PHYSICS

BOOKS - MODERN PUBLICATION

Competitive Exam Question

Exercise

1. Give the magnitude and direction of the net force acting on:- a drop of rain falling down with a constant speed.

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2. Give the magnitude and direction of the net force acting on:- a cork of mass 10 g floating on water.

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3. Give the magnitude and direction of the net force acting on:- a kite skillfully held stationary in the sky.

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4. Give the magnitude and direction of the net force acting on:- a car moving with a constant velocity of $30km/h$ on a rough road.

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5. Give the magnitude and direction of the net force acting on:- a high-speed electron in space far from all material objects, and free of electric and magnetic fields.

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6. A pebble of mass 0.05 kg is thrown vertically upwards. Give the direction and magnitude of the net force on the pebble:- during its upward motion.

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7. A pebble of mass 0.06 kg is thrown vertically upwards. Give the direction and magnitude of the net force on the pebble:- during its downward motion.

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8. A pebble of mass 0.07 kg is thrown vertically upwards. Give the direction and magnitude of the net force on the pebble:- at the highest point where it is momentarily at rest. Do your answers change if the pebble was thrown at an angle of 45° with the horizontal direction? Ignore air resistance.

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9. Give the magnitude and direction of the net force acting on a stone of mass 0.1kg:- just after it is dropped from the window of a stationary train, Neglect air resistance throughout.

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10. Give the magnitude and direction of the net force acting on a stone of mass 0.1kg:- just after it is dropped from the window of a train running at a constant velocity of $36km/h$, Neglect air resistance throughout.

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11. One end of a string of length t is connected to a particle of mass m and the other to a small peg on a smooth horizontal table. If the particle moves in a circle with speed v the net force on the particle (directed towards the centre) is : T is the tension in the string. [Choose the correct alternative].

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12. A constant retarding force of 50 N is applied to a body of mass 20 kg moving initially with a speed of $15ms^{-1}$. How long does the body take to stop ?

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13. A constant force acting on a body of mass 3.0 kg changes its speed from $2.0ms^{-1}$to $3.5ms^{-1}$ in 25 s. The direction of the motion of the body remains unchanged. What is the magnitude and direction of the force ?

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14. A body of mass 5 kg is acted upon by two perpendicular forces 8 N and 6 N. Give the magnitude and direction of the acceleration of the body.

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15. The driver of a three-wheeler moving with a speed of $36km/h$ sees a child standing in the middle of the road and brings his vehicle to rest in 4.0 s just in time to save the child. What is the average retarding force on the vehicle ? The mass of the three-wheeler is 400 kg and the mass of the driver is 65 kg.

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16. A rocket with a lift-off mass 20,000 kg is blasted upwards with an initial acceleration of $5.0ms^{-2}$. Calculate the initial thrust (force) of the blast.

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17. A body of mass 0.40 kg moving initially with a constant speed of $10ms^{-1}$ to the north is subject to a constant force of 8.0 N directed towards the south for 30 s. Take the instant the force is applied to be t = 0, the position of the body at that time to be x = 0, and predict its position at t = -5 s, 25 s, 100 s.

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18. A truck starts from rest and accelerates uniformly at $2.0ms^{-2}$. At t = 10 s, a stone is dropped by a person standing on the top of the truck (6 m high from the ground). What are the:- acceleration of the stone at t = 11s? (Neglect air resistance.)

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dropped by a person standing on the top of the truck (6 m high from the ground). What are the:- acceleration of the stone at t = 11s? (Neglect air resistance.)

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20. A bob of mass 0.1 kg hung from the ceiling of a room by a string 2 m long is set into oscillation. The speed of the bob at its mean position is $1ms^{-1}$. What is the trajectory of the bob if the string is cut when the bob is:- at one of its extreme positions,

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21. A bob of mass 0.1 kg hung from the ceiling of a room by a string 2 m long is set into oscillation. The speed of the bob at its mean position is $1ms^{-2}$. What is the trajectory of the bob if the string is cut when the bob is:- at its mean position.

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22. A man of mass 70 kg stands on a weighing scale in a lift which is moving :- upwards with a uniform speed of $10ms^{-1}$, what would be the reading on scale?

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23. A man weighs 70 kg. He stands on a weighing scale in a lift which is moving?

upwards with a uniform acceleration of $5ms^{-2}$.

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24. A man weighs 70 kg. He stands on a weighing scale in a lift which is moving?

upwards with a uniform acceleration of $5ms^{-2}$.

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25. Two bodies of masses 10 kg and 20 kg respectively kept on a smooth, horizontal surface are tied to the ends of a light string, a horizontal force F = 600 N is applied to:-B along the direction of string. What is the tension in the string in each case?

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26. Two bodies of masses 10 kg and 20 kg respectively kept on a smooth, horizontal surface are tied to the ends of a light string, a horizontal force F = 600 N is applied to:-B along the direction of string. What is the tension in the string in each case?

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27. A nucleus is at rest in the laboratory frame of reference. Show that if it disintegrates into two smaller nuclei the products must move in opposite directions.

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28. Two billiard balls each of mass 0.05 kg moving in opposite directions with speed $6ms^{-1}$ collide and rebound with the same speed. What is the impulse imparted to each ball due to the other ?

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29. A shell of mass 0.020 kg is fired by a gun of mass 100 kg. If the muzzle speed of the shell is $80ms^{-1}$, what is the recoil speed of the gun ?

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30. A batsman deflects a ball by an angle of 45° without changing its initial speed which is equal to $54km/h$. What is the impulse imparted to the ball ? (Mass of the ball is 0.15 kg.)

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31. If, in Exercise 5.21, the speed of the stone is increased beyond the maximum permissible value, and the string breaks suddenly, which of the following correctly describes the trajectory of the stone after the string breaks :- the stone moves radially outwards.

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32. If, in Exercise 5.21, the speed of the stone is increased beyond the maximum permissible value, and the string breaks suddenly, which of the following correctly describes the trajectory of the stone after the string breaks :- the stone flies off tangentially from the instant the string breaks.

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33. If, in Exercise 5.21, the speed of the stone is increased beyond the maximum permissible value, and the string breaks suddenly, which of the following correctly describes the trajectory of the stone after the string breaks :- the stone flies off at an angle with the tangent whose magnitude depends on the speed of the particle ?

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34. Explain why:- a horse cannot pull a cart and run in empty space.

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35. Explain why:- passengers are thrown forward from their seats when a speeding bus stops suddenly.

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36. Explain why:- it is easier to pull a lawn mower than to push it.

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37. Explain why:- a cricketer moves his hands backwards while holding a catch.

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38. A stone of mass mtied to the end of a string revolves in a vertical circle of radius R. The net forces at the lowest and highest points of the circle directed vertically downwards are : [Choose the correct alternative] T_1 and v_1 denote the tension and speed at the lowest point. T_2 and v_2 denote corresponding values at the highest point.

(a)	$mg - T1$	$mg + T2$
(b)	$mg + T1$	$mg - T2$
(c)	$mg + T1\text{-}(mv21)\ /\ R$	$mg \sim T2+\ (mv)\ /\ R$
(d)	$mg - T_1 - (m v_1^2)\ /\ R$	$mg + T2 + (m\,u2)\ /\ R$

A. $F_L = mg - T_1, F_H = mg + T_2$

B. $F_L = mg + T_1, F_H = mg - T_2$

C.

$$F_L = mg + T_1 - \frac{mv_1^2}{R}, F_H = mg - T_2 + \frac{mv_2^2}{R}$$

D.

$$F_L = mg - T_1 - \frac{mv_1^2}{R}, F_H = mg + T_2 + \frac{mv_2^2}{R}$$

.

Answer:

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39. A helicopter of mass 1000 kg rises with a vertical acceleration of $15ms^{-2}$. The crew and the passengers weigh 300 kg. Give the magnitude and direction of the:- force on the floor by the crew and passengers,

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40. A helicopter of mass 1000 kg rises with a vertical acceleration of $15ms^{-2}$. The crew and the passengers weigh 300 kg. Give the magnitude and direction of the:- action of the rotor of the helicopter on the surrounding air,

Watch Video Solution

41. A helicopter of mass 1000 kg rises with a vertical acceleration of $15ms^{-2}$. The crew and the passengers weigh 300 kg. Give the magnitude and direction of the:- force on the floor by the crew and passengers,

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42. A stream of water flowing horizontally with a speed of $15ms^{-1}$ gushes out of a tube of cross-sectional area $10^{-2}m^2$, and hits a vertical wall nearby. What is the force exerted on the wall by the impact of water, assuming it does not rebound ?

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43. Ten one-rupee coins are put on top of each other on a table. Each coin has a mass m Give the magnitude and direction of:- the force on the 7th coin (counted from the bottom) due to all the coins on its top,

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44. Ten one-rupee coins are put on top of each other on a table. Each coin has a mass m Give the magnitude and direction of:- the force on the 7th coin by the eighth coin,

Watch Video Solution

45. Ten one-rupee coins are put on top of each other on a table. Each coin has a mass m Give the magnitude and direction of:- the reaction of the 6th coin on the 7th coin.

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46. An aircraft executes a horizontal loop at a speed of $720km/h$ with its wings banked at 15°. What is the radius of the loop ?

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47. A train runs along an unbanked circular track of radius 30 m at a speed of $54km/h$. The mass of the train is $10^6 kg$. What provides the centripetal force required for this purpose — Hie engine or the rails

? What is the angle of banking required to prevent wearing out of the rail ?

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48. A train runs along an unbanked circular track of radius 30 m at a speed of $54 km / h$. The mass of the train is $10^6 kg$. What provides the centripetal force required for this purpose — Hie engine or the rails ? What is the angle of banking required to prevent wearing out of the rail ?

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49. A train runs along an unbanked circular track of radius 30 m at a speed of $54km/h$. The mass of the train is $10^6 kg$. What provides the centripetal force required for this purpose — Hie engine or the rails ? What is the angle of banking required to prevent wearing out of the rail ?

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50. A block of mass 15 kg is placed on a long trolley. The coefficient of friction between the block and the trolley is 0.18. The trolley accelerate from rest with $0.5ms^{-2}$ for 20 s and then moves with unifrom velocity. Discuss the motion of the block as viewd by an observer with the trolley.

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51. A block of mass 15 kg is placed on a long trolley. The coefficient of friction between the block and the trolley is 0.18. The trolley accelerate from rest with $0.5ms^{-2}$ for 20 s and then moves with unifrom velocity. Discuss the motion of the block as viewd by an observer with the trolley.

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52. A disc revolves with a spped of $33\left(\frac{1}{3}\right)rev/\min$, and has a radius of 15 cm. Two coins are placed at 4 cm and 14 cm away from the centre the record. If the co-effcient of friction between the coins and the record is 0.15, which of the coins will revolve with the record?

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53. A 70 kg man stands in contact against the ineer wall of a hollow cylindrical drum of radius 3 m rotating about its vertical axis with $200 rev/\min$. The coeffcient of friction between the wall and his clothing is 0.15. What is the minimum rotational speed of the cylinder to enable the man of remain stuck to the wall (without falling) when the floor ids suddenly removed?

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54. A thin circular loop of radius R rotates about its vertical diameter with an angular frequency ω. Show that a small bead on the wire loop rem ains at its lowermost point for $\omega \overleftarrow{\sqrt{\frac{g}{R}}}$ What is the angle made by the radius vector joining the centre to the bead with the vertical downward direction for $\omega = \sqrt{2\frac{g}{R}}$? neglect friction.

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55. When a constant force is applied to a body, it moves with uniform

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56. Aristotle taught that a constant force was required to produce a constant velocity and from this he concluded that in the absence of force,

boodies would come to rest. How do you explain, each of the situations in a constant force seems to produce a constant velocity in the light of Newton's law of motion ?

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57. Describe how a man weighing 980 N might be able to slide down a rope that can support a weight of only 755 N.

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58. A man weighing 980 N might be able to slide down a rope that can support a weight of only 755 N.What will be his minimum velocity after sliding 8 m with acceleration 2.25 meter per (second square)?

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59. An aircraft oof masss 300 kg flies at a speed of $360h^{-1}$ and makes a turn of radius 2500 m. Determine the aircraft's bank angle and d the magnitude of the lift needed to perform the turn in a hhorizontal plane. The lift is always directed perpendicular to the plane of the aircraft wings.

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60. When a force of constant magnitude always acts perpendicular to the motion of a particle then:

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61. A body of mass 3.513 kg is moving along the X-axis with a speed of $5.00ms^{-1}$. The magnitude of its momentum is recorded as

A. $17.56 kgms^{-1}$

B. $17.565 kgms^{-1}$

C. $17.6 kgms^{-1}$

D. $17.57 kgms^{-1}$

Answer:

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62. A rocket with a lift-off mass 20,000 kg is blasted upwards with an initial acceleration of $5.0 ms^{-2}$. Calculate the initial thrust (force) of the blast.

A. $3.5 \times 10^5 N$

B. $7.0 \times 10^5 N$

C. $14.0 \times 10^5 N$

D. $1.75 \times 10^5 N$

Answer:

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63. A block of mass m is connected to another block of mass M by a spring (massless) of spring constant k. The blocks are kept on a smooth horizontal plane. Initially, the blocks are at rest and the spring is unstretched. Then a constant force F starts acting on the block of mass M to pull it. Find the force on the block of mass m.

A. $\frac{mF}{M}$

B. $\frac{(M+m)F}{m}$

C. $\frac{mF}{(M+m)}$

D. $\frac{MF}{(M+m)}$.

Answer:

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64. A block of mass M is pulled along a horizontal frictionless surface by a rope of mass m. If a force P is applied at the free end of the rope, the force exerted by the rope on the block

A. $\dfrac{Pm}{(M+m)}$

B. $\dfrac{Pm}{(M-m)}$

C. P

D. $\dfrac{PM}{(M+m)}$.

Answer:

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65. A particle of mass 0.3 kg is subjected to a force $F = -kx$ with $k = 15Nm^{-1}$. What will be its initial acceleration, if it is released from a point 20 cm away from the origin ?

A. $3ms^{-2}$

B. $15ms^{-2}$

C. $5ms^{-2}$

D. $10ms^{-2}$

Answer:

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66. A ball of mass 0.2 kg is thrown vertically upwards by applying a force by hand. If the hand moves 0.2 m while applying the force and the ball goes upto 2 m height further, find the magnitude of the force. Take $g = 10ms^{-2}$.

A. 20 N

B. 22 N

C. 4 N

D. 16 N

Answer:

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67. A player catches a cricket ball of mass of 0.15 kg moving with a speed of $20ms^{-1}$. The process of catching is completed in 0.1 s. The average force exerted by the player is

A. 30 N

B. 300 N

C. 150 N

D. 3 N

Answer:

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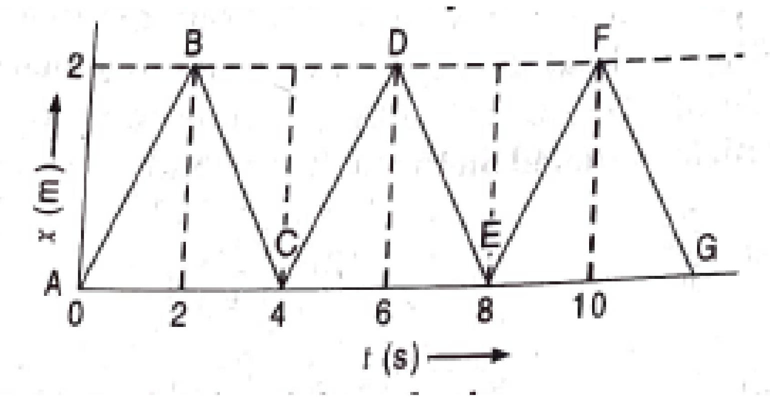
68. The figure shows



the position-time $(x - t)$ graph of one dimensional motion of a body of mass 0.4 kg. The magnitude of each impulse is

A. 0.2 N s

B. 0.4 N s

C. 0.8 N s

D. 1.6 N s

Answer:

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69. A machine gun fires a bullet of mass 40 g with a velocity $1200 ms^{-1}$. The man holding it, can exert a maximum force of 144 N on the gun. How many bullets can he fire per second at the most ?

A. one

B. four

C. two

D. three

Answer:

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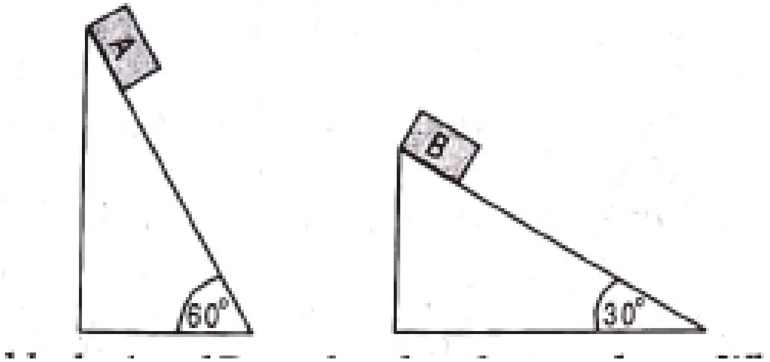
70. Two frictionless inclined planes making an angle of 30° and $606 \circ$ with the vertical are shown in the figure.



Two blocks A and B are placed on the two planes. What is the relative vertical acceleration of A w.r.t. B ?

A. $4.9ms^{-2}$ in vertical direction

B. $4.9ms^{-2}$ in horizontal direction

C. $9.8ms^{-2}$ in vertical direction

D. zero.

Answer:

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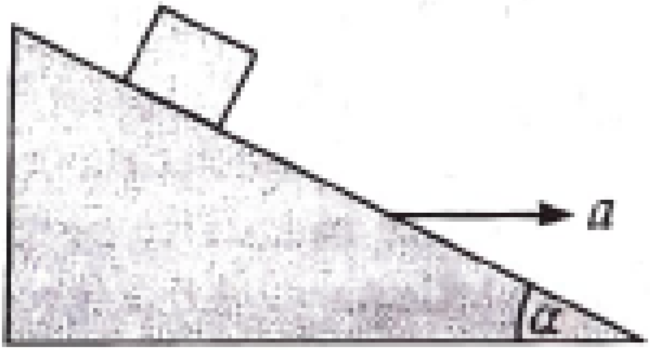
71. A block is kept on a frictionless inclined surface with angle of inclination α. The incline is given an acceleration a to keep the block stationary.



Then, a is equal to

A. $g \tan \alpha$

B. $g \cos ec\alpha$

C. g

D. $a \tan \alpha$

Answer:

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72. A lift is moving down with acceleration a. A man in the lift drops a ball inside the lift. The acceleration of the ball as observed by the man in the lift and a man standing stationary on the ground are respectively.

A. g, g

B. $g - a, g - a$

C. $g - a, g$

D. a, g

Answer:

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73. A light spring balance hangs from the hook of the other light spring balance and a block of mass M kg hangs from the former one. Then, the true statement about the scale reading is :

A. Both the scale read M kg each.

B. The scale of the lower one reads M kg and of the upper one zero.

C. The reading of the two scales can be anything but the sum of the readings will be M kg.

D. Both the scales read $M/2kg$.

Answer:

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74. A spring balance is attached to the ceiling of a stationary lift. A man suspends a block from the hook of the spring balance and the balance reads

98 N. What will be the reading of the spring balance, if the lift starts moving downward with an acceleration of $2ms^{-2}$?

A. 24 N

B. 74 N

C. 15 N

D. 49 N

Answer:

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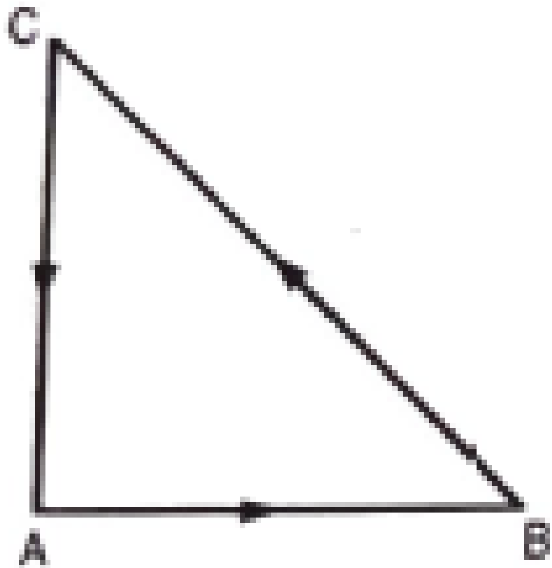
75. Three forces start acting simultaneously on a particle moving with velocity $\vec{v}$. These forces are represented in magnitude and direction by the three sides of a triangle ABC (as shown).



The particle will now move with velocity :

A. less than $\vec{v}$

B. greater than $\vec{v}$

C. $\left|\vec{v}\right|$ in the direction of largest force BC

D. $\vec{v}$ remaining unchanged

Answer:

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76. When forces F_1, F_2 and F_3 are acting on a particle of mass m such that F_2 and F_3 are mutually perpendicular, then the particle remains stationary. If the force F_1 is now removed then the acceleration of the particle is :

A. F_1 / m

B. $F_2 F_3 / mF$

C. $(F_2 - F_3) / m$

D. $F_2 / m.$

Answer:

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77. Three identical blocks of masses $m = 2kg$ are drawn by a force $F = 10.2N$ with an acceleration of $0.6ms^{-2}$ on a frictionless surface. What is the tension (in N) in the string between the blocks B and C ?

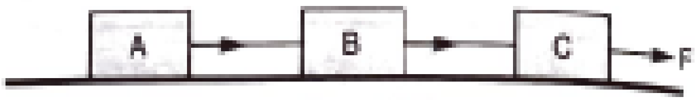

Fig. 1.36

A. 9.2

B. 7.8

C. 4

D. 9.8

Answer:

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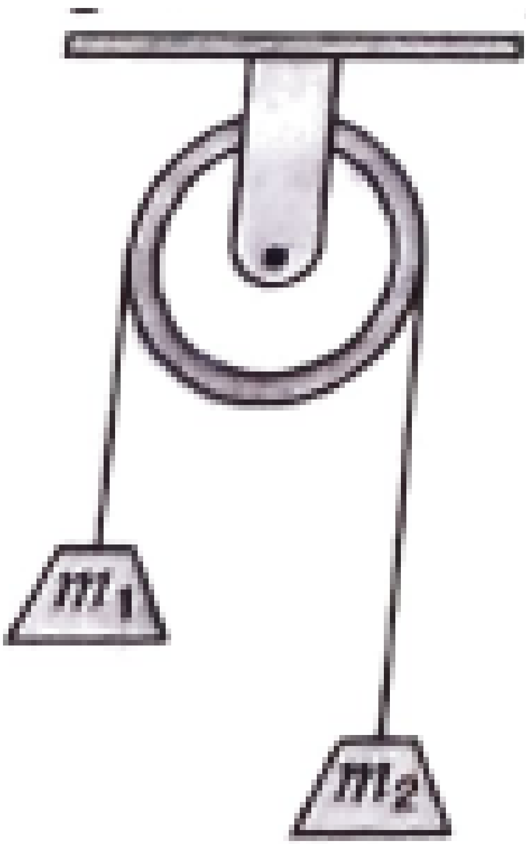
78. Two masses $m_1 = 5kg$ and $m_2 = 4.8kg$ tied to a string are hanging over a light frictionless pulley. What is the acceleration of the masses, when lift is free to move ? Given, $g = 9.8ms^{-2}$.



A. $0.2ms^{-2}$

B. $9.8ms^{-2}$

C. $5ms^{-2}$

D. $4.8ms^{-2}$

Answer:

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79. A light string passing over a smooth light pulley connects two blocks of masses m_1 and m_2 (vertically). If the acceleraton of the system is $g/8$, find the ratio of the two masses.

A. $8:1$

B. $9:7$

C. $4:3$

D. $5:3$

Answer:

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80. A marble block of mass 2 kg lying on ice, when given a velocity of $6m^{-1}$, is stopped by friction in 10 s. Then the coefficient of friction is :

A. 0.02

B. 0.03

C. 0.06

D. 0.01

Answer:

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81. A block rests on a rough inclined plane making an angle of 30° with the horizontal. The coefficient of static friction between the block and the plane is

0.8. If the frictional force on the block is 10 N, the mass of the block (in kg) is $(g = 10 m s^{-2})$:

A. 2.0

B. 4.0

C. 1.6

D. 2.5

Answer:

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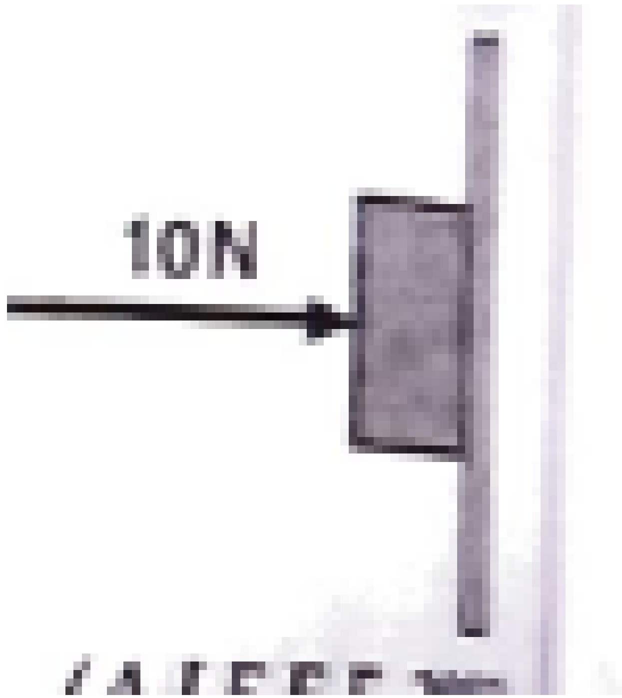
82. A horizontal force of 10 N is necessary to just hold a block stationary against a wall. The coefficient of friction between the block and the wall is 0.2. the weight of the block is :



A. 20 N

B. 50 N

C. 100 N

D. 2 N

Answer:

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83. The upper half of an inclined plane with inclination θ is perfectly smooth, while the lower half is rough. A bdy starting from rest at the top will again come to rest at the bottom, find the coefficient of friction for the lower half.

A. $2\tan\theta$

B. $\tan\theta$

C. $2\sin\theta$

D. $2\cos\theta$

Answer:

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84. A smooth block is released at rest on a 45° incline an dthen slides a distance d. The time taken to slide is n times as much to slide on rough incline than on a smooth incline. The coefficient of friction is :

A. $\mu_k = \sqrt{1 - \frac{1}{n^2}}$

B. $\mu_s = \sqrt{1 - \frac{1}{n^2}}$

C. $\mu_k = 1 - \frac{1}{n^2}$

D. $\mu_s = 1 - \frac{1}{n^2}$

Answer:

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85. When a force of constant magnitude always acts perpendicular to the motion of a particle then:

A. Its velocity is constant.

B. its acceleration is constant

C. its kinetic energy is constant

D. it moves in a straight line.

Answer:

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86. An annular ring with inner and outer radii R_1 and R_2 is rolling without slipping with a uniform angular speed. The ratio of the forces F_1 / F_2 experienced by two identical particles situated on the inner and outer parts of the ring is

A. $\frac{R_2}{R_1}$

B. $\left(\frac{R_1}{R_2}\right)^2$

C. 1

D. $\frac{R_1}{R_2}$

Answer:

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87. The minimum velocity (in ms^{-1}) with which a car driver must traverse a flat curve of radius 150 m and coefficient of friction 0.6 to avoid skidding is :

A. 60

B. 30

C. 15

D. 25

Answer:

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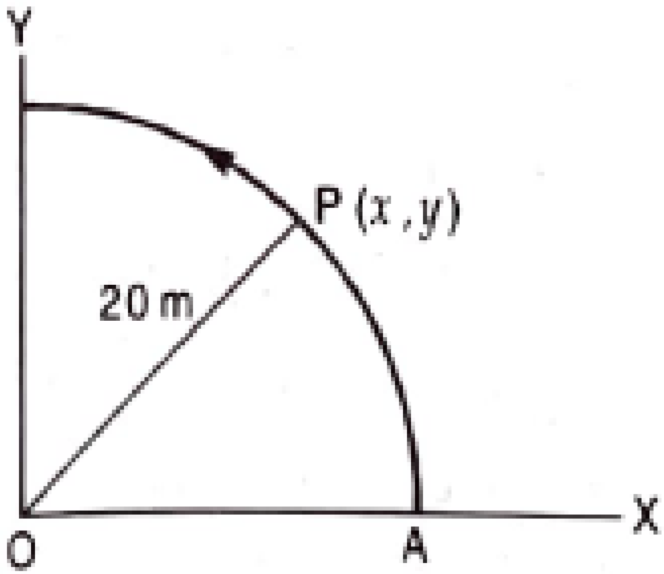
88. A point P moves in counter-clockwise direction on a circular path as shown in the figure. The movement of P is such that it sweeps out a length $S = t^3 + 5$, where S is in metres and t in seconds. The radius of the path is 20 m. The acceleration of P, when $t = 2s$ is nearly



A. $7.2ms^{-2}$

B. $12ms^{-2}$

C. $13ms^{-2}$

D. $14ms^{-2}$

Answer:

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89. For a particle in circular motion, the acceleration $\vec{a}$ at a point (R, θ) on the circle of radius R is (Here, θ is measured from the X-axis)

A. $\frac{v^2}{R}\hat{i} + \frac{v^2}{R}\hat{j}$

B. $\frac{v^2}{R}\cos\theta\hat{i} + \frac{v^2}{R}\sin\theta\hat{j}$

C. $-\frac{v^2}{R}\sin\theta\hat{i} + \frac{v^2}{R}\cos\theta\hat{j}$

D. $-\frac{v^2}{R}\cos\theta\hat{i} - \frac{v^2}{R}\sin\theta\hat{j}$

Answer:

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90. A ball is dropped from a spacecraft revolving around the earth at a height of 120 km. What will happen to the ball ?

A. It will continue to move with the same speed along the original orbit of spacecraft

B. It will move with the same speed, tangentially to the spacecraft.

C. It will fall down to the earth gradually

D. It will go very far in the space.

Answer:

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91. 10 N force applied on a body produces in it an acceleration of $1ms^{-2}$. The mass of the body is

A. 10 kg

B. 5 kg

C. 15 kg

D. 20 kg

Answer:

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92. A force of 6 N acts on a body of mass 1 kg and at rest. During this time, the body attains a velocity of $30ms^{-1}$. The time for which the force acts on the body is

A. 10 s

B. 8 s

C. 7s

D. 5s

Answer:

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93. A particle of mass m is projected with velocity v making an angle of 45° with the horizontal. When the particle lands on the level ground, the magnitude of the change in momentum will be

A. $mv / \sqrt{2}$

B. $\sqrt{2}mv$

C. $2mv$

D. zero.

Answer:

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94. A force vector applied on a mass is represented as $\overrightarrow{F} = 6\hat{i} - 8\hat{j} + 10\hat{k}$ and accelerates with $1ms^{-2}$. What will be the mass of the body ?

A. $10\sqrt{2}kg$

B. $2\sqrt{10}kg$

C. 10 kg

D. 20 kg

Answer:

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95. An object of mass 3 kg is at rest. Now a force of $\overrightarrow{F} = \left(6t^2\hat{i} + 4t\hat{j}\right)N$ applied on the object. Then, the velocity (in ms^{-1}) 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. $18\hat{i} + 4\hat{j}$

Answer:

Watch Video Solution

96. If the force on a rocket moving with a velocity of $300ms^{-1}$ is 210 N, then the rate of combustion of the fuel is

A. $0.7kgs^{-1}$

B. $1.4kgs^{-1}$

C. $0.07kgs^{-1}$

D. $10.7kgs^{-1}$

Answer:

Watch Video Solution

97. A cricket catches a ball of mass 150 g in 0.1 s moving with a speed of $20ms^{-1}$. Then the experiences a foce of

A. 300 N

B. 30 N

C. 3 N

D. 0.3 N

Answer:

Watch Video Solution

98. A 0.5 kg ball moving with a speed of $12ms^{-1}$ strikes a hard wall at an angle of 30° with thw wall. It is reflected with the same speed at the same angle. If the ball is contact with the wall for 0.25 s, the average force acting on the wall is

A. 96 N

B. 48 N

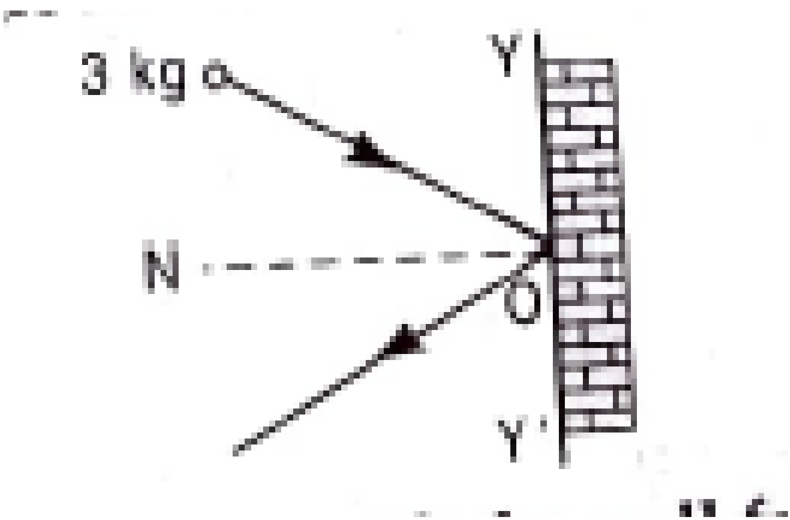
C. 24 N

D. 12 N

Answer:

Watch Video Solution

99. A 3 kg ball strikes a heavy rigid wall with a speed of $10ms^{-1}$ at an angle of 60°. It gets reflected with the same speed and angle as shown in the figure. If the ball is in contact with the wall for 0.2 s, what is the average force exerted on the ball by the wall ?



A. 300 N

B. zero

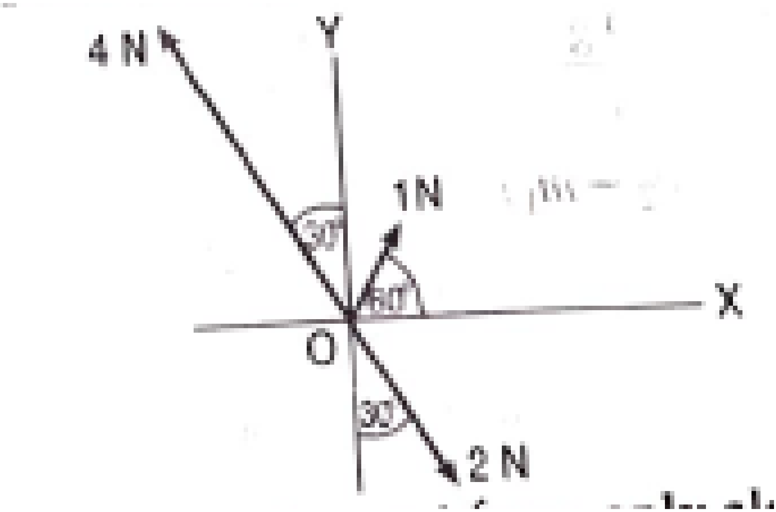
C. $150\sqrt{3}N$

D. 150 N

Answer:

Watch Video Solution

100. Three forces acting on a body are as shown in figure . To have the resultant force only along the X-direction, the magnitude of the minimum additional force needed is



A. $\sqrt{3}/4N$

B. $\sqrt{3}N$

C. 0.5 N

D. 1.5 N

Answer:

Watch Video Solution

101. A mass of 1 kg is suspended by a thread. It is lifted up and them lowered with an acceleration $4.9ms^{-2}$. The ratio of the tension is

A. $3:1$

B. $1:3$

C. $1:2$

D. $2:1$

Answer:

Watch Video Solution

102. A mass of 1 kg is suspended by a thread. It is lifted up and them lowered with an acceleration $4.9ms^{-2}$. The ratio of the tension is

A. $3:1$

B. $1:3$

C. $1:2$

D. $2:1$

Answer:

Watch Video Solution

103. A man weighs 80 kg. He stands on a weighing scale in the lift, which is moving upward with a uniform acceleration of $5ms^{-2}$ what whould be the reading on the scale? $\left(g = 10m/s^2\right)$.

A. zero

B. 400 N

C. 800 N

D. 1200 N

Answer:

Watch Video Solution

104. A lift of mass 1000 kg is moving with an acceleration of $1ms^{-2}$ in upward direction. Then, the tension developed in the string, which is connected to lift, is

A. 9800 N

B. 10000 N

C. 10800 N

D. 11000 N

Answer:

Watch Video Solution

105. 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:

Watch Video Solution

106. 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 if the mass exceeds 25kg. What is the maximum acceleration with which the monkey can climb up along the rope ?

A. $2.5ms^{-2}$

B. $5ms^{-2}$

C. $10ms^{-2}$

D. $25ms^{-2}$

Answer:

Watch Video Solution

107. Sand is being dropped on a conveyer belt at the rate of $Mkgs^{-1}$. The force (N) necessary to keep the belt moving with a constant velocity of $v(ms^{-1})$ will be

A. $Mv/2$

B. Mv

C. $2Mv$

D. zero.

Answer:

Watch Video Solution

108. A block of mass m is placed on a smooth wedge of inclination θ. The whole system is accelerated horizontally so that 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. $mg/\cos\theta$

Answer:

Watch Video Solution

109. A 5000 kg rocket is set for vertical firing. The exhaust speed is $800ms^{-1}$. To give an initial upward acceleration of $20ms^{-2}$, the amount of gas ejected per second to supply the needed thrust will be $(g = 10ms^{-2})$

A. $127.5kgs^{-1}$

B. $137.5kgs^{-1}$

C. $155.5kgs^{-1}$

D. $187.5 kgs^{-1}$

Answer:

Watch Video Solution

110. A bullet of mass 200 g is fired with avelocity $30 ms^{-1}$ from a gun of mass 100 kg. The recoil velocity of the gun is

A. $10 ms^{-1}$

B. $5 ms^{-1}$

C. $0.06 ms^{-1}$

D. $0.03ms^{-1}$

Answer:

Watch Video Solution

111. A man fires a bullet of mass 20 g at a speed of $5ms^{-1}$. The gun is of 1 kg mass. With what velocity, the gun rebounds backward ?

A. $0.1ms^{-1}$

B. $10ms^{-1}$

C. $1ms^{-1}$

D. $0.01ms^{-1}$

Answer:

Watch Video Solution

112. A nucleus ruptures into two nuclear parts, which have their velocity ratio equal to $2:1$. What will be the ratio of their nuclear size (nuclear radius)?

A. $2^{1/3}:1$

B. $1:2^{1/3}$

C. $3^{1/2} : 1$

D. $1 : 3^{1/2}$

Answer:

Watch Video Solution

113. 1 kg stationary bomb is exploded in three parts having mass $1:1:3$ respectively. Parts having same mass move in perpendicular direction with velocity $39ms^{-1}$, then the velocity of bigger part will be

A. $10\sqrt{2}ms^{-1}$

B. $10/\sqrt{2}ms^{-1}$

C. $15\sqrt{2}ms^{-1}$

D. $15/\sqrt{2}ms^{-1}$

Answer:

Watch Video Solution

114. A bomb of mass 1 kg is thrown vertically upwards with a speed of $100m/s$ .After 5 seconds it explodes into two fragments .One fragment of mass 400 g is found to go down with a speed of 25 m//s .the second fragment just after the explosion will go $\left(g = 10m / s^2\right)$.

A. It will go upward with speed of $100ms^{-1}$

B. It will go upward with speed of $40ms^{-1}$

C. It will go upward with speed of $60ms^{-1}$

D. It will go downward with speed of $40ms^{-1}$

Answer:

Watch Video Solution

115. If a number of forces are acting simultaneously on a particle, then ecah one of them will produce the same effect, which it would have done while acting alone. This known as

A. principle of transmissibility of forces.

B. principle of physical independence of forces.

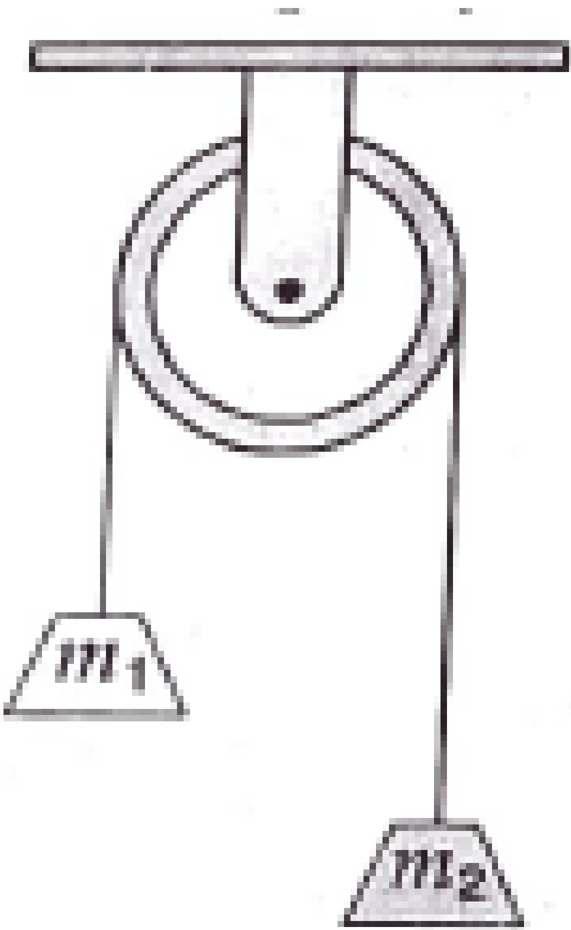
C. principle of resolution of forces.

D. principle of physical dependence of forces.

Answer:

Watch Video Solution

116. Two blocks $m_1 = 5g$ and $m_2 = 10g$ are hung vertically over a light frictionless pulley as shown in the figure.



[illegible] What is

the acceleration of the masses, when left free ?

(Here, g is acceleration due to gravity)

A. $g/5$

B. $g/2$

C. g

D. $g/3$

Answer:

Watch Video Solution

117. On the horizontal surface of a truck, a block of mass 1 kg is placed and truck is moving with acceleration $5ms^{-2}$. Coefficient of friction 0.6. then, the frictional force on the block will be

A. 5 N

B. 6 N

C. 5.88 N

D. 8 N

Answer:

Watch Video Solution

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

A. $10ms^{-2}$

B. $5ms^{-2}$

C. $15ms^{-2}$

D. $0.5ms^{-2}$

Answer:

Watch Video Solution

119. Consider a car moving along a straight horizontal road with a speed of $20ms^{-1}$. If the coefficient of static friction between the tyres and road is 0.5, the shortest distance in which the car can be stopped is (take $g = 10ms^{-2}$)

A. 30 m

B. 40 m

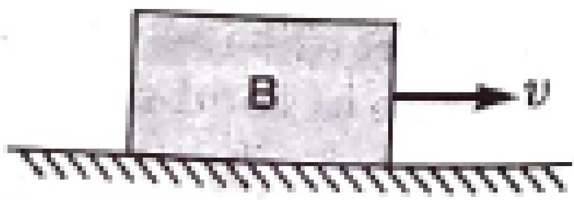
C. 72 m

D. 20 m

Answer:

Watch Video Solution

120. A block B is pushed momentarily along a horizontal surface with an initial velocity v.



If μ is the coefficient of sliding friction between the block and the surface, the block will come to rest after a time

A. $v / g\mu$

B. $g\mu / v$

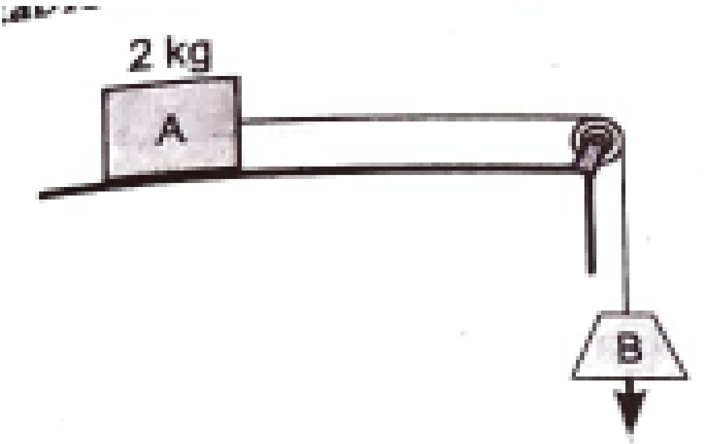
C. g / v

D. v / g.

Answer:

Watch Video Solution

121. The coefficient of static friction, between block A of mass 2 kg and the table as shown in the figure



is 0.2. What would be the maximum mass of block B, so that the two blocks do not move ? The string and the pulley are assumed to be smooth and massless.

A. 2.0 kg

B. 4.0 kg

C. 0.2 kg

D. 0.4 kg

Answer:

Watch Video Solution

122. When a body slides down from rest along a smooth inclined plane making anangle of 45° with the horizontal, it takes time T. when the same body slides down from rest along a rough inclined plane making the same angle and through the same distance, it is seen to take time pT, where p is some number greater than 1. Calculate the co-efficient of friction between the body and the rough plane.

A. 0.33

B. 0.25

C. 0.75

D. 0.8

Answer:

Watch Video Solution

123. A chain of mass M and length L is placed on a table, such that only a part of it is on the table and the remaining part hangs in air. If the coefficient of friction between the chain and table is μ, find the maximum length of the chain that can hang in air without the sliding of the part of the chain on the table.

A. 0.2

B. 0.25

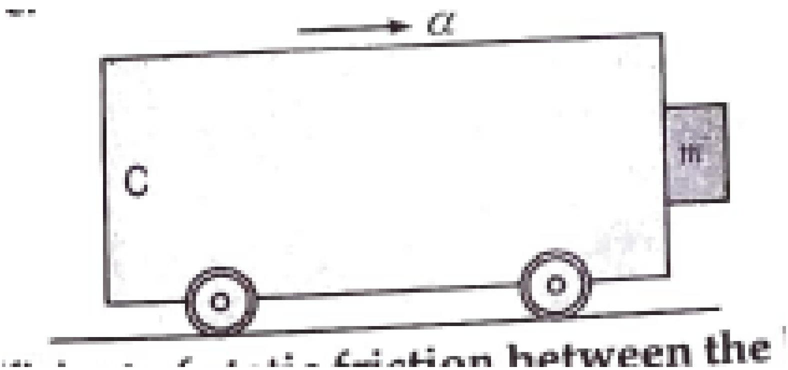
C. 0.35

D. 0.15

Answer:

Watch Video Solution

124. 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 acceleration α of the cart that will prevent the block from falling satisfies

A. $\alpha > mg/\mu$

B. $\alpha > g / \mu m$

C. $\alpha \geq g / \mu$

D. $\alpha < g / \mu$.

Answer:

Watch Video Solution

125. If a ladder is not in equilibrium against a smooth vertical wall, then it can be made in equilibrium by

A. increasing the angle of ladder.

B. decreasing the angle of ladder.

C. increasing the length of the ladder.

D. decreasing the length of the ladder.

Answer:

Watch Video Solution

126. A ball of mass 0.25 kg attached to the end of a string of length 1.96 m is moving in a horizontal circle. The string will break, if the tension is more than 25 N. What is the maximum speed with which the ball can be moved ?

A. $3ms^{-1}$.

B. $5ms^{-1}$.

C. $9.8ms^{-1}$.

D. $14ms^{-1}$.

Answer:

Watch Video Solution

127. A stone of mass 1 kg, tied to the nd of a 1 m long string, is whirled in a horizontal circle with a uniform angular velocity of $2rads^{-1}$. Tension in the string is

A. 0.5 N

B. 1 N

C. 2 N

D. 4 N

Answer:

Watch Video Solution

128. A particle of mass M is moving in a horizontal circle radius R with uniform speed v. When it moves from one point to a diametrically opposite point, its

A. kinetic energy changes by $\frac{1}{2}Mv^2$.

B. momentum does not change.

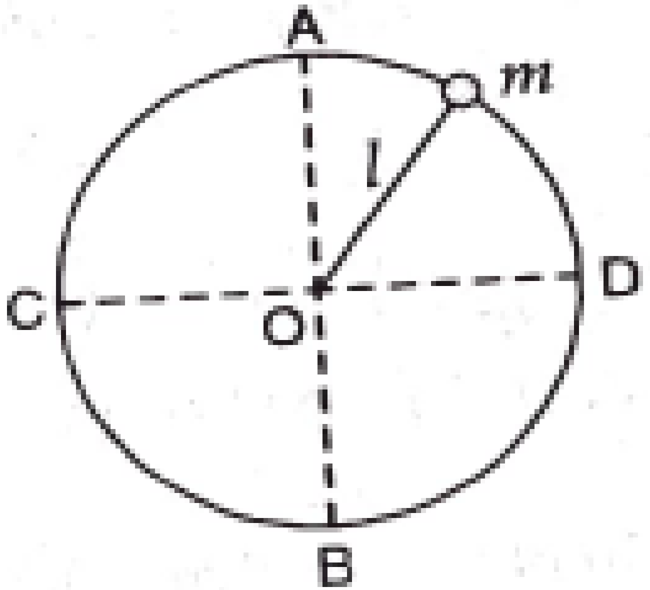
C. momentum changes by $2Mv$.

D. kinetic energy changes by Mv^2.

Answer:

Watch Video Solution

129. A small sphere is attached to a cord and rotates in a vertical circle about a point O. If the average speed of the sphere is increased, the cord is most likely to break at the orientation, when the mass is at



A. bottom point B

B. top point A

C. the point D

D. the point C

Answer:

Watch Video Solution

130. A tube of length L is filled completely with an incompressible liquid of mass M and closed at both the ends.The tube is then rotated in a horizontal circle about one of its end with uniform angular velocity ω.The force exerted by the liquid at the other end is :

A. $\frac{ML^2\omega^2}{2}$

B. $\frac{ML\omega^2}{2}$

C. $\frac{ML^2\omega}{2}$

D. $ML^2\omega$

Answer:

Watch Video Solution

131. A stone tied to string of length l is whirled in a vertical circle with the other end of the string at the centre. At a certain instant of time the stone is at its lowest position and has a speed u. The magnitude of the change in velocity as it reaches a position, where the string is horizontal (g being acceleration due to gravity) is

A. $\sqrt{2gl}$

B. $\sqrt{u^2 - gl}$

C. $u - \sqrt{(u^2 - 2gl)}$

D. $\sqrt{2(u^2 - gl)}$.

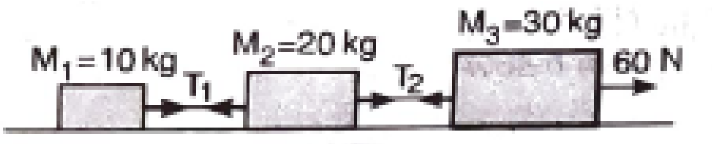
Answer:

Watch Video Solution

132. A 60 kg man jumps to a height of 0.8 m. Find the impulse provided by the groud to the man.

Watch Video Solution

133. Three masses connected by massless string are placed on a horizontal frictionless surface as shown in Fig.



. Find tensions T_1 and T_2.

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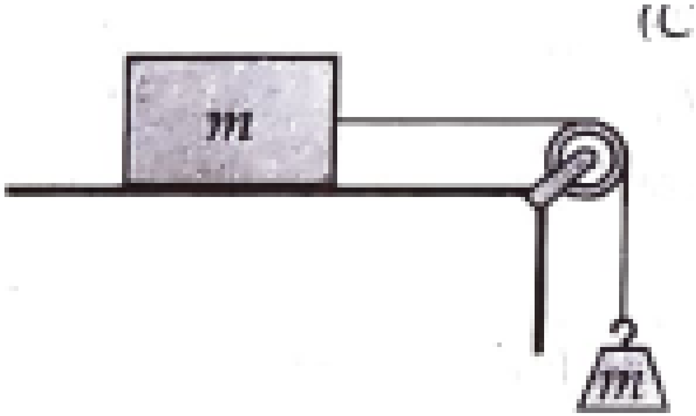
134. As shown in Fig.



, mass of bodies is equal to m. If coefficient of friction between the horizontal surface and the mass m is equal to 0.2, then find accelertaion of the system ?

Watch Video Solution

135. Fig.

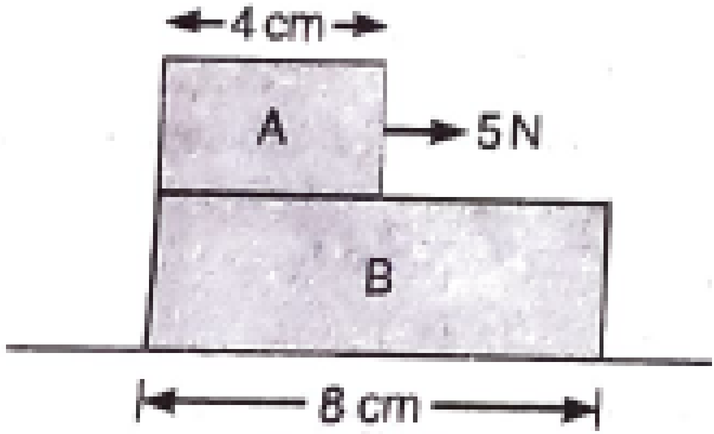


Fig. 3.03

shows two blocks A and B having masses 1 kg and 2 kg respectively. A force of 5 N is applied on A. Coefficient of friction between A and B is 0.2 and that of between B and horizontal surface is zero. Find acceleration of A and B.

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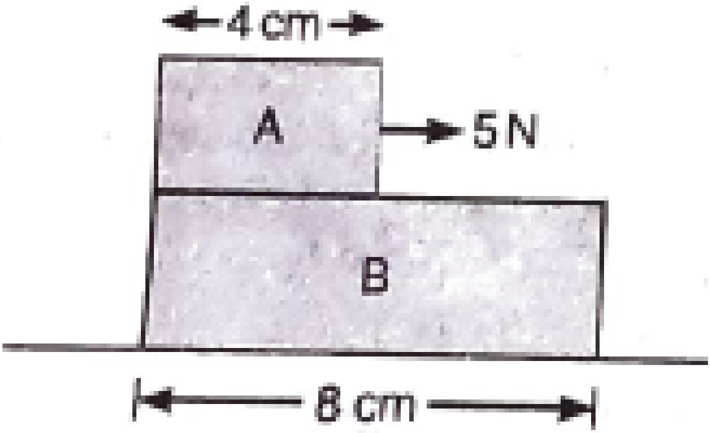
136. 

Fig. 3.03

Fig. shows two blocks A and B having masses 1 kg and 2 kg respectively. A force of 5 N is applied on A. Coefficient of friction between A and B is 0.2 and that of between B and horizontal surface is zero. Find the time taken for the front face of A of coincide with that of B ?

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137. A block of mass 5 kg is placed on a horizontal surface and a pushing force of 20 N is acting on the block as shown in fig.

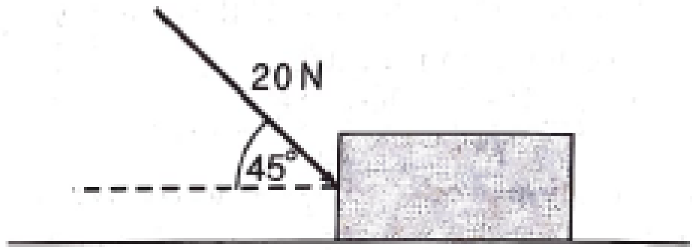

Fig. 3.04

If coefficient of friction between the horizontal surface and the block is equal to 0.2, then calculate the frictional force and the speed of the block after 15 s. Given, $g = 10ms^{-2}$.

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138. A conveyor belt is moving at a constant speed of $2ms^{-1}$. A box is gently droped on it. The coefficient of friction between them is $\mu = 0.5$. The distance that the box will move relative to the belt before coming to rest on it, taking $g = 10ms^{-2}$, is

A. 0.4 m

B. 1.2 m

C. 0.6 m

D. zero.

Answer:

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139. A disc is rotating with angular velocity ω about its axis (without any translational push) on a smooth surface as shown in Fig.

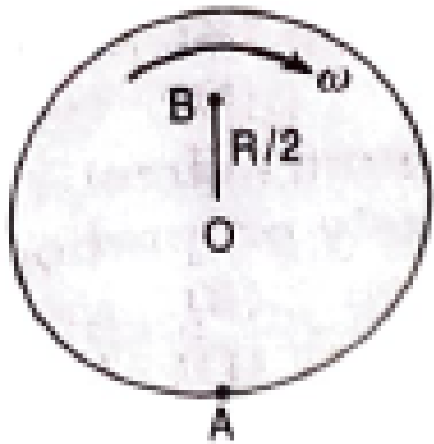

Fig. 3.05

. Find direction and magnitude of the velocity at the points A and B.

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140. A disc is rotating with angular velocity ω about its axis (without any translational push) on a smooth surface as shown in Fig. Why is friction necessary for rolling ?

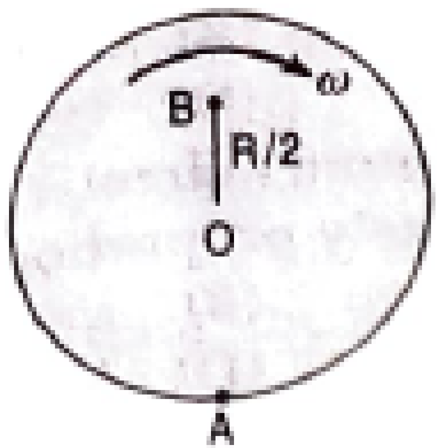

Fig. 3.05

Watch Video Solution

141. A disc is rotating with angular velocity ω about its axis (without any translational push) on a smooth surface as shown in Fig.

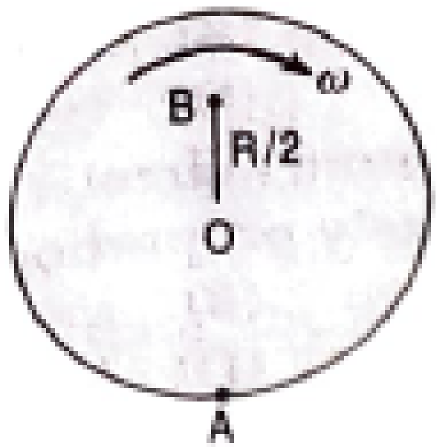

Fig. 3.05

. What is the condition of friction during rolling ?

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142. A disc is rotating with angular velocity ω about its axis (without any translational push) on a smooth surface as shown in Fig.

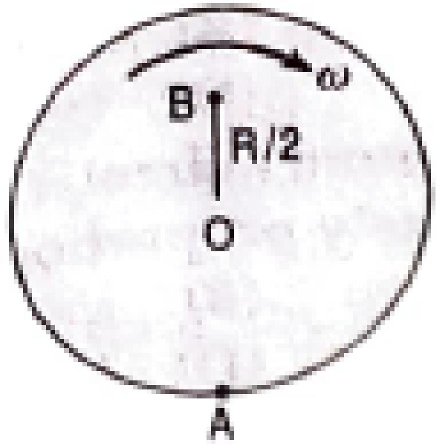
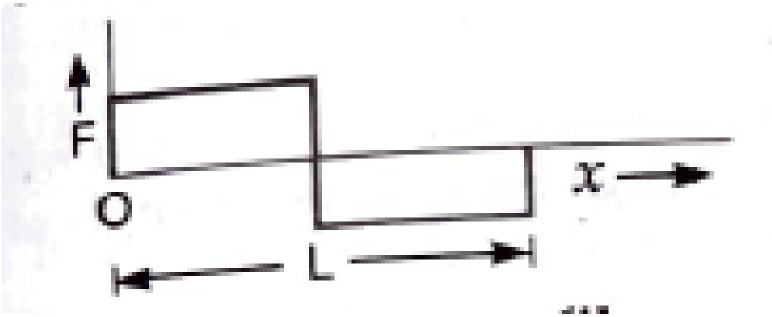


Fig. 3.05

. What is the condition of friction during rolling ?

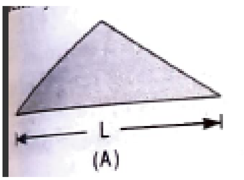
Watch Video Solution

143. A person used force (F), shown in figure

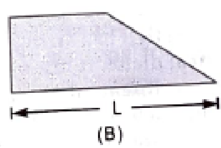


to move a load with constant velocity on surface. Identify the corrcet surface profile.

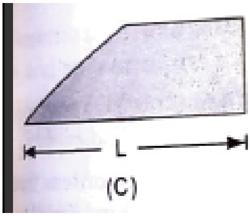
A.



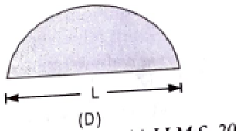
B.



C.



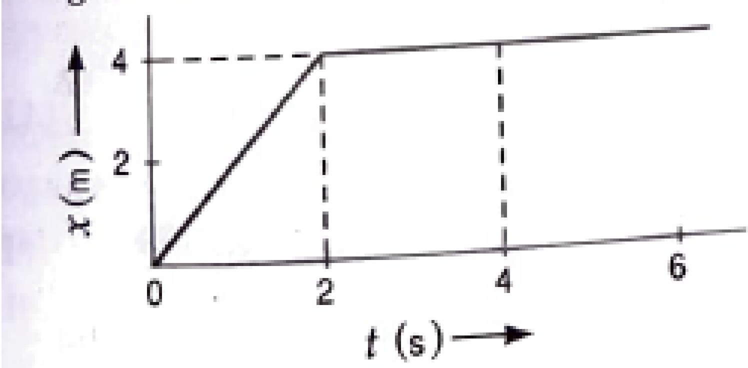
D.



Answer:

Watch Video Solution

144. In the figure given, the position-time graph of a particle of mass 0.1 kg is shown



. The impulse at $t = 2s$ is :

A. $0.2kgms^{-1}$

B. $-0.2kgms^{-1}$

C. $0.1kgms^{-1}$

D. $-0.4kgms^{-1}$

Answer:

Watch Video Solution

145. When a horse pulls a wagon, the force that causes the horse to move forward is the force

A. that ground exerts on the horse.

B. that horse exerts on the ground

C. that wagon exerts on the horse.

D. that horse exerts on the wagon.

Answer:

Watch Video Solution

146. Rocket engines lift a rocket from the earth surface, because hot gases with high velocity

A. push against the air

B. push against the earth

C. react against the rocket and push it up

D. heat up the air which lifts the rocket.

Answer:

Watch Video Solution

147. If two forces of equal magnitudes act simultaneously on a body in the east and the north directions, then

A. the body will displace in the north direction.

B. the body will displace in the east direction.

C. the body will displace in the north-east direction.

D. the body will remain at the rest.

Answer:

Watch Video Solution

148. If a person with a spring balance and a body hanging from it goes up and up in an aeroplane, then the reading of the weight of the body as indicated by the spring balance, will

A. go on increasing

B. go on decreasing

C. first increase and then decrease

D. remain the same.

Answer:

Watch Video Solution

149. A person is standing in an elevator. In which situation he finds his weight less ?

A. When the elevator moves upward with constant acceleration.

B. When the elevator moves downward with constant acceleration.

C. When the elevator moves upward with uniform acceleration.

D. When the elevator moves downward with uniform acceleration.

Answer:

Watch Video Solution

150. What is non-conservative force?

A. Interatomic force

B. Gravitational force

C. Electrostatic force

D. Viscous force.

Answer:

Watch Video Solution

151. A gun fires a bullet of mass 50 g with a velocity of $30ms^{-1}$. Because of this, the gun is pushed back with a velocity of $1ms^{-1}$. The mass of the gun is

A. 5.5 kg

B. 3.5 kg

C. 1.5 kg

D. 0.5 kg

Answer:

Watch Video Solution

152. A bullet is fired from a rifle. If the rifle recoils freely, then the kinetic energy of the rifle, is

A. less than that of the bullet

B. more than that of the bullet

C. same as that of the bullet

D. equal or less than that of the bullet

Answer:

Watch Video Solution

153. Rocket works on the principle of conservatin of:

A. linear momentum

B. angular momentum

C. kinetic energy

D. mass

Answer:

Watch Video Solution

154. A simple pendulum is set up in a trolley which is moving with an acceleration a on a horizontal palne. Then, the thread of the pendulum in the mean position makes an angle with the vertical equal to

A. $\tan^{-1}(a/g)$ in the forward direction

B. $\tan^{-1}(a/g)$ in the backward direction

C. $\tan^{-1}(g/a)$ in the forward direction

D. $\tan^{-1}(g/a)$ in the backward direction

Answer:

Watch Video Solution

155. The forces, which meet at one point but their lines of action do not in one plane, are called

A. coplanar concurrent forces

B. coplanar non-concurrent forces

C. non-coplanar concurrent forces

D. non-coplanar non-concurrent forces.

Answer:

Watch Video Solution

156. In ordinary terrestrial experiments, the observer in an inertial frame in the following cases is

A. a child revolving in a giant wheel

B. a driver in a sports car moving with a constant high speed on a straight road

C. the pilot of an aeroplane, which is taking off.

D. a cyclist negotiating a sharp turn.

Answer:

Watch Video Solution

157. If the normal force is doubled, then coefficient of friction is

A. halved

B. tripled

C. doubled

D. not changed

Answer:

Watch Video Solution

158. A body of mass m is placed on a rough surface with coefficient of friction μ inclined at θ. If the mass is in equilibrium, then

A. $\theta = \tan^{-1}\mu$

B. $\theta = \dfrac{\tan^{-1}1}{\mu}$

C. $\theta = \dfrac{\tan^{-1}m}{\mu}$

D. $\theta = \dfrac{\tan^{-1}\mu}{m}$

Answer:

Watch Video Solution

159. When two surface are coated with a lubricant, then they :

A. roll upon each other

B. slide upon each other

C. stick to each other

D. None of the above.

Answer:

Watch Video Solution

160. A wheel has an angular acceleration of $3rads^{-2}$ and an initial angular speed of $2rads^{-1}$. In a time of 2 s, it has rotated through an angle (in radian) of

A. 4

B. 6

C. 10

D. 12

Answer:

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161. A car moving on a circular path of length 4π metre experience a force of 6 N towards the centre of the path. If the mass of the car is 108 kg, the velocity of the car is

A. $0.33ms^{-1}$

B. $0.66ms^{-1}$

C. $0.77ms^{-1}$

D. $0.99ms^{-1}$.

Answer:

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162. A particle revolves round a circular path. The acceleration of the particle is inversely proportional to

A. radius

B. velocity

C. mass of particle

D. both (B) and (C)

Answer:

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163. If the radii of circular paths of two particles of same masses are in the ratio of 1:2, then to have a constant centripetal force, their velocities should be in a ratio of

A. $1:\sqrt{2}$

B. $\sqrt{2}:1$

C. $4:1$

D. $1:4$.

Answer:

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164. The acceleration of a body in a non-uniform circular motion is $5 ms^{-2}$. Which one of the following is correct ?

A. The radial acceleration and tangential acceleration are $3 ms^{-2}$ and $4 ms^{-2}$.

B. The radial acceleration and tangential acceleration are $2 ms^{-2}$ and $3 ms^{-2}$.

C. The radial and tangential acceleration are both $5 ms^{-2}$

D. The radial acceleration and tangential acceleration are $5 ms^{-2}$ and $3 ms^{-2}$.

Answer:

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165. An aircraft executes a horizontal loop with a speed of $150ms^{-1}$ with its wings banked at an angle of 12°. The radius of the loop is $(g = 10ms^{-2})$

A. 5.8 km

B. 7.4 km

C. 9.6 km

D. 10.6 km

Answer:

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166. A stone tied to a string is rotated with a uniforms speed in a vertical plane. If mass of the stone is m, length of the string is r and linear speed of the stone is v, then tension in the string, when the stone is at its lowest point, is $(g =$ acceleration due to gravity)

A. mg

B. $\frac{mv^2}{r}$

C. $\frac{mv^2}{r} - mg.$

D. $\frac{mv^2}{r} + mg.$

Answer:

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167. A body is allowed to slide down a frictionless track freely under gravity. The track ends in a semicircular shaped part of diameter D. What should be the height (minimum) from which the body must fall, so that it completes the circle.

A. $4D/5$

B. $5D/4$

C. D

D. 2D

Answer:

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168. Assertion : To keep a body moving with a uniform velocity along a straight line, no external force is required. Reason : It is in accordance with Newton's first law of motion. A moving body comes to rest only due to the presence of frictional force.

A. if both assertion and reason are true and reason is the correct explanation of the assertion.

B. if both assertion and reason are true and reason is not correct explanation of the assertion.

C. if assertion is true, but reason is false.

D. if both assertion and reason are false.

Answer:

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169. Assertion : If two balls are released simultaneously from a certain height, one is allowed to fall freely and other thrown with some horizontal velocity, then both the balls hit the ground together. Reason : In both the cases, the velocity of the balls along vertical is zero.

A. if both assertion and reason are true and reason is the correct explanation of the assertion.

B. if both assertion and reason are true and reason is not correct explanation of the

assertion.

C. if assertion is true, but reason is false.

D. if both assertion and reason are false.

Answer:

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170. Assertion : A rocket moves forward by pushing the surrounding air backwards. Reason : it derives the necessary thrust to move forward according to Newton's third law of motion.

A. if both assertion and reason are true and reason is the correct explanation of the assertion.

B. if both assertion and reason are true and reason is not correct explanation of the assertion.

C. if assertion is true, but reason is false.

D. if both assertion and reason are false.

Answer:

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171. Assertion : The propulsion of rocket is based on the principle of conservation of linear momentum.

Reason : At any instant, the linear momentum of the rocket is equal to the vector sum of the linear momentum of the exhaust gases and the linear momentum of the remaining mass of the rocket.

A. if both assertion and reason are true and reason is the correct explanation of the assertion.

B. if both assertion and reason are true and reason is not correct explanation of the

assertion.

C. if assertion is true, but reason is false.

D. if both assertion and reason are false.

Answer:

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172. Assertion : A rocket in flight is an illustration of the application of the principle of conservation of linear momentum of a system of varying mass. Reason : The linear momentum of the exhaust gases becomes irrelevant, as these gases no longer remain a part of the rocket.

A. if both assertion and reason are true and reason is the correct explanation of the assertion.

B. if both assertion and reason are true and reason is not correct explanation of the assertion.

C. if assertion is true, but reason is false.

D. if both assertion and reason are false.

Answer:

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173. Assertion : Frictional forces are conservation forces. Reason : Potential energy can be associated with frictional forces.

A. if both assertion and reason are true and reason is the correct explanation of the assertion.

B. if both assertion and reason are true and reason is not correct explanation of the assertion.

C. if assertion is true, but reason is false.

D. if both assertion and reason are false.

Answer:

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174. Assertion : Two bodies, one sliding along a smooth inclined plane and the other falling freely along its vertical side, reach the bottom with same velocity. Reason : It is because, gravitational force is a conservative force.

A. if both assertion and reason are true and reason is the correct explanation of the assertion.

B. if both assertion and reason are true and reason is not correct explanation of the assertion.

C. if assertion is true, but reason is false.

D. if both assertion and reason are false.

Answer:

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175. Assertion : The driver in a vehicle moving with a constant speed on a straight road is in a non-inertial frame of reference. Reason : A reference frame, in which Newton's laws of motion are applicable, is non-inertial.

A. if both assertion and reason are true and reason is the correct explanation of the assertion.

B. if both assertion and reason are true and reason is not correct explanation of the assertion.

C. if assertion is true, but reason is false.

D. if both assertion and reason are false.

Answer:

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176. Assertion : The driver in a vehicle moving with a constant speed on a straight road is in a non-inertial frame of reference. Reason : A reference frame, in which Newton's laws of motion are applicable, is non-inertial.

A. if both assertion and reason are true and reason is the correct explanation of the assertion.

B. if both assertion and reason are true and reason is not correct explanation of the assertion.

C. if assertion is true, but reason is false.

D. if both assertion and reason are false.

Answer:

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177. Assertion : A freely falling body is in the state of weightlessness. Reason : A body becomes conscious of its weight, only when it is opposed.

A. if both assertion and reason are true and reason is the correct explanation of the assertion.

B. if both assertion and reason are true and reason is not correct explanation of the assertion.

C. if assertion is true, but reason is false.

D. if both assertion and reason are false.

Answer:

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178. Assertion : A man in a closed cabin, which is falling freely, does not experience gravity. Reason : Inertial and gravitational masses have equivalence.

A. if both assertion and reason are true and reason is the correct explanation of the assertion.

B. if both assertion and reason are true and reason is not correct explanation of the

assertion.

C. if assertion is true, but reason is false.

D. if both assertion and reason are false.

Answer:

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179. Assertion : A body can be at rest even when a number of external forces are acting on it. Reason : It can happen, when the resultant of the concurrent forces is zero.

A. if both assertion and reason are true and reason is the correct explanation of the assertion.

B. if both assertion and reason are true and reason is not correct explanation of the assertion.

C. if assertion is true, but reason is false.

D. if both assertion and reason are false.

Answer:

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180. Assertion : It is difficult to move a cycle along the road with its brakes on. Reason : Sliding friction is greater than rolling friction.

A. if both assertion and reason are true and reason is the correct explanation of the assertion.

B. if both assertion and reason are true and reason is not correct explanation of the assertion.

C. if assertion is true, but reason is false.

D. if both assertion and reason are false.

Answer:

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181. Assertion : On a rainy day, it is difficult to drive a car or bus at high speed. Reason : The value of coefficient of friction is lowered due o wetting of the surface.

A. if both assertion and reason are true and reason is the correct explanation of the assertion.

B. if both assertion and reason are true and reason is not correct explanation of the assertion.

C. if assertion is true, but reason is false.

D. if both assertion and reason are false.

Answer:

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182. Assertion : Angle of repose is equal to the angle of limiting friction. Reason : When a body is just at the point of motion, the force of friction in this stage is called limiting friction.

A. if both assertion and reason are true and reason is the correct explanation of the assertion.

B. if both assertion and reason are true and reason is not correct explanation of the assertion.

C. if assertion is true, but reason is false.

D. if both assertion and reason are false.

Answer:

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183. Assertion : Mountain roads rarely go straight up the slope. Reason : Slopes of mountains are large and therefore, more chances of vechiles to slip from the roads.

A. if both assertion and reason are true and reason is the correct explanation of the assertion.

B. if both assertion and reason are true and reason is not correct explanation of the

assertion.

C. if assertion is true, but reason is false.

D. if both assertion and reason are false.

Answer:

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184. Assertion : Use of ball bearings between two moving parts of a machine is common practice. Reason : Ball bearings reduce vibrations and provide good stability.

A. if both assertion and reason are true and reason is the correct explanation of the assertion.

B. if both assertion and reason are true and reason is not correct explanation of the assertion.

C. if assertion is true, but reason is false.

D. if both assertion and reason are false.

Answer:

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185. Assertion : A body of mass 1 kg is making 1 r.p.s. in a circle of radius 1 m. The centrifugal force acting on it is $4\pi^2 N$. Reason : The centrifugal force is given by $F = \frac{Mv^2}{r}$.

A. if both assertion and reason are true and reason is the correct explanation of the assertion.

B. if both assertion and reason are true and reason is not correct explanation of the assertion.

C. if assertion is true, but reason is false.

D. if both assertion and reason are false.

Answer:

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186. Assertion : The centrifugal force is a pseudo force. Reason : It arises in an accelerated frame of reference.

A. if both assertion and reason are true and reason is the correct explanation of the assertion.

B. if both assertion and reason are true and reason is not correct explanation of the assertion.

C. if assertion is true, but reason is false.

D. if both assertion and reason are false.

Answer:

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187. Assertion : During turning, cyclist leans towards the centre of the curve , while a man sitting in the car, leans outwards of the curve.

Reason : An acceleration is acting towards the centre of the curve.

A. if both assertion and reason are true and reason is the correct explanation of the assertion.

B. if both assertion and reason are true and reason is not correct explanation of the assertion.

C. if assertion is true, but reason is false.

D. if both assertion and reason are false.

Answer:

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188. Assertion : When a stone tied to a string is revolved along a vertical circle, the string has maximum tendency to break, when the stone is at the lowermost point. Reason : It is because, the tension in the string is maximum at the lowermost point.

A. if both assertion and reason are true and reason is the correct explanation of the assertion.

B. if both assertion and reason are true and reason is not correct explanation of the assertion.

C. if assertion is true, but reason is false.

D. if both assertion and reason are false.

Answer:

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189. When train suddenly stops, the passengers fall forward. It is due to

A. inertia of passenger

B. inertia of train

C. gravitational pull by earth

D. None of the above.

Answer:

Watch Video Solution

190. When a bus suddenly takes a turn, the passengers are thrown outward, because of :

A. speed of bus

B. inertia of motion

C. acceleration of motion

D. None of the above.

Answer:

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191. While dusting a carpet, we give a sudden jerk or beat it with a stick, because

A. inertia of rest keeps the dust in its position and the dirt gets removed as the carpet moves away.

B. jerk compensates for the force of adhesion between the dust and carpet and the dust is removed.

C. inertia of motion removes the dust.

D. no inertia is involved in the process, it is simply due to practical experience.

Answer:

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192. When a car moves on a road with a uniform speed of $30 kmh^{-1}$, then the net resultant force on the car is :

A. the driving force, drives the car in the direction of propagation of car

B. the resistive force, acts opposite to the direction of propagation of car

C. zero

D. None of the above.

Answer:

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193. A bomb is dropped from an aeroplane moving horizontally at constant speed. If air resistance is taken into consideration, then the bomb :

A. falls on earth exactly below the aeroplane.

B. falls on the earth exactly behind the aeroplane.

C. falls on the earth ahead of the aeroplane.

D. flies with the aeroplane.

Answer:

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194. If an iron ball and wooden ball of the same radius are released from a height h in vacuum, the time taken by both of these to reach the ground is :

A. roughly equal

B. exactly equal

C. unequal

D. zero.

Answer:

Watch Video Solution

195. A bullet of mass 250 g moving with a velocity $200ms^{-1}$ is stopped within 5 cm of the target. The average resistance offered by the target is :

A. 40kN

B. 30 kN

C. 20 kN

D. 10 kN

Answer:

Watch Video Solution

196. If two numerically equal forces A and B acting at a point produce a resultant force of magnitude A, then the angle between the two original forces is :

A. 120°

B. 90°

C. 0°

D. 45°

Answer:

Watch Video Solution

197. A ball of mass 150 g moving with an acceleration $20ms^{-2}$ is hit by a force, which acts on it for 0.1 s. The impulsive force is :

A. 1.2 N s

B. 0.3 N s

C. 0.1 N s

D. 0.5 N s

Answer:

Watch Video Solution

198. A ball of mass 0.1 kg coming with speed of $40ms^{-1}$ strikes a bat and returns in opposite direction with a speed $30ms^{-1}$. Then, the impulse is

A. $4kgms^{-1}$

B. $3kgms^{-1}$

C. $1kgms^{-1}$

D. $7kgms^{-1}$

Answer:

Watch Video Solution

199. If two balls, each of mass 0.06 kg, moving in opposite directions with speed $4ms^{-1}$ collide and rebound with the same speed, then the impulse imparted to each ball due to the other is :

A. $0.92kgms^{-1}$.

B. $0.80kgms^{-1}$.

C. $0.48kgms^{-1}$.

D. $0.52kgms^{-1}$.

Answer:

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200. A person swimming in a fresh water pool, obeying :

A. Newton's second law

B. Gravitational law

C. Newton's third law

D. Newton's first law

Answer:

Watch Video Solution

201. A bird weights 2 kg and is inside a cage of 1 kg. If it starts flying then what is weight of bird and cage assembly?

A. 4 kg

B. 3 kg

C. 2.5 kg

D. 1.5 kg

Answer:

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202. A man is standing on a spring platform. Reading of spring balance is 60 kgf. If man jumps outside from the platform, then reading of spring balance will

A. increase.

B. remain same

C. decrease to zero

D. be first (A) and then (C).

Answer:

Watch Video Solution

203. A coin is dropped in a lift. It takes time t_1 to reach the floor, when lift is stationary. It takes time t_2, when lift is moving up with constant acceleration. Then,

A. $t_1 > t_2$

B. $t_1 < t_2$

C. $t_1 = t_2$

D. None of these.

Answer:

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204. A smooth inclined plane of length L ahving inclination θ with the horizontal is inside a lift, which is moving down with a retardation a. The time taken by a body to slide down the inclined plane from rest will be :

A. $\sqrt{\dfrac{2L}{(g+a)\sin\theta}}$

B. $\sqrt{\dfrac{2L}{(g-a)\sin\theta}}$

C. $\sqrt{\dfrac{2L}{a\sin\theta}}$

D. $\sqrt{\dfrac{2L}{g\sin\theta}}$

Answer:

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205. A machine gun has a mass of 5 kg. It fires 50 g bullets at the rate of 30 bullets min^{-1} at a speed of $400ms^{-1}$. Force required to keep the gun in position is

A. 5 N

B. 10 N

C. 15 N

D. 30 N

Answer:

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206. A body of mass M at rest explodes into three masses, two of which of mass $M/4$ each, are thrown off in perpendicular directions with velocity of $3ms^{-1}$ and $4ms^{-1}$ respectively. The third piece will be thrown off with a velocity of :

A. $3.0ms^{-1}$

B. $2.5ms^{-1}$

C. $2.0ms^{-1}$

D. $1.5ms^{-1}$

Answer:

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207. A particle is projected with $200 ms^{-1}$ at an angle 60°. At the highest point, it explodes into three particles of equal masses. One goes vertically upwards with velocity $100 ms^{-1}$, second particle goes vertically downwards. Then, the velocity of the third particle will be :

A. $200 ms^{-1}$

B. $300 ms^{-1}$

C. $120ms^{-1}$ at 60°

D. $200ms^{-1}$ at 30°

Answer:

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208. A jet engine works on the principle of conservation of

A. mass

B. energy

C. linear momentum

D. angular momentum.

Answer:

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209. Which of the following works on the principle of conservation of linear momentum?

A. jet

B. aeroplane

C. rocket

D. all of these.

Answer:

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210. Which one is the self-adjusting force ?

A. Kinetic friction

B. Static friction

C. Nuclear force

D. None of these.

Answer:

Watch Video Solution

211. A block moving up at $\theta = 30^{\circ}$ with a velocity $5ms^{-1}$, stops after 0.5 s. What is the value of coefficient of friction ?

A. 0.6

B. 0.5

C. 1.25

D. None of these.

Answer:

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212. A car of mass m is moving with momentum p. If μ be the coefficient of friction between the tyres and the road, what will be the stopping distance due to friction alone ?

A. $\dfrac{p^2}{2m\mu g}$

B. $\dfrac{p^2}{2m^2\mu g}$

C. $\dfrac{p^2}{2\mu g}$

D. $\dfrac{p^2}{2mg}$

Answer:

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213. A block of mass 60 kg just slides over a horizontal distance of 0.9 m. If the coefficient of friction between their surfaces is 0.15, then work done against friction will be :

A. 79.4 J

B. 97.54 J

C. 105.25 J

D. None of these.

Answer:

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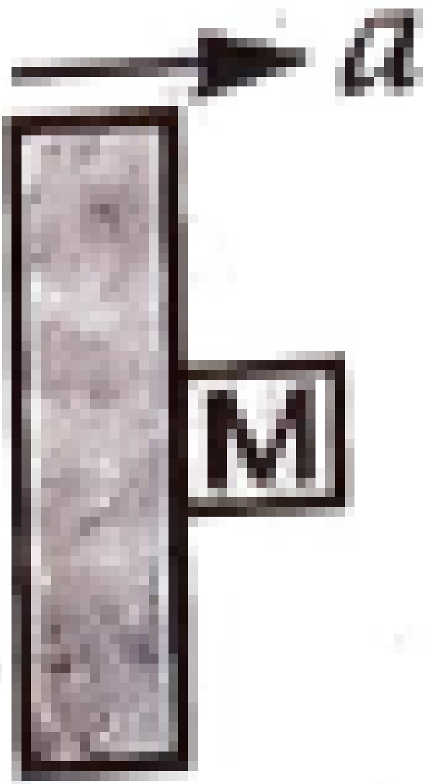
214. A rough vertical board has an acceleration a long the horizontal, so that a block of mass M pressing against it does not fall. The coefficient of friction between block and the board is



A. $= a/g$

B. $> a/g$

C. $< g/a$

D. $> g/a$.

Answer:

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215. Force responsible for the circular motion of the body is :

A. centripetal force

B. centrifugal force

C. gravitational force

D. None of the above.

Answer:

Watch Video Solution

216. Two particles of equal masses are revolving in circular paths of radii r_1 and r_2 respectively with the same time period .The ratio fo the centripetal force is :

A. r_1 / r_2

B. r_2 / r_1

C. $(r_2 / r_1)^{1/2}$

D. $(r_2 / r_1)^2$.

Answer:

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217. A body of mass 5 kg is moving in a circle of radius 1 m with an angular velocity of $2 rads^{-1}$. The centripetal force acting on the body is :

A. 20N

B. 10N

C. 5N

D. 15 N

Answer:

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218. A car is moving along a circular road at a speed of $20ms^{-1}$. The radius of the circular road is 10 m. If the speed is increased at the rate of $30ms^{-2}$, what is the resultant acceleration ?

A. $10ms^{-2}$

B. $50ms^{-2}$

C. $80ms^{-2}$

D. $250ms^{-2}$

Answer:

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219. The earth (mass=6×10^{24}kg) revolves around the sun with an angular velocity of $2 \times 1^{-7} rads^{-1}$ in a circular orbit of radius 1.5×10^{8} km. the force exerted by the sun on the earth in Newton is

A. 36×10^{21}

B. 18×10^{25}

C. 29×10^{39}

D. zero.

Answer:

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220. A cyclist moves in a circular track of radius 100 m. If the coefficient of friction is 0.2, then the maximum speed with which the cyclist can take a turn without leaning inwards, is :

A. $14.0ms^{-1}$

B. $140ms^{-1}$

C. $1.4ms^{-1}$

D. $9.8ms^{-1}$

Answer:

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221. A cyclist moving with a speed of $4.9ms^{-1}$ on a level road can take a sharp circular turn of radius 4 m. Then, coefficient of friction between the cycle tyres and road is :

A. 0.71

B. 0.61

C. 0.31

D. 0.81

Answer:

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222. A cyclist moving at a speed of $20ms^{-1}$ takes a turn, if he doubles his speed, then chance of overturn :

A. becomes four times

B. becomes $1/4$ times

C. is doubled

D. is halved.

Answer:

Watch Video Solution

223. A motor cyclist moving with a velocity of $72kmh^{-1}$ on a flat road takes a turn on the road at a point, where the radius of curvature of the road is 20 m. The acceleration due to gravity is $10ms^{-2}$. In order to avoid skiding, he must not bend w.r.t. the vertical plane by an angle greater than :

A. $\theta = \tan^{-1} 4$

B. $\theta = \tan^{-1} 2$

C. $\theta = \tan^{-1} 6$

D. $\theta = \tan^{-1} 3$

Answer:

Watch Video Solution

224. A car sometimes overturns, while taking a turn. When it overturns, it is

A. the inner wheel, which leaves the ground first.

B. the outer wheel, which leaves the ground first.

C. both the wheels leave the ground simultaneously

D. either wheel, which leaves the ground first.

Answer:

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225. A bucket, full of water is revolved in a vertical circle of radius 2 m. Whats hould be the maximum time period of revolution, so that the water does not fall out of the bucket ?

A. 1 s

B. 2 s

C. 3 s

D. 4 s

Answer:

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226. A motor cycle is going on an overbridge of radius R. The driver maintains a constant speed. As the motor cycle is ascending on the overbridge, the normal force on it :

A. increases

B. decreases

C. remains the same

D. fluctuates erratically

Answer:

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227. A car when passes through a convex bridge exert a force on it which is equal to :

A. Mg

B. $\frac{Mv^2}{r}$

C. $Mg + \frac{Mv^2}{r}$

D. $Mg - \frac{Mv^2}{r}$.

Answer:

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228. A ship of mass $3 \times 10^7 kg$ initially at rest is pulled by a force of $5 \times 10^4 N$ through a distance of 3 m. Assume that the resistance due to water is negligible, the speed of the ship is

A. $1.5ms^{-1}$

B. $60ms^{-1}$

C. $0.1ms^{-1}$

D. $5ms^{-1}$.

Answer:

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229. A small block slides without friction down a inclined plane starting from rest. Let S_n be the distance travelled from time $t = n - 1$ to $t = n$. Then, $\frac{S_n}{S_{n+1}}$ is

A. $\frac{2n - 1}{2n}$

B. $\frac{2n + 1}{2n - 1}$

C. $\frac{2n - 1}{2n + 1}$

D. $\frac{2n}{2n + 1}$

Answer:

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230. A spring of force constant k is cut into two pieces, such that one piece is double the length of the other. Then the long piece will have a force constant of :

A. $2/3k$

B. $3/2k$

C. $3k$

D. $6k$

Answer:

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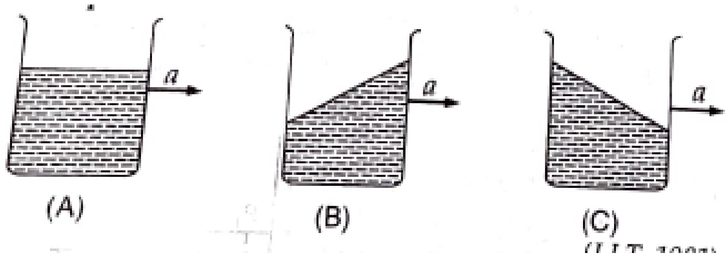
231. A vessel containing water is given a constant acceleration a towards the right, along a straight horizontal path. Which of the following figures represents the surface of the liquid ?



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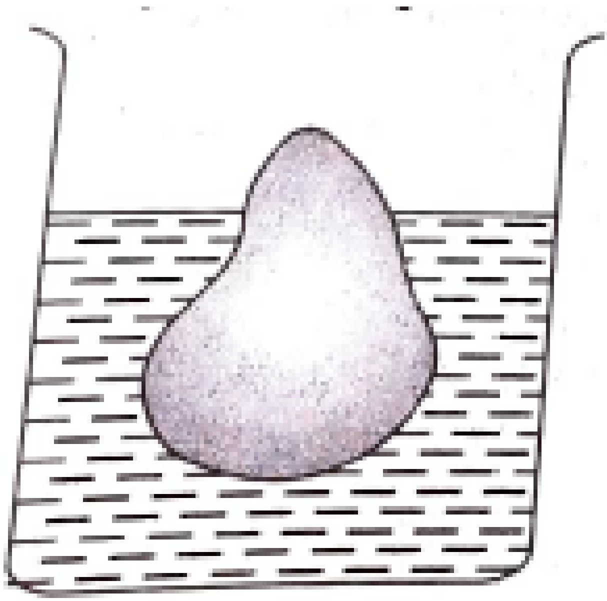
232. A body floats in a liquid contained in a beaker. If the whole system as shown in figure falls freely under gravity, then the upthrust on the body due to liquid is



A. equal to the weight of the liquid displaced.

B. equal to the weight of the body in air.

C. equal to the weight of the immersed portion of the body.

D. zero.

Answer:

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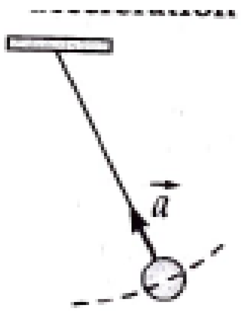
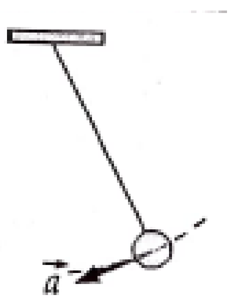
233. A simple pendulum is oscillating without damping. When the displacement of the bob is less than maximum, its acceleration vector $\vec{a}$ is correctly shown in

A.



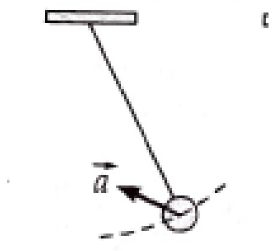
(A)

B.



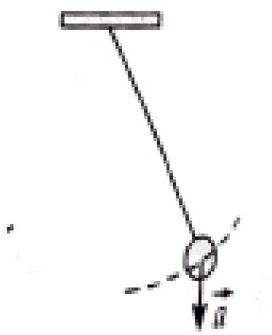
(B)

C.



(C)

D.



(D)

(I.I.T. 2002)

Answer:

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234. An ideal spring with spring constant k is hung from the ceiling and a block of mass M is attached to its lower end. The mass is released with the spring initially unstretched. Then, the maximum extension in the spring is

A. $4Mg/k$

B. $2Mg/k$

C. Mg/k

D. $Mg/2k$

Answer:

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235. Essential characteristic of equilibrium is :

A. momentum equal to zero

B. acceleration equal to zero

C. kinetic energy equal to zero

D. velocity equal to zero.

Answer:

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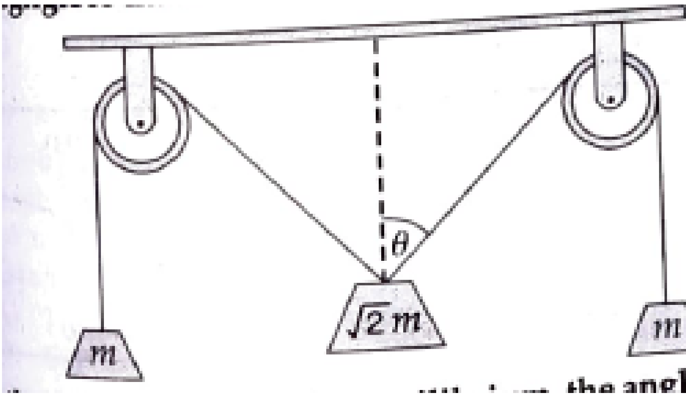
236. The pulleys and strings shown in the figure are smooth and of negligible mass.



the angle θ sh. For the system to remain in equilibrium, the angle θ should be :

A. 0°

B. 30°

C. 45°

D. 60°

Answer:

Watch Video Solution

237. If the resultant of all the external forces acting on a system of particles is zero, then form an inrtial frame, one can surely say that

A. linear momentum of the system does not change in time.

B. kinetic energy of the system does not change in time.

C. potential energy of the system does not change in time.

D. angular momentum of the system does not change in time.

Answer:

Watch Video Solution

238. Statement 1. It is easier to pull a heavy object than to push it on a level ground. Statement 2. The magnitude of frictional force depends on te nature of the two surfaces in contact.

A. Statement 1 is true, statement 2 is true, statement 2 is a correct explanation for statement 1.

B. Statement 1 is true, statement 2 is true, statement 2 is not a correct explanation for statement 1.

C. Statement 1 is true, statement 2 is false.

D. Statement 1 is false, statement 2 is true.

Answer:

Watch Video Solution

239. A block of mass 2 kg rests on a plane inclined at 30° with the horizontal. The coefficient of friction between the block and the surface is 0.7. Calculate the frictional force acting on the block.

A. 9.8 N

B. $0.7 \times 9.8\sqrt{3}N$

C. $98\sqrt{3}$

D. $0.7 \times 9.8N$.

Answer:

Watch Video Solution

240. When a bicycle is in motion, the force of friction exerted by ground on the two wheels is such that, it acts :

A. in the backward direction on the front wheel and in the forward direction on the rear wheels.

B. in the forward direction on the front wheel and in the backward direction on the rear wheels.

C. in the backward direction on both the front and the rear wheels.

D. in the forward direction on both the front and the rear wheels.

Answer:

Watch Video Solution

241. A weight W rests on a rough horizontal plane. If the angle of friction be θ, the least force that will move the body along the plane will be

A. $W \cos \theta$

B. $W \tan \theta$

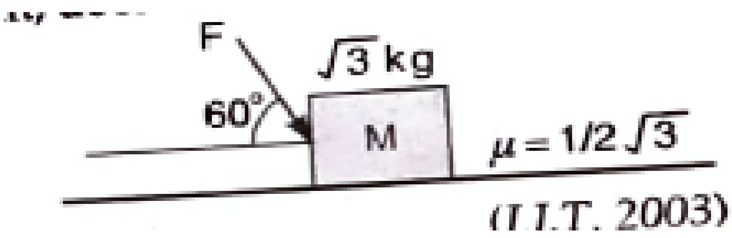
C. $W \cot \theta$

D. $W \sin \theta$

Answer:

Watch Video Solution

242. What is the maximum value of the foce F, such that the block shown in the arrangement, does not move ?



A. 20 N

B. 10 N

C. 12 N

D. 15 N

Answer:

Watch Video Solution

243. A long horizontal rod has a bead, which can slide along its length and initially placed at a disatnce L from on end A of the rod. The rod is set in angular motion about A with constant angular acceleration α. If the coefficientt of friction between the rod and the bead is μ and gravity is neglected, then the time after which the bead starts slipping is

A. $\sqrt{\frac{\mu}{\alpha}}$

B. $\frac{\mu}{\sqrt{\alpha}}$

C. $\frac{1}{\sqrt{\mu\alpha}}$

D. infinitesimal

Answer:

Watch Video Solution

244. A particle revolves round a circular path with auniform speed. The centripetal acceleration of the particle is

A. along the circumference of the circle

B. along the tangent

C. along the rdaius

D. zero.

Answer:

Watch Video Solution

245. A car is moving along a circular horizontal track of radius 10 m with a constant speed of $10 ms^{-1}$. A plumb bob is suspended from the roof of the car by a light rigid rod of length 1.0 m. The angle made by the rod with the track is ($g = 10 ms^{-2}$).

A. zero

B. 30°

C. 45°

D. 60°

Answer:

Watch Video Solution

246. The kinetic energy K of the particle moving in a circle of radius R depends upon the distance (s) covered as $K = as^2$. The force acting on the particle is :

A. $2aS^2 / R$

B. $2aR^2 / S$

C. $2aS$

D. $2aS(1 + S^2 / R^2)^{1/2}$.

Answer:

Watch Video Solution

247. A stone tied to string of length l is whirled in a vertical circle with the other end of the string at the centre. At a certain instant of time the stone is at its lowest position and has a speed u. The magnitude of the change in velocity as it reaches a position, where the string is horizontal (g being acceleration due to gravity) is

A. $\sqrt{u^2 - 2gL}$.

B. $\sqrt{2gL}$

C. $\sqrt{u^2 - gL}$.

D. $\sqrt{2(u^2 - gL)}$.

Answer:

Watch Video Solution

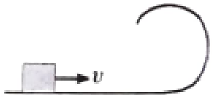
248. A small block is shot into each of the four tracks as shown below. Each of the track rises to the same height. The speed with which the block enters the track is the same in all cases. At the highest point of the track, the normal reaction is maximum in :

A.

maximum in :

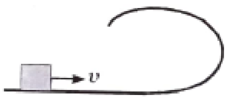
(A)

B.



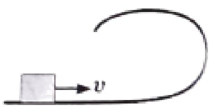
(B)

C.



(C)

D.



(D)

Answer:

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249. The driver of a car suddenly sees a broad wall in front of him. He should

A. brake sharply

B. turn sharply

C. (A) and (B) both.

D. None of the above.

Answer:

Watch Video Solution

250. A piece of paper and an iron piece are dropped simultaneously from the same point. They will reach ground simultaneously, if they

A. are in vacuum.

B. fall very far from each oher.

C. have the same density

D. have the same weight.

Answer:

Watch Video Solution

251. If a particle is moving with a constant speed along a straight line, we do not require a force to

A. decrease its momentum

B. change the direction

C. increase its speed

D. keep it moving with uniform velocity.

Answer:

Watch Video Solution

252. Inertia is the property by virtue of which the body is unable to change by itself

A. the state of rest only.

B. the state of uniform linear motion only.

C. the direction of motion only.

D. the steady state of rest and of uniform linear motion.

Answer:

Watch Video Solution

253. An athlete runs some distance before taking a long jump. This is because

A. he gains energy to take him through long distance.

B. it helps to apply large force

C. by running, he gives himself larger inertia of motion

D. by running, action and reaction forces increase.

Answer:

Watch Video Solution

254. Why does the horse rider fall forward when a running horse suddenly stops ?

A. the inertia of the horse

B. the inertia of the rider

C. large weight of the horse

D. losing the balance

Answer:

Watch Video Solution

255. A body moving with a constant speed on a horizontal surface does not have

A. velocity

B. momentum

C. kinetic energy

D. acceleration

Answer:

Watch Video Solution

256. Two bodies of masses m_1 and $m_2 (m_1 > m_2)$ and having momentum p_1 and p_2 move with the same velocity. Then, which of the following is correct ?

A. $p_1 > p_2$

B. $p_1 < p_2$

C. $p_1 = p_2$

D. None of the above.

Answer:

Watch Video Solution

257. A force of 5 N acts on a body of weight 9.8 N.

What is the acceleration produced in ms^{-2} ?

A. 25 N

B. 10 N

C. 5 Nn

D. 2 N

Answer:

Watch Video Solution

258. A force of 5 N acts on a body of weight 9.8 N. What is the acceleration produced in ms^{-2} ?

A. 49

B. 5

C. 1.96

D. 0.51

Answer:

Watch Video Solution

259. A force of 1 kg wt produces an acceleration in mass of 9.8 kg of

A. $1ms^{-2}$

B. $\frac{1}{9.8}ms^{-2}$

C. $9.8ms^{-1}$

D. $1cms^{-2}$.

Answer:

Watch Video Solution

260. A body is moving with a velocity $1ms^{-1}$ and a force F is needed to stop it within a distance x. If the speed of the body is $3ms^{-1}$, then force needed to stop it within the same distance (x) will be :

A. 1.5 F

B. 3 F

C. 6 F

D. 9 F

Answer:

Watch Video Solution

261. A 100 kg man jumps into a swimming pool from a height of 5 m. It takes 0.4s for the water to reduce his velocity to zero. The average force exerted by the water on the man is

A. 25 N

B. 250 N

C. 2500 N

D. 5000 N

Answer:

Watch Video Solution

262. The units of impulse are the same as those of

A. energy

B. momentum

C. power

D. velocity

Answer:

Watch Video Solution

263. Which of the following quantities has its units as newton-second ?

A. torque

B. momentum

C. energy

D. Planck's constant

Answer:

Watch Video Solution

264. A player catches a cricket ball of mass of 0.15 kg moving with a speed of $20ms^{-1}$. The process of catching is completed in 0.1 s. The average force exerted by the player is

A. 30 N

B. 3 N

C. 0.3 N

D. 0.03 N

Answer:

Watch Video Solution

265. A particle of mass m moving with a velocity v strikes a wall and rebounds back. If the magnitude of the velocity is unchanged, the magnitude of the force exerted on the wall by the particle during the time of contact (t) will be

A. zero

B. mvt

C. $\frac{2mv}{t}$

D. $\frac{mv}{t}$.

Answer:

Watch Video Solution

266. A graph is drawn with force along Y-axis and time along X-axis. The area under the graph represents

A. momentum

B. couple

C. moment of the force

D. impulse of the force.

Answer:

Watch Video Solution

267. The working of a rocket is based on the principle of

A. elasticity

B. Kepler's laws

C. Newton's laws

D. conservation of momentum

Answer:

Watch Video Solution

268. A Diwali rocket is ejecting 0.05 kg of gases per second at a velocity of $400ms^{-1}$. The acceleration force on the rocket is

A. 20 dynes

B. 20 N

C. 22 kgf

D. 4000 N

Answer:

Watch Video Solution

269. When we kick a stone, we get hurt. Due to which property of the stone it happens ?

A. Inertia

B. Velocity

C. Reaction

D. Momentum

Answer:

Watch Video Solution

270. A man is at rest in the middle of a pond on perfectly smooth ice. He can get himself to the shore by making use of Newton's

A. first law

B. second law

C. third law

D. all the laws.

Answer:

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271. A man in a lift weighs more, when the lift

A. begins to go up

B. is going up steadily

C. is slowing down

D. is descending freely.

Answer:

Watch Video Solution

272. A man weighing 50 kgf wt is in a lift. The lift is moving up with a uniform acceleration of $1ms^{-2}$. If

g is taken as $10ms^{-2}$, then the apparent weight of the man is

A. 55 kg wt

B. 50 kg wt

C. 45 kg wt

D. 52 kg wt.

Answer:

Watch Video Solution

273. A man of mass 75 kg is standing on a spring balance inside a lift. If the lift falls freely downwards, then, the reading of the spring balance will be

A. zero

B. 75 kgf

C. $> 75kgf$

D. $< 75kgf$

Answer:

Watch Video Solution

274. A bullet of mass m moving with speed v strikes a wooden block of mass M and gets embedded into the block. The final speed is

A. $\sqrt{\frac{M}{M+m}}v$

B. $\sqrt{\frac{m}{M+m}}v$

C. $\left(\frac{m}{M+m}\right)v$

D. $v/2$

Answer:

Watch Video Solution

275. Consider the following statements : Assertion (A) : A table cloth can be pulled from a table without dislodging the dishes. Reason (R) : To every action, there is equal and opposite reaction. Of these statements :

A. both A nd R are true and R is the correct explanation of A.

B. both A nd R are true and R is not the correct explanation of A.

C. A is true, but R is false.

D. A is false, but R is true.

Answer:

Watch Video Solution

276. A glass of water is kept on a table in the dining car of a train. If the acceleration of the train is $g/5$ in the forward direction, the surface of water is inclined to the horizontal at an angle of

A. $\tan^{-1}(5/2)$

B. $\tan^{-1}(2/5)$

C. $\tan^{-1}(1/5)$

D. $\tan^{-1}(5)$.

Answer:

Watch Video Solution

277. A rain drop of mass 0.1 g is falling with uniform speed of $10cms^{-1}$. What is the net weight of the drop ?

A. zero

B. $2 \times 10^{-3}N$

C. $10^{-3}N$

D. $10^{-2}N$.

Answer:

Watch Video Solution

278. One end of a spring balance is stretched by a force of 2 N and an equal and opposite force is applied on its other end. The reading of the spring balance will be

A. 4 N

B. 2 N

C. 0

D. any value between 0 and 4 N.

Answer:

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279. A spring balance P is suspended from a rigid support. Another identical spring balance Q is fastened to the hook of the balance P and a body of weight 2 kgf is attached to the spring balance Q. Then,

A. both P and Q will read 2 kgf.

B. both P and Q will read 1 kgf.

C. P will read 2 kgf, while Q will read zero.

D. P will read zero, while Q will read 2 kgf.

Answer:

Watch Video Solution

280. A man weighing 100 kgf carries a load of 10 kgf on his head. He jumps from a tower with the load on his head. What will be the eright of the load as experienced by the man ? Take $g = 10ms^{-2}$.

A. zero

B. 10 kgf

C. slightly more than 10 kgf

D. 110 kgf

Answer:

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281. Smoothening the surfacce in contact beyond a certain limit raises friction, because :

A. irregularities are increased

B. surface projections are sharpened

C. area of actual contact increases

D. None of the above.

Answer:

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282. Brakes of very small contact area are not used although friction is independent of area because friction

A. depends on the nature of the material

B. causes wear and tear

C. resists motion

D. operating in this ccase is sliding friction

Answer:

Watch Video Solution

283. Decrease of which one of the following quantiities enables us to transport even a heavy barrel by rolling across the road ?

A. Weight

B. Normal friction

C. Limiting friction

D. Coefficient of friction

Answer:

Watch Video Solution

284. Which of the following surface in contact has maximum coefficient of friction ?

A. Wood on wood

B. Steel on steel

C. Rubber tyre on dry concrete

D. Rubber tyre on wet concrete

Answer:

Watch Video Solution

285. Proper inflation of tyres saves fuel. this is because:

A. Normal reaction decreases

B. Sliding contact with the road increases

C. Nomal reaction increases

D. Sliding contact with the road decreasess.

Answer:

Watch Video Solution

286. Why are tyres made circular?

A. They require less material

B. Rollling ffriction is smaller than sliding friction

C. It is easy too inflate the circular tyres.

D. None of the above.

Answer:

Watch Video Solution

287. When walkin on ice,is it better to take short or long steps?Explain.

A. larger friction

B. smaller friction

C. larger normal force

D. smaller normal force.

Answer:

Watch Video Solution

288. A body begins to slide over the surface of another, when pulled with a force of 10 N. If we pull with a force of 5 N, the force oof friction that will come into play is :

A. zero

B. 0.5 N

C. 5 N

D. 50 N

Answer:

Watch Video Solution

289. A body of mass 10 kg is sliding down a rough inclined plane which makes an angle of 30° with the horizontal. If the coefficient of friction is 0.25, what is the acceleration of the body ?

A. $1.39 ms^{-2}$.

B. $2.78 ms^{-2}$.

C. $3.65 ms^{-2}$.

D. $5.56 ms^{-2}$.

Answer:

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290. A man holds a book weighing 10 N between hands and keeps it free from falling by pressing both hands against the book with a force of 25 N each. The coefficient of friction between the book and hand would be

A. 0.1

B. 0.2

C. 0.4

D. 0.6

Answer:

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291. A fireman ofof mass 60 kg is holding a vertical pole. The coefficient of static friction between his hands and the pole is 0.5. If he is able to climb up the pole, what is the minimum force with which he should press the pole with his hands ? Take $g = 10ms^{-1}$.

A. 1200 N

B. 600 N

C. 300 N

D. 150 N

Answer:

Watch Video Solution

292. When milk is churned, cream separates out because of the

A. cohesive force

B. gravitational force

C. frictional force

D. centrifugal force.

Answer:

Watch Video Solution

293. A particle is taken round a circle by the application of force. The work done by the force is

A. positive non-zero

B. negative nnon-zeroo

C. zero

D. None of the above.

Answer:

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294. Certain neutron stars (extremely dense stars) are believed to be rotating at about 1 revolution per second. If such aa star has a radius of 20 km, the acceleration of an object oon the equator of the star will be

A. $2.0 \times 10^9 ms^{-2}$

B. $1.2 \times 10^7 ms^{-2}$

C. $8 \times 10^5 ms^{-2}$

D. $4 \times 10^8 ms^{-2}$

Answer:

Watch Video Solution

295. Two particles of equal masses are revolving in circular paths of radii r_1 and r_2 respectively with the same time period .The ratio fo the centripetal force is :

A. r_2 / r_1

B. $\sqrt{r_2 / r_1}$

C. $(r_1 / r_2)^2$

D. $(r_2 / r_1)^2$

Answer:

Watch Video Solution

296. The ratio of the linear velocities of points at distance r and $r/4$ from the axis of rotation of a rigid body is

A. 0.25

B. 2

C. 4

D. 0.5

Answer:

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297. A car is taking a sudden turn to the left. A passenger in the front seat finds himself sliding towards the dorr. Explain, indicating the forces acting on the passenger and on the car at this instant.

A. the larger difference in the speeds in two cases.

B. the car is heavier than cycle.

C. the cyclist has to counteract the centrifugal force, while passenger is only thrown by it.

D. the car has four wheels, while cycle has only two.

Answer:

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298. Two cars of unequal masses are having similar tyres. If they are moving at the same initial speed, the minimum stopping distance

A. is smaller for the heavier car.

B. is smaller for the lighter car.

C. is same for both the cars

D. cannot be predicted.

Answer:

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299. In order to stop a car in shortest distance on a horizontal road, one should

A. apply the brakes very hard, so that thw wheels stop rotating.

B. apply the brakes hard enough to just prevent slipping.

C. press and release the brakes.

D. shut the engine off and should not apply brakes.

Answer:

Watch Video Solution

300. The maximum speed that can be achieved without skidding by a car on a circular unbanked road of radius R and coefficient of kinetic friction μ

is

A. μRg

B. $Rg\sqrt{\mu}$

C. $\mu\sqrt{Rg}$

D. $\sqrt{\mu Rg}$.

Answer:

Watch Video Solution

301. An automobile is moving on a horizontal road with a speed v. If the coefficient of friction between the tyres and the road is μ, show that the shortest distance in which the automobile can be stopped in $v^2/2\mu g$.

A. $\dfrac{v}{2\mu g}$

B. $\dfrac{v^2}{2\mu g}$

C. $\left(\dfrac{v^2}{2\mu g}\right)^{1/2}$

D. $\left(\dfrac{v^2}{2\mu g}\right)^2$

Answer:

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