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PHYSICS

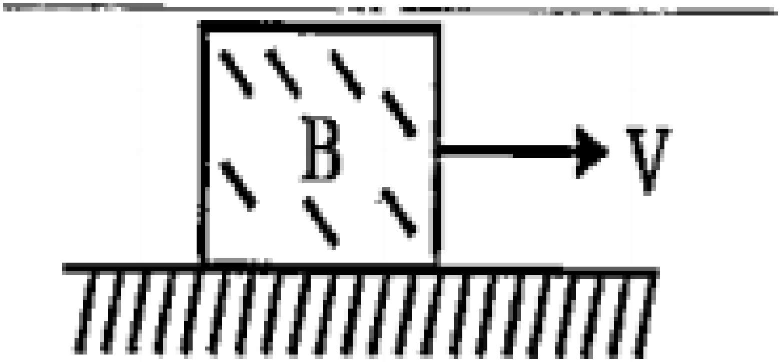
BOOKS - SARAS PUBLICATION

LAWS OF MOTION

Example

1. A block B is pushed momentarily along a horizontal surface with an initial velocity v. If μ is the coefficient of sliding friction betweenB and the surface , block B will come to rest after

a time.



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A. v/g

B. $v/(g\mu)$

C. $g\mu/v$

D. g/v

Answer:

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2. Sand is being dropped on a conveyor belt at the rate of $M kg / s$. Tne force necessary to keep the belt moving with a constant velocity of v m / s will be:

A. Mv newton

B. 2Mv newton

C. $\frac{Mv}{2} \ne w \to n$

D. Zero

Answer:

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3. The mass of a lift is 2000 kg. When the tension in the supporting cable is 28000 N, then its .acceleration is:

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

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

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

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

Answer:

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4. The figure shows elliptical orbit of a planet 'M' about the Sun 'S', the shaded area SCD is twice the shaded area SAB. If t_1 is the time for the planet to move from C and D and t_2 is the time to move from A to B then.

A. $t_1 = 4t_2$

B. $t_1 = 2t_2$

C. $t_1 = t_2$

D. $t_1 > t_2$

Answer:

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5. A particle starts its motion from rest under the action of a constant force. If the distance covered in first 10 seconds is S_1 and that covered in the first 20 seconds is S_2 then:

A. $S_2 = 3S_1$

B. $S_2 = 4S_1$

C. $S_2 = S_1$

D. $S_2 = 2S_1$

Answer:

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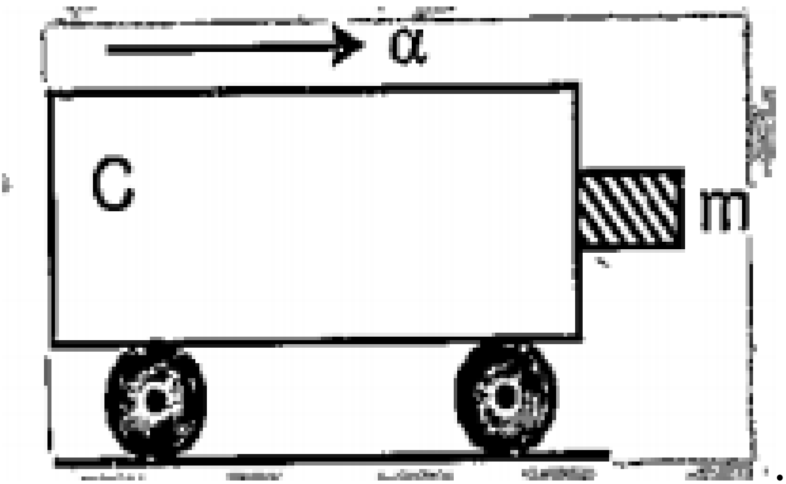
6. A block of mass m is in contact with the cart C as shown in the figure. The coefficient of static friction between the block and the cart is μ. The accelaration α of the cart that will prevent the block from falling satisfies:



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

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

C. $\alpha \overset{>}{-} \frac{g}{\mu}$

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

Answer:

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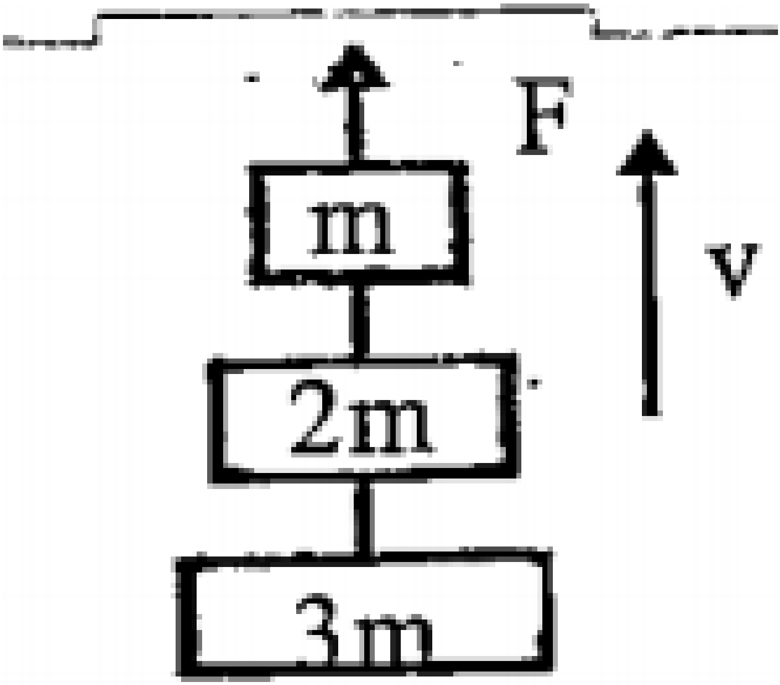
7. Three blocks with masses m, 2m, 3m. are connected by strings , as shown in the figure. After an upward forced is applied bn block m, the masses move upward at constant speed v. What is the net force on the block of mass

2m? (g is the acceleration due to gravity).



A. zero

B. 2mg

C. 3mg

D. 6mg

Answer:

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8. The upper half of an inclined plane of inclination θ is perfectly smooth lower half is rough. A block starting from rest at the top of the plane will again come to rest at the bottom, if the coefficient of friction between the block and lower half of the plane is given by:

A. $\mu = \frac{1}{\tan\theta}$

B. $\mu = \frac{2}{\tan\theta}$

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

D. $\mu = \tan\theta$

Answer:

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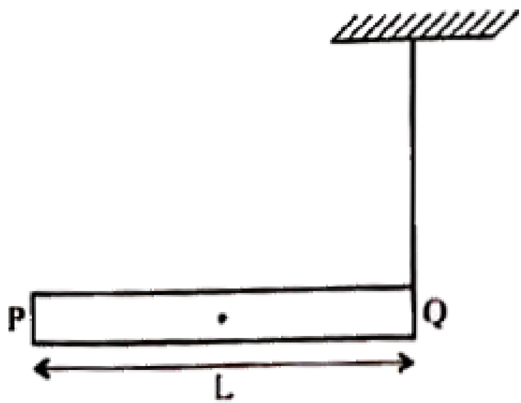
9. A rod PQ of mass M and length L is hinged at end P. The rod is kept horizontal by a mass less than string tied at a point Q as shown in figure. When string is cut, the initial acceleration rod is:



A. $3\frac{g}{2L}$

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

C. $2\frac{g}{L}$

D. $2\frac{g}{3L}$

Answer:

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10. A particle of mass m oscillates along x -axis according to equation $x = a\sin\omega t$. The nature of the graph between momentum and displacement of the particle is:

A. Straight line passing through origin

B. Circle

C. Hyperbola

D. Ellipse

Answer:

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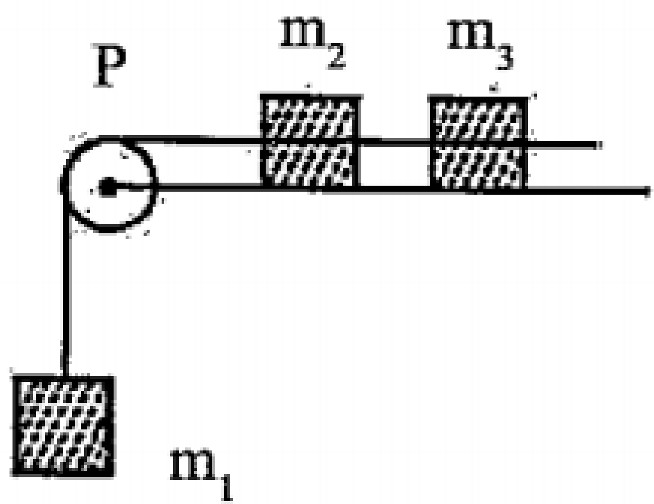
11. A system consists of three m_1, m_2 and m_3 connected by a string passing over a pulley P . The mass m_1 hangs freely and m_2 and m_3 are on a rough horizontal table(the coefficient of friction=μ)The pulley is frictionless and of negligible mass. The downward acceleration of mass m_1 is (Assume $m_1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



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:

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12. A ship A is moving Westwards with a speed $10kmh^{-1}$ and a ship B 100 km South of A , is moving Northwards with a speed of $10km^{-10}$. The time after which the distance between them becomes shortest is :

A. 5h

B. $5\sqrt{2}h$

C. $10\sqrt{2}h$

D. 0

Answer:

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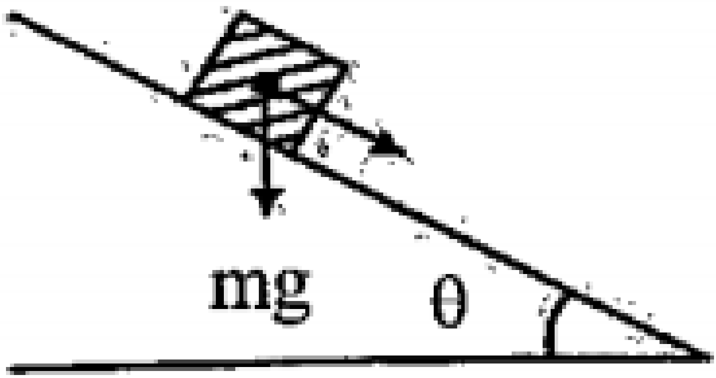
13. A plank with a box on it at one end is gradually raised about the other end. As the angle of invlination with the horizontal reaches 30° , the box starts to slip and slides

4.0 m down the plank in 4.0s.The coefficients of static and kinetic friction between the box and the plank will be, respectively:



A. 0.4 and 0.3

B. 0.6 and 0.6

C. 0.6 and 0.5

D. 0.5 and 0.6

Answer:

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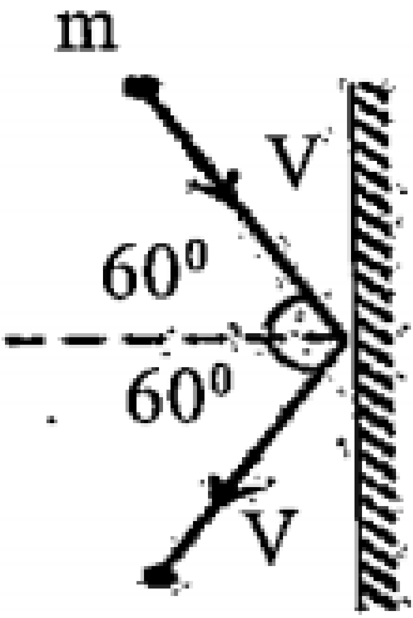
14. A rigid ball of mass m strikes a rigid wall at 60° and gets reflected without loss of speed as shown in the figure below. The value of impulse imparted by the wall on the ball will be:



A. $m\frac{v}{2}$

B. $m\frac{v}{3}$

C. Mv

D. $2mV$

Answer:

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15. A body cools- from a temperature 3T to 2T in 10 minutes.The room temperature is T. Assume that Newton's law of cooling is applicable . The temperature of the body at the end of next 10 minutes.

A. $\frac{4}{3}T$

B. T

C. $\frac{7}{4}T$

D. $\frac{3}{2}T$

Answer:

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16. A car negotating a curved road of radius R. The road is banked at an angle θ . The coefficient of friction between the tyres of the car and the road is μ_0. The maximum safe velocityb on this road is:

A. $\sqrt{\frac{g}{R^2}\frac{\mu_s+\tan\theta}{1-\mu_s+\tan\theta}}$

B. $\sqrt{gR^2\frac{\mu_s+\tan\theta}{1-\mu_s+\tan\theta}}$

C. $\sqrt{gR\frac{\mu_s+\tan\theta}{1-\mu_s+\tan\theta}}$

D. $\sqrt{\frac{g}{R}\frac{\mu_s+\tan\theta}{1-\mu_s+\tan\theta}}$

Answer:

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