/s, strikes a wall at an angle 60° (as shown in figure). The ball rebounds at the same speed and remains in contact with the wall for 0.2 s, the force exerted by the ball on

the wall is



A. $1500\sqrt{3}N$

B. 1500 N

C. $300\sqrt{3}N$

D. 300 N

Answer: A

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43. The force on a rocket moving with a velocity 300 m/s is 210N. The rate of consumption of fuel of rocket is

A. 0.7 kg/s

B. 1.4 kg/s

C. 0.07 kg/s

D. 10.7 kg/s

Answer: A

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44. A 5000 kg rocket is set for vertical firing. The exhaust speed is $800ms^{-1}$.To give an intial upward acceleration of 20 m/s^2 , the

amount of gas ejected per second to supply the needed thrust will be ($g = 10ms^{-2}$)

A. $127.5kgs^{-1}$

B. $187.5kgs^{-1}$

C. $185.5kgs^{-1}$

D. $137.5kgs^{-1}$

Answer: B

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45. 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. 8 N-s

B. Zero

C. 0.9 N-s

D. 1.8 N-s

Answer: B

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46. A mass of 1kg is suspended by a thread. It is

1. lifted up with an accleration $4.9 m / s^2$.

2. lowered with an acceleration $4.9\ m / s^2$.

The ratio of the tensions is

A. $3:1$

B. $1:3$

C. $1:2$

D. $2:1$

Answer: A

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47. A 10 N force is applied on a body produces an acceleration of 1 m/s^2 . The mass of the body is

A. 5 kg

B. 10 kg

C. 15 kg

D. 20 kg

Answer: B

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48. A ball of mass 150 g moving with an acceleration 20 m/s^2 is hit by a force, which acts on it for 0.1 s. The impulsive force is

A. 0.5 N-s

B. 0.1 N-s

C. 0.3 N-s

D. 1.2 N-s

Answer: C

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49. What will be the maximum speed of a car on a road turn of radius 30 m, if the coefficient

of friction between the tyres and the road is 0.4? (Take $g = 9.8m/s^2$)

A. 10.84 m/s

B. 9.84 m/s

C. 8.84 m/s

D. 6.84 m/s

Answer: A

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50. If the force on a rocket moving moving with a velocity of 300 m/s is 345 N, then the rate of combustion of the fuel is

A. 0.55 kg/s

B. 0.75 kg/s

C. 1.15 kg/s

D. 2.25 kg/s

Answer: C

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51. A shell is fired from a cannon, it explodes in mid air, its total

A. momentum increases

B. momentum decreases

C. KE increases

D. KE decreases

Answer: B

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52. A satellite in a force - free space sweeps stationary interplanetary dust at a rate $dM/dt = \alpha v$, where M is the mass , $v$is the velocity of the satellite and α is a constant. What is the deacceleration of the satellite ?

A. $-\frac{2\alpha v^2}{M}$

B. $-\frac{\alpha v^2}{M}$

C. $-\frac{\alpha v^2}{2M}$

D. $-\alpha v^2$

Answer: B

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53. A block has been placed on an inclined plane with the slope angle θ. Block slide down the plane at constant speed. The cofficient of Kinetic friction is equal to

A. $\sin\theta$

B. $\cos\theta$

C. g

D. $\tan\theta$

Answer: D

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54. A mokey is descending from the branch of a tee with constant acceleration. If the the monkey, the minimum acceleration with which monkey can slide down without breaking the branch is

A. g

B. $\frac{3g}{4}$

C. $\frac{g}{4}$

D. $\frac{g}{2}$

Answer: C

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55. Consider, a car moving along a straight horizontal road with a speed of 72 km/h. If the coefficient of static friction between the distance in which the car can be stopped is (Take $g = 10/s^2$)

A. 30m

B. 40m

C. 72m

D. 20m

Answer: B

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56. A heavy uniform chain lies on horizontal table top. If the coeficient of friction 0.25, then

the maximum friction of length of the chain that can hang over on edge of the table is

A. $20\ \%$

B. $25\ \%$

C. $35\ \%$

D. $15\ \%$

Answer: A

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57. Physical independence of force is a consequence of

A. Third law of motion

B. secon law of motion

C. first law of motion

D. All of these

Answer: C

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58. A particle of mass m is moving with a uniform velocity v_1. It is given an impulse such that its velocity becomes v_2. The impulse is equal to

A. $m[|v_2| - |v_1|]$

B. $\frac{1}{2}m\left(v_2^2 - v_1^2\right)$

C. $m(v_1 + v_2)$

D. $m(v_2 - v_1)$

Answer: D

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59. A 600 kg rocket is set for a vertical firing. If the exhaust speed is 1000 ms^{-1}, the mass of the gas ejected per second to supply the thrust needed to overcome the weight of rocket is

A. 117.6 kg s^{-1}

B. 58.6 kg s^{-1}

C. 6 kg s^{-1}

D. 76.4 kg s^{-1}

Answer: C

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60. 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. 0.8

B. 0.75

C. 0.25

D. 0.33

Answer: B

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