PHYSICS

BOOKS - NCERT FINGERTIPS PHYSICS (HINGLISH)

LAWS OF MOTION

The Law Of Inertia

1. The term inertia was first used by

A. Newton

B. Galileo

C. Aristotle

D. Kepler

Answer: B

Watch Video Solution

2. Inertia is that property of a body by virtue of which the body is

A. unable to change by itself the state of rest

B. unable to change by itself the state of uniform motion.

C. unable to change by itself the direction of motion.

D. unable to change by itself the state of rest or of uniform motion

Answer: D

 Watch Video Solution

3. A passenger getting down from a moving bus, falls in the direction of the motion of the bus. This is is an example for

A. second law of motion

B. second law of motion

C. second law of motion

D. inertia of motion

Answer: D

Watch Video Solution

4. A ball is travelling with uniform translatory motion . This means that

A. it is at rest.

B. the path can be a straight line or circular and the ball travels with uniform speed.

C. all parts of the ball have the same velocity (magnitude and direction) and the velocity is constant.

D. the centre of the ball moves with constant velocity and the ball spins about its centre uniformly.

Answer: C

Watch Video Solution

5. When a speeding bus stop suddenly, passengers are thrown forward from their seats because

A. the back of seat suddenly pushes the passengers forward.

B. inertia of rest stops the bus and takes that body forward.

C. upper part of that body continuous to be state of motion whereas that the lower part of the body in contact with seat remains rest.

D. upper part of the body come to rest whereas the lower part of the body in contact with seat begins to move.

Answer: C

Watch Video Solution

Conservation Of Momentum

1. Which one of the following statements is not true

A. The same force for the same time causes the same change in momentent for different bodies.

B. The rate of change of momentum of a body is directly proportional to the applied force and takes place in the direction in which the force acts.

C. A greater opposing force is needed to stop a heavy body than a light body in the same time, if they are moving with the same speed.

D. The greater the change in the momentum in a given time, is the forece that needs to be applied.

Answer: D

Watch Video Solution

2. A shell of mass 200g is fired by a gun of mass 100kg. If the muzzle speed of the shell is $80ms^{-1}$, then the rcoil speed of the gun is

A. 16cms^{-1}

B. 8cms^{-1}

C. 8ms^{-1}

D. 16ms^{-1}

Answer: A

Watch Video Solution

3. a 100kg gun fires a ball of 1kg horizontally from a cliff of height 500m. If falls on the ground at a distance of 400m from the bottom of the cliff. The recoil velocity of the gun is (Take g: $10ms^{-2}$

A. $0.2 \mathrm{ms}^{-1}$

B. $0.4 \mathrm{ms}^{-1}$

C. $0.6 \mathrm{ms}^{-1}$

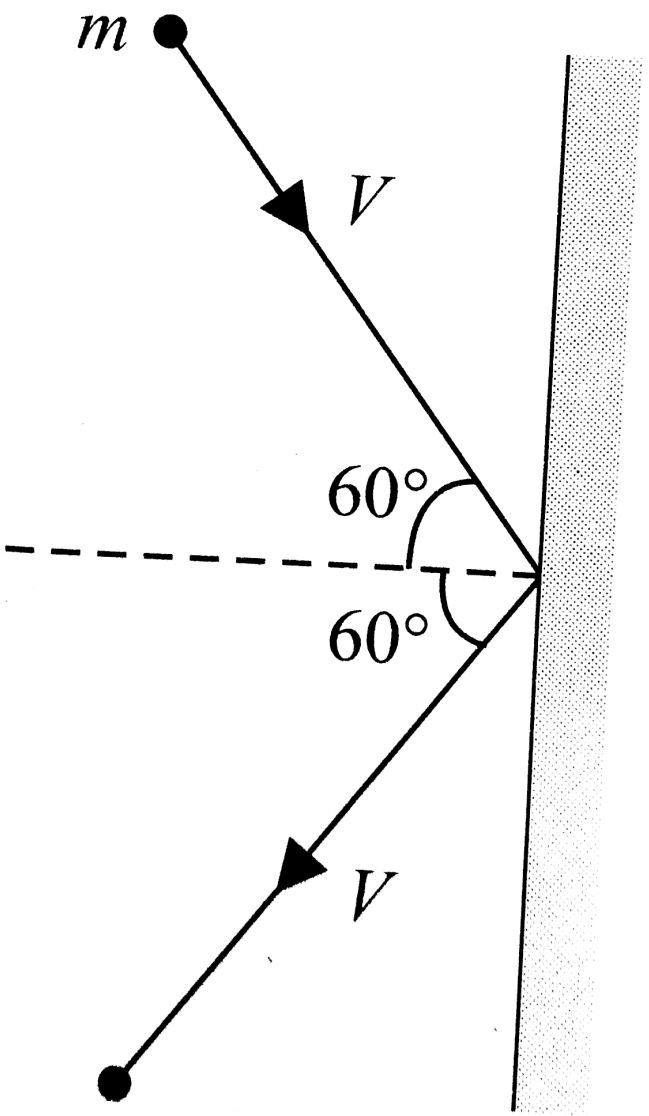
D. $0.8 \mathrm{ms}^{-1}$

Answer: B

Watch Video Solution

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

by the wall on the ball will be.



A. Mv

B. 2mV

C. $\frac{mV}{2}$

D. $\frac{mV}{3}$

Answer: A

Watch Video Solution

Equilibrium Of A Particle

1. A body subjected to three concurrent force is found to be in equilibrium. The resultant of any two force

A. is equal to third force

B. is equal to third force

C. is collinear fifth the third force

D. all of these

Answer: D

Watch Video Solution

2. Three concurrent co-planer force $1N$, $2N$ and $3N$ acting along different directions on a body

A. can keep the body in equilibrium if 2 N and J N act at right angle.

B. can keep the body in equilibrium if I N and 2 N act at right angle.

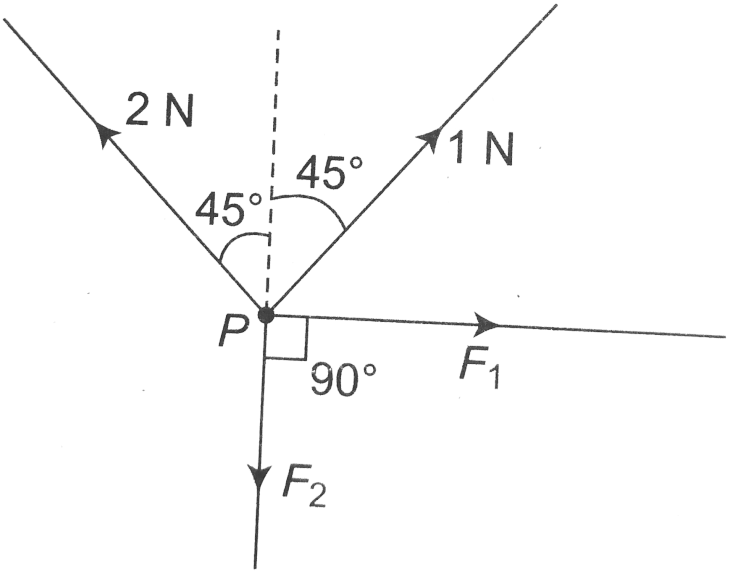
C. cannot keep the body in equilibrium.

D. cannot keep the body in equilibrium.

Answer: C

 Watch Video Solution

3. There are four force acting at a point p produced by strings as shown in figure, which is at rest. The force F_1 and F_2 are .



A. $\frac{1}{\sqrt{2}}N, \frac{3}{\sqrt{2}}N$

B. $\frac{3}{\sqrt{2}}N, \frac{1}{\sqrt{2}}N$

C. $\frac{1}{\sqrt{2}}N, \frac{1}{\sqrt{2}}N$

D. $\frac{3}{\sqrt{2}}N, \frac{3}{\sqrt{2}}N,$

Answer: A

Watch Video Solution

4. A body of mass $10kg$ is acted upon by two perpendicular forces $6N$ and $8N$. The resultant acceleration of the body is .

A.

$1ms^{-2}$ at angle of $\tan^{-1}\left(\frac{3}{4}\right) w.r.t. 8N$ force

B.

$0.2ms^{-2}$ at angle of $\tan^{-1}\left(\frac{3}{4}\right) w.r.t.\ 8N$force

C.

$1ms^{-2}$ at angle of $\tan^{-1}\left(\frac{4}{3}\right) w.r.t.\ 8N$force

D.

$0.2ms^{-2}$ at angle of $\tan^{-1}\left(\frac{4}{3}\right) w.r.t.\ 8N$force

Answer: A

Watch Video Solution

5. A body is moving under the action of two force $\overrightarrow{F_1 = 2\hat{i} - 5\hat{j}}$, $\overrightarrow{F_2 = 3\hat{i} - 4\hat{j}}$. Its velocity will become uniform under a third force $\overrightarrow{F_3}$ given by.

A. $5\hat{i} - \hat{j}$

B. $-5\hat{i} - \hat{j}$

C. $5\hat{i} + \hat{j}$

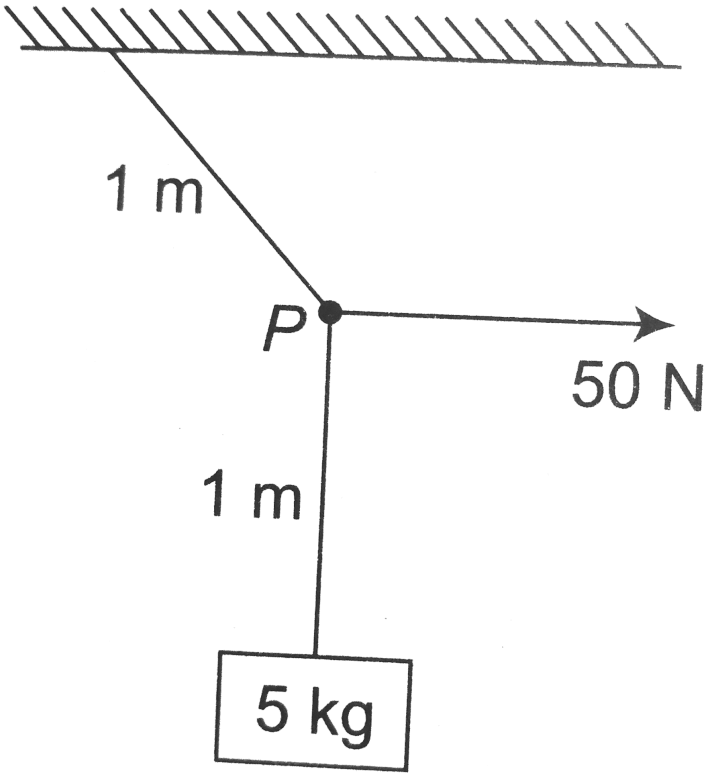
D. $-5\hat{i} + 9\hat{j}$

Answer: D

Watch Video Solution

6. A block fof mass 5kg is suspended by a massless rope of length 2 m from the ceilling. A force of 50 N is applied in the horizontal direction at the midpoint P of the rope, as shown in the figure. The angle made by the rope with the vertical in

equilibrium is (Take $g = 10ms^{-2}m$.



A. 30°

B. 40°

C. 60°

D. 45°

Answer: D

Watch Video Solution

Common Forces In Mechanics

1. Which of the following statements is correct about friction?

A. The coefficient of friction between a given pair of substances is largely independent of the

area of contact between them.

B. The frictional force can never exceed the reaction force on the body from the support surface.

C. Rolling friction is only slightly smaller than slidmg friction.

D. The main source of friction is the irregularity of the surfaces in contact.

Answer: A

 Watch Video Solution

2. Identify the correct statement.

A. Static friction depends on the area of contact.

B. Kinetic friction depends on the area of contact.

C. Coefficient of static formation does not depend on the surfaces in contact.

D. Coefficient of kinetic friction is less than the coefficient of static friciton.

Answer: D

Watch Video Solution

3. Which of the following is a self adjusting force ?

A. Static friction

B. Rolling friction

C. Sliding friction

D. Dynamic friction

Answer: A

Watch Video Solution

4. Which one of the following can also act as a lubricant in the machines?

A. Iron fillings

B. Polish on machines

C. Flow of waler through the machine

D. Flow of compressed and purifie air.

Answer: D

View Text Solution

5. A girl press her physics text book against a rough vertical wall with her hand. The direction of the frictional force on the book exerted by the wall is

A. downwards

B. upwards

C. out from the wall

D. into the wall

Answer: B

Watch Video Solution

6. A car accelerates on a horizontal road due to the force exerted by

A. the engine of the car

B. the driver of the car

C. the car on earth

D. the road on the car

Answer: D

Watch Video Solution

7. A block of mass m rests on a rough inclined plane. The coefficient of friction between the surface and the block is μ. At what angle of inclination θ of the plane to the horizontal will the block just start to slide down the plane?

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

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

C. $\theta = \sin^{-1}\mu$

D. $\theta = \sec^{-1}\mu$

Answer: A

Watch Video Solution

8. When a body slides down from rest along a smooth inclined plane making an angle of 30° with the horizontal, it takes time 20s. When the same body slides down from rest along a rough inclined plane making the same angle and through the same distance, it takes time 20p is, where p is some number greater than 1. The coefficient of friction between the body and the rough plane is

A. $\mu = \left(1 - \frac{1}{p^2}\right)\frac{1}{\sqrt{3}}$

B. $\mu = \left(1 - \frac{1}{9p^2}\right)$

C. $\mu = \left(1 - p^2\right)\frac{1}{\sqrt{3}}$

D. $\mu = \sqrt{1 - 9p^2}$

Answer: A

Watch Video Solution

9. The minimum force required to start pushing a body up a rough (frictional coefficient μ) inclined plane is F_1 while the minimum force needed to prevent it from sliding down is F_2. If the inclined plane makes an angle θ with the horizontal such that $\tan\theta = 2\mu$ then the ratio $\frac{F_1}{F_2}$ is .

A. 4

B. 1

C. 2

D. 3

Answer: D

Watch Video Solution

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

A. 10ms^{-2}

B. 5ms^{-2}

C. 15ms^{-2}

D. 0.5ms^{-2}

Answer: B

Watch Video Solution

11. The coefficient of static friction between the box and the train's floor is 0.2. The maximum acceleration of the train in which a box lying on its floor will remain stationary is $\left(\text{Take g} = 10ms^{-2}\right)$

A. $2ms^{-2}$

B. $4ms^{-2}$

C. $6ms^{-2}$

D. $8ms^{-2}$

Answer: A

Watch Video Solution

12. A block of mass 1 kg lies on a horizontal surface in a truck. The coefficient of static friction between the block and the surface is 0.6. If the acceleration

of the truck is $5m/s^2$, the frictional force acting on the block is.....newtons.

A. 10N

B. 5N

C. 2.5N

D. 20N

Answer: B

 Watch Video Solution

13. A block of mass 2kg 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 0.7. The frictional force on the block is

A. 10.3N

B. 23.8N

C. 11.9N

D. 6.3N

Answer: C

Watch Video Solution

14. A block of mass M is held against a rough vertical wall by pressing it with a finger . If the coefficient of friction between the block and the wall is μ and the acceleration due to gravity is g , calculate the minimum force required to be applied by the finger to hold the block against the wall.

A. μMg

B. Mg

C. $\frac{Mg}{\mu}$

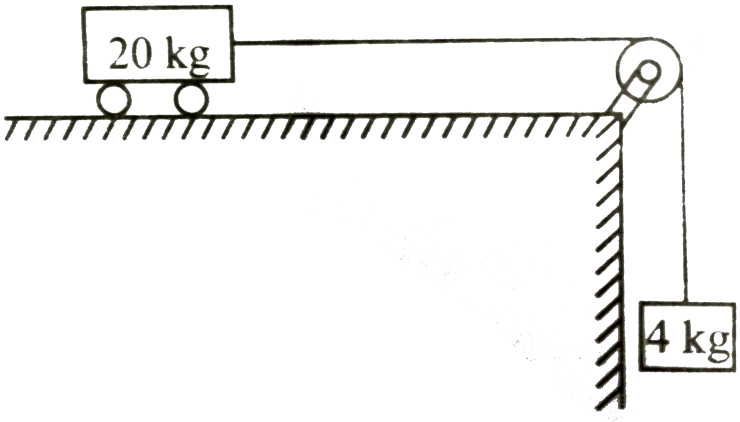
D. $2\mu Mg$

Answer: C

Watch Video Solution

15. A trolley of mass 20 kg is attached to a block of mass 4kg by massless string passing over a frictionless pulley as shown in the figure. If the coefficient of kinetic friction between trolley and the surface is 0.02, then the acceleration of the

trolley and block system is $(Takeg = 10ms^{-2})$



A. $1ms^{-2}$

B. $2ms^{-2}$

C. $1.5ms^{-2}$

D. $2.5ms^{-2}$

Answer: C

Watch Video Solution

16. In the question number 66, the tension in the string is

A. 30N

B. 36N

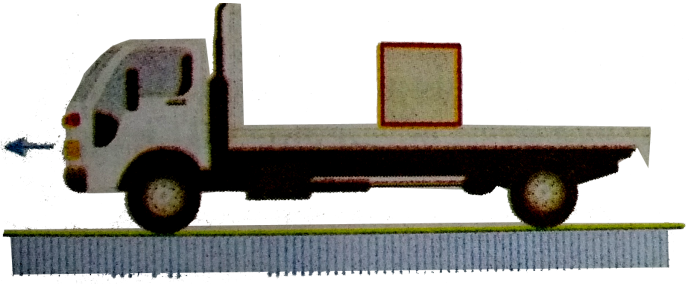
C. 34N

D. 32N

Answer: C

View Text Solution

17. The rear side of a truck is open A box of $40kg$ mass is placed $5m$ away from the open end as shown in The coefficient of friction between the box and the surface is 0.15. On a straight road, the truck starts from rest and accelerating with $2m/s^2$. At what dis tance from the starting point does the box distance from the starting point does the box fall from the truck? (Ignore the size of the box)



A. 20m

B. 30m

C. 40m

D. 50m

Answer: A

Watch Video Solution

18. The coefficient of static friction between the two blocks shown in figure is μ and the table is smooth. What maximum horizontal forced F can be applied to he block of mass M so that the block move

together?

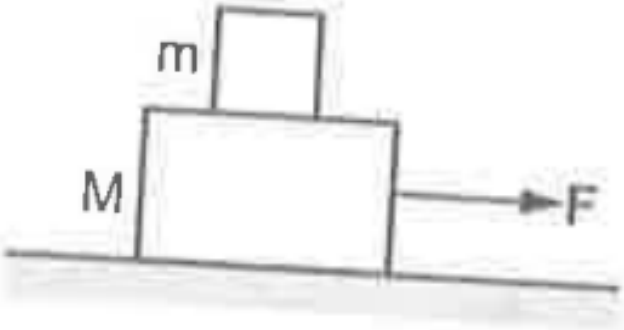


Figure 6-W4

A. 0.15mg

B. 0.05mg

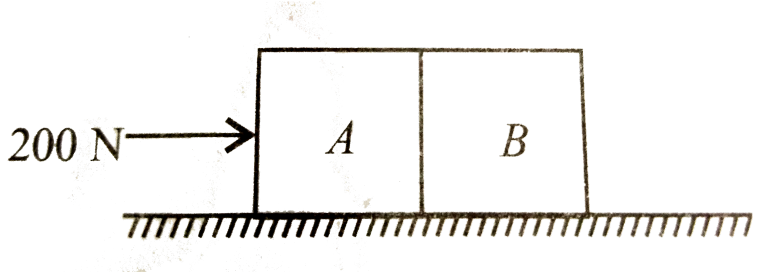
C. 0.1mg

D. 0.45mg

Answer: D

Watch Video Solution

19. Two blocks A and B of masses 10 kg and 15 kg are placed in contact with each other rest on a rough horizontal surface as shown in the figure. The coefficient of friction between the blocks and surface is 0.2. A horizontal force of 200 N is applied to block A. The acceleration of the system is $(\text{Take g} = 10ms^{-2})$



A. 4ms^{-2}

B. $6ms^{-2}$

C. $8ms^{-2}$

D. $10ms^{-2}$

Answer: B

Watch Video Solution

Circular Motion

1. A cyclist bends while taking turn to

A. reduce friction

B. generate required centripetal force

C. reduce apparent weight

D. reduce speed

Answer: B

Watch Video Solution

2. A motor cyclist is going in a vertical circle what is the necessary condition so that he may not fall down ?

A. the force of gravity disappears.

B. he loses weight some how.

C. he is kept in this path due to the force exerted by surrounding air.

D. the frictional force of the wall balances his weight

Answer: D

Watch Video Solution

3. One end of string of length l is connected to a particle on mass m and the other end is connected to a small peg on a smooth horizontal table. If the

particle moves in circle with speed v the net force on the particle (directed toward centre) will be (T reprents the tension in the string):

A. T

B. $T - \frac{(mv)^2}{l}$

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

D. 0

Answer: A

Watch Video Solution

4. The mass of a bicycle rider along with the bicycle is 100 kg. he wants to cross over a circular turn of radius 100 m with a speed of $10ms^{-1}$. If the coefficient of friction between the tyres and the road is 0.6, will the rider be able to cross the turn? Take $g = 10ms^{-2}$.

A. 300N

B. 600N

C. 1200N

D. 150N

Answer: B

Watch Video Solution

5. A stone of mass m tied 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] Lowest point Highest point

T_1 and V_1 denote the tension and speed at the lowest point T_2 and V_2 denote the corresponding values at the highest points.

Watch Video Solution

6. A small objective placed on a rotating horizontal turn table just slips when it is placed at a distance 4cm from the axis of rotation. If the angular velocity of the trun-table doubled, the objective slip when its distance from the axis of ratation is.

A. 1cm

B. 2cm

C. 4cm

D. 8cm

Answer: A

Watch Video Solution

7. A particle is moving on a circular path of 10 m radius. At any instant of time, its speed is $5ms^{-1}$ and the speed is increasing at a rate of $2ms^{-2}$. At this instant, the magnitude of the net acceleration will be

A. $5ms^{-2}$

B. $2ms^{-2}$

C. $3.2ms^{-2}$

D. $4.3ms^{-2}$

Answer: C

Watch Video Solution

8. In the question number 77, the force acting 011 thr particle is

A. $m\omega^2\vec{r}$

B. $-m\omega^2\vec{r}$

C. $2m\omega^2\vec{r}$

D. $-2m\omega^2\vec{r}$

Answer: B

View Text Solution

9. The coefficient of friction between the tyres and the road is 0.1. The maximum speed with which a cyclist can take a circular turn of radius 3 m without skidding is $\left(\text{Take g} = 10ms^{-2}\right)$

A. $\sqrt{15}\text{ms}^{-1}$

B. $\sqrt{3}\text{ms}^{-1}$

C. $\sqrt{30}\text{ms}^{-1}$

D. $\sqrt{10}\text{ms}^{-1}$

Answer: B

Watch Video Solution

10. A stone of mass 5 kg is tied to a string of length 10 m is whirled round in a horizontal circle. What is the maximum speed with which the stone can be whirled around if the string can withstand a maximum tension of 200 N?

A. $10 \mathrm{ms}^{-1}$

B. $15 \mathrm{ms}^{-1}$

C. $20 \mathrm{ms}^{-1}$

D. $25 \mathrm{ms}^{-1}$

Answer: C

Watch Video Solution

11. A disc revovles with a speed of $33\frac{1}{3}rev/\ \min$ and has a radius of 15 cm Two coins A and B are palaced at 4 cm and 14 cm away from the center of the record If the coefficient of friction between the coins and the record is 0.5 which of the coins will revolve with the record ?

A. A

B. B

C. Both A and B

D. Neither A nor B

Answer: A

Watch Video Solution

12. A circular race track of radius 300 m is banked at an angle of 15° If the coefficient of friction between the wheels of a race car and the road is 0.2. What is the (a) optimum speed of the race car to avoid wear and tear on its tyres , and (b) maximum permissible speed to avoid slipping ?

A. $10\sqrt{3}\mathrm{ms}^{-1}$

B. $9\sqrt{10}\mathrm{ms}^{-1}$

C. $\sqrt{10}\mathrm{ms}^{-1}$

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

Answer: B

Watch Video Solution

13. In the question number 82, the maximum permissible speed to avoid slipping is

A. $18.6\mathrm{ms}^{-1}$

B. $28.6\mathrm{ms}^{-1}$

C. $38.6\mathrm{ms}^{-1}$

D. $48.6 \mathrm{ms}^{-1}$

Answer: C

View Text Solution

14. An aircraft executes a horizontal loop at a speed of $720 kmh^{-1}$, with its wings banked at 15° What is the radiue of the loop ?

A. 14.8km

B. 14.8m

C. 29.6km

D. 29.6m

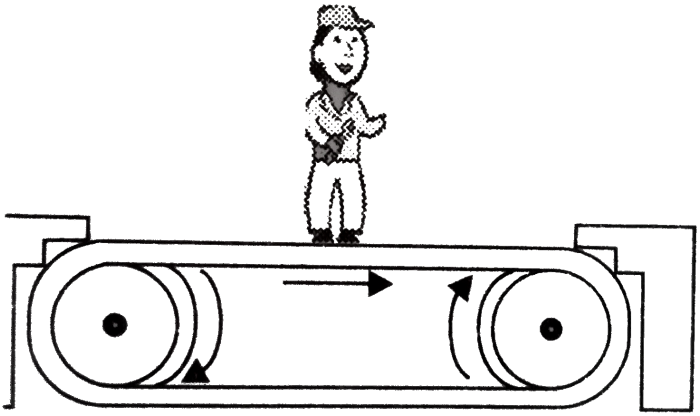
Answer: A

Watch Video Solution

Solving Problem In Mechanics

1. An iron block of sides $50cm \times 8cm \times 15cm$ has to be pushed along the floor. The force required will be minimum when the surface in contact with

ground is



A. $8\text{cm} \times 15\text{cm}$ surface

B. $50\text{cm} \times 15\text{cm}$ surface

C. $8\text{cm} \times 50\text{cm}$ surface

D. force is same for all surface

Answer: D

View Text Solution

2. Figure shows a man of mass 55 kg standing stationary with respect to a horizontal conveyor belt that is accelerating with $1ms^{-2}$. The net force acting on the man is

A. 35N

B. 45N

C. 55N

D. 65N

Answer: C

Watch Video Solution

3. A helicopter of mass 2000 kg rises with a vertical acceleration of $15ms^{-2}$. The total mass of the crew and passengers is 500 kg. Give the magnitude and direction of the (g $= 10ms^{-2}$)

(a) Force on the floor of the helicopter by the crew and passengers.

(b) action of the rotor of the helicopter on the surrounding air.

(c) force on the helicopter dur to the surrounding air.

A. $1.25 \times 10^5 N, 6.25 \times 10^3 N, 6.25 \times 10^2 N$

B. $1.25 \times 10^8 N, 6.25 \times 10^9 N, 6.25 \times 10^2 N$

C. $1.25 \times 10^5 N, 6.25 \times 10^3 N, 6.25 \times 10^7 N$

D. $1.25 \times 10^4 N, 6.25 \times 10^4 N, 6.25 \times 10^4 N$

Answer: D

Watch Video Solution

4. A person in an elevator accelerating upwards with an acceleration of $2ms^{-2}$, tosses a coin vertically upwards with a speed of $20ms^{-1}$. After how much time will the coin fall back into his hand ? (g = 10 ms^{-2})

A. $\frac{5}{3}s$

B. $\frac{3}{10}s$

C. $\frac{10}{3}s$

D. $\frac{3}{5}s$

Answer: C

Watch Video Solution

5. The person o(mass 50 kg slands on a weighing scale on a lift. If the lift is ascending upwards with a uniform acceleration of $9ms^{-2}$, what would be the

reading of the weighting scale?

$(\text{Take g} = 10ms^{-2})$

A. 50kg

B. 60kg

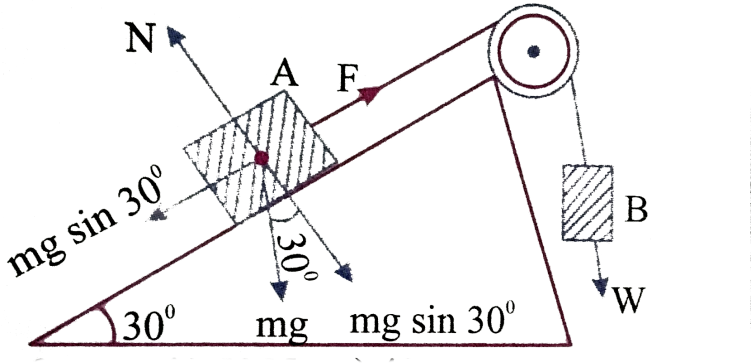
C. 96kg

D. 176kg

Answer: C

Watch Video Solution

6. Block A of weight $100N$ rests on a frictionless inclined plane of slope angle 30° (Fig. 5.7). A flexible cord attached to A passes over a frictonless pulled and is connected to block B of weight W. Find the weight W for which the system in equilibrium.



A. 25N

B. 50N

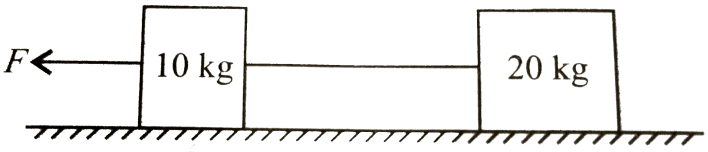
C. 75N

D. 100N

Answer: B

Watch Video Solution

7. Two blocks of masses 10 kg and 20 kg are connected by a massless string and are placed on a smooth horizontal surface as shown in the figure. If a force F=600 N is applied to 10 kg block, then the tension in the string is



A. 100N

B. 200N

C. 300N

D. 400N

Answer: D

Watch Video Solution

8. In the question number 91, if a force Fis applied to 20 kg block, then the tension in the string is

A. 100N

B. 200N

C. 300N

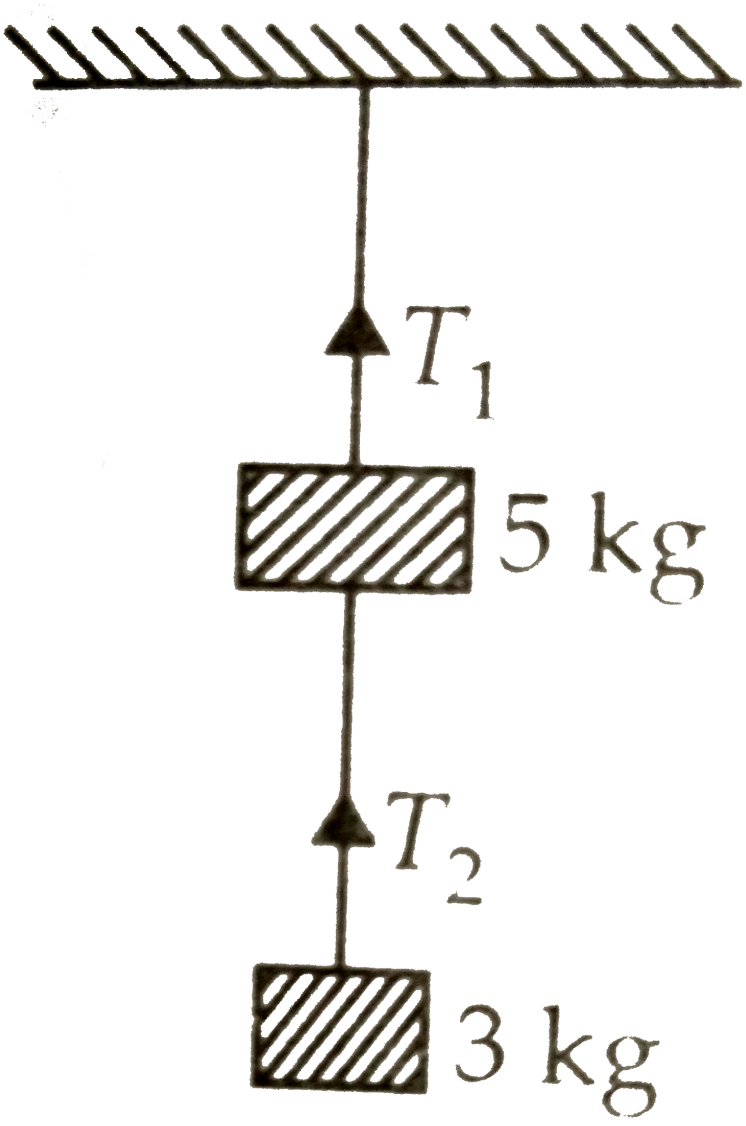
D. 400N

Answer: B

View Text Solution

9. Two masses of 5 kg and 3 kg are suspended with the help of massless inextensible strings as shown in figure. The whole system is going upwards with an acceleration of $2ms^{-2}$. The tensions T_1 and T_2

are respectively $\left(\text{Take g} = 10ms^{-2}\right)$



A. 96N, 36N

B. 36N,96N

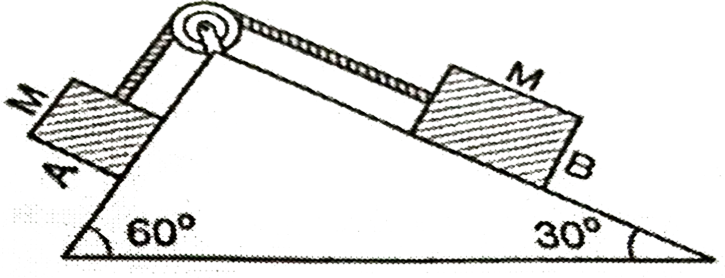
C. 96N,96N

D. 36N,36N

Answer: A

Watch Video Solution

10. Two blocks each of mass M are resting on a frictionless inclined plane as shown in fig then:



A. The block A moves down the plane

B. The block B moves down the plane.

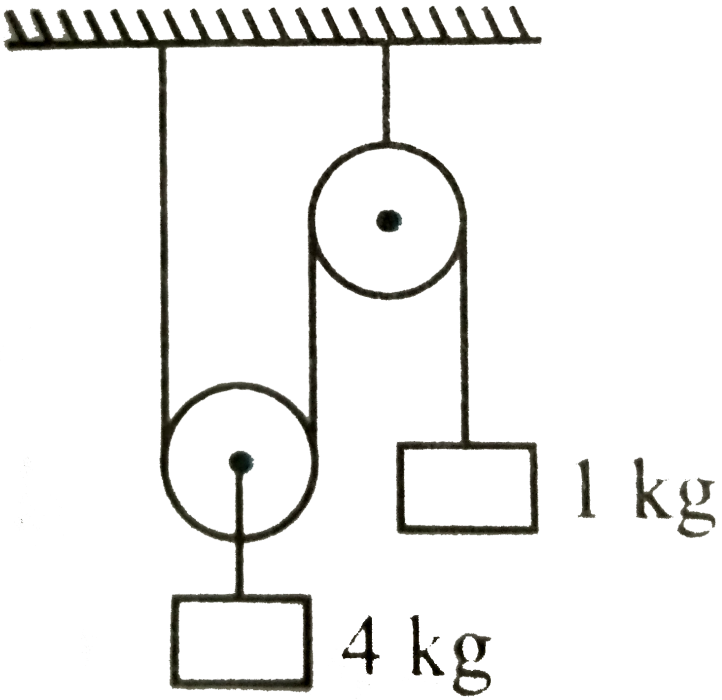
C. Both the blocks remain at rest

D. Both the blocks move down the plane.

Answer: A

Watch Video Solution

11. In the system shown in the figure, the acceleration of 1 kg mass is



A. $\frac{g}{4}$ downwards

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

C. $\frac{g}{2}\text{upwards}$

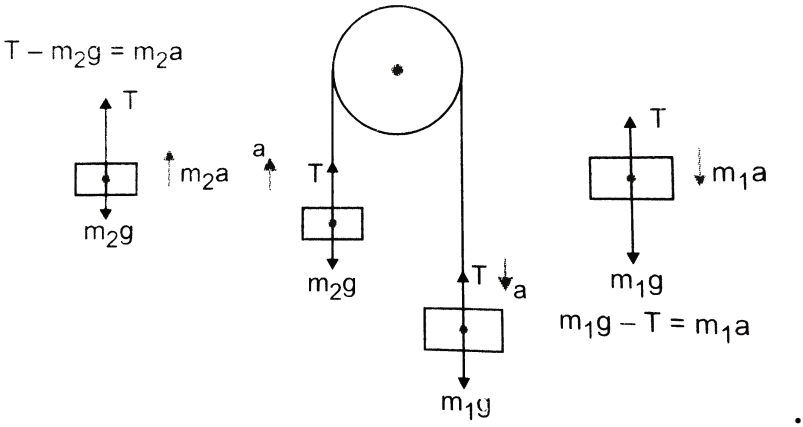
D. $\frac{g}{4}upwards$

Answer: C

Watch Video Solution

12. Two masses 8 kg and 12 kg are connected at the two ends of a light in extensible string that passes over a friction less pulley Find the acceleration of the masses and tension in the string , when the

masses are released



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

B. $\frac{g}{5}$

C. $\frac{g}{8}$

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

Answer: B

Watch Video Solution

13. A monkey of mass 40 kg climbs on a massless rope which can stand a maximum tension of 500 N. In which of the following cases will the rope break?

$(\text{Take g} = 10ms^{-2})$

A. The monkey climbs up with an acceleration of

$5ms^{-2}$.

B. The monkey climbs down with an acceleration of $5ms^{-2}$.

C. The monkey climbs up with a uniform speed $5ms^{-2}$.

D. The monkey falls down, the rope freely under gravity.

Answer: A

Watch Video Solution

14. A book is lying on the table. What is the angle belween the action of the book on the table and the reaction of the table on the book?

A. 0°

B. 45°

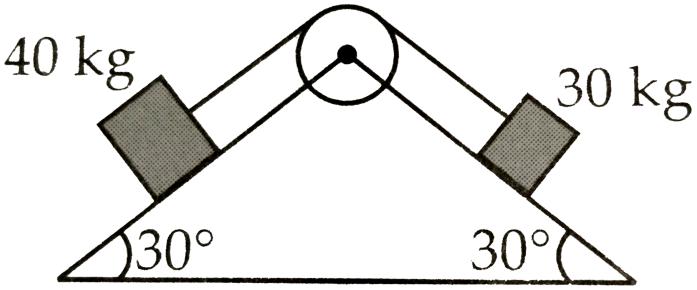
C. 90°

D. 180°

Answer: D

Watch Video Solution

15. Two blocks of masses of 40 kg and 30 kg are connected by a weightless string passing over a frictionless pulley as shown in the figure.



A. 0.7ms^{-2}

B. 0.8ms^{-2}

C. 0.6ms^{-2}

D. 0.5ms^{-2}

Answer: A

Watch Video Solution

16. A mass of 1 kg is suspended by means of a thread. The system is (i) lifted up with an acceleration of $4.9ms^{-2}$ (ii) lowered with an acceleration of $4.9ms^{-2}$. The ratio of tension in the first and second case is

A. $3:1$

B. $1:2$

C. $1:3$

D. $2:1$

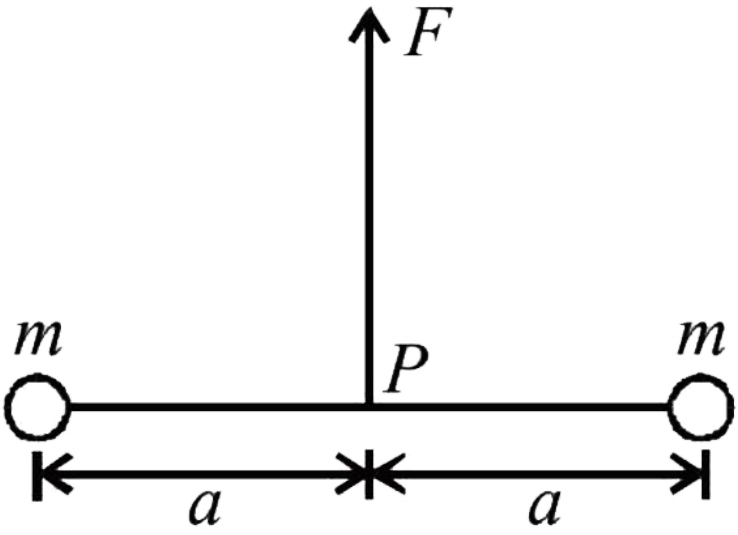
Answer: A

Watch Video Solution

Higher Order Thinking Skills

1. Two particles of mass m each are tied at the ends of a light string of length 2a. The whole system is kept on a frictionless horizontal surface with the string held tight so that each mass is at a distance a from the centre P (as shown in the figure). Now,

the mid-point of the string is pulled vertically upwards with a small but constant force F. As a result, the particles move towards each other on the surface. The magnitude of acceleration, when the separation between them becomes 2x, is



A. $\frac{F}{2m}\frac{a}{\sqrt{a^2-x^2}}$

B. $\frac{F}{2m} - \frac{x}{\sqrt{a^2 - x^2}}$

C. $\frac{F}{2m}\frac{x}{a}$

D. $\frac{F}{2m}\frac{\sqrt{a^2 - x^2}}{x}$

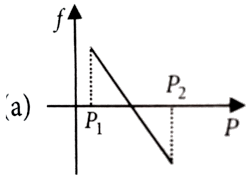
Answer: B

Watch Video Solution

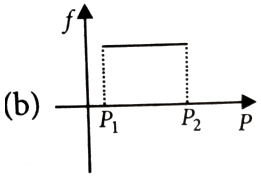
2. A block of mass m is on an inclined plane of angle θ. The coefficient of friction between the block and the plane is μ and $\tan\theta > \mu$. The block is held stationary by applying a force P parallel to the plane. The direction of force pointing up the plane

is taken to be positive. As P is varied from $P_1 = mg(\sin\theta - \mu\cos\theta)$ to $P_2 = mg(\sin\theta + \mu\cos\theta)$, the frictional force f versus P graph will look like

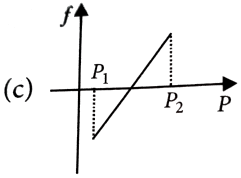
A.



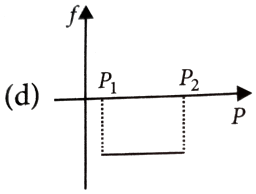
B.



C.



D.

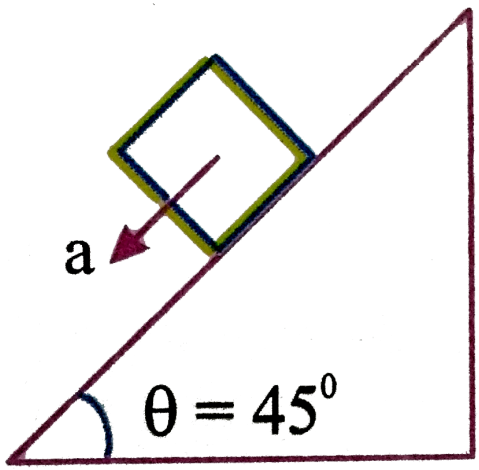


Answer: A

Watch Video Solution

3. When body slides down from rest along smooth inclined plane making angle 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 that 1. Calculate the coefficient of

friction beween the body and the rough plane.



A. 1/P

B. $\mu = \left(1 - 1/p^2\right)$

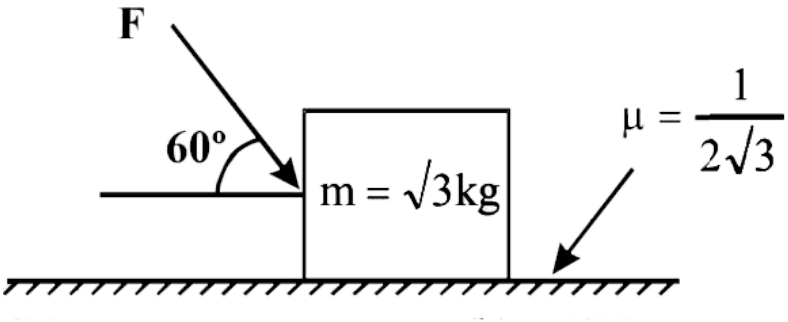
C. $1/p^2$

D. 2-p

Answer: B

Watch Video Solution

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



A. 20N

B. 10N

C. 12N

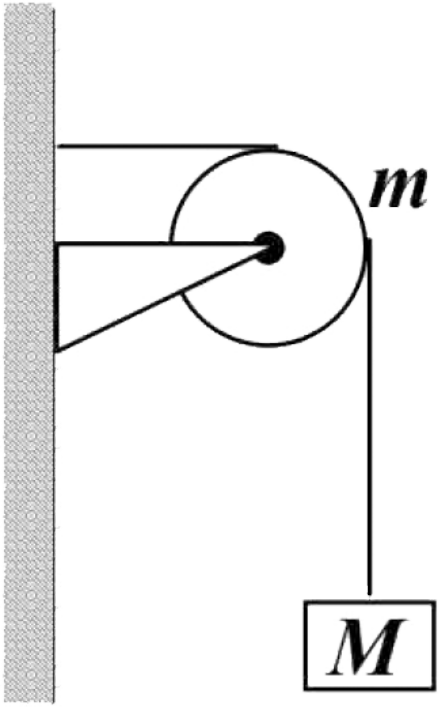
D. 15N

Answer: A

Watch Video Solution

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

clamp is given by



A. $\sqrt{2}Mg$

B. $\sqrt{2}mg$

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

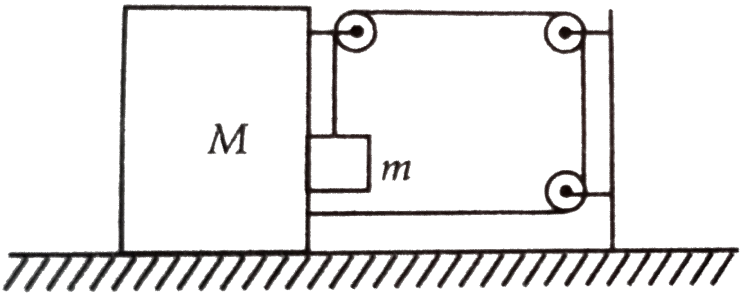
D. $\sqrt{(M+m)^2+M^2g}$

Answer: D

Watch Video Solution

6. Assuming all the surface to be frictionless. The smaller block m is moving horizontally with acceleration a and vertically downwards with acceleration a. Then magnitude of net acceleration

of smaller block m with respect to ground



A. $\frac{2\sqrt{5}mg}{(5m+M)}$

B. $\frac{2mg}{(5m+M)}$

C. $7\sqrt{5}g$

D. none of these

Answer: A

View Text Solution

7. A block of mass is placed on a surface with a vertical cross section given by $y = \frac{x^3}{6}$. If the coefficient of friction is 0.5, the maximum height above the ground at which the block can be placed without slipping is:

A. 1/2m

B. $\frac{1}{6}$m

C. $2/3$

D. $1/3m$

Answer: B

Watch Video Solution

8. A piece of wire is bent in the shape of a parabola $y = kx^2$ (y-axis vertical) with a bead of mass m on it. The bead can slide on the wire without friction. It stays at the lowest point of the parabola when the wire is at rest. The wire is now accelerated parallel to the x-axis with a constant acceleration a. The distance of the new equilibrium position of the bead, where the bead can stay at rest with respect to the wire, from the y-axis is:

A. a/gk

B. a/2gk

C. 2a/gk

D. a/4gk

Answer: B

Watch Video Solution

Ncert Exemplar

1. A ball is travelling with uniform translatory motion . This means that

A. it is at rest

B. he path can be a straight line or circular and the ball travels with uniform speed.

C. all parts of the ball have the same velocity (magnitude and direction) and the velocity is constant

D. the centre of the ball moves with constant velocity and the ball spins about its centre uniformly.

Answer: C

Watch Video Solution

2. A metre scale is moving with uniform velocity. This implies .

A. the force acting on the scale is zero, but a torque about the centre of mass can act on the scale.

B. he force acting on the scale is zero and the torque acting about centre of mass of the scale is also zero.

C. the total force acting on it need not be zero but the torque on it is zero.

D. neither the force nor the torque need to be zero.

Answer: B

Watch Video Solution

3. A cricket ball of mass 150 g has an initial velocity $\bar{u} = \left(3\hat{i} - 4\hat{j}\right) ms^{-1}$ and a final velocity $\bar{v} = -\left(3\hat{i} - 4\hat{j}\right) ms^{-1}$ after being hit. The change in momentum (final momentum -initial momentum) is $\left(\text{in kg ms}^{-1}\right)$

A. zero

B. $-\left(0.45\hat{i}+0.6\hat{j}\right)$

C. $-\left(0.9\hat{i}+1.2\hat{j}\right)$

D. $-5\left(\hat{i}+\hat{j}\right)$

Answer: C

Watch Video Solution

4. In the previous problem 3 the magnitude of the momentum transferred during the hit is .

A. zero

B. 0.75kgms^{-1}

C. $1.5 \mathrm{kgms}^{-1}$

D. $14 \mathrm{kgms}^{-1}$

Answer: C

Watch Video Solution

5. Conservation of momentum in a collision between particles can be understood from

A. conservation of energy.

B. Newton's first law onl

C. Newton's second law only.

D. both Newton's second and third law.

Answer: D

Watch Video Solution

6. A hockey player is moving northward and suddenly turns westward with the same speed to avoid an opponet. The force that acts on the player is.

A. frictional force along westward.

B. muscle force along southward.

C. frictional force along south-west.

D. muscle force along south-west.

Answer: C

Watch Video Solution

7. A body of mass $2kg$ travels according to the law $x(t) = pt + qt^2 + rt^3$ where $p = 3ms^{-1}$, $q = 4ms^{-2}$ and $r = 5ms^{-3}$. Find the force acting on the body at t=2 sec.

A. 136N

B. 134N

C. 158N

D. 98N

Answer: A

Watch Video Solution

8. A body with mass 5 kg is acted upon by a force $\overrightarrow{F} = \left(-3\hat{i} + 4\hat{j} \right) N$. If its initial velocity at t =0 is $\overrightarrow{v} = 6\hat{i} - 12\hat{j} ms^{-1}$, the time at which it will just have a velocity along the y-axis is :

A. 0

B. 10s

C. 2s

D. 15s

Answer: B

Watch Video Solution

9. A car of mass m starts from rest and acquires a velocity along east $v = v\hat{i}(v > 0)$ in two seconds Assuming the car moves with unifrom acceleration the force exerted on the car is .

A. $\frac{mv}{2}$ eastward and is exerted by the car engine.

B. $\frac{mv}{2}$ eastward and is due to the friction on the tyres exerted by the road.

C. more than $\frac{mv}{2}$ eastward exerted due to the 2 engine and overcomes the friction of the road.

D. $\frac{mv}{2}$ exerted by the engine.

Answer: B

Watch Video Solution

Assertion And Reason

1. Assertion : An external force is required to keep a body in motion.

Reason : If the net external force is zero, a body at rest continues to remain at rest and a body in motion continues to move with a uniform velocity.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: B

Watch Video Solution

2. Assertion: For applying the second law of motion, there is no conceptual distinction between inanimate and animate objects.

Reason: An animate object requires an external force to acceleration.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: B

Watch Video Solution

3. Assertion: If a body is momentarily at rest, it means that force or acceleration are necessarily zero at that instant.

Reason: Force on a body at a given time is determined by the direction of motin only.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: D

4. Assertion: If external force on a body is zero, its acceleration is zero.

Reason: This is the simple from of Newton's second law of motion.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: C

Watch Video Solution

5. Assertion: There is no apprecible change in the position of the body during the action of the impulsive force.

Reason: In case of impulsive force the time of action of the force is very short.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: A

 Watch Video Solution

6. Assertion:On a merry-go-around, all parts of our body are subjected to an inward force.

Reason: We have a feeling of being pushed outward the direction of impending motion.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: B

7. Assertion : The moment after a stone is released out of an accelerated train, there is no horizontal force or acceleration on the stone.

Reason : Force on a body at a given time is determined by the situation at the location of the body at that time.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: A

 Watch Video Solution

8. Assertion: Force on a body A by body B is equal and opposite to the force on the body B by A .

Reason: Force in nature always occur between pairs of bodies.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: B

Watch Video Solution

9. Assertion: There is no cause-effect relation between action and raction.

Reason: Action and reaction are not simultaneous force.

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

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

assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: C

Watch Video Solution

10. Assertion: The terms action and reaction in the third law of motion stand for simultaneous mutual force between a pair of bodies.

Reason: In this conext action always precede or cause reaction.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: C

Watch Video Solution

11. Assertion : The total momentum of an isolated system of particles is conserved.

Reason: The law of conservation of momentum follows from the second and third law of motion.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: B

 Watch Video Solution

12. Assertion: Friction opposes relative motion and thereby dissipates power in the form of heat.

Reason: Friction is always an undesirable force.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: C

Watch Video Solution

13. 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 to wetting of the surface.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: A

Watch Video Solution

14. Assertion : Static friction is a self-adjusting force upto its limit $\mu_s N$ where μ_s is the coefficient of static friction.

Reason: One can use the equation $f_s = \mu_s N$ only when the maximum value of static friction comes into play

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: B

Watch Video Solution

15. Assertion: The familiar equation $mg = R$ for a body on a table is true only if the body is in equilibrium.

reason: The equality of mg and R has no connection with the third law.

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

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

C. If assertion is true but reason is false

D. If both assertion and reason are false.

Answer: B

Watch Video Solution

Others

1. Physical independence of force is a Consequcnce of

A. first law of motion

B. second law of motion

C. third law of motion

D. all of these laws

Answer: A

Watch Video Solution

2. An astronaut accidentally gets separated out his small spaceship accelerating in interstellar space at a constant rate of $100ms^{-2}$. What is the acceleration of the astronaut the instant after he is outside the spaceship? (Assume that there are no nearby stars to exert gravitional force on him)

A. zero

B. $10ms^{-2}$

C. $50ms^{-2}$

D. $100ms^{-2}$

Answer: A

Watch Video Solution

3. Newton's second law of motion is

A. $F = \frac{dp}{dt}$

B. $F = mv$

C. $F = mv^2$

D. $F = m^2 v$

Answer: A

Watch Video Solution

4. Which one of the following statement is not ture about Newton's second law of motion $\overrightarrow{F} = \overrightarrow{ma}$?

A. The second law of motion is consistent with the first law

B. The second law of motion is a vector law.

C. The second law of motion is applicable to a single point particle.

D. The second law of motion is not applicable to a single point particle.

Answer: D

Watch Video Solution

5. The relation $\vec{F} = \overrightarrow{ma}$, cannot be deduced from Newton's second law, if

A. force depends on time

B. momentum depends on time

C. acceleration depends on time

D. mass depends on time

Answer: D

Watch Video Solution

6. A large force is acting on a body for a short time.

The impulse imparted is equal to the change in

A. acceleration

B. momentum

C. energy

D. velocity

Answer: B

Watch Video Solution

7. Which one of the following is not force

A. impulse

B. Tension

C. Thrust

D. Weight

Answer: A

Watch Video Solution

8. The motion of a particle of mass m is described by $y = ut + \frac{1}{2}gt^2$. Find the force acting on the particale .

A. mg

B. $\frac{\mu}{t}$

C. 2mg

D. $\frac{2\mu}{t}$

Answer: A

Watch Video Solution

9. A constant force acting on a body of mass of 5 kg change its speed from $5ms^{-1}$ to $10ms^{-1}$ in $10s$ without changing the direction of motion. The force acting on the body is

A. 1.5N

B. 2N

C. 2.5N

D. 5N

Answer: C

Watch Video Solution

10. A bullet of mass 40g moving with a speed of $90ms^{-1}$ enters a heavy wooden block and is stopped after a direction of 60cm. The average resistive force exered by the block on the bullet is

A. 180 N

B. 220 N

C. 270 N

D. 320 N

Answer: C

Watch Video Solution

11. A body under the action of a force $\overrightarrow{F} = 6\hat{i} - 8\hat{j}N$ acquires an acceleration of $5ms^{-2}$. The mass of the body is

A. 2kg

B. 5kg

C. 4kg

D. 6kg

Answer: A

Watch Video Solution

12. A constant retarding force of 50N is apllied to a body of mass 10kg moving initially with a speed of $10ms^{-1}$. The body comes to rest after

A. 2s

B. 4s

C. 6s

D. 8s

Answer: A

Watch Video Solution

13. A body of mass 5 kg starts from the origin with an initial velocity $\overrightarrow{u} = \left(30\hat{i} + 40\hat{j}\right)ms^{-1}$. If a constant force $\left(-6\hat{i} - 5\hat{j}\right)N$ acts on the body,

the time in which the y-component of the velocity becomes zero is

A. 5s

B. 20s

C. 40s

D. 80s

Answer: C

14. A body of mass $0.4kg$ starting at origin at $t = 0$ with a speed of $10ms^{-1}$ in the positive x-axis direction is subjected to a constant $F = 8$ N towards negative x-axis. The position of body after 25s is

A. $-6000m$

B. $-8000m$

C. $+4000m$

D. $+7000m$

Answer: A

Watch Video Solution

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

A. $0.07kgs^{-1}$

B. $1.4kgs^{-1}$

C. $0.7kgs^{-1}$

D. $10.7kgs^{-1}$

Answer: C

Watch Video Solution

16. A ball of mass m strikes a rigid walJ with speed u and rebounds with the same speed. The impulse imparted to the ball by the wall is

A. 2mu

B. mu

C. zero

D. $-2mu$

Answer: D

Watch Video Solution

17. A batsman hits back a ball straight in the direction of the bowler without changing its initial speed of $12ms^{-1}$. If the mass of the ball is 0.15 kg , determine the impulse imparted to the ball . (Assume linear motion of the ball).

A. 1.8N s

B. 2.8N s

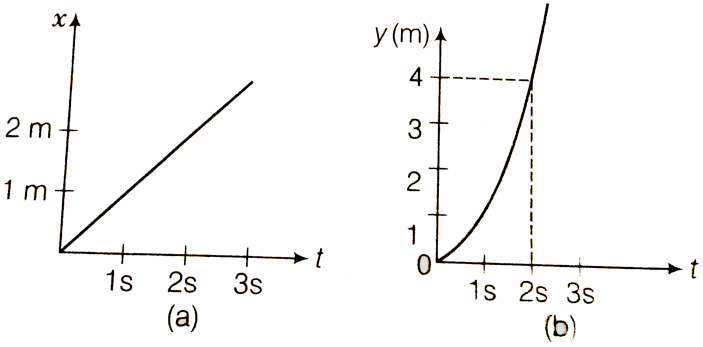
C. 3.6N s

D. 4.2N s

Answer: C

Watch Video Solution

18. Figure shows (x,t) (y,t) diagram of a particle moving in 2-dimensions.



If the particle has a mass of 500 g , find the force (direction and magnitude) acting on the particle .

A. 1N along y-axis

B. 1N along x-axis

C. 0.5N along x-axis

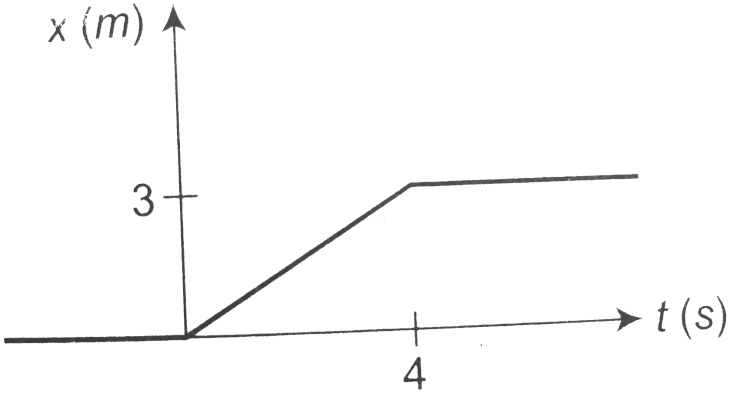
D. 0.5N along y-axis

Answer: A

Watch Video Solution

19. Figure shows the position-time graph of a particle of mass 4kg. Let the force on the particle for $t < 0$, $0 < t$lt,$4s$, $t > 4s$ be F_1, F_2 and F_3

respectively. Then



A. $F_1 = F_2 = F_3 = 0$

B. $F_1 > F_2 = F_3$

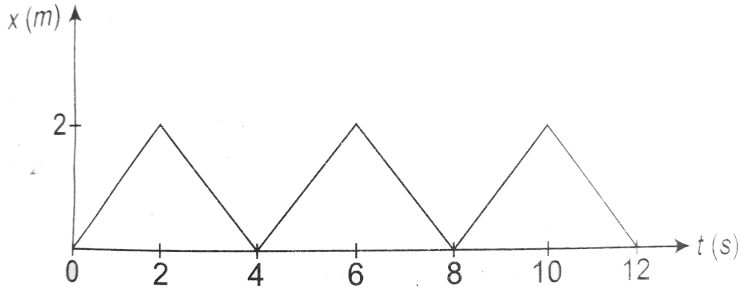
C. $F_1 > F_2 > F_3$

D. $F_1 < F_2 < F_3$

Answer: A

Watch Video Solution

20. Figure shows the position-time (x-t) graph of one dimensional motion of a mass 500g. What is the time interval between two consecutive impulses received by the body?



A. 2s

B. 4s

C. 6s

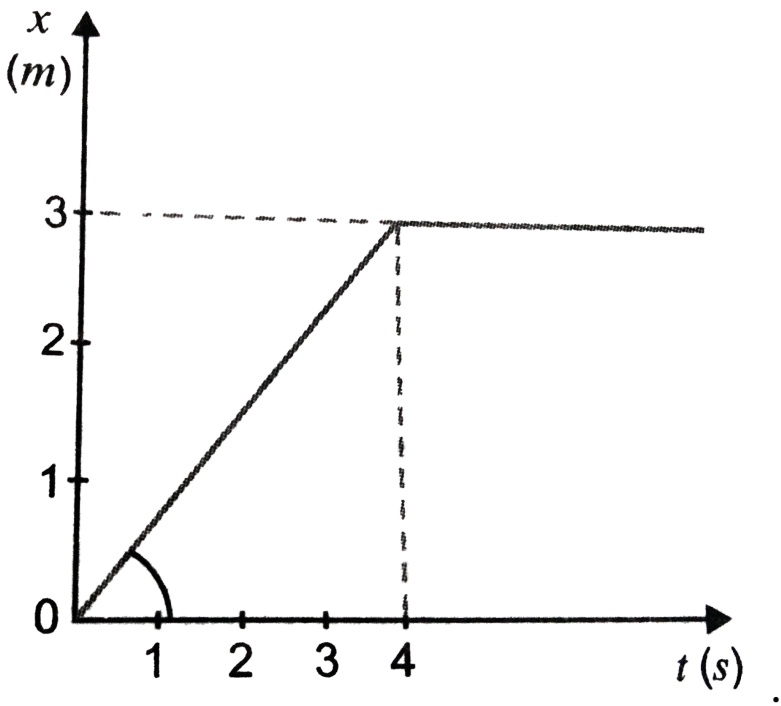
D. 8s

Answer: A

Watch Video Solution

21. The position time graph of a body of mass $2kg$ is as given in What is the impulse on the body at

$t = 0$ s and $t = 4s$?



A. $\frac{2}{3}\text{kgms}^{-1}$

B. $-\frac{2}{3}\text{kgms}^{-1}$

C. $\frac{3}{2}\text{kgms}s^{-1}$

D. $-\frac{3}{2}\text{kgms}s^{-1}$

Answer: D

Watch Video Solution

22. We can derive Newton's

A. second and third laws from the first law.

B. first and second laws from the third law

C. third and first laws from the second law.

D. all the three laws are independent of each other.

Answer: C

Watch Video Solution

23. Which of the following statement is not true regarding the Newton's third law of motion?

A. To every action there is always an equal and opposite reaction.

B. Action and reaction act on the same body.

C. There is no cause-effect relation between action and reaction.

D. Action and reaction forces are simultaneous forces.

Answer: B

Watch Video Solution

24. The driver of a car travelling at velocity v suddenly see a broad wall in front of him at a distance d. He should

A. break sharply

B. turn sharply

C. both (a) and (b)

D. none of these

Answer: A

25. Which of the following statements is incorrect?

A. A cricketer moves his hands backwards while holding a catch.

B. A person from Hing from a certain height receives more iniuries when he falls on a cemented floor than when he falls on a heap of sand.

C. It is easier lo push a lawn mower than to pull it.

D. Mountain roads are generally made winding upwards rather than going strainght up.

Answer: C

View Text Solution

26. Which of the following statements is incorrect?

Column I		Column II	
(A)	Definition of force	(p)	Newton's third law
(B)	Measure of force	(q)	Impulse
(C)	Effect of force	(r)	Newton's second law
(D)	Recoiling of gun	(s)	Newton's first law

A. A -q, B -p, C-r, D-s

B. A-p,B-q,C-r,D-s

C. A-s,B-r,C-q,D-p

D. A-s, B-q, C-r, D-p

Answer: C

Watch Video Solution

27. A rocket is going upward with acceleration motion. A man string in it feels his weight increased 5 time his own weight. If the mass of the rocket including that of the man is $1.0 \times 10^4 kg$, how much force is being applied by rocket engine? $\left(Takeg = 10ms^{-2}\right)$.

A. $5 \times 10^4 N$

B. $5 \times 10^5 N$

C. $5 \times 10^8 N$

D. $2 \times 10^4 N$

Answer: B

 Watch Video Solution

28. Ten one-rupee coins are put on top each other on a table. Each coin has a mass m. The rection of the 6^{th} coin (counted from the bottom) on the 7^{th} coin is

A. 4mg

B. 6mg

C. 7mg

D. 3mg

Answer: A

Watch Video Solution

29. A cork of mass 10 g is floating on water. The net force acting on the cork is

A. 10N

B. $10^{-3}N$

C. $10^{-2}N$

D. zero

Answer: D

Watch Video Solution

30. A stone of mass I kg is lying on the floor of a train which is accelerating with $1ms^{-2}$ The net force acting on the stone is

A. zero

B. 1N

C. 5N

D. 10N

Answer: B

Watch Video Solution

31. A stream of water flowing horizontally with a speed of $15ms^{-1}$ pushes out of a tube of cross sectional area $10^{-2}m^2$ and hits a vertical wall near by what is the force exerted on the wall by the impact of water assuming.that it does not rebound? (Density of water $= 1000kgm^3$)

A. $1.25 \times 10^3 N$

B. $2.25 \times 10^3 N$

C. $3.25 \times 10^3 N$

D. $4.25 \times 10^3 N$

Answer: B

Watch Video Solution

32. A steam of water flowing horizontally with a speed of $25m^{s-1}$ gushes out of a tube of cross-sectional area $10^{-3}m^2$, and hits at a vertical wall nearby. What is the force exerted on the wall by the impact of water

A. 125N

B. 625N

C. $-650N$

D. $-1125N$

Answer: B

Watch Video Solution

33. A rocket with a lift-off mass $2 \times 10^4 kg$ is blasted upwards with an initial acceleration of $5ms^{-2}$. The initial thrust of the blast is $\left(\text{Take g} = 10ms^{-2}\right)$

A. $2 \times 10^5 N$

B. $3 \times 10^5 N$

C. $4 \times 10^5 N$

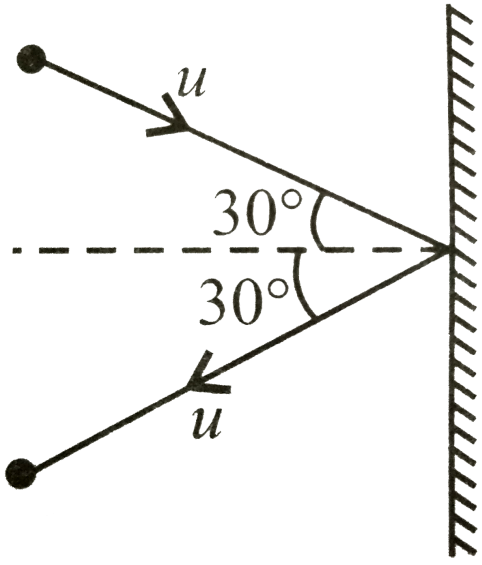
D. $5 \times 10^5 N$

Answer: B

 Watch Video Solution

34. A ball of mass m strikes a rigid walJ with speed u and rebounds with the same speed. The impulse

imparted to the ball by the wall is



A. $\frac{\text{mu}\sin 30^\circ}{t}$

B. $\frac{2\text{mu}\sin 30^\circ}{t}$

C. $\frac{\text{mu}\cos 30^\circ}{t}$

D. $\frac{2\text{mu}\cos 30^\circ}{t}$

Answer: D

Watch Video Solution

35. A rocket of initial mass $6000kg$ ejects mass at a constant rate of $16kg/s$ with constant relative speed of $11m/s$ What is the acceleration of the rocket one minute after blast ?

A. 25ms^{-2}

B. 50ms^{-2}

C. 10ms^{-2}

D. 35ms^{-2}

Answer: D

Watch Video Solution

36. Two billiard ball A and B each of mass $50g$ and moving in opposite direction with speed of $5ms^{-1}$ each, collide and rebound with the same speed. The impulse imparted to each ball is

A. 0.25kgms^{-1}

B. 0.5kgms^{-1}

C. 0.8kgms^{-1}

D. 0.125kgms^{-1}

Answer: B

Watch Video Solution