PHYSICS

BOOKS - UNIVERSAL BOOK DEPOT 1960 PHYSICS (HINGLISH)

NEWTONS LAWS OF MOTION

Ordinary Thinking

1. A rider on horse back falls when horse starts running all of a sudden because

A. Rider is taken back

B. Rider is suddenly afraid of falling

C. Inertia of rest keeps the upper part of body at rest whereas lower part of the body moves forward with the horse

D. None of the above

Answer: C

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2. 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 train and takes the body forward

C. Upper part of the body continues to be in the state of motion whereas the lower part of the body in contact with seat remains at rest

D. Nothing can be said due to insufficient data

Answer: C

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3. 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 and of uniform linear motion

Answer: D

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

A. Due to inertia of rest, road is left behind and man reaches forward

B. Due to inertia of motion upper part of body continues to be in motion in forward direction while feet come to rest as soon as they touch the road

C. He leans forward as a matter of habit

D. Of the combined effect of all the three factors stated in (a), (b) and (c)

Answer: B

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5. A boy sitting on the topmost berth in the compartment of a train which is just going to stop on a railway station, drop an apple aiming at the open hand of his brother sitting vertically below his hands at a distnace of about 2 meter. The apple willl fall

A. Precisely on the hand of his brother

B. Slightly away from the hand of his brother in the direction of motion of the train

C. Slightly away from the hand of his brother in the direction opposite to the direction of motion of the train

D. None of the above

Answer: B

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6. state Newton's first law of motion. Hence define forece and inertia.

A. Energy

B. Work

C. Inertia

D. Moment of inertia

Answer: C

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7. A person sitting in an open car moving at constant velocity throws a ball vertically up into air. The ball falls

A. Outside the car

B. In the car ahead of the person

C. In the car to the side of the person

D. Exactly in the hand which threw it up

Answer: D

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8. A bird weighs 2 kg and is inside a closed cage of 1 kg. If it starts flying, then what is the weight of the bird and cage assembly

A. 1.5 kg

B. 2.5 kg

C. 3 kg

D. 4 kg

Answer: C

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9. A particle is moving with a constant speed along a straight line path. A force is not required to

A. Increase its speed

B. Decrease the momentum

C. Change the direction

D. Keep it moving with uniform velocity

Answer: D

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10. When a bus suddenly takes a turn, the passengers are thrown outwards because of

A. Inertia of motion

B. Acceleration of motion

C. Speed of motion

D. Both (b) and (c)

Answer: A

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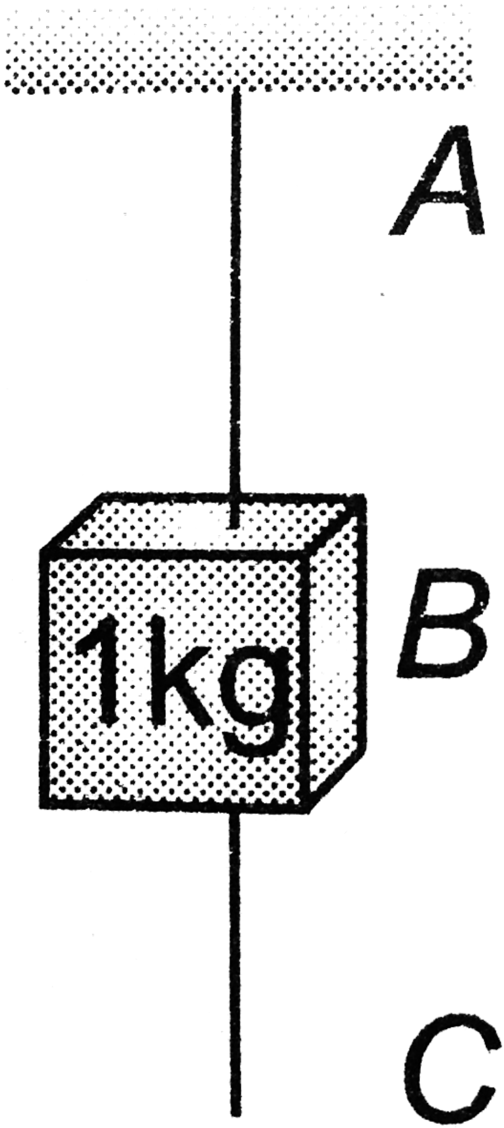
11. A mass of 1kg is suspended by a string A. Another string C is connected to its lower end (see figure). If a sunsudden jerk is given to C, then



A. The portion AB of the string will break

B. The portion BC of the string will break

C. None of the strings will break

D. The mass will start rotating

Answer: B

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12. In the previous problem, If the string C is stretched slowly, then

A. The portion AB of the string will break

B. The portion BC of the string will break

C. None of the strings will break

D. None of the above

Answer: A

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Second Law Of Motion

1. If a bullet of mass 5gm moving with velocity `100m/sec, penertates the wooden block upto 6cm. Then the average force imposed by the bullet on the block is

A. 8300 N

B. 417 N

C. 830 N

D. Zero

Answer: B

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2. Newton's second law of motion gives us

A. Acceleration

B. Force

C. Momentum

D. Angular momentum

Answer: B

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3. A force of 100 dynes acts on mass of 5 gm for 10 sec . The velocity produced is

A. $2cm/\sec$

B. $20cm/\sec$

C. $200cm/\sec$

D. $2000cm/\sec$

Answer: C

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4. An object will continue moving uniformly until

A. The resultant force acting on it begins to decrease

B. The resultant force on it is zero

C. The resultant force is at right angle to its rotation

D. The resultant force on it is increased continuously

Answer: B

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5. A diwali rocket is ejecting $0.05kg$ of gases per second at a velocity of $400m/\text{sec}$. The accelerating force on the rocket is

A. 20 dynes

B. 20 N

C. 22 dynes

D. 1000 N

Answer: B

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6. A body of mass $2kg$ moving on a horizontal surface with an initial velocity of $4ms^{-1}$ comes to rest after 2 second. If one wants to keep this body moving on the same surface with a velocity of $4ms^{-1}$ the force required is

A. 8 N

B. 4 N

C. Zero

D. 2 N

Answer: B

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7. A body of mass 2 kg is hung on a spring balance mounted vertically in a lift. If the lift descends with an acceleration equal to the acceleration due to gravity ‘ g ’, the reading on the spring balance will be

A. 2 kg

B. $(4 \times g) kg$

C. $(2 \times g) kg$

D. Zero

Answer: D

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8. In the above problem, if the lift moves up with a constant velocity of $2m / \sec$, the reading on the balance will be

A. 2 kg

B. 4 kg

C. Zero

D. 1 kg

Answer: A

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9. In the above problem if the lift moves up with an acceleration equal to the acceleration due to gravity, the reading on the spring balance will be

A. 2 kg

B. $(2 \times g) kg$

C. $(4 \times g) kg$

D. 4 kg

Answer: D

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10. 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 costant acceleration. Then

A. $t_1 > t_2$

B. $t_2 > t_1$

C. $t_1 = t_2$

D. $t_1 > > t_2$

Answer: A

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11. If the tension in the cable of 1000 kg elevator is 1000 kg weight, the elevator

A. Is accelerating upwards

B. Is accelerating downwards

C. May be at rest or accelerating

D. May be at rest or in uniform motion

Answer: D

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12. A man weighing $80kg$ is standing on a trolley weighting $320kg$. The trolley is resting on frictionless horizontal rails. If the man starts walking on the trolley along the rails at speed $1m/s$ (w.r.t. to trolley) then after $4s$ his displacement relative to the ground will be :

A. 5 m

B. 4.8 m

C. 3.2 m

D. 3.0 m

Answer: C

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13. In doubling the mass and acceleration of the mass, the force acting on the mass with respect to the previous value

A. Decreases to half

B. Decreases to half

C. Increases two times

D. Increases four times

Answer: D

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14. A force of 5 N acts on a body of weight 9.8 N . What is the acceleration produced in $m/\sec^2$

A. 49.00

B. 5.00

C. 1.46

D. 0.51

Answer: B

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15. A body of mass 40 gm is moving with a constant velocity of $2cm/\sec$ on a horizontal frictionless table. The force on the table is

A. 39200 dyne

B. 160 dyne

C. 80 dyne

D. Zero dyne

Answer: A

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16. When 1 N force acts on 1 kg body that is able to move freely, the body receives

A. A speed of $1m/\sec$

B. An acceleration of $1m/\sec^2$

C. An acceleration of $980cm/\sec^2$

D. An acceleration of $1cm/\sec^2$

Answer: B

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17. A body of mass $10kg$ is moving with a constant velocity of $10m/s$. When a constant force acts for 4 seconds on it, it moves with a velocity $2m/\sec$ in the opposite direction. The acceleration produced in it is

A. $3m/\sec^2$

B. $-3m/\sec^2$

C. $0.3m / \sec^2$

D. $-0.3m / \sec^2$

Answer: B

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18. In the above question, the force acting on the object is

A. 30 N

B. $-30N$

C. 3 N

D. $-3N$

Answer: B

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19. In the above question, the impulse acting on the object is

A. $120 \text{newton} \times \sec$

B. $-120 \text{newtont} \sec$

C. $30 \text{newton} \times \sec$

D. $-30 \text{newton} \times \sec$

Answer: B

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20. A machine gun is mounted on a 2000kg car on a harizontal frictionless surface. At some instant the gun fires bullets of mass 10gm with a velocity of $500 \frac{m}{\sec}$ with respect to the car. The number of bullets fired per second is ten. The average thrust on the system is

A. 550 N

B. 50 N

C. 250 N

D. 250 dyne

Answer: B

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21. In the above question, the acceleration of the car will be

A. $0.25m/\sec^2$

B. $2.5m/\sec^2$

C. $5.0m/\sec^2$

D. $0.25m/\sec^2$

Answer: D

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22. A person is standing in an elevator. In which situation he finds his weight less than actual when:

A. The elevator moves upward with constant acceleration

B. The elevator moves downward with constant acceleration.

C. The elevator moves upward with uniform velocity

D. The elevator moves downward with uniform velocity

Answer: B

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23. A particle of mass 0.3 kg subject to a force $F = -kx$ with $k = 15N/m$. What will be its initial acceleration if it is released from a point 20cm away from the origin?

A. $5m/s$

B. $10m/s$

C. $3m/s$

D. $15m/s$

Answer: B

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24. A block of metal weighing $2kg$ is resting on a frictionless plane . It is struck by a jet of releasing water at the rate of $1kgs^{-1}$ and at a speed of $5ms^{-1}$ Calculate the intial acceleration of the blocks .

A. $2.5m/\sec^2$

B. $5.0m/\sec^2$

C. $10m/\sec^2$

D. None of the above

Answer: A

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25. Gravels are dropped on a conveyor belt at the rate of 0.5 kg / sec . The extra force required in newtons to keep the belt moving at 2 m/sec is

A. 1

B. 2

C. 4

D. 0.5

Answer: A

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26. A parachutist of weight ' w ' strikes the ground with his legs fixed and comes to rest with an upward acceleration of magnitude 3 g . Force exerted on him by ground during landing is

A. w

B. 2 w

C. 3 w

D. 4 w

Answer: D

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27. At a place where the acceleration due to gravity is 10m sec^{-2} a force of 5 kg - wt acts on a body of mass 10 kg initially at rest. The velocity of the body after 4 second is

A. 5m sec^{-1}

B. 10m sec^{-1}

C. 20m sec^{-1}

D. $50 \mathrm{m} \sec^{-1}$

Answer: C

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28. In a rocket of mass 1000 kg fuel is consumed at a rate of 40 kg/s . The velocity of the gases ejected from the rocket is $5 \times 10^4 m / s$. The thrust on the rocket is

A. $2 \times 10^3 N$

B. $5 \times 10^4 N$

C. $2 \times 10^6 N$

D. $2 \times 10^9 N$

Answer: C

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29. A man is standing on a weighing machine placed in a lift. When stationary his weight is recorded as 40 kg . If the lift is accelerated upwards with an acceleration of $2m/s^2$, then the weight recorded in the machine will be $(g = 10m / s^2)$

A. 32 kg

B. 40 kg

C. 42 kg

D. 48 kg

Answer: D

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30. A body of mass 4 kg weighs 4.8 kg when suspended in a moving lift. The acceleration of the lift is

A. $9.80ms^{-2}$ downwards

B. $9.80ms^{-2}$ upwards

C. $1.96ms^{-1}$ downwards

D. $1.96ms^{-2}$ upwards

Answer: D

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31. An elevator weighing 6000 kg is pulled upward by a cable with an acceleration of $5ms^{-2}$. Taking g to be $10ms^{-2}$, then the tension in the cable is

A. 6000 N

B. 9000 N

C. 60000 N

D. 90000 N

Answer: D

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32. A ball of mass 0.2 kg moves with a velocity of $20 m / \sec$ and it stops in 0.1 sec , then the force on the ball is

A. 40 N

B. 20 N

C. 4 N

D. 2 N

Answer: A

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33. A vehicle of 100 kg is moving with a velocity of $5m/\sec$. To stop it in $\frac{1}{10}$sec , the required force in opposite direction is

A. 5000 N

B. 500 N

C. 50 N

D. 1000 N

Answer: A

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34. A boy having a mass equal to 40 kilograms is standing in an elevator. The force felt by the feet of the boy will be greatest when the elevator

$\left(g = 9.8 \text{metres} / \sec^2\right)$

A. Stands still

B. Moves downward at a constant velocity of 4 metres/sec

C. Accelerates downward with an acceleration equal to $4 \text{metres} / \sec^2$

D. Accelerates upward with an acceleration equal to $4 \text{metres} / \sec^2$

Answer: D

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35. A rocket has an initial mass of 20×10^3 kg. If it is to blast off with an initial acceleration of

$4ms^{-2}$, the initial thrust needed is $(g \cong 10ms^{-2})$

A. 6×10^4 N

B. 28×10^4 N

C. 20×10^4 N

D. 12×10^4 N

Answer: B

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36. The ratio of the weight of a man in a stationary lift and when it is moving downward with uniform acceleration a is $3:2$. The value of a is (g - Acceleration due to gravity of the earth)

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

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

C. $\frac{2}{3}g$

D. g

Answer: B

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37. The mass of lift is 500 kg. When it ascends with an acceleration of $2m/s^2$,the tension in the cable will be $\left[g = 10m/s^2\right]$

A. 6000 N

B. 5000 N

C. 4000 N

D. 50 N

Answer: A

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

A. $0.7kg/s$

B. $1.4kg/s$

C. $0.07kg/s$

D. $10.7kg/s$

Answer: D

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39. In an elevator moving vertically up with an acceleration g, the force exerted on the floor by a passanger of mass M is

A. Mg

B. $\frac{1}{2}Mg$

C. Zero

D. 2 Mg

Answer: D

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40. A mass 1 kg is suspended by a thread. It is

(i) lifted up with an acceleration $4.9m/s^2$

(ii) lowered with an acceleration $4.9m/s^2$.

The ratio of the tensions is

A. $3:1$

B. $1:3$

C. $1:2$

D. $2:1$

Answer: A

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41. A 500kg rocket is set for verticle firing. The exhaust speed is 800ms^{-2} . To give an initial upward acceleration of 20ms^{-2} , the amount of gas ejected per second to supply the needed thrust will be (g=10 ms^{-2})

A. 127.5kg s^{-1}

B. 187.5kg s^{-1}

C. $185.5 kgs^{-1}$

D. $137.5 \mathrm{kg\,s}^{-1}$

Answer: B

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42. A person holds a spring balance with a mass m hanging from it goes up and up in a helicopter, then reading of weight of body as indicated by spring balance will.

A. Go on increasing

B. Go on decreasing

C. First increase and then decrease

D. Remain the same

Answer: C

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43. The time period of a simple pendulum measured inside a stationary lift is found to be

T . If the lift starts accelerating upwards with an acceleration $g/3$, the time period is

A. $T\sqrt{3}$

B. $T\sqrt{3}/2$

C. $T/\sqrt{3}$

D. $T/3$

Answer: B

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44. A cork is submerged in water by a spring attached to the bottom of a bowl. When the bowl is kept in an elevator moving with acceleration downwards, the length of spring.

A. Increases

B. Decreases

C. Remains unchanged

D. Data insufficient

Answer: D

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45. Two trolleys of mass m and $3m$ are attached by a spring. The spring was compressed and then released , they move off in opposite direction and comes to rest after covering distances s_1 and s_2 respectively. Assuming the coefficient of friction to be uniform , the ratio of distances $s_1 : s_2$ is

A. $1:9$

B. $1:3$

C. $3:1$

D. $9:1$

Answer: B

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46. A boy of 50 kg is in a lift moving down with an acceleration $9.8ms^{-2}$.The apparent weight of the body is $(g = 9.8ms^{-2})$

A. $50 \times 9.8N$

B. Zero

C. 50 N

D. $\frac{50}{9.8}N$

Answer: B

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47. A body is imparted motion from rest to move in a straight line. If it is then obstructed by an opposite force, then

A. The body may necessarily change direction

B. The body is sure to slow down

C. The body will necessarily continue to move in the same direction at the same speed

D. None of these

Answer: B

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48. A mass of 10 gm is suspended by a string and the entire system is falling with a uniform acceleration of . $400 cm / \sec^2$ The tension in the string will be $\left(g = 980 cm / \sec^2\right)$

A. 5,800 dyne

B. 9,800 dyne

C. 11,800 dyne

D. 13,800 dyne

Answer: A

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49. A second's pendulum is mounted in a rocket. Its period of oscillation decreases when the rocket

A. Comes down with uniform acceleration

B. Moves round the earth in a geostationary orbit

C. Moves up with a uniform velocity

D. Moves up with uniform acceleration

Answer: D

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50. Two balls of masses m_1 and m_2 are separated from each other by a powder charge placed between them. The whole system is at rest on the ground. Suddenly the powder charge explodes and masses are pushed apart. The mass m_1 travels a distance s_1 and stops. If the coefficients of friction between the balls and ground are same, the mass m_2 stops after travelling the distance

A. $s_2 = \frac{m_1}{m_2} s_1$

B. $s_2 = \frac{m_2}{m_1} s_1$

C. $s_2 = \frac{m_1^2}{m_2^2} s_1$

D. $s_2 = \frac{m_2^2}{m_1^2} s_1$

Answer: C

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

A. $10\sqrt{2}kg$

B. $2\sqrt{10}kg$

C. 10 kg

D. 20 kg

Answer: A

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52. A cart of mass M is tied to one end of a massless rope of length $10m$. The other end of the rope is in the hands of a man of mass M. The entire system is on a smooth horizontal surface. The man is at $x=0$ and the cart at $x=10m$. If the man pulls the cart by the rope, the man and the cart will meet at the point

A. $x=0$

B. $x=5m$

C. $x=10m$

D. They will never meet

Answer: B

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53. A cricket ball of mass 250g collides with a bat with velocity $10m/s$ and returns with the same velocity within 0.01 second. The force acted on bat is

A. 25 N

B. 50 N

C. 250 N

D. 500 N

Answer: D

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54. A pendulum bob of mass 50 gm is suspended from the ceiling of an elevator. The tension in the string if the elevator goes up with uniform velocity is approximately

A. 0.30N

B. 0.40N

C. 0.42 N

D. 0.50 N

Answer: D

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55. A train is moving with velocity $20m/\sec$. on this dust is falling at the rate of 50 kg /

minute . The extra force required to move this train with constant velocity will be

A. 16.66 N

B. 1000 N

C. 166.6 N

D. 1200 N

Answer: A

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56. The average force necessary to stop a bullet of mass 20 g moving with a speed of 250 m/s, as it penetrates into the wood for a distance of 12 cm is

A. $2.2 \times 10^3 N$

B. $3.2 \times 10^3 N$

C. $4.2 \times 10^3 N$

D. $5.2 \times 10^3 N$

Answer: D

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57. The average resisting force that must act on $5kg$ mass to reduce its speed from $65ms^{-1}$ to $15ms^{-1}$ in $2s$ is

A. $12.5N$

B. 25 N

C. 50 N

D. 100 N

Answer: A

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58. A mass is hanging on a spring balance which is kept in a lift. The lift ascends. The spring balance will show in its reading

A. Increase

B. Decrease

C. No change

D. Change depending upon velocity

Answer: D

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59. An army vehicle of mass 1000 kg is moving with a velocity of $10m/s$ and is acted upon by a forward force of 1000 N due to the engine and a retarding force of 500 N due to friction. What will be its velocity after 10 s

A. $5m/s$

B. $10m/s$

C. $15m/s$

D. $20m/s$

Answer: C

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60. A body of mass 2 kg is moving with a velocity $8m/s$ on a smooth surface. If it is to be brought to rest in 4 seconds, then the force to be applied is

A. 8 N

B. 4 N

C. 2 N

D. 1 N

Answer: B

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61. The apparent weight of the body, when it is travelling upwards with an acceleration of $2m/s^2$ and mass is 10 kg , will be

A. 198 N

B. 164 N

C. 140 N

D. 118 N

Answer: D

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62. A man measures time period of a pendulum (T) in stationary lift. If the lift moves upward with acceleration $\frac{g}{4}$, then new time period will be

A. $\frac{2T}{\sqrt{5}}$

B. $\frac{\sqrt{5}T}{2}$

C. $\frac{\sqrt{5}}{2T}$

D. $\frac{2}{\sqrt{5}T}$

Answer: A

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63. A $30gm$ bullet initially at $120m/s$ penetrates $12cm$ into a wooden block. The average block. The average resistance exerted by the wooden block is.

A. 2850 N

B. 2200 N

C. 2000 N

D. 1800 N

Answer: D

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64. A force of 10 Newton acts on a body of mass 20 kg for 10 seconds. Change in its momentum is

A. $5 \text{ kg m} / s$

B. $100 \text{kg m} / s$

C. $200 \text{kg m} / s$

D. $1000 \text{kg m} / s$

Answer: B

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65. A body of mass 1.0 kg is falling with an acceleration of 10 m/s^2. Its apparent weight will be $(g = 10m/\sec^2)$

A. 1.0 kg wt

B. 2.0 kg wt

C. 0.5 kg wt

D. Zero

Answer: D

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66. A player caught a cricket ball of mass $150gm$ moving at a rate of $20m/s$. If the catching process be comleted in $0.1\ s$, then the force of the blow exerted by the ball on the hands of the player is.

A. 0.3 N

B. 30 N

C. 300 N

D. 3000 N

Answer: B

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67. If rope of lift breaks suddenly, the tension exerted by the surface of lift

(a=acceleration of lift)

A. mg

B. $m(g+a)$

C. $m(g-a)$

D. 0

Answer: D

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68. A boy whose mass is 50 kg stands on a spring balance inside a lift. The lift starts to ascent with an acceleration of $2ms^{-2}$. The reading of the machine or balance $(g=10ms^{-2})$ is

A. 50 kg

B. Zero

C. 49 kg

D. 60 kg

Answer: D

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69. A rocket is ejecting g 50 of gases per sec at a speed of $500m/s$. The accelerating force on the rocket will be

A. 125 N

B. 25 N

C. 5 N

D. Zero

Answer: B

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70. A block of mass kg 5 is moving horizontally at a speed of $1.5m/s$. A perpendicular force of 5 N acts on it for 4 sec. What will be the distance of the block from the point where the force started acting

A. 10 m

B. 8 m

C. 6 m

D. 2 m

Answer: A

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71. A lift of mass $1000kg$ is moving with an acceleration of $1m/s^2$ in upward direction. Tension developed in the string, which is connected to the lift, is.

A. 9,800 N

B. 10,000 N

C. 10,800 N

D. 11,000 N

Answer: C

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72. A lift accelerated downward with acceleration ' a '. A man in the lift throws a ball upward with acceleration $a_0(a_0 < a)$. Then acceleration of ball observed by observer, which is on earth, is

A. $(a + a_0)$ upward

B. $(a - a_0)$ upward

C. $(a + a_0)$ downward

D. $(a - a_0)$ downward

Answer: D

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73. 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: C

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

A. 400 N

B. 800 N

C. 1200 N

D. Zero

Answer: C

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75. A monkey of mass $20kg$ is holding a vertical rope. The rope will not break when a mass of $25kg$ is suspended from it but will break it the mass exeeds $25kg$. What is the maximum acceleration with which the monkey can climb up along the rope? $(g = 10m / s^2)$.

A. $10m / s^2$

B. $25m / s^2$

C. $2.5m / s^2$

D. $5m / s^2$

Answer: C

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76. If in a stationary lift, a man is standing with a bucket full of water, having a hole at its bottom. The rate of flow of water through this hole is R_0. If the lift starts to move up and down with same acceleration and then that rates of flow of water are R_u and , R_d, then

A. $R_0 > R_u > R_d$

B. $R_u > R_0 > R_d$

C. $R_d > R_0 > R_u$

D. $R_u > R_d > R_0$

Answer: B

Watch Video Solution

77. A rocket with a lift-off mass $3.5 \times 10^4 kg$ is blasted upwards with an initial acceleration of $10m/s^2$. Then the initial thrust of the blast is

A. $1.75 \times 10^5 N$

B. $3.5 \times 10^5 N$

C. $7.0 \times 10^5 N$

D. $14.0 \times 10^5 N$

Answer: C

Watch Video Solution

78. A spring balance is attached to the ceiling of a lift. A man hangs his bag on the spring and the spring reads 49N, when the lift is stationary. If the lift moves downward with an acceleration of $5m/s^2$, the reading of the spring balance will be

A. 49 N

B. 24 N

C. 74 N

D. 15 N

Answer: B

Watch Video Solution

79. A plumb line is suspended from a ceiling of a car moving with horizontal acceleration of a . What will be the angle of inclination with vertical

A. $\tan^{-1}(a/g)$

B. $\tan^{-1}(g/a)$

C. $\cos^{-1}(a/g)$

D. $\cos^{-1}(g/a)$

Answer: A

Watch Video Solution

80. Mass of a person sitting in a lift is 50 kg . If lift is coming down with a constant acceleration of 10 $m/\sec^2$. Then the reading of spring balance will be $(g = 10m/\sec^2)$

A. 0

B. 1000 N

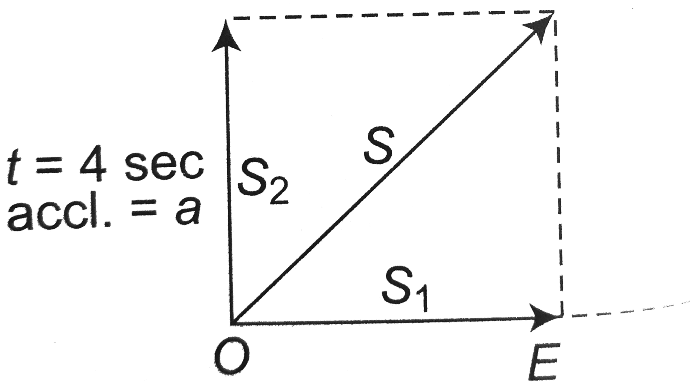
C. 100 N

D. 10 N

Answer: A

Watch Video Solution

81. A body mass $2kg$ has an initial velocity of 3 metre//sec along OE and it is subject to a force of $4N$ in a direction perpendicular to OE. The distance of body from O after 4 sec will be:



A. 12 m

B. 20 m

C. 8 m

D. 48 m

Answer: B

Watch Video Solution

82. A block of mass m is placed on a smooth wedge of inclination θ. The whole system is accelerated horizontally, so that the block does not slip on the wedge. The force exerted by the wedge on the block (g is acceleration due to gravity) will be

A. $mg\ \cos\theta$

B. $mg\ \sin\theta$

C. mg

D. $mg / \cos\theta$

Answer: D

Watch Video Solution

83. 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 be fire per second at the most?

A. One

B. Four

C. Two

D. Three

Answer: D

Watch Video Solution

84. An automobile travelling with a speed $60 km / h$, can brake to stop within a distance of $20m$. If the car is going twice as fast i. e. , $120 km / h$, the stopping distance will be

A. 20 m

B. 40 m

C. 60 m

D. 80 m

Answer: D

Watch Video Solution

85. A man of weight 75 kg is standing in an elevator which is moving with an acceleration of $5m/s^2$ in upward direction the apparent weight of the man will be $(g = 10m/s^2)$

A. 1425 N

B. 1375 N

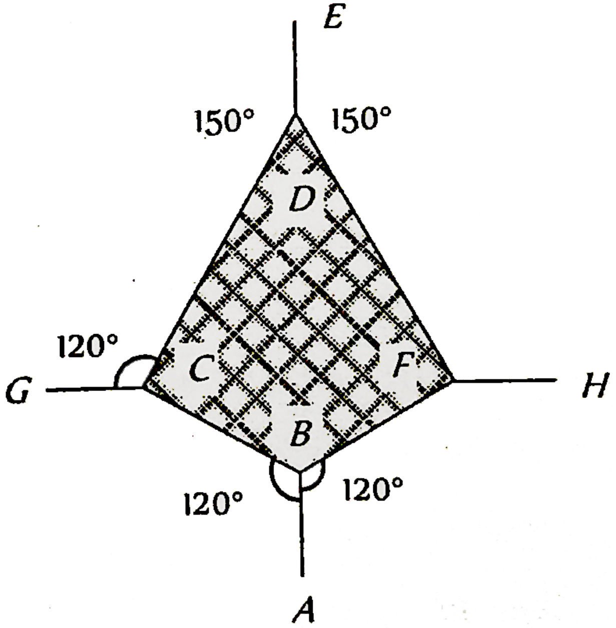
C. 1250 N

D. 1125 N

Answer: D

View Text Solution

86. The adjacent figure is the part of a horizontally stretched net. section AB is stretched with a force of 10 N . The tensions in the sections BC and BF are



A. 10 N, 11 N

B. 10 N, 6 N

C. 10 N, 10 N

D. Can't calculate due to insufficient data

Answer: C

Watch Video Solution

87. The linear momentum p of a body moving in one dimension varies with time according to the equation $p = a + bt^2$ where a and b are positive constants. The net force acting on the body is

A. A constant

B. Proportional to t^2

C. Inversely proportional to t

D. Proportional to t

Answer: D

Watch Video Solution

88. The spring balance inside a lift suspends an object. As the lift begins to ascent, the reading indicated by the spring balance will

A. Increase

B. Decrease

C. Remain unchanged

D. Depend on the speed of ascend

Answer: A

Watch Video Solution

89. There is a simple pendulum hanging from the ceiling of a lift. When the lift is stand still, the time period of the pendulum is T . If the resultant acceleration becomes $g/4$,then the new time period of the pendulum is

A. 0.8 T

B. 0.25T

C. 2 T

D. 4 T

Answer: C

Watch Video Solution

90. A man of weight 80 kg is standing in an elevator which is moving with an acceleration of $6m/s^2$ in upward direction. The apparent weight of the man will be $(g = 10m/s^2)$

A. 1480 N

B. 1280 N

C. 1380 N

D. None of these

Answer: B

Watch Video Solution

Watch Video Solution

91. A force of 100 dynes acts on mass of 5 gm for 10 sec . The velocity produced is

A. 2000 cm/sec

B. 200 cm/sec

C. 20 cm/sec

D. 2 cm/sec

Answer: B

Watch Video Solution

92. When the speed of a moving body is doubled

A. Its acceleration is doubled

B. Its momentum is doubled

C. Its kinetic energy is doubled

D. Its potential energy is doubled

Answer: B

Watch Video Solution

93. A body of mass 'M' collides against a wall with a velocity v and retraces its path with the same speed. The change in momentum is (take initial direction of velocity as positive)

A. 2 mv

B. mv

C. $-mv$

D. Zero

Answer: A

Watch Video Solution

94. A thief stole a box full of valuable articles of weight W and while carrying it on his back, he jumped down a wall of height ‘ h ’ from the ground. Before he reached the ground he experienced a load of

A. 2 W

B. W

C. $W/2$

D. Zero

Answer: D

Watch Video Solution

95. N bullet each of mass m kg are fired with a velocity $v\ ms^{-2}$ at the rate of n bullets per second upon a wall. The reaction offered by the wall to the bullets is given by

A. nmv

B. $\frac{Nmv}{n}$

C. $n\frac{Nm}{v}$

D. $n\frac{Nv}{m}$

Answer: A

Watch Video Solution

96. If a body of mass m is carried by a lift moving with an upward acceleration a, then the forces acting on the body are (i) the reaction R on the floor of the lift upwards (ii) the weight mg of the body acting vertically downwards. The equation of motion will be given by

A. $R = mg - ma$

B. $R = mg + ma$

C. $R = ma - mg$

D. $R = mg \times ma$

Answer: B

Watch Video Solution

97. With what minimum acceleration can monkey slide down a rope whose breaking strength is two third of his weight?

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

B. g

C. $\frac{1}{3}g$

D. Zero

Answer: C

Watch Video Solution

98. A ball of mass m moves with speed v and it strikes normally with a wall and reflected back normally, if its time of contact with wall is t then find force exerted by ball on wall

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

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

C. mvt

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

Answer: A

Watch Video Solution

99. The velocity of a body at time $t = 0$ is $10\sqrt{2}m / s$ in the north-east direction and it is moving with an acceleration of $2m / s$ directed towards the south. The magnitude and direction of the velocity of the body after 5 sec will be

A. $10m / s$, towards east

B. $10m / s$,towards north

C. $10m / s$, towards south

D. $10m/s$, towards north-east

Answer: A

Watch Video Solution

100. A body of mass 5 kg starts from the origin with an initial velocity $\overrightarrow{u} = 30\hat{i} + 40\hat{j}ms^{-1}$. If a constant force $\overrightarrow{F} = -\left(\hat{i} + 5\hat{j}\right)N$ acts on the body, the time in which the y-component of the velocity becomes zero is

A. 5 seconds

B. 20 seconds

C. 40 seconds

D. 80 seconds

Answer: C

Watch Video Solution

101. A body of mass $8kg$ is moved by a force $F = (3x)N$, where x is the disatance covered Initial position is $x = 2m$ and final position is

$x = 10m$ If initially the body is at rest find the final speed .

A. $6m/s$

B. $12m/s$

C. $18m/s$

D. $14m/s$

Answer: A

Watch Video Solution

102. The linear momentum p of a body moving in one dimension varies with time according to the equation $p = a + bt^2$, where a and b are positive constants. The net force acting on the body is

A. Proportional to t^2

B. A constant

C. Proportional to t

D. Inversely proportional to t

Answer: C

Watch Video Solution

103. A ball of mass $0.5kg$ moving with a velocity of $2m/s$ strikes a wall normally and bounces back with the same speed . If the time of contact between the ball and the wall is 1 millisecond , the average force exerted by the wall on the ball is

A. 2000 N

B. 1000 N

C. 5000 N

D. 125 N

Answer: A

Watch Video Solution

104. A paarticle moves in the xy-plane under the action of a force F such that the componentes of its linear momentum p at any time t and $p_x = 2\cos$ t, $p_y = 2\sin$ t. the eangle between F and p at time l is

A. 90°

B. 0°

C. 180°

D. 30°

Answer: A

Watch Video Solution

105. n balls each of mass m impinge elastically each second on a surface with velocity u. The average force experienced by the surface will be

A. mnu

B. 2 mnu

C. 4 mnu

D. $\frac{1}{2}$mnu

Answer: B

Watch Video Solution

106. A ball of mass 400 gm is dropped from a height of 5 m . A boy on the ground hits the ball vertically upwards with a bat with an average force of 100 newton so that it attains a vertical height of 20 m . The time for which the ball remains in contact with the bat is

$\left[g = 10m / s^2\right]$

A. $0.12s$

B. 0.08 s

C. 0.04 s

D. 12 s

Answer: A

View Text Solution

107. The time in which a force of 2 N produces a change of momentum of $0.4kg - ms^{-1}$ in the body is

A. $0.2s$

B. $0.02s$

C. $0.5s$

D. $0.05s$

Answer: A

Watch Video Solution

108. A gun of mass 10 kg fires 4 bullets per second. The mass of each bullet is 20 g and the velocity of the bullet when it leaves the gun is $300 ms^{-1}$. The force required to hold the gun while firing is

A. 6 N

B. 8 N

C. 24 N

D. 240 N

Answer: C

Watch Video Solution

109. A gardener water the plants by a pipe of dimeter $1mm$. The water comes out at the rate or $10cm^3m/\sec^2$. The reactionary force exerted on the hand of the gardener is

A. Zero

B. $1.27 \times 10^{-2}N$

C. $1.27 \times 10^{-4}N$

D. $0.127N$

Answer: D

Watch Video Solution

110. A solid disc of mass M is just held in air horizontally by throwing 40 stones per sec vertically upwards to strike the disc each with a velocity 6 ms^{-1}. If the mass of each stone is $0.05kg$ what is the mass of the disc $(g = 10ms^{-2})$

A. 1.2 kg

B. 0.5kg

C. 20 kg

D. 3 kg

Answer: A

Watch Video Solution

111. A ladder rests against a frictionless vertical wall, with its upper end $6m$ above the ground and the lower end $4m$ away from the wall. The weight of the ladder is $500N$ and its CG at $1/3^{rd}$ distance from the lower end. Wall's reaction will be (in newton)

A. 111

B. 333

C. 222

D. 129

Answer: A

Watch Video Solution

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

A. $-2\alpha v^2 N/M$

B. $-\alpha v^2/M$

C. $+\alpha v^2/M$

D. $-\alpha v^2$

Answer: C

Watch Video Solution

113. 10,000 small balls, each weighing 1 gm , strike one square cm of area per second with a velocity 100 m/s in a normal direction and rebound with the same velocity. The value of pressure on the surface will be

A. $2 \times 10^3 N/m^2$

B. $2 \times 10^5 N/m^2$

C. $10^7 N/m^2$

D. $2 \times 10^7 N/M^2$

Answer: D

Watch Video Solution

Third Law Of Motion

1. Swimming is possible on account of

A. First law of motion

B. Second law of motion

C. Third law of motion

D. Newton's law of gravitation

Answer: C

Watch Video Solution

2. When we jump out of a boat standing in water it moves

A. Forward

B. Backward

C. Sideways

D. None of the above

Answer: B

Watch Video Solution

3. You are on a frictionless horizontal plane. How can you get off if no horizontal force is exerted by pushing against the surface

A. By jumping

B. By spitting or sneezing

C. By rolling your body on the surface

D. By running on the plane

Answer: B

Watch Video Solution

4. On a stationary sail-boat, air is blown at the sails from a fan attached to the boat. The boat will

A. Remain stationary

B. Spin around

C. Move in a direction opposite to that in which air is blown

D. Move in the direction in which the air is blown

Answer: A

Watch Video Solution

5. A man is at rest in the middle of an ice pond. If ice is perfectly smooth, then he can get started himself to move the shore by making use of Newton's

(a) First law

(b) Second law

(c) Third law

(d) First and third law

A. First law

B. Second law

C. Third law

D. All the laws

Answer: C

Watch Video Solution

6. A cannon after firing recoils due to

A. Conservation of energy

B. Backward thrust of gases produced

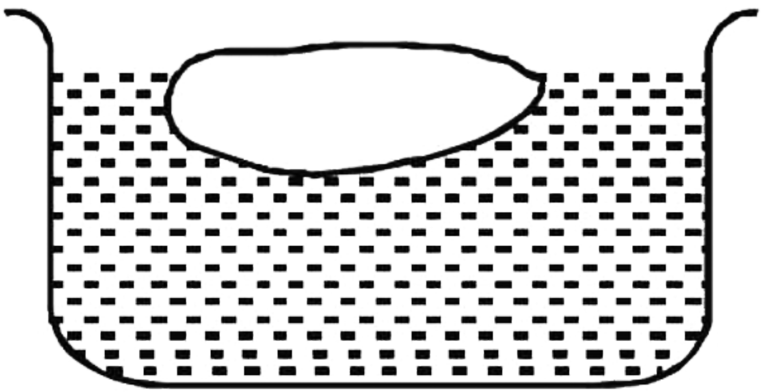
C. Newton's third law of motion

D. Newton's law of motion

Answer: C

Watch Video Solution

7. A body floats in a liquid contained in a beaker. The whole system as shown in Figure falls freely under gravity. The upthrust on the body is



A. Zero

B. Equal to the weight of liquid displaced

C. Equal to the weight of the body in air

D. None of these

Answer: A

Watch Video Solution

8. Newton's third law of motion leads to the law of conservation of

A. Angular momentum

B. Energy

C. Mass

D. Momentum

Answer: D

Watch Video Solution

9. A man is carrying a block of a certain substance (of density $1000 kgm^{-3}$) weighing $1kg$ in his left hand and a bucket filled with water and weighing $10kg$ in his right hand. He drops the block into the bucket. How much load does he carry in his right hand now.

A. 9 kg

B. 10 kg

C. 11 kg

D. 12 kg

Answer: C

Watch Video Solution

10. A man is standing on a balance and his weight is measured. If he takes a step in the left side, then weight

A. Will decrease

B. Will increase

C. Remains same

D. First decreases then increases

Answer: C

Watch Video Solution

11. A man is standing on a sparing platform, Reading of spring balaance is $60kg$ wt If man jumps outside the platform then the reading of the spring balance .

A. First increases then decreases to zero

B. Decreases

C. Increases

D. Remains same

Answer: A

Watch Video Solution

12. A cold soft drink is kept on the balance. When the cap is open, then the weight

A. Increases

B. Decreases

C. First increases then decreases

D. Remains same

Answer: C

Watch Video Solution

13. Action and reaction forces act on

A. The same body

B. The different bodies

C. The horizontal surface

D. Nothing can be said

Answer: B

Watch Video Solution

14. A bird is sitting in a large closed cage which is placed on a spring balance. It records a weight of 25 N . The bird (mass m = 0.5 kg) flies upward in the cage with an acceleration of $2m / s^2$. The spring balance will now record a weight of

A. 24 N

B. 25 N

C. 26 N

D. 27 N

Answer: B

View Text Solution

15. 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 scales read M /2 kg each

B. Both the scales read M kg each

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

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

Answer: B

Watch Video Solution

16. A machine gun fires 20 bullets per second into a target. Each bullet weighs 150 gms and has a speed of 800 $m/\sec$. Find the force necessary to hold the gun in position

A. 800 N

B. 1000 N

C. 1200 N

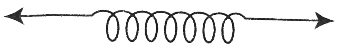
D. 2400 N

Answer: D

Watch Video Solution

Watch Video Solution

17. The tension in the spring is.



A. Zero

B. 2.5 N

C. 5 N

D. 10 N

Answer: C

Watch Video Solution

18. Consider a book lying on a table. The weight of the book and the nromal force by the table on the book are equal in magnitude and opposite in direction. Is this an example of Newton's third law?

A. 0°

B. 30°

C. 45°

D. 180°

Answer: D

Watch Video Solution

19. When a horse pulls a cart, the force that helps the horse to move forward is the force exerted by

A. The ground exerts on it

B. It exerts on the ground

C. The wagon exerts on it

D. It exerts on the wagon

Answer: A

Watch Video Solution

20. A student unable to answer a question on Newton's laws of motion attempts to pull himself up by tugging on her hair. He will not succeed.

A. As the force exerted is small

B. The frictional force while gripping, is small.

C. Newton's law of inertia is not applicable to living beings.

D. As the force applied is internal to the system.

Answer: D

Watch Video Solution

21. A man is standing at the center of frictionless pond of ice. How can he get himself to the shore ?

A. By throwing his shirt in vertically upward direction

B. By spitting horizontally

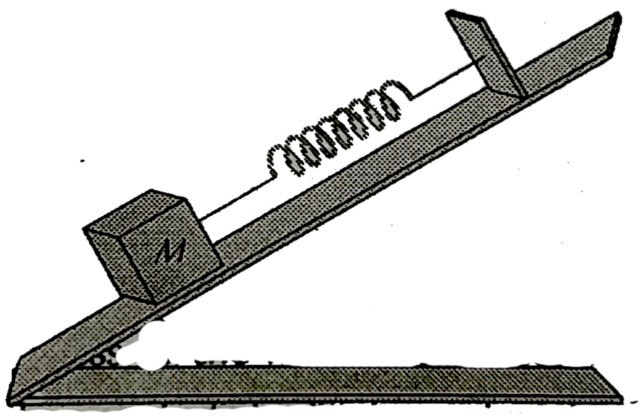
C. He will wait for the ice to melt in pond

D. Unable to get at the shore

Answer: B

Watch Video Solution

22. A body of mass 5 kg is suspended by a spring balance on an inclined plane as shown in figure. The spring balance measure



A. 50 N

B. 25 N

C. 500 N

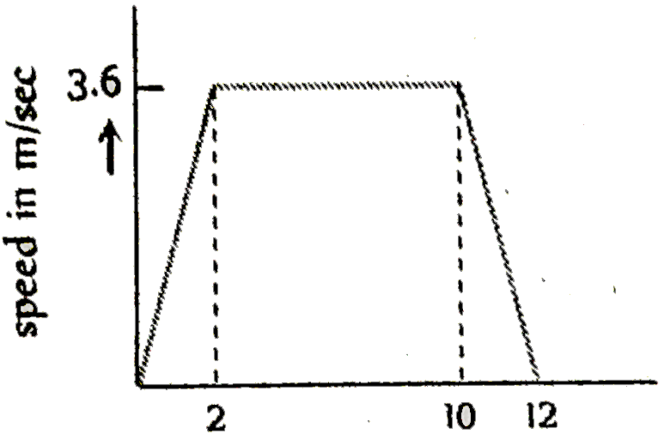
D. 10 N

Answer: B

View Text Solution

23. A lift is going up. The total mass of the lift and the passenger is 1500 kg . The variation in the speed of the lift is as given in the graph. The tension in the rope pulling the lift at

$t = 11$th sec will be



A. 17400 N

B. 14700 N

C. 12000 N

D. Zero

Answer: C

View Text Solution

24. In the above ques., the height to which the lift takes the passenger is

A. 3.6 meters

B. 8 meters

C. 1.8 meters

D. 36 meters

Answer: D

View Text Solution

Conservation Of Linear Momentum And Impulse

1. A jet plane flies in the air because

A. The gravity does not act on bodies moving with high speeds

B. The thrust of the jet compensates for the force of gravity

C. The flow of air around the wings causes an upward force, which compensates for the force of gravity

D. The weight of air whose volume is equal to the volume of the plane is more than the weight of the plane

Answer: B

Watch Video Solution

2. A player caught a cricket ball of mass 150g moving at a rate of $20m/s$. If the catching process is completed in 0.1s, the force of the blow exerted by the ball on the hand of the player is equal to

A. 0.3 N

B. 30 N

C. 300 N

D. 3000 N

Answer: B

Watch Video Solution

3. A rocket has a mass of 100 kg . 90% of this is fuel. It ejects fuel vapours at the rate of $1kg/\sec$ with a velocity of 500 $m/\sec$ relative to the rocket. It is supposed that the rocket is outside the gravitational field. The initial upthrust on the rocket when it just starts moving upwards is

A. Zero

B. 500 N

C. 1000 N

D. 2000 N

Answer: B

Watch Video Solution

4. In which of the following cases forces may not be required to keep the

A. Particle going in a circle

B. Particle going along a straight line

C. The momentum of the particle constant

D. Acceleration of the particle constant

Answer: C

Watch Video Solution

5. A wagon weighing 1000 kg is moving with a velocity 50 km/h on smooth horizontal rails. A mass of 250 kg is dropped into it. The velocity with which it moves now is

A. 2.5km/hour

B. 20 km/hour

C. 40 km/hour

D. 50 km/hour

Answer: C

Watch Video Solution

6. If a force of 250 N act on body, the momentum acquired is 125 $kg - m / s$. What is the period for which force acts on the body

A. 0.5 sec

B. 0.2 sec

C. 0.4 sec

D. 0.25 sec

Answer: A

Watch Video Solution

7. A $100g$ iron ball having velocity $10m/s$ collies with a wall at an angle 30° and rebounds with the same angle. If the period of contact between the ball and wall is 0.1 second, then the force experinced by the wall is

A. 10 N

B. 100 N

C. 1.0N

D. 0.1N

Answer: A

Watch Video Solution

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

A. 0.5 N-s

B. 0.1 N-s

C. 0.3 N-s

D. 1.2 N-s

Answer: C

Watch Video Solution

9. A body, whose momentum is constant, must have constant

A. Force

B. Velocity

C. Acceleration

D. All of these

Answer: B

Watch Video Solution

10. The motion of a rocket is based on the principle of conservation of

A. Mass

B. Kinetic energy

C. Linear momentum

D. Angular momentum

Answer: C

Watch Video Solution

11. A rope of length 5 m is kept on frictionless surface and a force of 5 N is applied to one of its end. Find the tension in the rope at 1 m from this end

A. 1 N

B. 3 N

C. 4 N

D. 5 N

Answer: C

Watch Video Solution

12. An aircraft is moving with a velocity of $300ms^{-1}$. If all the forces acting on it are balanced, then

A. It still moves with the same velocity

B. It will be just floating at the same point in space

C. It will fall down instantaneously

D. It will lose its velocity gradually

Answer: A

Watch Video Solution

13. A rocket of mass 1000 kg exhausts gases at a rate of 4 kg /sec with a velocity 3000 m/s . The thrust developed on the rocket is

A. 12000 N

B. 120 N

C. 800 N

D. 200 N

Answer: A

Watch Video Solution

14. The momentum is most closely related to

A. Force

B. Impulse

C. Power

D. K.E.

Answer: B

Watch Video Solution

15. Rocket engines lift a rocket from the earth surface because hot gas with high velocity

A. Push against the earth

B. Push against the air

C. React against the rocket and push it up

D. Heat up the air which lifts the rocket

Answer: C

Watch Video Solution

16. A man fires a bullet of mass 200 g at a speed of 5 m/s . The gun is of one kg mass. By what velocity the gun rebounds backwards

A. $0.1 m/s$

B. $10 m/s$

C. $1 m/s$

D. $0.01 m/s$

Answer: C

Watch Video Solution

17. The bullet of 5 g is shot from a gun of mass 5 kg. The muzzle velocity of the bullet is 500 m / s.The recoil velocity of the gun is

A. $0.5m / s$

B. $0.25m / s$

C. $1m / s$

D. Data is insufficient

Answer: A

Watch Video Solution

18. A force of 50 dynes is acted on a body of mass 5 g which is at rest for an interval of 3 seconds, then impulse is

A. 0.15×10^{-3} Ns

B. 0.98×10^{-3} Ns

C. 1.5×10^{-3} Ns

D. 2.5×10^{-3} Ns

Answer: C

Watch Video Solution

19. A body of mass M at rest explodes into three pieces, two of which of mass $M/4$ each are thrown off in perpendicular directions with velocities of $3m/s$ and $4m/s$ respectively. The third piece will be thrown off with a velocity of

A. $1.5m/s$

B. $2.0m/s$

C. $2.5m/s$

D. $3.0m/s$

Answer: C

Watch Video Solution

20. The momentum of a system is conserved

A. Always

B. Never

C. In the absence of an external force on the system

D. None of the above

Answer: C

Watch Video Solution

21. A body of mass 0.25 kg is projected with muzzle velocity $100ms^{-1}$ from a tank of mass 100 kg. What is the recoil velocity of the tank

A. $5ms^{-1}$

B. $25ms_{-1}$

C. $0.5ms^{-1}$

D. $0.25ms^{-1}$

Answer: D

Watch Video Solution

22. A bullet is fired from a gun. The force on the bullet is given by $F = 600 - 2 \times 10^5$ t, where F is in newtons and t in seconds. The force on the bullet becomes zero as soon as it leaves the barrel. What is the average impulse imparted to the bullet?

A. 9 Ns

B. Zero

C. 0.9 Ns

D. 1.8 Ns

Answer: C

Watch Video Solution

23. A bullet of mass 0.1 kg is fired with a speed of 100 $m / \sec$, the mass of gun is 50 kg . The velocity of recoil is

A. $0.2m/\sec$

B. $0.1m/\sec$

C. $0.5m/\sec$

D. $0.05m/\sec$

Answer: A

Watch Video Solution

24. A bullet of mass 10 g is fired from a gun of mass 1 kg with recoil velocity of gun 5 m/s. The muzzle velocity will be

A. $20m / s^2$

B. $100m / s^2$

C. $200m / s^2$

D. $500m / s^2$

Answer: D

Watch Video Solution

25. A rocket can go vertically upwards in earth's atmosphere because

A. It is lighter than air

B. Of gravitational pull of the sun

C. It has a fan which displaces more air per unit time than the weight of the rocket

D. Of the force exerted on the rocket by gases ejected by it

Answer: D

Watch Video Solution

26. At a certain instant of time, the mass of a rocket going up vertically is 100kg. If it is ejecting 5kg of gas per second at a speed of $400m / s$, the acceleration of the rocket would be (taking $g = 10m / s^2$)

A. $20m / s^2$

B. $10m / s^2$

C. $2m / s^2$

D. $1m / s^2$

Answer: B

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27. Rocket works on the principle of coservation of

A. Conservation of mass

B. Conservation of energy

C. Conservation of linear momentum

D. Conservation of angular momentum

Answer: C

Watch Video Solution

Equilibrium Of Force

1. The weight of an aeroplane flying in the air is balanced by

A. Vertical component of the thrust created by air currents striking the lower surface of the wings

B. Force due to reaction of gases ejected by the revolving propeller

C. Upthrust of the air which will be equal to the weight of the air having the same volume as the plane

D. Force due to the pressure difference between the upper and lower surfaces of the wings created by different air speeds on the surfaces

Answer: D

Watch Video Solution

2. When a body is stationary:

A. There is no force acting on it

B. The force acting on it is not in contact with it

C. The combination of forces acting on it balances each other

D. The body is in vacuum

Answer: C

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3. Two forces, each of magnitude F have a resultant of the same magnitude F. The angle between the two forces is

A. 45°

B. 120°

C. 150°

D. 60°

Answer: B

Watch Video Solution

4. Two forces with equal magnitudes F act on a body and the magnitude of the resultant force is F /3. The angle between the two forces is

A. $\cos^{-1}\left(-\frac{17}{18}\right)$

B. $\cos^{-1}\left(-\frac{1}{3}\right)$

C. $\cos^{-1}\left(\frac{2}{3}\right)$

D. $\cos^{-1}\left(\frac{8}{9}\right)$

Answer: A

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5. An object is subjected to a force in the north-east direction. To balance this force, a second force should be applied in the direction

A. North-East

B. South

C. South-West

D. West

Answer: C

Watch Video Solution

6. The resultant force of 5 N and 10 N can not be

A. 12 N

B. 8 N

C. 4 N

D. 5 N

Answer: C

Watch Video Solution

7. The resultant of two forces 3P and 2P is R. If the first force is doubled then resultant is also doubled.The angle between the two forces is

A. 60°

B. 120°

C. 70°

D. 180°

Answer: B

Watch Video Solution

8. The resultant of two forces , one double the other in magnitude is perpendicular to the smaller of the two forces. The angle between the two forces is ________?

A. 60°

B. 120°

C. 150°

D. 90°

Answer: B

Watch Video Solution

9. Two forces are such that the sum of their magnitudes is 18N and their resultant is 12 N which is perpendicular to the smaller force. Then the magnitude of the forces are

A. 12 N, 6 N

B. 13 N, 5N

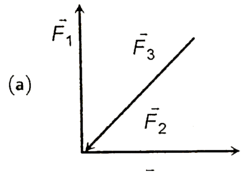
C. 10 N, 8 N

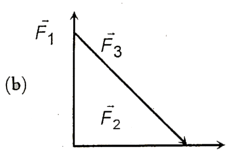
D. 16 N, 2 N

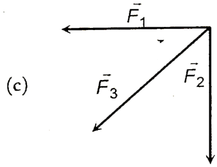
Answer: B

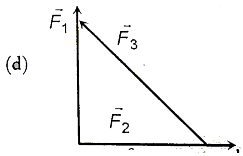
Watch Video Solution

10. Which of the four arrangements in the figure correctly shows the vector addition of two forces $\overrightarrow{F}_1$ and $\overrightarrow{F}_2$ to yield the third force $\overrightarrow{F}_3$

A. 

B. 

C. 

D. 

Answer: C

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11. Which of the following sets of concurrent force may be in equilibrium?

A. $F_1 = 3N, F_2 = 5N, F_3 = 9N$

B. $F_1 = 3N, F_2 = 5N, F_3 = 1N$

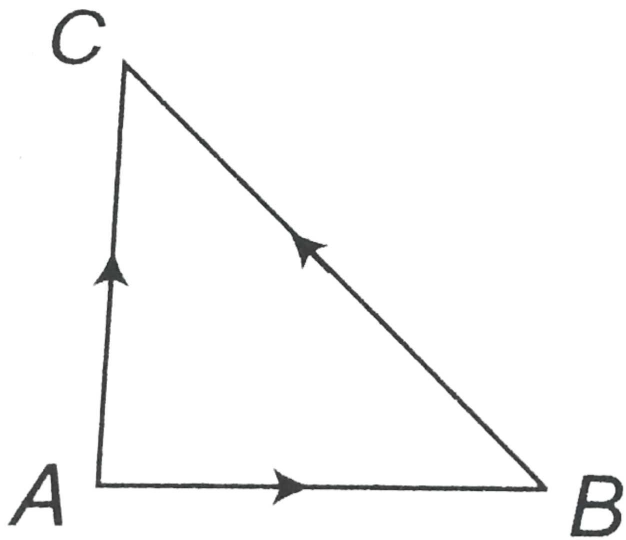
C. $F_1 = 3N, F_2 = 5N, F_3 = 15N$

D. $F_1 = 3N, F_2 = 5N, F_3 = 6N$

Answer: D

Watch Video Solution

12. 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 os a triangle ABC (as shown). The particle will now move with velocity.



A. $\vec{v}$ remaining unchanged

B. Less than $\vec{v}$

C. Greater than $\vec{v}$

D. $\vec{v}$ in the direction of the largest force

BC

Answer: A

Watch Video Solution

13. Which of the following groups of forces could be in equibrium

A. 3 N, 4 N, 5 N

B. 4N, 5 N, 10 N

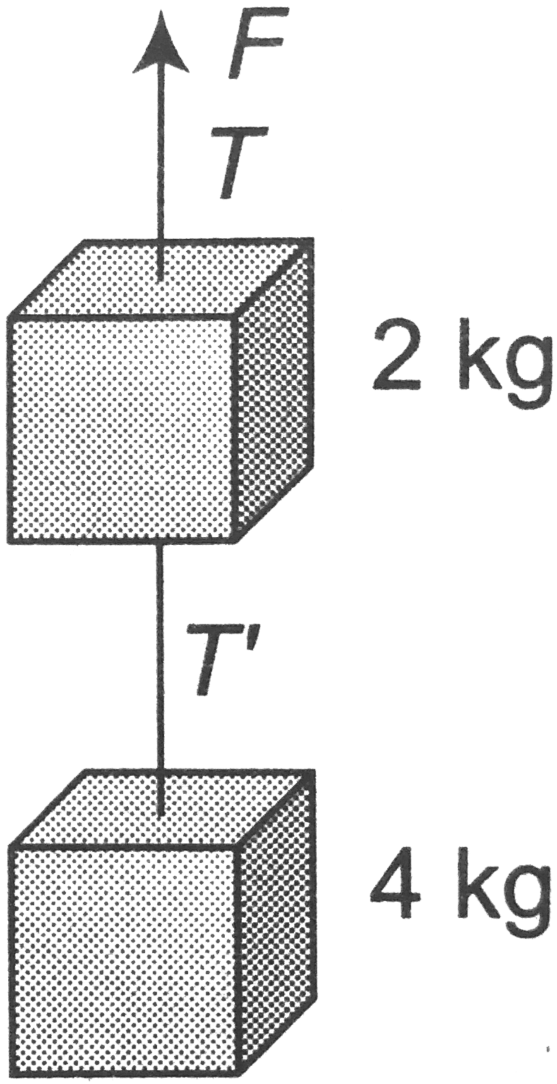
C. 30N, 40 N, 80 N

D. 1N, 3 N, 5 N

Answer: A

Watch Video Solution

14. Two block are connected by a string as shown in the diagram. The upper block is hung by another string. A force F applied on the upper string produces an acceleration of $2m/s^2$ in the upward direction in both the blocks. If T and T^t be the tension in the two part of the string, then



A. $T = 70.8N$ and $T' = 47.2N$

B. $T = 58.8N$ and $T' = 47.2N$

C. $T = 70.8N$ and $T' = 58.8N$

D. $T = 70.8N$ and $T' = 0$

Answer: A

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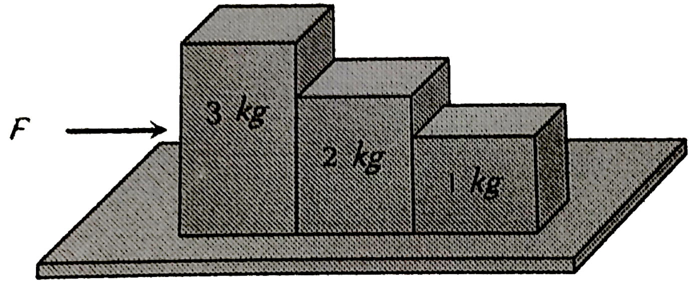
15. Consider the following statements about the blocks shown in the diagram that are being pushed by a constant force on a frictionless table



ltbegt

(a) All blocks move with the same acceleration

(b) The net force on each block is the same

Which of these statements are/is correct

A. A only

B. B only

C. Both A and B

D. Neither A nor B

Answer: A

Watch Video Solution

16. If two forces of 5 N each are acting along X and Y axes, then the magnitude and direction of resultant is

A. $5\sqrt{2}, \pi / 3$

B. $5\sqrt{2}, \pi / 4$

C. $-5\sqrt{2}, \pi / 3$

D. $-5\sqrt{2}, \pi / 4$

Answer: B

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17. which of the following is correct order fo forces?

A. Weak $<$ gravitational forces $<$ strong forces (nuclear) $<$ electrostatic

B. Gravitational $<$ weak $<$ (electrostatic) $<$ strong force

C. Gravitational $<$ electrostatic $<$ weak

$<$ strong force

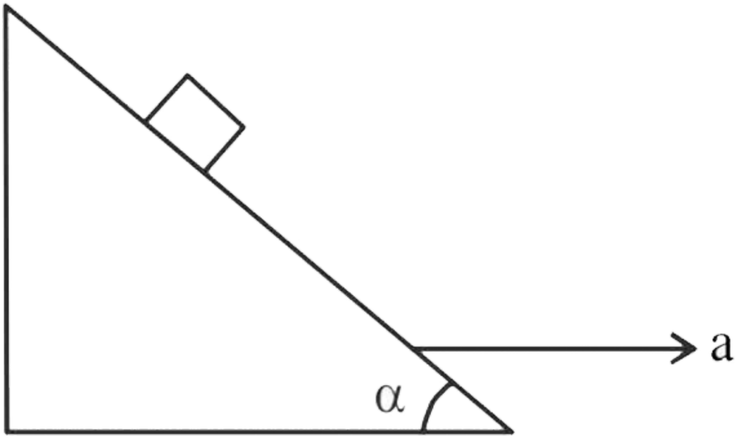
D. Weak $<$ gravitational $<$ electrostatic

$<$ strong forces

Answer: B

Watch Video Solution

18. 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

B. $g \tan \alpha$

C. $g / \tan \alpha$

D. $g \cos ec\alpha$

Answer: B

Watch Video Solution

Motion Of Connected Bodies

1. 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 will be

A. p

B. $\dfrac{Pm}{M+m}$

C. $\dfrac{PM}{M+m}$

D. $\dfrac{Pm}{M-m}$

Answer: C

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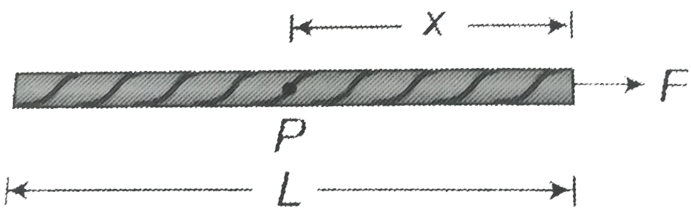
2. A uniform rope of length of length L is pulled by a force F on a smooth surface. Find tension in the rope at a distance x from the end where force is applied.



A. $\dfrac{FL}{x}$

B. $\dfrac{F(L-x)}{L}$

C. $\dfrac{FL}{L-x}$

D. $\dfrac{Fx}{L-x}$

Answer: B

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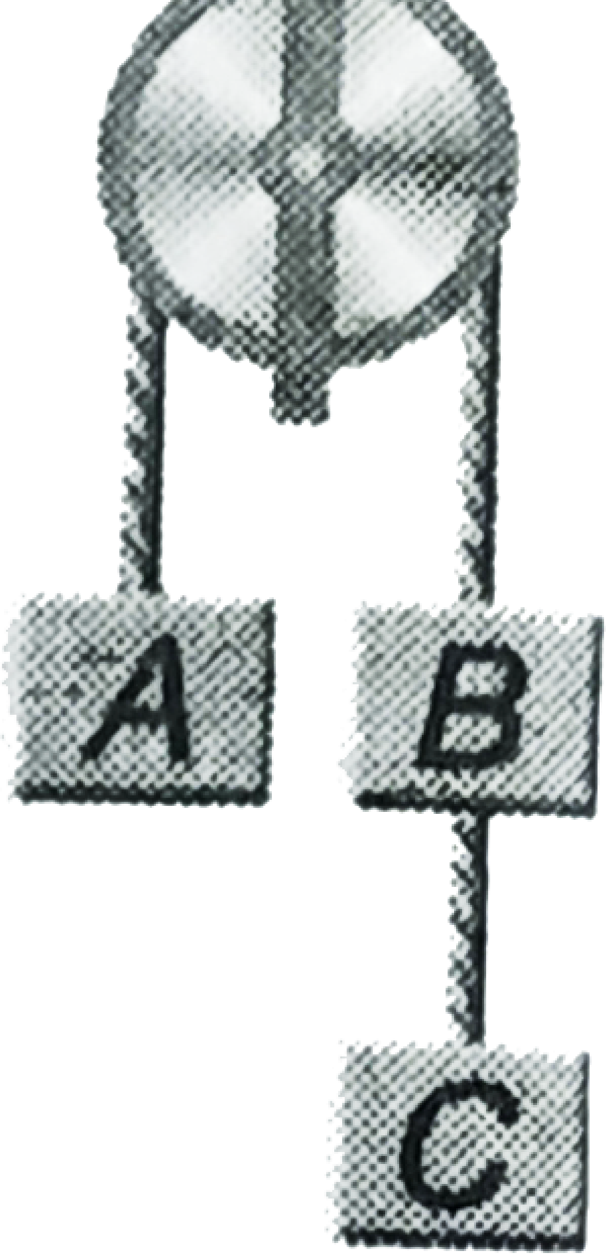
3. Three equal weight A, B and C of mass $2kg$ each are hanging on a string passing over a fixed frictionless pulley as shown in the figure. The tension in the string connecting weights B and C is approximately


A
B
C

A. Zero

B. 13 N

C. 3.3 N

D. 19.6 N

Answer: B

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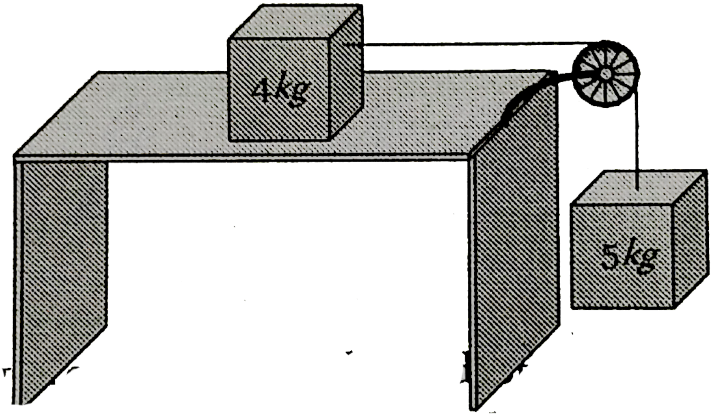
4. Two masses of 4 kg and 5 kg are connected by a string passing through a frictionless pulley and are kept on a frictionless table as shown in the figure. The acceleration of 5 kg mass is



A. $49 m / s^2$

B. $5.44 m / s^2$

C. $19.5 m / s^2$

D. $2.72 m / s^2$

Answer: B

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5. Two masses 2 kg and 3 kg are attached to the end of the string passed over a pulley fixed at the top. The tension and acceleration are

A. $\frac{7g}{8}, \frac{g}{8}$

B. $\frac{21g}{8}, \frac{g}{8}$

C. $\frac{21g}{8}, \frac{g}{5}$

D. $\frac{12g}{5}, \frac{g}{5}$

Answer: D

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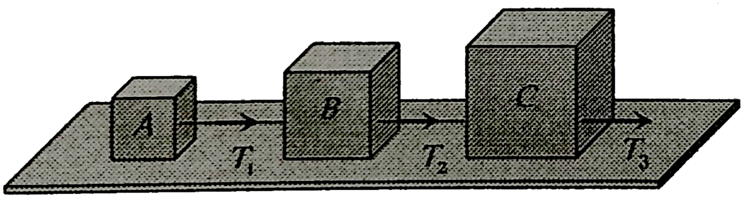
6. Three blocks A , B and C weighing 1, 8 and 27 kg respectively are connected as shown in the figure with an inextensible string and are moving on a smooth surface. T_3 is equal to 36 N . Then T_2 is



A. 18 N

B. 9 N

C. 3.375 N

D. 1.20 N

Answer: B

Watch Video Solution

7. Two bodies of mass 3 kg and 4 kg are suspended at the ends of massless string passing over a frictionless pulley. The acceleration of the system is $\left(g = 9.8m/s^2\right)$

A. $4.9m/s^2$

B. $2.45m/s^2$

C. $1.4m/s^2$

D. $9.5m/s^2$

Answer: C

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8. Three solids of masses m_1, m_2 and m_3 are connected with weightless string in succession and are placed on a frictionless table. If the mass m_3 is dragged with a force T , the tension in the string between m_2 and m_3 is

A. $\frac{m_2}{m_1+m_2+m_3}T$

B. $\frac{m_3}{m_1+m_2+m_3}T$

C. $\frac{m_1+m_2}{m_1+m_2+m_3}T$

D. $\frac{m_2+m_3}{m_1+m_2+m_3}T$

Answer: C

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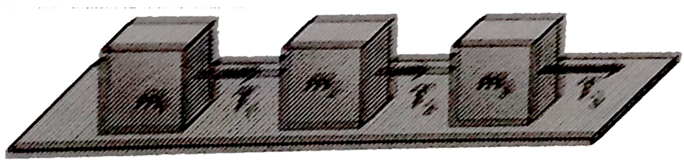
9. Three blocks of masses m_1, m_2 and m_3 are connected by massless strings as shown on a frictionless table. They are pulled with a force $T_3 = 40N$. If $m_1 = 10kg, m_2 = 6kg$ and $m_3 = 4kg$ the tension T_2 will be



A. 20 N

B. 40 N

C. 10 N

D. 32 N

Answer: D

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10. A block of mass m_1 rests on a horizontal table. A string tied to the block is passed on a frictionless pulley fixed at the end of the table and to the other end of string is hung another block of mass m_2. The acceleration of the system is

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

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

C. g

D. $\frac{m_2 g}{m_1}$

Answer: A

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11. A 2 kg block is lying on a smooth table which is connected by a body of mass 1 kg by a string which passes through a pulley. The 1 kg mass is hanging vertically. The acceleration of block and tension in the string will be

A. $3.27m / s^2, 6.54N$

B. $4.38m / s^2, 6.54N$

C. $3.27m / s^2, 9.86N$

D. $4.38m / s^2, 9.86N$

Answer: A

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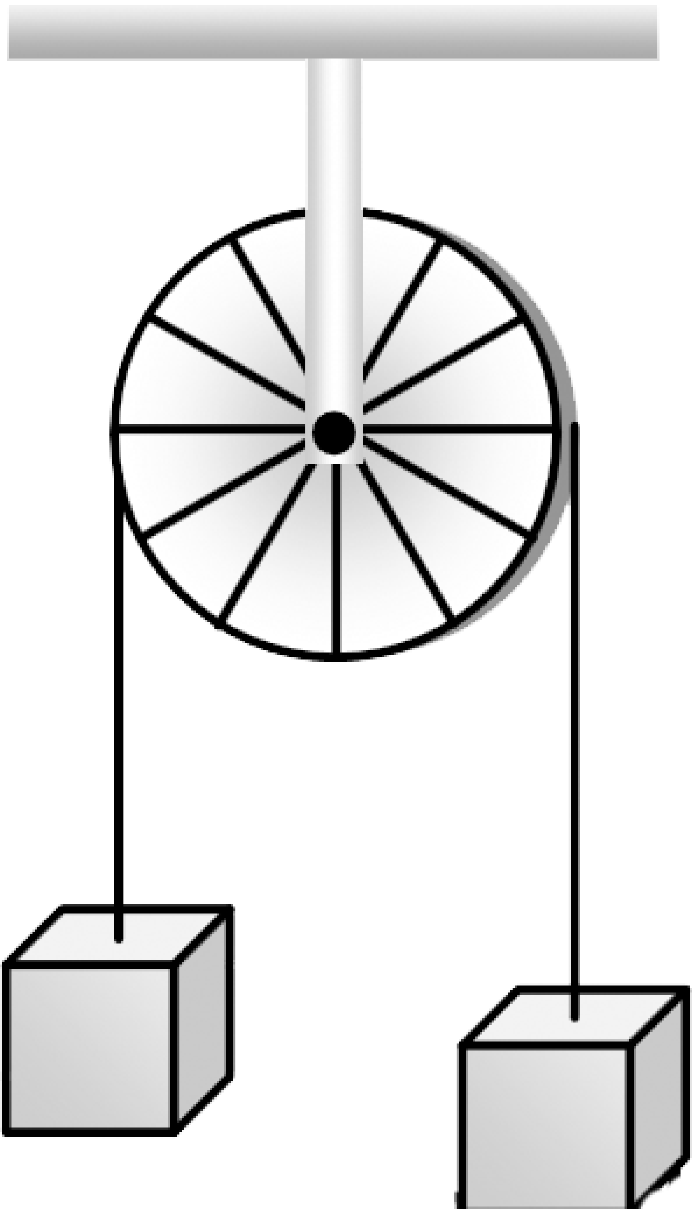
12. A light string passes over a frictionless pulley. To one of its ends a mass of 6 kg is attached. To its other end a mass of 10 kg is attached. The tension in the thread will be



A. 24.5 N

B. 2.45 N

C. 79 N

D. `73.5 N

Answer: D

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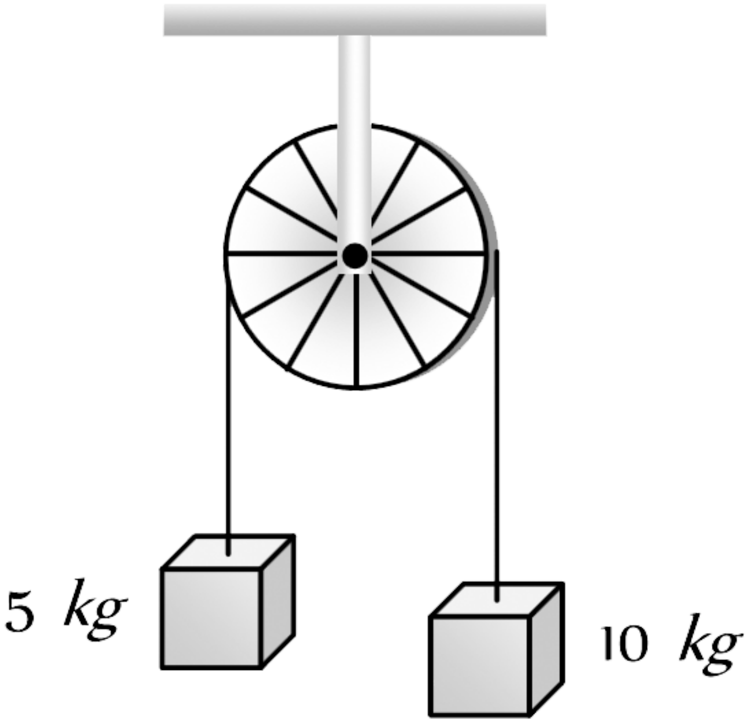
13. USS 150) Two masses of 5 kg and 10 kg are connected to a pulley as shown. What will be the acceleration of the system (g= acceleration due to gravity)



A. g

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

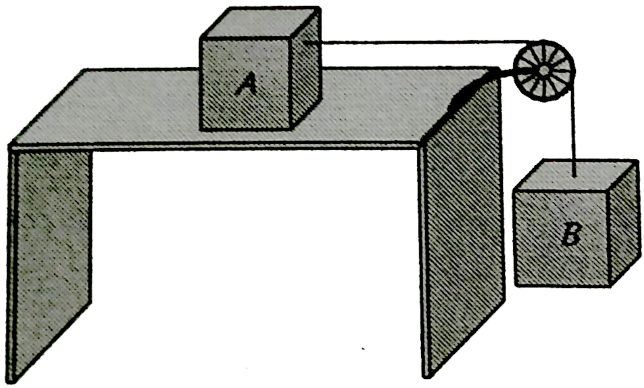
C. $\frac{g}{3}$

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

Answer: C

Watch Video Solution

14. A block A of mass 7 kg is placed on a frictionless table. A thread tied to it passes over a frictionless pulley and carries a body B of mass 3 kg at the other end. The acceleration of the system is (given $g = 10ms^{-2}$)



A. $100ms^{-2}$

B. $3ms^{-2}$

C. $10ms^{-2}$

D. $30ms^{-2}$

Answer: B

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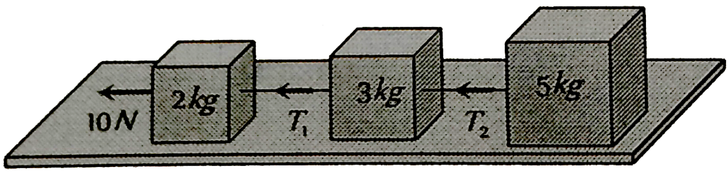
15. Three blocks of masses 2 kg , 3 kg and 5 kg are connected to each other with light string and are then placed on a frictionless surface as shown in the figure. The system is pulled by a force $F = 10N$ then tension $T_1 =$



A. 1N

B. 5 N

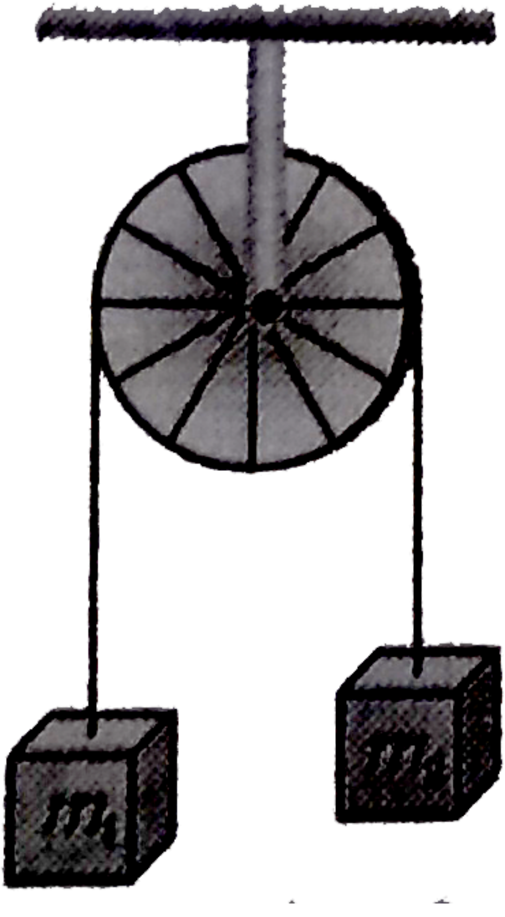
C. 8 N

D. 10 N

Answer: C

Watch Video Solution

16. Two masses m_1 and m_2 are attached to a string which passes over a frictionless smooth pulley. When $m_1 = 10kg, m_2 = 6kg,$ the acceleration of masses is



A. $20m / s^2$

B. $5m / s^2$

C. $2.5m / s^2$

D. $10m / s^2$

Answer: C

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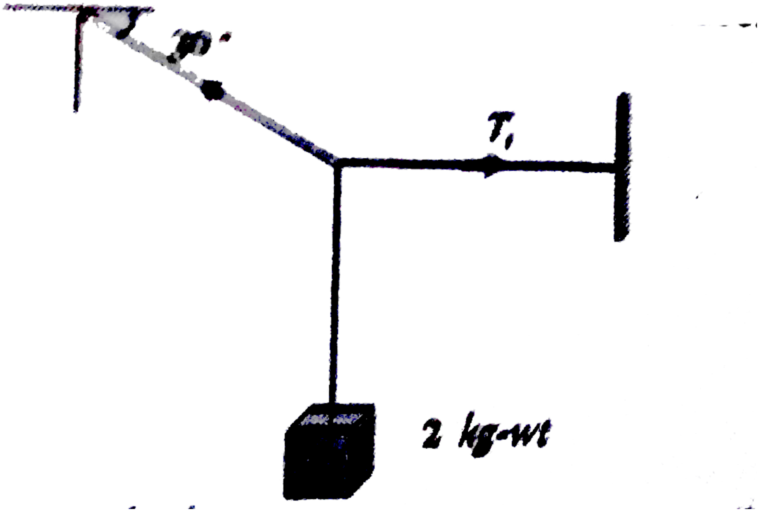
17. A body of weight 2 kg is suspended as shown in the figure. The tension T_1 in the horizontal string (in kg wt) is



A. $2 / \sqrt{3}$

B. $\sqrt{3} / 2$

C. $2\sqrt{3}$

D. 2

Answer: C

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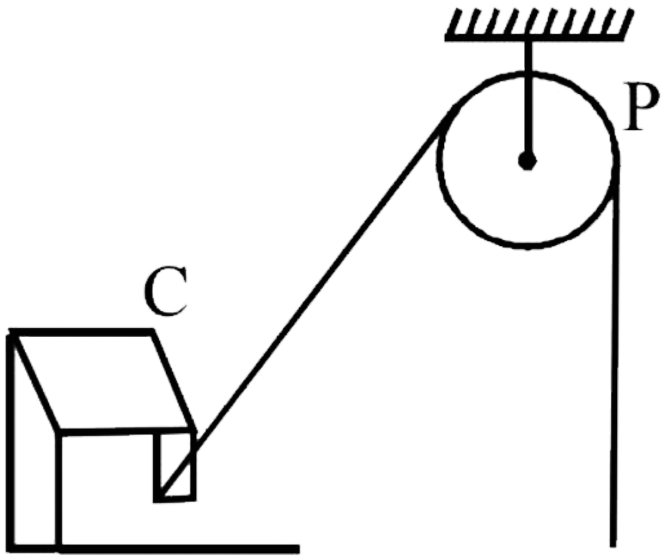
18. One end of a massless rope, which passes over a massless and frictionless pulley P is tied to a hook C while the other end is free. Maximum tension that the rope can bear is 360 N. With what value of maximum safe acceleration (in ms^{-2}) can a man of 60kg climb on the scope?



A. 16

B. 6

C. 4

D. 8

Answer: C

Watch Video Solution

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

A. $8:1$

B. $9:7$

C. $4:3$

D. $5:3$

Answer: B

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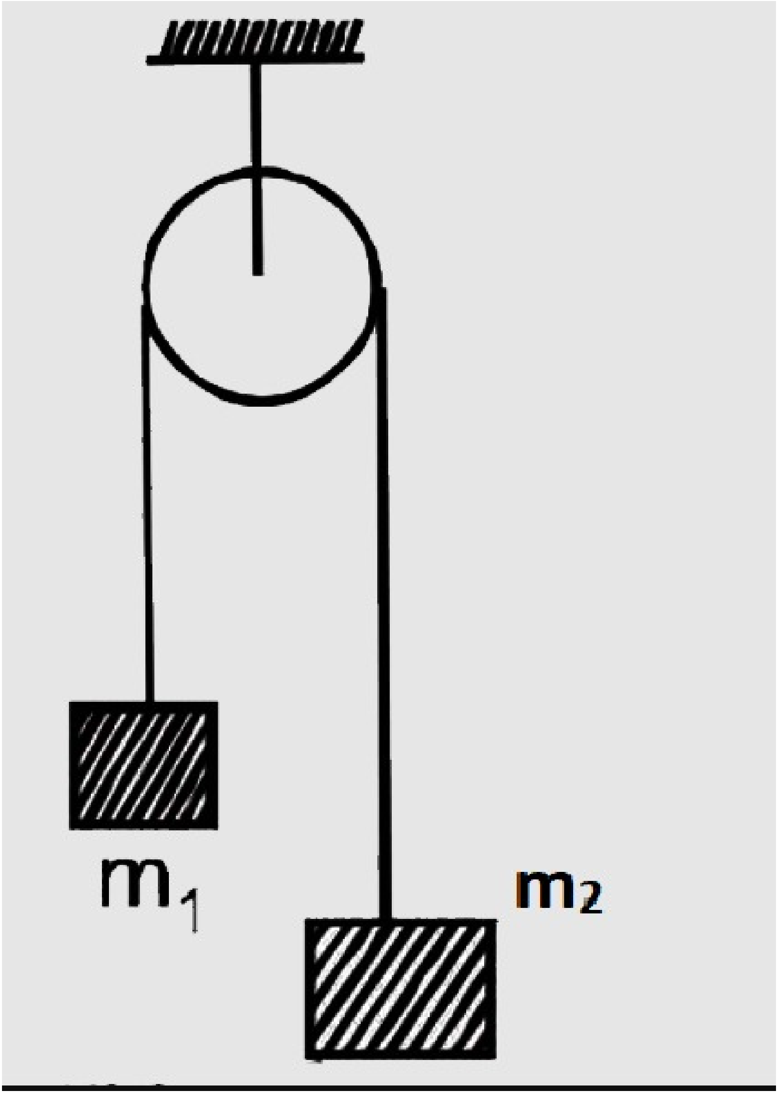
20. Two masses $m_1 = 5kg$ and $m_2 = 4.8kg$ tied to a string are hanging over a light frictionless pulley. What is the acceleration of the masses when left free to move?



A. $0.2 m / s^2$

B. $9.8m / s^2$

C. $5m / s^2$

D. $4.8m / s^2$

Answer: A

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21. A block of mass 4 kg is suspended through two light spring balances A and B is series. Then A and B will read respectively.

A. 4 kg and zero kg

B. Zero kg and 4 kg

C. 4 kg and 4 kg

D. 2 kg and 2 kg

Answer: C

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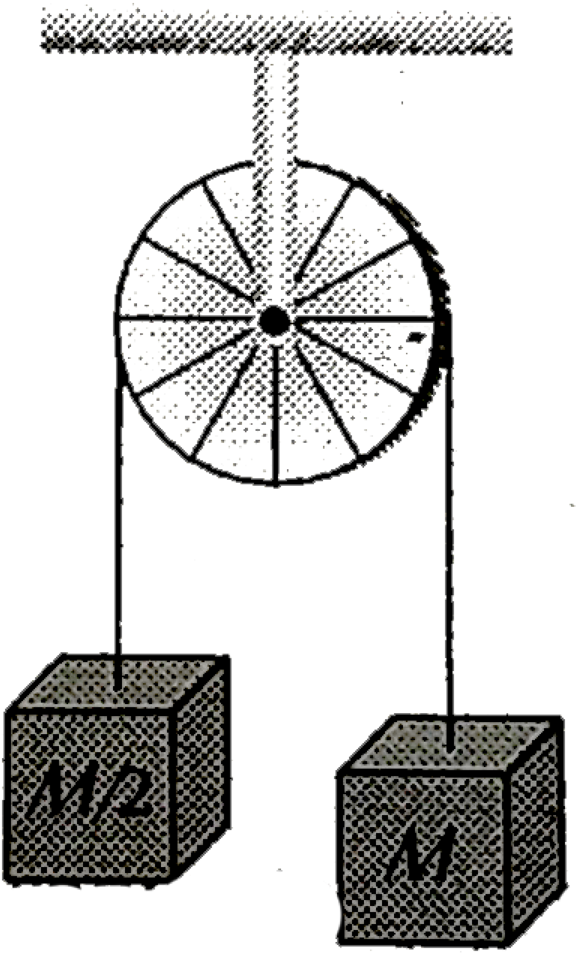
22. Two masses M and M/ 2 are joint together by means of a light inextensible string passes over a frictionless pulley as shown in figure.

When bigger mass is released the small one will ascend with an acceleration of



A. $g/3$

B. $3g/2$

C. $g/2$

D. g

Answer: A

Watch Video Solution

23. Two masses m and m $(m > m)$ are connected by massless flexible and inextensible string passed over massless and frictionless pulley. The acceleration of centre of mass is

A. $\left(\frac{m_1 - m_2}{m_1 + m_2}\right)^2 g$

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

C. $\frac{m_1 + m_2}{m_1 - m_2} g$

D. Zero

Answer: B

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Critical Thinking

1. A vessel containing water is given a constant acceleration 'a' towards the right along a straight horizontal path. Which of the following diagrams in Fig. represents the surface of the liquid?

A. A

B. B

C. C

D. D

Answer: C

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2. A closed compartment containing gas is moving with some acceleration in horizontal direction. Neglect effect of gravity. Then the pressure in the compartment is

A. Same everywhere

B. Lower in front side

C. Lower in rear side

D. Lower in upper side

Answer: B

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

A. $1.5m/s$

B. $60m/s$

C. $0.1m/s$

D. $5m/s$

Answer: C

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4. The mass of a body measured by a physical balance in a lift at rest is found to be m . If the lift is going up with an acceleration a , its mass will be measured as

A. $m\left(1-\frac{a}{g}\right)$

B. $m\left(1+\frac{a}{g}\right)$

C. m

D. Zero

Answer: C

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5. Three weights W , 2 W and 3 W are connected to identical springs suspended from a rigid horizontal rod. The assembly of the rod and the weights fall freely. The positions of the weights from the rod are such that

A. 3 W will be farthest

B. W will be farthest

C. All will be at the same distance

D. 2 W will be farthest

Answer: C

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

A. F_1 / m

B. $F_2 F_3 / m F_1$

C. $(F_2 - F_3) / m$

D. F_2 / m

Answer: A

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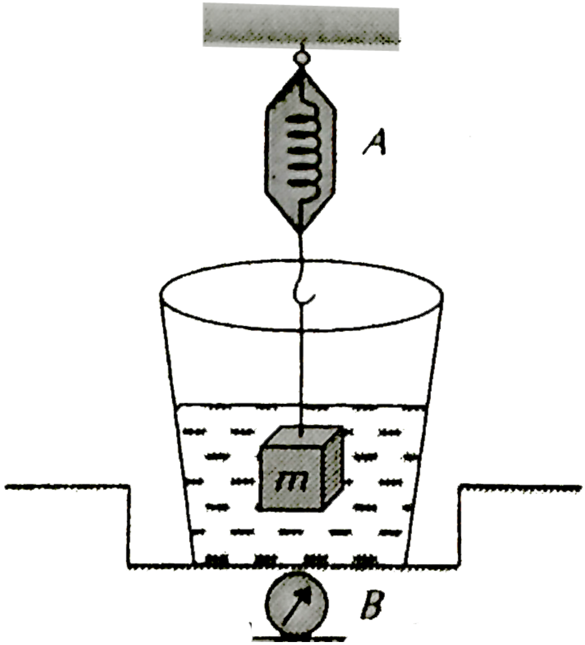
7. The spring balance A reads 2 kg with a block m suspended from it. A balance B reads 5 kg when a beaker filled with liquid is put on the pan of the balance. The two balances are now so arranged that the hanging mass is inside the liquid as shown in figure. In this situation



A. The balance A will read more than 2 kg

B. The balance B will read more than 5 kg

C. The balance A will read less than 2 kg

and B will read more than 5 kg

D. The balances A and B will read 2 kg and 5 kg respectively

Answer: B::C

View Text Solution

8. A rocket is propelled by a gas which is initially at a temperature of 4000 K . The temperature of the gas falls to 1000 K as it leaves the exhaust nozzle. The gas which will acquire the largest momentum while leaving the nozzle, is

A. Hydrogen

B. Helium

C. Nitrogen

D. Argon

Answer: D

View Text Solution

9. Consider the following statement: When jumping from some height, you should bend your knees as you come to rest, instead of keeping your legs stiff. Which of the following relations can be useful in explaining the statement

Where symbols have their usual meaning

A. $\Delta \overrightarrow{P}_1 = -\Delta \overrightarrow{P}_2$

B. $\Delta E = -\Delta(PE + KE) = 0$

C. $\overrightarrow{F} \Delta t = m \Delta \overrightarrow{v}$

D. $\Delta \overrightarrow{x} \propto \Delta \overrightarrow{F}$

Answer: C

View Text Solution

10. A false balance has equal arms. An object weigh X when placed in one pan and Y when placed in other pan, then the weight W of the object is equal to

A. $\sqrt{XY}$

B. $\dfrac{X+Y}{2}$

C. $\dfrac{X^2+Y^2}{2}$

D. $\dfrac{2}{\sqrt{X^2+Y^2}}$

Answer: B

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11. The vector sum of two forces is perpendicular to their vector differences. In that case, the force

A. Are equal to each other in magnitude

B. Are not equal to each other in magnitude

C. Cannot be predicted

D. Are equal to each other

Answer: A

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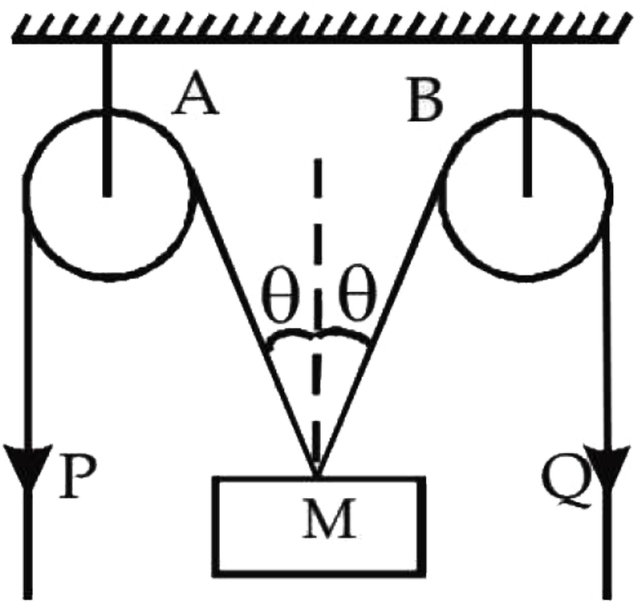
12. In the arrangement shown in the Fig, the ends P and Q of an unstretchable string move downwards with uniform speed U. Pulleys A and B are fixed.

Mass M moves upwards with a speed



A. $2U \cos \theta$

B. $U \cos \theta$

C. $\frac{2U}{\cos \theta}$

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

Answer: D

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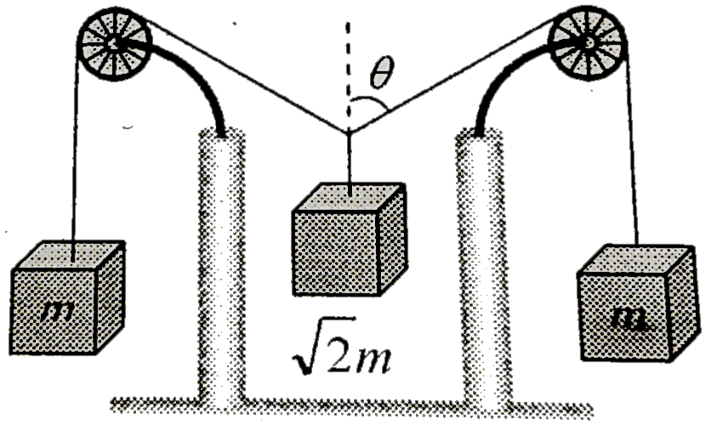
13. The pulleys and strings shown in the figure are smooth and of negligible mass. For the system to remain in equilibrium, the angle θ

should be



A. 0°

B. 30°

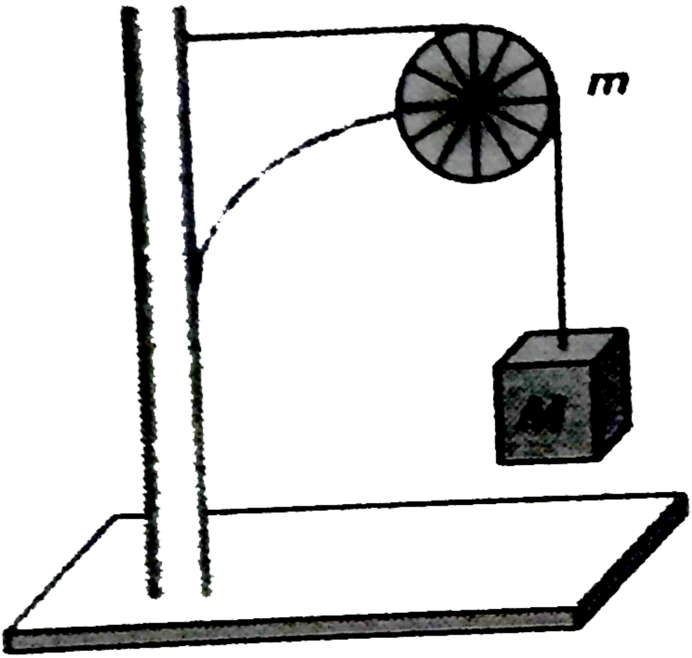
C. 45°

D. 60°

Answer: C

Watch Video Solution

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

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

Answer: D

Watch Video Solution

15. A pulley fixed to the ceiling carries a string with blocks of mass m and $3m$ attached to its ends. The masses of string and pulley are negligible .When the system is released, its center of mass moves with what acceleration

A. 0

B. $g/4$

C. $g/2$

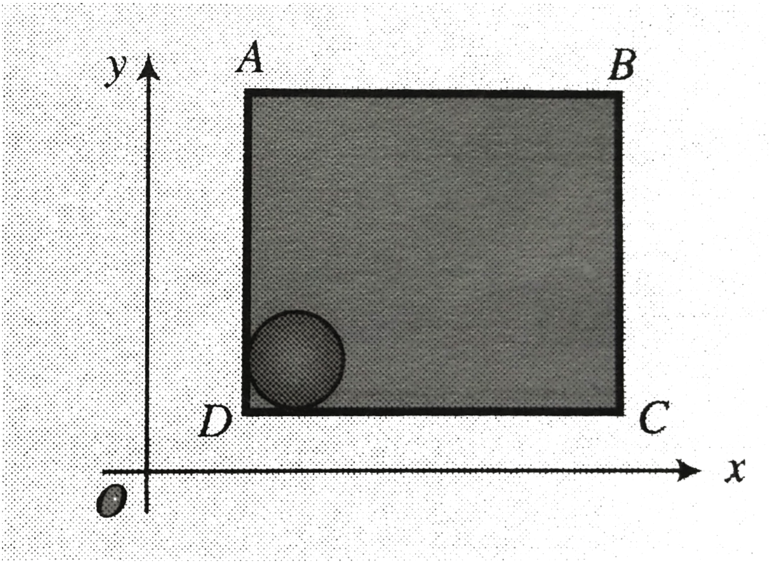
D. $-g/2$

Answer: B

Watch Video Solution

16. A solid sphere of mass 2 kg is resting inside a cube as shown in fig. The cube is moving with a velocity $\vec{v} = \left(5t\hat{i} + 2t\hat{j}\right)ms^{-1}$. Here t is time in seconds. All surface are smooth. The sphere is at rest with respect to the cube.

What is the total force exerted by the sphere on the cube?



A. $\sqrt{29}N$

B. 29 N

C. 26 N

D. $\sqrt{89}N$

Answer: C

Watch Video Solution

17. An object is moving along+ve x-axis with a uniform acceleration of $4ms^{-2}$. At time $t = 0$.

X= 4 m and v=2 ms^(-1).

(a) What will be the velocity and position of the object at time $t = 3s$?

(b) What will be the position of the object when it has a velocity $8ms^{-1}$?

A. 10 m

B. 0.22 m

C. 0.44 m

D. 2.4 m

Answer: C

Watch Video Solution

18. If the Earth be at one fourth its present distance from the sun, how many days will be charged in present one year on the surface of earth?

A. $1.5 \times 10^8 ms^{-1}$

B. $2.1 \times 10^8 ms^{-1}$

C. $2.6 \times 10^8 ms^{-1}$

D. $5.2 \times 10^8 ms^{-1}$

Answer: C

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19. A plate moves normally with the speed v_1 towads a horizontal jet of uniform area of cross-section. The jet discharge water at the rate of volume V per second at a speed of v_2. The density of water is ρ. Assume that water splashes along the surface of the plate ar right angles to the original motion. The magnitude of the force action on the plate due to the jet of water is

A. $\rho V v_1$

B. $\rho V(v_1 + v_2)$

C. $\dfrac{\rho V}{v_1 + v_2} v_1^2$

D. $\rho\left[\dfrac{V}{v_2}\right](v_1 + v_2)^2$

Answer: D

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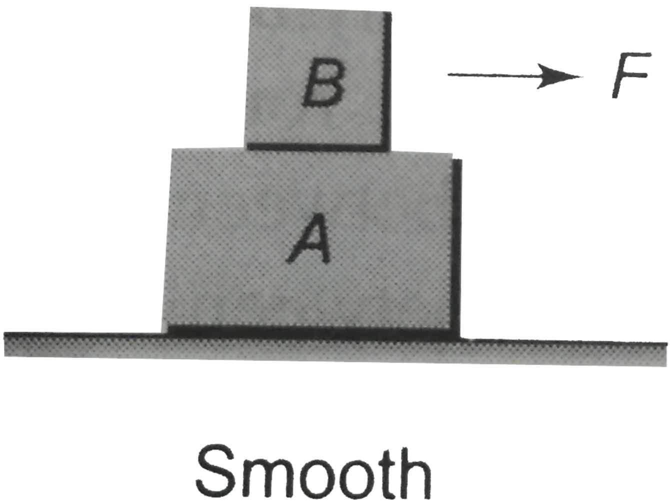
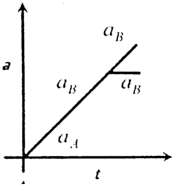
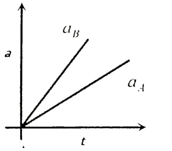
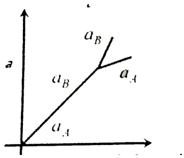
Graphical Questions

1. A block B is placed on the block A.The mass of block B is less than the mass of block A. Friction exists between the blocks , whereas the ground on which block A is placed is taken to be smooth. A horizontal force F, increasing linearly with time begins to act on B. The acceleration a_A and a_B of blocks A and B, respectively , are plotted against t. The correctly plotted graph is



A. (a) 

B. (b) 

C. (c) 

D.

Answer: D

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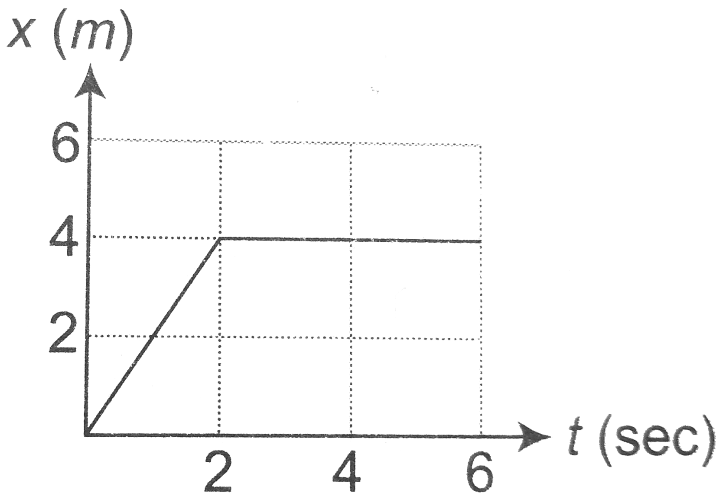
2. In the figure given below, the position-time graph of a particle of mass $0.1kg$ is shown. The impuslse at $t = 2$ sec is



A. $0.2\mathrm{kg\ m\ sec}^{-1}$

B. $-0.2\mathrm{kg\ m\ sec}^{-1}$

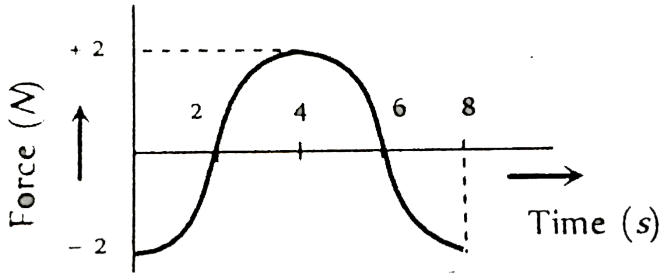
C. $0.1\mathrm{kg\ m\ sec}^{-1}$

D. $-0.4 : kgm\sec^{-1}$

Answer: B

Watch Video Solution

3. The force-time$(F-t)$ curve of a particle executing linear motion is as shown in the figure. The momentum acquired by the particle in time interval from zero to 8 second will be



A. -2 N-s

B. $+4$ N-s

C. 6 N-s

D. Zero

Answer: D

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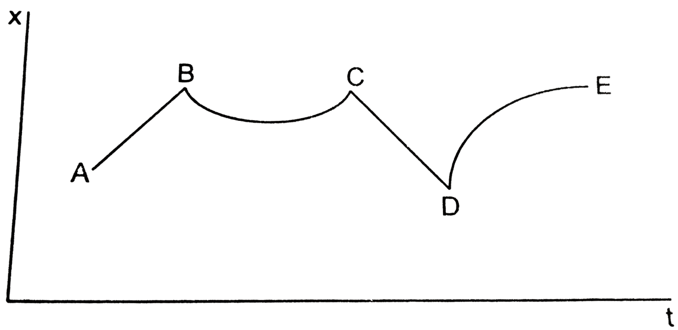
4. Figure shows the displacement of a particle going along the X-axis as a function of time. The force acting on the particle is zero in the region



A. AB

B. BC

C. CD

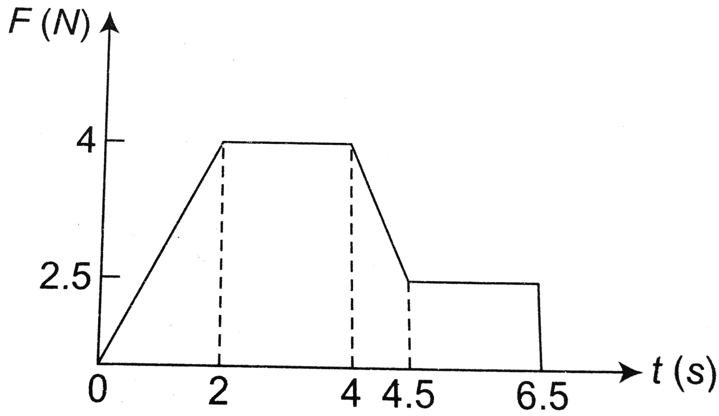
D. DE

Answer: A::C

Watch Video Solution

5. A body of 2kg has an initial speed $5ms^{-1}$. A force acts on it for some time in the direction of motion. The force time graph is shown in figure. The force time graph is shown in figure.

The final speed of the body is



A. $9.25ms^{-1}$

B. $5ms^{-1}$

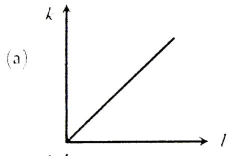
C. $14.25ms$

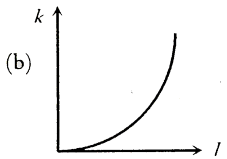
D. $4.25ms$

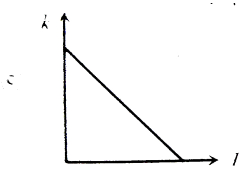
Answer: C

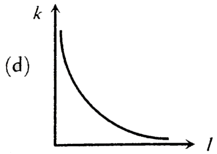
Watch Video Solution

6. Which of the following graph depicts spring constant k versus length l of the spring correctly

A. 

B. 

C. 

D. 

Answer: D

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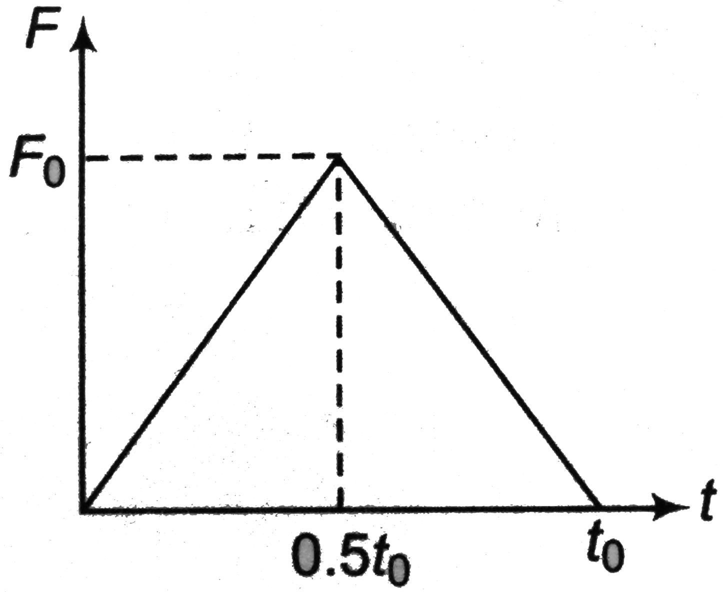
7. A particle of mass m moving with velocity u makes an elastic one-dimentional collision with a stationary particle of mass m. They come in contact for a very small time t_0. Their force of interaction increases from zero to F_0 linearly in time $0.5t_0$, and decreases linearly to zero in further time $0.5t_0$ as shown in figure.

The magnitude of F_0 is



A. mu/T

B. $2mu/T$

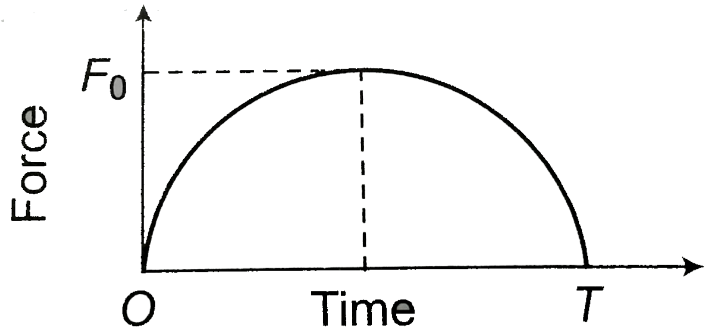
C. $mu/2T$

D. None of these

Answer: B

Watch Video Solution

8. A particle of mass m , initially at rest , is acted upon by a variable force F for a brief interval of time T. It begins to move with a velocity u after the force stops acting . F is shown in the graph as a function of time. The curve is a semicircle.



A. $u = \frac{\pi F_0^2}{2m}$

B. $u = \frac{\pi T^2}{8m}$

C. $u = \frac{\pi F_0 T}{4m}$

D. $u = \frac{F_0 T}{2m}$

Answer: C

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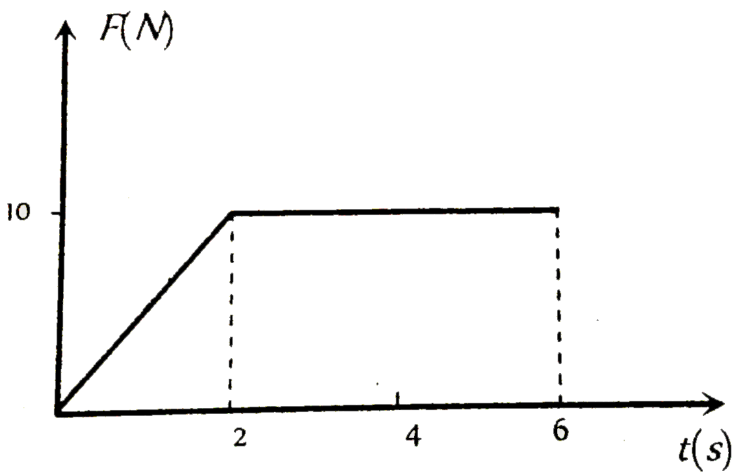
9. A body of mass 3 kg is acted on by a force which varies as shown in the graph below. The momentum acquired is given by



A. Zero

B. 5 N-s

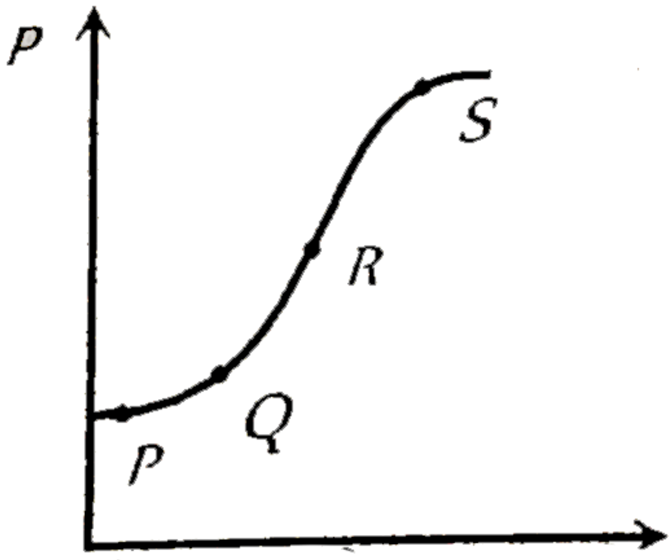
C. 30 N-s

D. 50 N-s

Answer: D

Watch Video Solution

10. The variation of momentum with time of one of the body in a two body collision is shown in fig. The instantaneous force is maximum corresponding to point



A. P

B. Q

C. R

D. S

Answer: C

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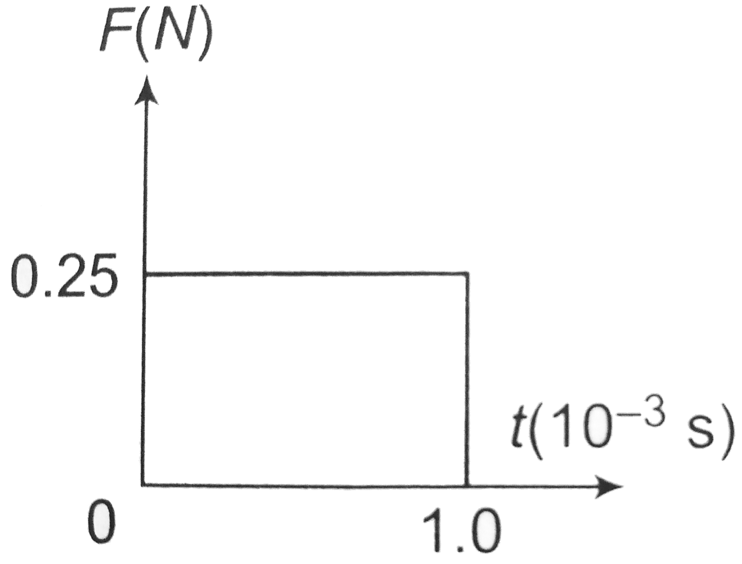
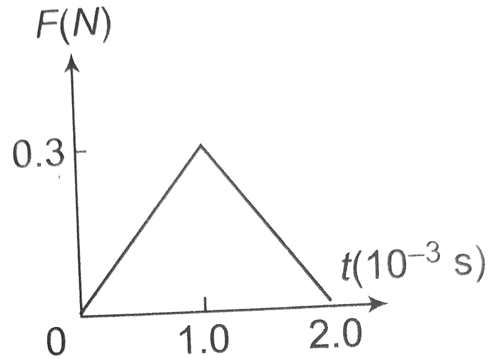
11. Figures I, II, III, and IV depict variation of force with time The impulse is hioghest in the case of situations depicted. Figure(s).



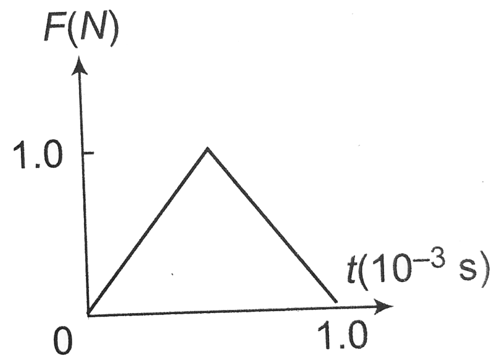
F(N)
0.25
t(10⁻³ s)
0
1.0

,

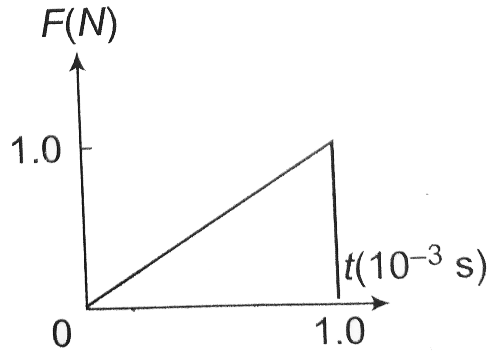
(II)



(III)



(IV)



A. I and II

B. III and I

C. III and IV

D. IV only

Answer: C

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Assertion Reason

1. Assertion : Inertia is the property by virtue of which the body is unable to change by itself the state of rest only.

Reason : The bodies do not change their state unless acted upon by an unbalanced external force.

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

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

C. If assertion is true but reason is false.

D. If assertion is fa lse but reason is true.

Answer: D

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2. Statement-1 : If the net external force on the body is zero then its acceleration is zero. Statement-2 : Acceleration does not depend on force

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

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

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: C

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3. Assertion: Newton's second law of motion given the measurement of force.

Reason: According to Newton's second law of motion, force is directly proportional to the rate of change of momentum.

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

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

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

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4. Assertion : Force is required to move a body uniformly along a circle.

Reason : When the motion is uniform, acceleration is zero.

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

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

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: B

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5. Assertion : If two objects of different masses have same momentum, the lighter body possess greater velocity.

Reason : For all bodies momentum always remains same.

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

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

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: C

Watch Video Solution

6. Statement -1 : Aeroplanes always fly at low altitudes.

Statement -2 : Ac cording to Newton's third law of motion, for every action there is an equal and opposite reaction.

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

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

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

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7. Assertion : No force is required by the body to remain in any state.

Reason : In uniform linear motion, acceleration has a finite value.

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

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

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: C

Watch Video Solution

8. Assertion:Mass is a measure of inertia of the body in linear motion.

Reason: Greater the mass, greater is the force required to change its state of rest or of uniform motion.

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

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

the assertion

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

Watch Video Solution

9. Statement-1 : The slope of momentum versus time graph give us the acceleration.

Statement-2 : Force is given by the rate of change of momentum

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

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

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: D

Watch Video Solution

10. Statement - I : A cyclist always bends in wards while negotiating a curve.

Statement - II : By bending, he lowers his centre of gravity

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

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

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: C

Watch Video Solution

11. Assertion : The work done in bringing a body down from the top to the base along a frictionless inclined plane is the same as the work done in bringing it down along the vertical side .

Reason : The gravitational force on the body along the inclined plane is the same as that along the vertical side.

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

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

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: C

Watch Video Solution

12. Assertion : Linear momentum of a body changes even when it is moving uniformly in a circle.

Reason : Force required to move a body uniformly along a straight line is zero.

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

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

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: B

Watch Video Solution

13. Assertion : A bullet is fired from a rifle. If the rifle recoils freely, the kinetic energy of rifle is more than that of the bullet.

Reason : In the case of rifle bullet system the law of conservation of momentum violates.

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

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

the assertion

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: D

Watch Video Solution

14. Assertion: A rocket works on the principle of conservation of linear momentum.

Reason: Wheneven there is a change in

momentum of one body, the same change occurs in the momentum of the second body of the same system but in the opposite directio.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion
B. If both assertion and reason are true but reason is not the correct explanation of the assertion
C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

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15. Assertion : The apparent weight of a body in an elevator moving with some downward acceleration is less than the actual weight of body.

Reason : The part of the weight is spent in producing downward acceleration, when body is in elevator.

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

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

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: C

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16. Assertion : When the lift moves with uniform velocity the man in the lift will feel weightlessness.

Reason : In downward accelerated motion of lift, apparent weight of a body decreases.

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

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

C. If assertion is true but reason is false.

D. If assertion is fa lse but reason is true

Answer: D

Watch Video Solution

17. Assertion : In the case of free fall of the lift, the man will feel weightlessness.

Reason : In free fall, acceleration of lift is equal to acceleration due to gravity.

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

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

the assertion

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

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18. Assertion: A player lowers his hands while catching a cricket ball and suffers less reaction force.

Reason: The time of catch increases when cricketer lowers hand while catching a ball.

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

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

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: A

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19. Assertion : The acceleration produced by a force in the motion of a body depends only upon its mass.

Reason : Larger is the mass of the body, lesser will be the acceleration produced.

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

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

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: B

Watch Video Solution

20. Assertion : Linear momentum of a body changes even when it is moving uniformly in a circle.

Reason : In uniform circular motion velocity remain constant.

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

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

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: C

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21. Assertion : Newton's third law of motion is applicable only when bodies are in motion.

Reason : Newton's third law applies to all types of forces, e.g. gravitational, electric or magnetic forces etc.

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

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

the assertion

C. If assertion is true but reason is false.

D. If assertion is fa lse but reason is true.

Answer: D

Watch Video Solution

22. Assertion : A reference frame attached to earth is an inertial frame of reference.

Reason : The reference frame which has zero acceleration is called a non inertial frame of reference.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion
B. If both assertion and reason are true but reason is not the correct explanation of the assertion
C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: D

View Text Solution

23. Assertion:A table cloth can be pulled from a table without dislodging the dishes.

Reason: To every action there is an equal and opposite reaction.

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

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

C. If assertion is true but reason is false.

D. If the assertion and reason both are false.

Answer: B

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24. Assertion : A body subjected to three concurrent forces cannot be in equilibrium.

Reason : If large number of concurrent forces acting on the same point, then the point will be in equilibrium, if sum of all the forces is equal to zero.

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

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

C. If assertion is true but reason is false.

D. If assertion is fa lse but reason is true.

Answer: D

Watch Video Solution

25. Assertion : Impulse and momentum have different dimensions.

Reason : From Newton's second law of motion, impulse is equal to change in momentum.

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

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

C. If assertion is true but reason is false.

D. If assertion is fa lse but reason is true.

Answer: D

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Self Evaluation Test

1. A car is moving with uniform velocity on a rough horizontal road. Therefore, according to Newton's first law of motion

A. No force is being applied by its engine

B. A force is surely being applied by its engine

C. An acceleration is being produced in the car

D. The kinetic energy of the car is increasing

Answer: B

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2. A person is sitting in a travelling train and facing the engine. He tosses up a coin and the coin falls behind him. It can be concluded that the train is

A. Moving forward and gaining speed

B. Moving forward and losing speed

C. Moving forward with uniform speed

D. Moving backward with uniform speed

Answer: A

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3. A block can slide on a smooth inclined plane of inclination θ kept on the floor of a lift. When the lift is descending with a retardation a , the acceleration of the block relative to the incline is

A. $(g+a)\sin\theta$

B. $(g-a)$

C. $g\sin\theta$

D. $(g-a)\sin\theta$

Answer: A

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4. A 60kg man stands on a spring scales in a lift. At some instant. He finds that the scale reading has changed from 60kg to 50 kg for a while and then comes back to original mark. What should be concluded?

A. The lift was in constant motion upwards

B. The lift was in constant motion downwards

C. The lift while in constant motion upwards, is stopped suddenly

D. The lift while in constant motion downwards, is suddenly stopped

Answer: C

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5. When a body is acted by a constant force, then which of the following quantities remains constant

A. Velocity

B. Acceleration

C. Momentum

D. None of these

Answer: B

Watch Video Solution

6. A man of weight mg is moving up in a rocket with acceleration 4 g . The apparent weight of the man in the rocket is

A. Zero

B. 4 mg

C. 5 mg

D. mg

Answer: C

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7. A spring balance and a physical balance are kept in a lift. In these balance equal masses are placed. If now the lift starts moving upward with constant acceleration, then.

A. The reading of spring balance will increase and the equilibrium position of the physical balance will disturb

B. The reading of spring balance will remain unchanged and physical balance will remain in equilibrium

C. The reading of spring balance will decrease and physical balance will remain in equilibrium

D. The reading of spring balance will increase and the physical balance will remain in equilibrium

Answer: D

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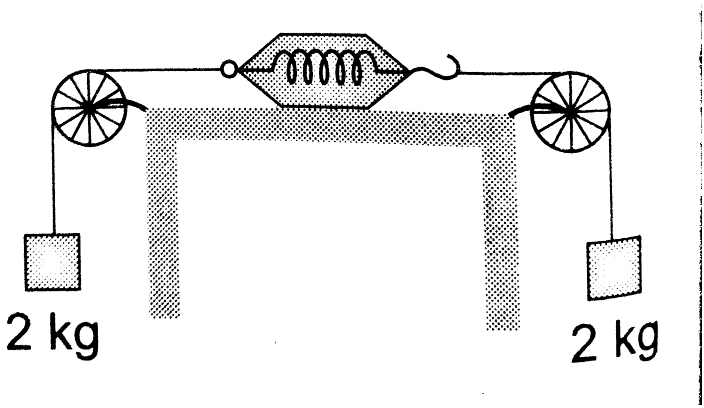
8. As shown in the figure, two equal masses each of $2kg$ are suspended from a spring balance. The reading of the spring balance will be.



A. Zero

B. 2 kg

C. 4 kg

D. Between zero and 2 kg

Answer: B

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9. A player kicks a football of mass 0.5 kg and the football begins to move with a velocity of 10 m/s . If the contact between the leg and the football lasts for $\frac{1}{50}$ sec , then the force acted on the football should be

A. 2500 N

B. 1250 N

C. 250 N

D. 625 N

Answer: C

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10. The engine of a jet aircraft applies a thrust force of $10^5 N$ during take off and causes the plane to attain a velocity of 1 $k\frac{m}{\sec}$ in 10 sec . The mass of the plane is

A. $10^2 kg$

B. $10^3 kg$

C. $10^4 kg$

D. $10^5 kg$

Answer: B

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11. A force of 50 dynes is acted on a body of mass 5 g which is at rest for an interval of 3 seconds, then impulse is

A. 0.15×10^{-3} N-s

B. 0.98×10^{-3} N-s

C. 1.5×10^{-3} N-s

D. 2.5×10^{-3} N-s

Answer: C

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12. Two weights w_1 and w_2 are suspended from the ends of a light string passing over a smooth fixed pulley. If the pulley is pulled up at an acceleration g , the tension in the string

will be

A. $\dfrac{4w_1w_2}{w_1+w_2}$

B. $\dfrac{2w_1w_2}{w_1+w_2}$

C. $\dfrac{w_1w_2}{w_1+w_2}$

D. $\dfrac{w_1w_2}{2(w_1+w_2)}$

Answer: A

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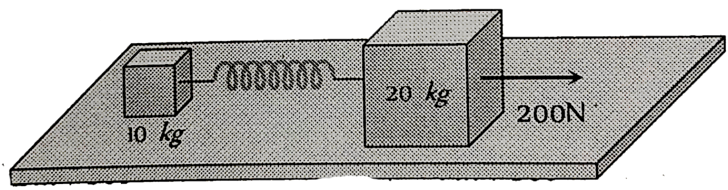
13. The masses of 10 kg and 20 kg respectively are connected by a massless spring as shown in figure. A force of 200 N acts on the 20 kg mass. At the instant shown, the 10 kg mass has acceleration $12m/\sec^2$. What is the acceleration of 20 kg mass



A. $1m/\sec^2$

B. $4m/s^2$

C. $10m/\sec^2$

D. Zero

Answer: B

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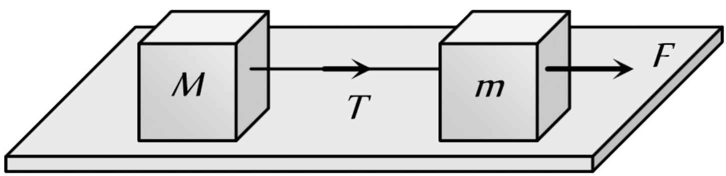
14. Two masses M and m are connected by a weightless string. They are pulled by a force F on a frictionless horizontal surface. The tension in the string will be



A. $\dfrac{FM}{m+M}$

B. $\dfrac{F}{M+m}$

C. $\dfrac{FM}{m}$

D. $\dfrac{Fm}{M+m}$

Answer: A

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15. In the above question, the acceleration of mass m is

A. $\dfrac{F}{m}$

B. $\dfrac{F-T}{m}$

C. $\dfrac{F+T}{m}$

D. $\dfrac{F}{M}$

Answer: B

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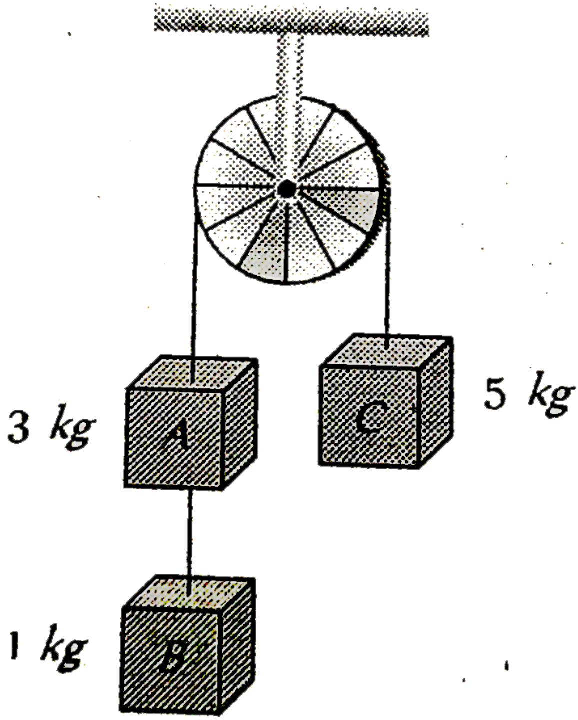
16. Three weights A ,B and C are connected by string as shown in the figure. The system moves over a frictionless pulley. The tension in the string connecting A and B is (where g is acceleration due to gravity)



A. g

B. $\frac{g}{9}$

C. $\frac{8g}{9}$

D. $\frac{10g}{9}$

Answer: D

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