NEET REVISION SERIES

LAWS OF MOTION

Revise Most Important Questions to Crack NEET 2020

Q-1 - 15821278

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

CORRECT ANSWER: C

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Q-2 - 9515379

when a horse pulls a cart, the force that helps the horse to move forward is the force exerted by

(A) the cart on the horse

(B) the ground on the horse

(C) the ground on the cart

(D) the horse on the ground

CORRECT ANSWER: B

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Q-3 - 11746143

When a speeding bus stop suddenly, passengers are thrown forward

from their seats because

(A) the back of seat suddenly puushes the passengers forward.

(B) inertia of rest stops the bus 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 crest.

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

CORRECT ANSWER: C

SOLUTION:

When the speeding bus stops suddnly, the lower part of

the passenger's body in contact with the seat remain at rest whereas the upper part of the body of the passenger continues to be in state of motion due to inertial. Hence, the passeners are thrown forward.

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Q-4 - 11746137

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

CORRECT ANSWER: D

SOLUTION:

Horizontal velocity of ball and person are same so both will cover equal horizontal distance in a given iterval of time and after following the parabolic path the ball falls exactly in the hand which threw it up.

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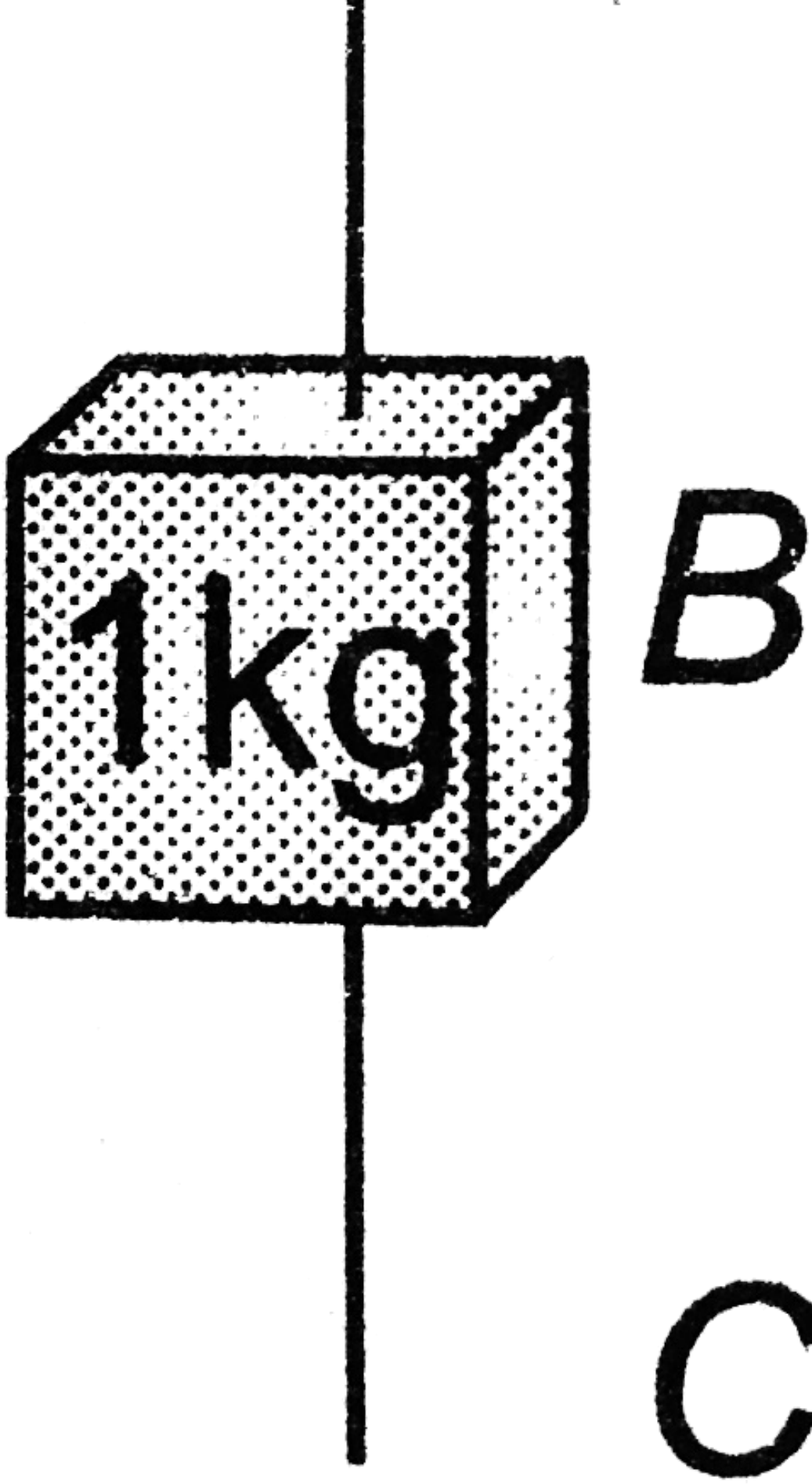
Q-5 - 11746139

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 string will break

(D) The mass will start rotating

CORRECT ANSWER: B

SOLUTION:

When a sudden jerk is given to C , an impulsive tension exceeding the breaking tension develops in C first, which breack before this impuls can reach A as a wave through block.

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Q-6 - 15821300

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

CORRECT ANSWER: B

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Q-7 - 15821302

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

CORRECT ANSWER: D

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Q-8 - 16978562

A monkey of mass mkg slides down a light rope attached to a fixed spring balance, with an acceleration a. The reading of the spring balance is W kg. [g = acceleration due to gravity]

(A) The force of fricion exerted by the rope on the monkey is $m(g-a)N$

(B) $m = \frac{Wg}{g-a}$

(C) $m = W\left(1+\frac{a}{g}\right)$

(D) The tension in the rope is Wg N

CORRECT ANSWER: A::B::D

Q-9 - 13163824

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) $t_1 \geq t_2$

CORRECT ANSWER: A

SOLUTION:

For stationary lift $t_1 = \sqrt{\frac{2h}{g}}$ and when the lift is

moveing up with constant acceleration $t_2 = \sqrt{\frac{2h}{g+a}}$

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Q-10 - 15821307

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

CORRECT ANSWER: D

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Q-11 - 14796664

The total mass of an elevator with a 80 kg man in it is 1000 kg. This elevator moving upward with a speed of 8 $m/\sec$, is brought to rest over a distance of 16m. The tension T in the cables supporting the elevator and the force exerted on the man by the elevator floor will respectively be-

(A) 7800 N,624 N

(B) 624 N, 7800 N

(C) 78 N, 624 N

(D) 624 N, 78 N

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Q-12 - 11747996

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

CORRECT ANSWER: C

SOLUTION:

(c) As no external force acting on the system, the displacement of centre of mass of the system should be zero. Let displacement of the trolley on opposite direction of motion of the man is x.

Hence

$$Delat x_{cm} = 0$$

$$= \frac{m\Delta x_{man} + M\Delta x_{\text{trolley}}}{m + M}$$

$$80(1 \times 4 - x)$$

$$+ 320(- x) = 0, x$$

$$= \frac{80 \times 4}{(320 + 80)}$$

$$= 3.2m$$

.

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Q-13 - 15821310

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

CORRECT ANSWER: D

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Q-14 - 15821314

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 $1cm/\sec^2$

CORRECT ANSWER: B

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Q-15 - 15821371

A body of mass 1.0 kg is falling with an acceleration of $10\ m/s^2$.

Its apparent weight will be $\left(g = 10m/\sec^2\right)$

(A) 1.0 kg wt

(B) 2.0 kg wt

(C) 0.5 kg wt

(D) Zero

CORRECT ANSWER: D

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Q-16 - 14280233

A block of mass $m = 3kg$ resting on a horizontal frictionless flooe

is horizontally struck by a 9N force that acts for 0.02 sec. After 3

sec it receivers a second blow of force 9 N but in opposite direction which acts for 0.01 sec. The speed of the body after 30 sec is

(A) 0

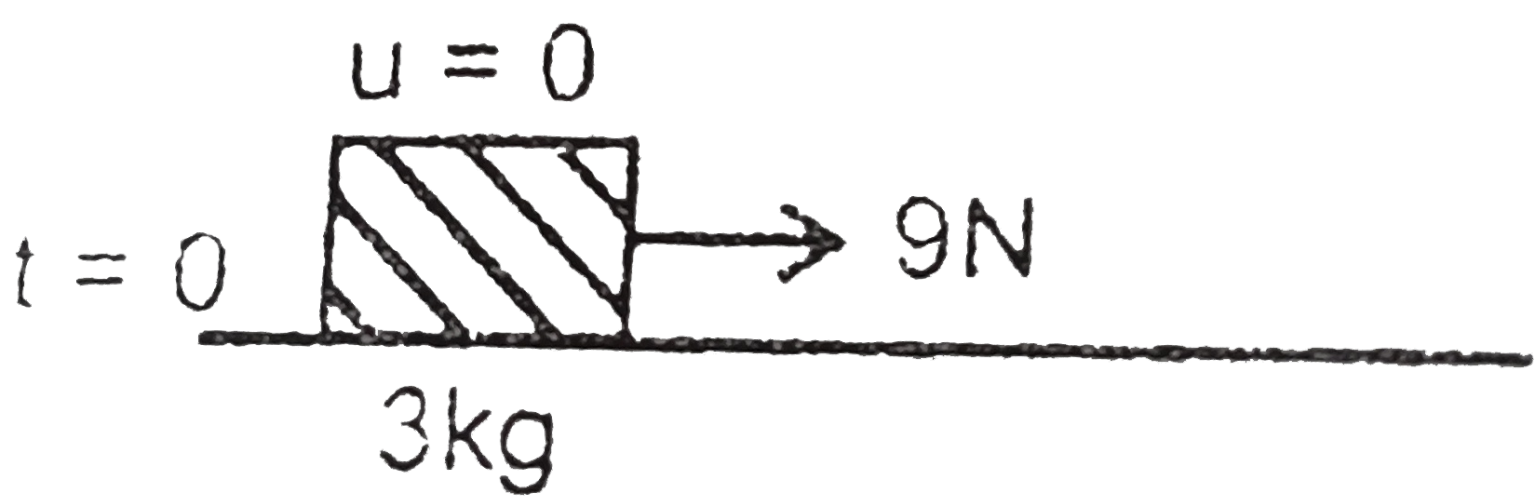
(B) 3 cm/sec

(C) 90 cm/sec

(D) 30 cm/sec

CORRECT ANSWER: B

SOLUTION:



As, impulse received ,

As,

$J = 9 \times 0.02$

$= m(V - 0)$

$$V = \frac{0.18}{3} 0.06 m / \sec$$

Velocity after

$3 \sec \Rightarrow V' = 0.06 m$

$/ \sec$

Now pulse received by second orce

$J' = -9 \times 0.01$

$= m(v'' - v')$

$v'' = -0.03 + 0.06$

$= 0.03 m / \sec$

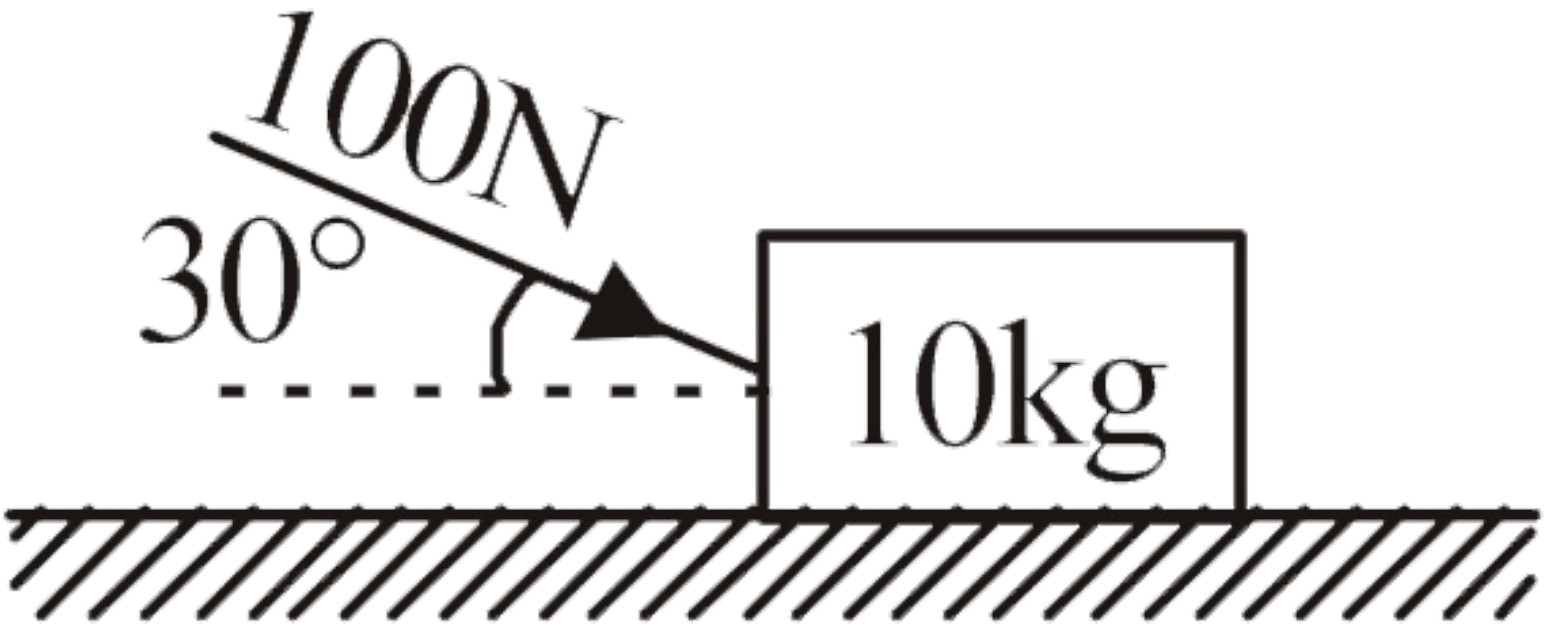
$v'' = -0.03 + 0.06$

$= 0.03 m / \sec$

$v'' = 3 cm / \sec.$

Q-17 - 14796693

A force of 100 N acts in the direction as shown in figure on a block of mass 10 kg resting on a smooth horizontal table. The speed acquired by the block after it has .moved a distance of 10 m, will be - (in m/sec) $\left(g = 10 m/sec^2\right)$



(A) 17 m/sec

(B) 13.17 m/sec

(C) 1.3 m/sec

(D) 1.7 m/sec

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Q-18 - 11746160

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 $500\frac{m}{\text{sec}}$ with respect to the car. The number of bullets fired per second is ten. The average thrust on the system is

(A) 550N

(B) 50N

(C) 250N

(D) 250N dyne

CORRECT ANSWER: B

SOLUTION:

u=velocity of bullet.

$\frac{dm}{dt}$ =mass thrown per second by the machine gun

=Mass of bulletxNumber of bullet fired per second

$= 10g \times 10$ bullet/sec

$= 100g/\sec = 0.1kg$

$/\sec$

.

:. Thrust

$= \frac{udm}{dt} = 500 \times 0.1$

$= 50N$

.

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Q-19 - 17463639

A machine gun of mass 10 kg fires 20 g bullets at the rate of 10 bullets per second with a speed of 500 ms^{-1}. What force is required to hold the gun in position ?

CORRECT ANSWER: 100 N

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Q-20 - 14527304

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 upwards with uniform velocity

(D) The elevetor moves downwards with uniform velocity.

CORRECT ANSWER: B

SOLUTION:

N=mg- ma when the elevator moves downwards with

constant acceleration

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Q-21 - 10058560

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) (a) $15m/s^2$

(B) (b) $3m/s^2$

(C) (c) $10m/s^2$

(D) (d) $5m/s^2$

CORRECT ANSWER: C

SOLUTION:

Mass (m)

$= 0.3kg \Rightarrow F = m.\, a$

$= 15x$

$a = \ - \ \frac{15}{0.3}x = \frac{150}{3}x$

$= 50xa = 50 \times 0.2$

$= 10m \, / \, s^2$

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Q-22 - 15821323

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

CORRECT ANSWER: A

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Q-23 - 15821325

At a place where the acceleration due to gravity is $10\mathrm{m\ sec}^{-2}$ 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) $5\mathrm{m\ sec}^{-1}$

(B) $10\mathrm{m\ sec}^{-1}$

(C) $20\mathrm{m\ sec}^{-1}$

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

CORRECT ANSWER: C

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Q-24 - 15821329

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

CORRECT ANSWER: D

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Q-25 - 15821333

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

CORRECT ANSWER: A

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Q-26 - 11746164

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 $(g = 10ms(- 2)$

(A) $127.5kgs^{-1}$

(B) $187.5kgs^{-1}$

(C) $185.5kgs^{-1}$

(D) $137.5kgs^{-1}$

CORRECT ANSWER: B

SOLUTION:

$$F\frac{umd}{dt} = m(g+a)\ .$$

$$\Rightarrow \frac{dm}{dt} = \frac{m(g+a)}{u}$$

$$= \frac{5000 \times (10+20)}{800}$$

$$= 187.5kg/s$$

.

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Q-27 - 15821335

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 $4 \text{metres} / \sec^2$

CORRECT ANSWER: D

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Q-28 - 11746528

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) be increasing

(B) be decreasing

(C) first increase and then decrease

(D) remain the same.

CORRECT ANSWER: D

SOLUTION:

Spring balance measure mg . The height obtained will not be apperciable to bring change in g so the reading will be the same.

Q-29 - 15821337

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

CORRECT ANSWER: B

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Q-30 - 15705541

The force on a rocket moving with a veloctiy 300 m/s is 210N. The

rate of consumption of fuel of rocket is

(A) 0.7 kg/s

(B) 1.4 kg/s

(C) 0.07 kg/s

(D) 10.7 kg/s

CORRECT ANSWER: A

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Q-31 - 15821360

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) $5.2 \times 10^3 N$

CORRECT ANSWER: D

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Q-32 - 15821363

An army vehicle of mass 1000 kg is moving with a velocity of $10 m / s$ 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) $5 m / s$

(B) $10 m / s$

(C) $15 m / s$

(D) $20 m / s$

CORRECT ANSWER: C

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Q-33 - 14156195

A force vector applied on a mass is represented as $\overrightarrow{F} = 6\hat{i} - 8\hat{j} + 10\hat{k}$ and acceleration with m / s^2. What will be the mass of the body in kg.

(A) $10\sqrt{2}$

(B) 20

(C) $2\sqrt{10}$

(D) 10

CORRECT ANSWER: A

SOLUTION:

$$\left|\overrightarrow{F}\right|$$

$$= F\sqrt{(6)^2 + (-8)^2 + (10)^2}$$

$$= 10\sqrt{2}N$$

$$F = ma = 2 \times 2$$

$$= 4N$$

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Q-34 - 15821364

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

CORRECT ANSWER: B

Q-35 - 15821385

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) $R_u > R_d > R_0$

CORRECT ANSWER: B

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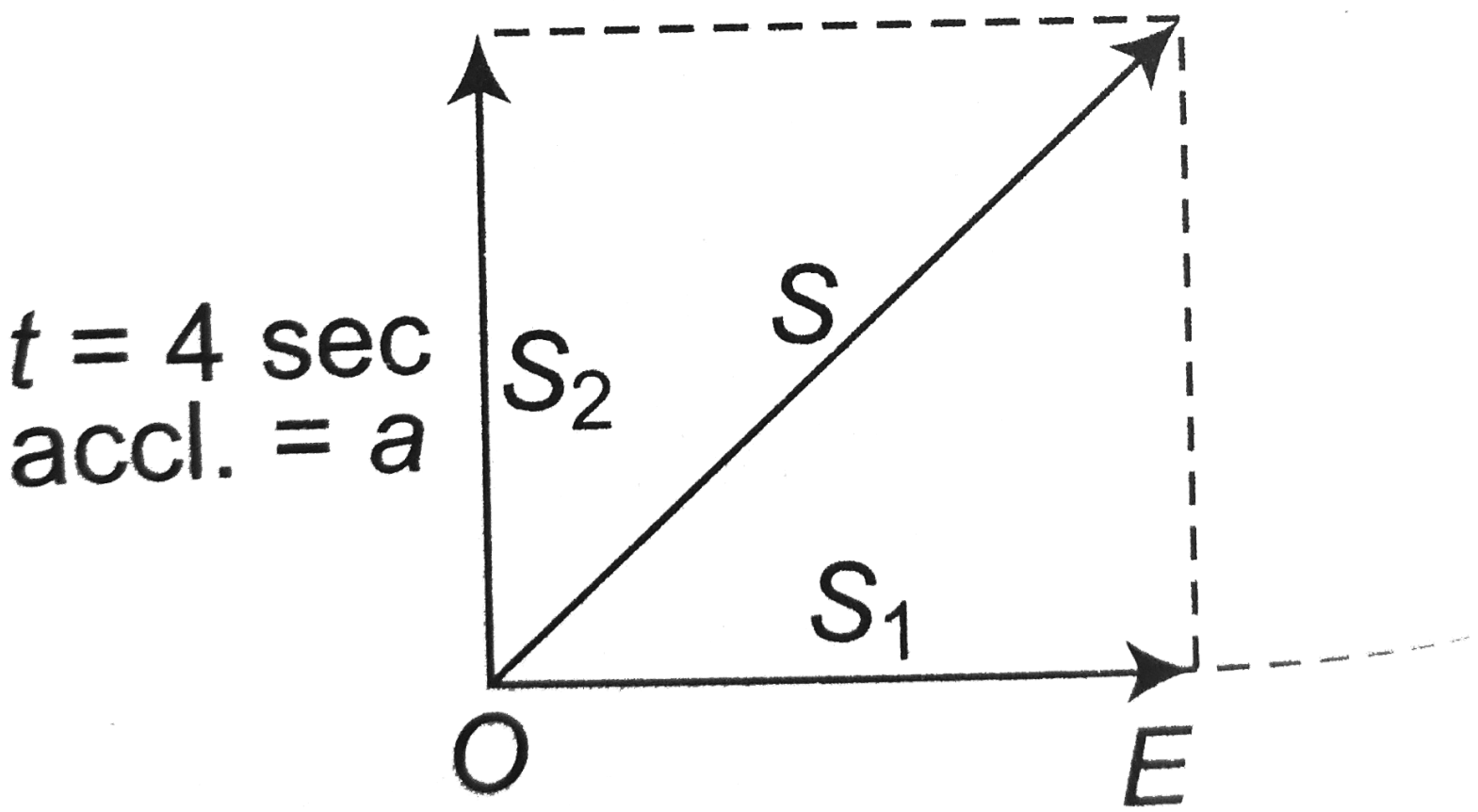
Q-36 - 11746540

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 metres

(B) 20 metres

(C) 8 metres

(D) 48 metres

CORRECT ANSWER: B

SOLUTION:

The acceleration of the body perpendicular to OE is

$$a = \frac{F}{m} = \frac{4}{2} = 2m$$

$$/ s^2$$

Displacement along OE ,

$$s_1 = vt = 3 \times 4$$

$$= 12m$$

Displacement perpendicular to OE

$$s_2 = \frac{1}{2}at^2 = \frac{1}{2} \times 2$$

$$\times (4)^2 = 16m$$

the resultant displacement

$$s = \sqrt{s_1^2 + s_2^2}$$

$$= \sqrt{144 + 256}$$

$$= \sqrt{400} = 20m$$

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Q-37 - 20475225

The velocity of a body of mass 20 kg decreases from $20m/s$ to $5m/s$ in a distance of 100 m. Force on the body is:

(A) $-27.5N$

(B) $-47.5N$

(C) $-37.5N$

(D) $-67.5N$

CORRECT ANSWER: C

SOLUTION:

$$F = M\frac{(v-u)}{t}$$

$$\left(v^2 = u^2 - 2as\right)$$

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Q-38 - 15705528

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

(A) $mg\cos\theta$

(B) $mg\sin\theta$

(C) mg

(D) $\frac{mg}{\cos\theta}$

CORRECT ANSWER: D

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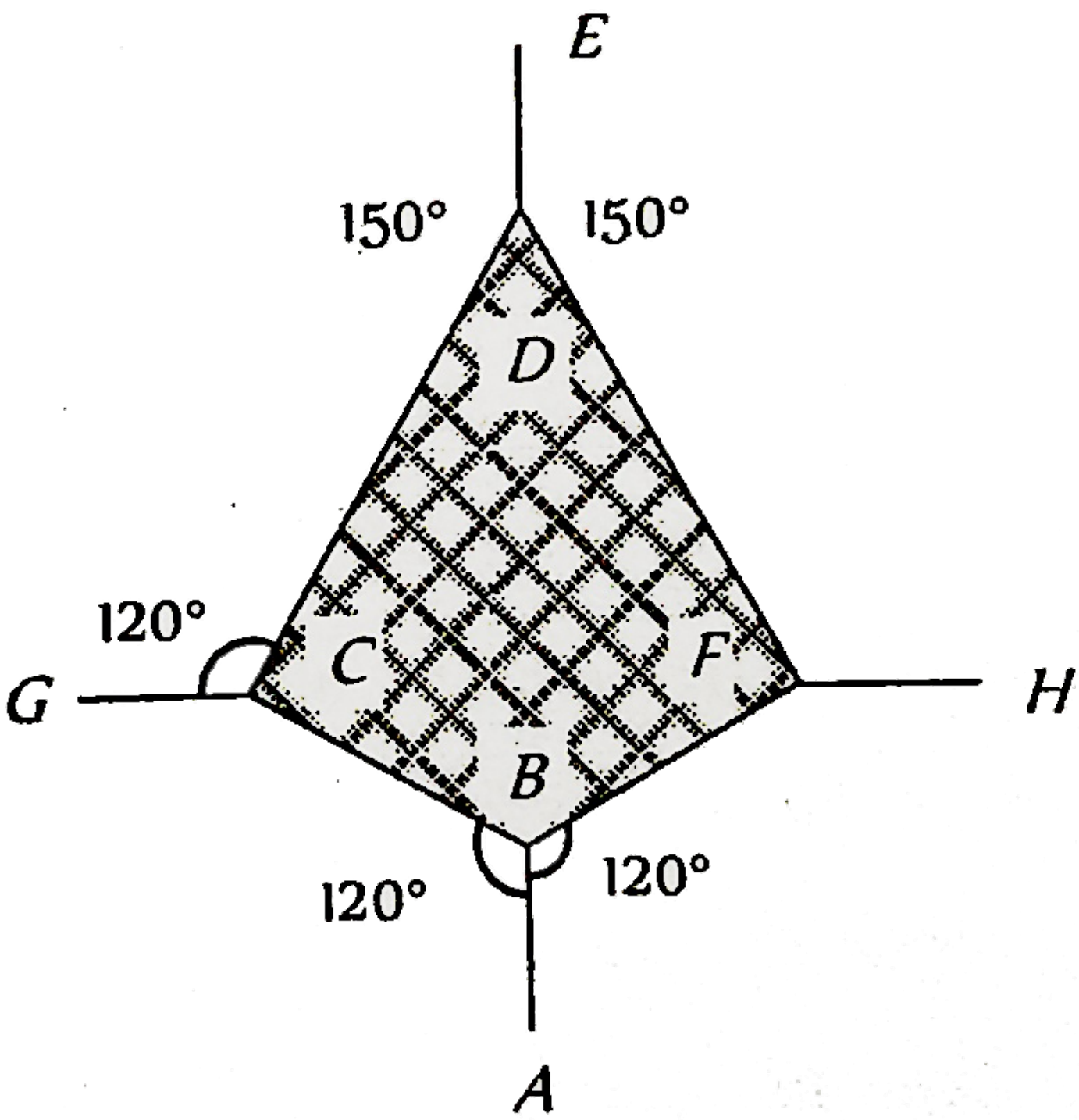
Q-39 - 15821398

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

CORRECT ANSWER: C

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Q-40 - 15821406

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

CORRECT ANSWER: D

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Q-41 - 15821408

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) $R = mg \times ma$

CORRECT ANSWER: B

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Q-42 - 11746190

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°

CORRECT ANSWER: A

SOLUTION:

Given that

$$\overrightarrow{P} = P_x\hat{j} + P_y\hat{j}$$

$$= 2\cos t\hat{i} + 2\sin t\hat{j}$$

.

$$\overrightarrow{F} = \frac{d\overrightarrow{p}}{dt} =$$

$$-2\sin t\hat{i} + 2\cos t\hat{j}$$

Now, $\overrightarrow{F}.\overrightarrow{p} = 0$ i.e., angle between $\overrightarrow{F}$ and $\overrightarrow{p}$ is 90 .

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Q-43 - 11745776

A body is moving with velocity $30m/s$ towards east. After $10s$ its velocity becomes $40m/s$ towards north. The average acceleration of the body is.

(A) $7m/s^2$

(B) $\sqrt{7}m/s^2$

(C) $5m/s^2$

(D) $1m/s^2$

CORRECT ANSWER: C

SOLUTION:

Average acceleration = $\dfrac{\text{Change in velocity}}{\text{Total time}}$

$\overrightarrow{v_L} = 30\hat{i}m/$ and $\overrightarrow{v_i}$

$= 40\hat{j}m/s$

$\Delta\overrightarrow{v} = \overrightarrow{v_f} - \overrightarrow{v_i} = 40\hat{j}$

$- 30\hat{i}m/s$

$\left|\Delta\overrightarrow{v}\right|\sqrt{30^2 + 40^2}$

$= \sqrt{900 + 1600}$

$= 50m/s$

$$\vec{a} = \frac{\left|\overrightarrow{-V_f} - \vec{V_i}\right|}{\Delta t}$$

$$= \frac{\sqrt{50}}{10} = 50ms^{-2}$$

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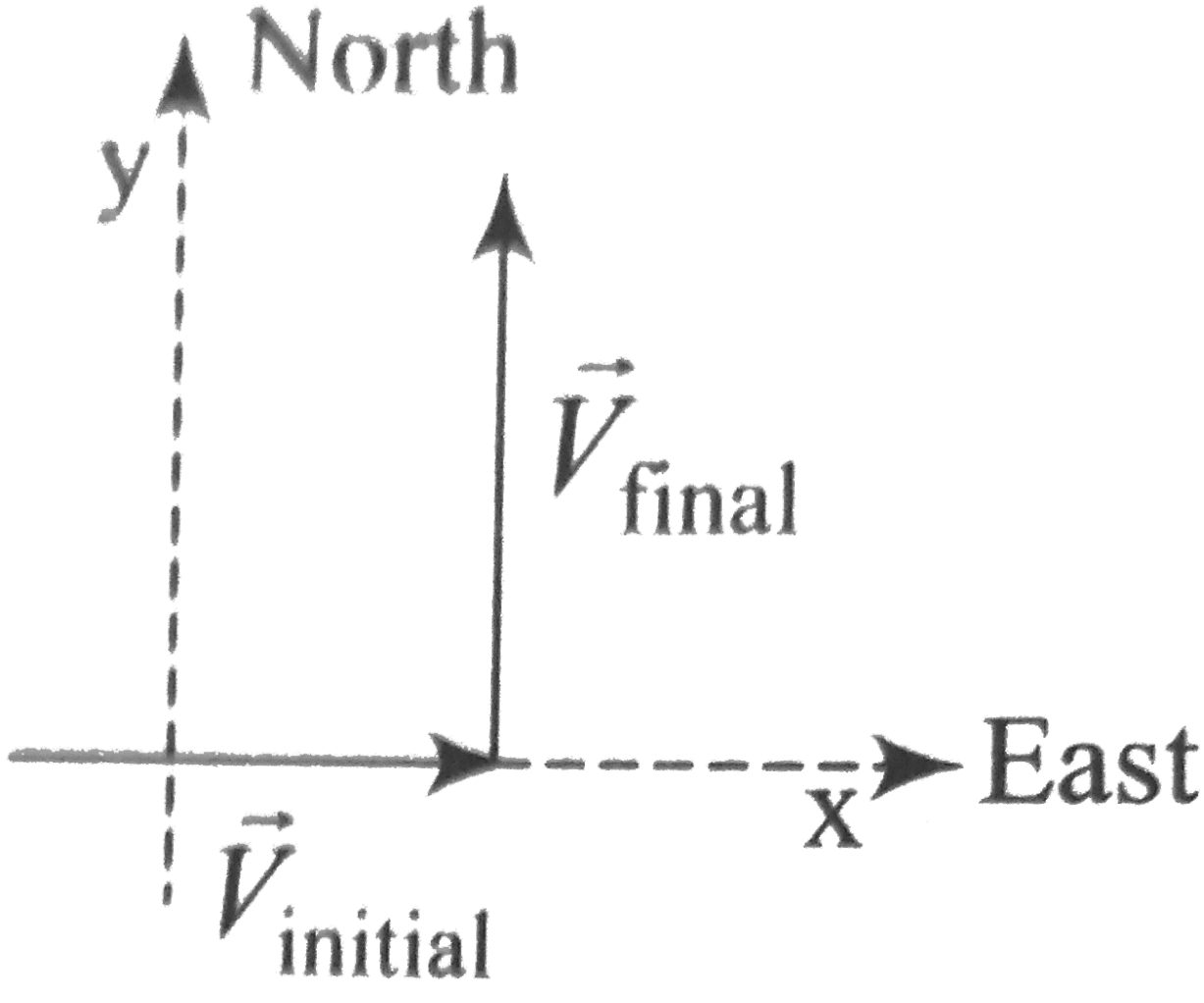

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Q-44 - 13075670

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 .

SOLUTION:

$$F = ma \Rightarrow F = m\frac{dv}{dt}$$

$$\Rightarrow 3x = m\frac{dv}{dx}\frac{dx}{dt}$$

$$3x = 8\frac{dv}{dx}v \Rightarrow 3xdx$$

$$= 8vdv$$

$$3\int_2^{10} xdx = \int_0^v vdx$$

$$\Rightarrow 3\left[\frac{x^2}{2}\right]_2^{10} = \left[\frac{v^2}{2}\right]_0^v$$

$$3[100 - 4] = 8v^2 \Rightarrow v^2$$

$$= \frac{3 \times 96}{8} = 36 \Rightarrow v$$

$$= 6ms^{-1}$$

Q-45 - 15821414

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

CORRECT ANSWER: C

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Q-46 - 13025906

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)

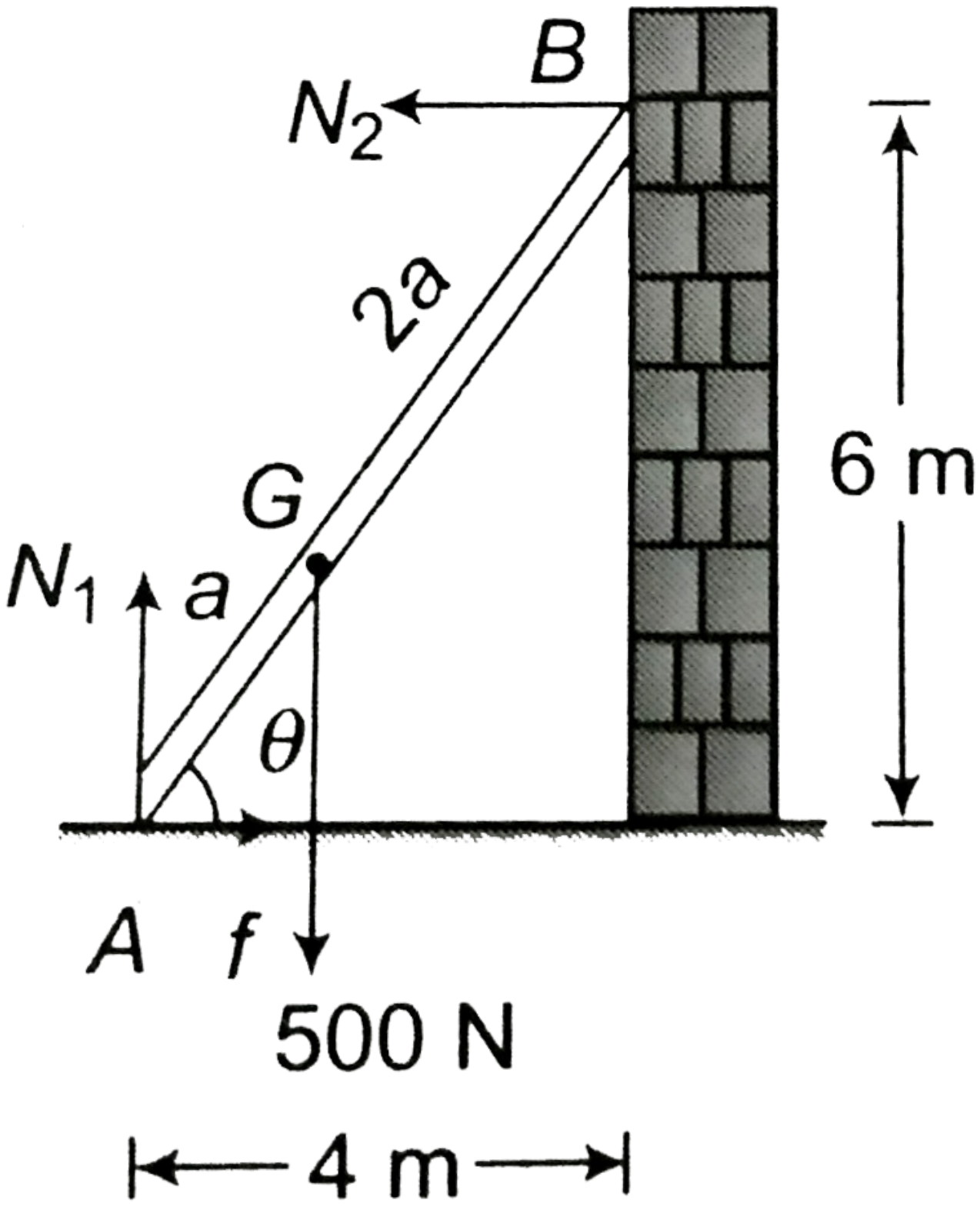
(A) 111

(B) 333

(C) 222

(D) 129

SOLUTION:



Let the length of the rod is $3a$, by geometry we have

$$3a = \sqrt{(4)^2 + (6)^2}$$

$$= \sqrt{5^2}$$

$$\uparrow : N_1 = 500$$

$$\rightarrow : f = N_2$$

$$\tau_A = 0 \Rightarrow N_2(6)$$

$$= 500(a\cos\theta)$$

$$N_2 = \frac{500}{6} \times \frac{\sqrt{52}}{3} \times \frac{4}{\sqrt{52}}$$

$$= \frac{2000}{18} = \frac{1000}{9} = 111N$$

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Q-47 - 13652058

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) $-2\alpha v^2/M$

(B) $-\alpha v^2 / M$

(C) $+\alpha v^2 / M$

(D) $-\alpha v^2$

CORRECT ANSWER: C

SOLUTION:

$$F = \frac{dp}{dt} = v\frac{dM}{dt} = v$$

$$\times \alpha v = \alpha v^2$$

$$a = \frac{F}{M} = \frac{\alpha v^2}{M}$$

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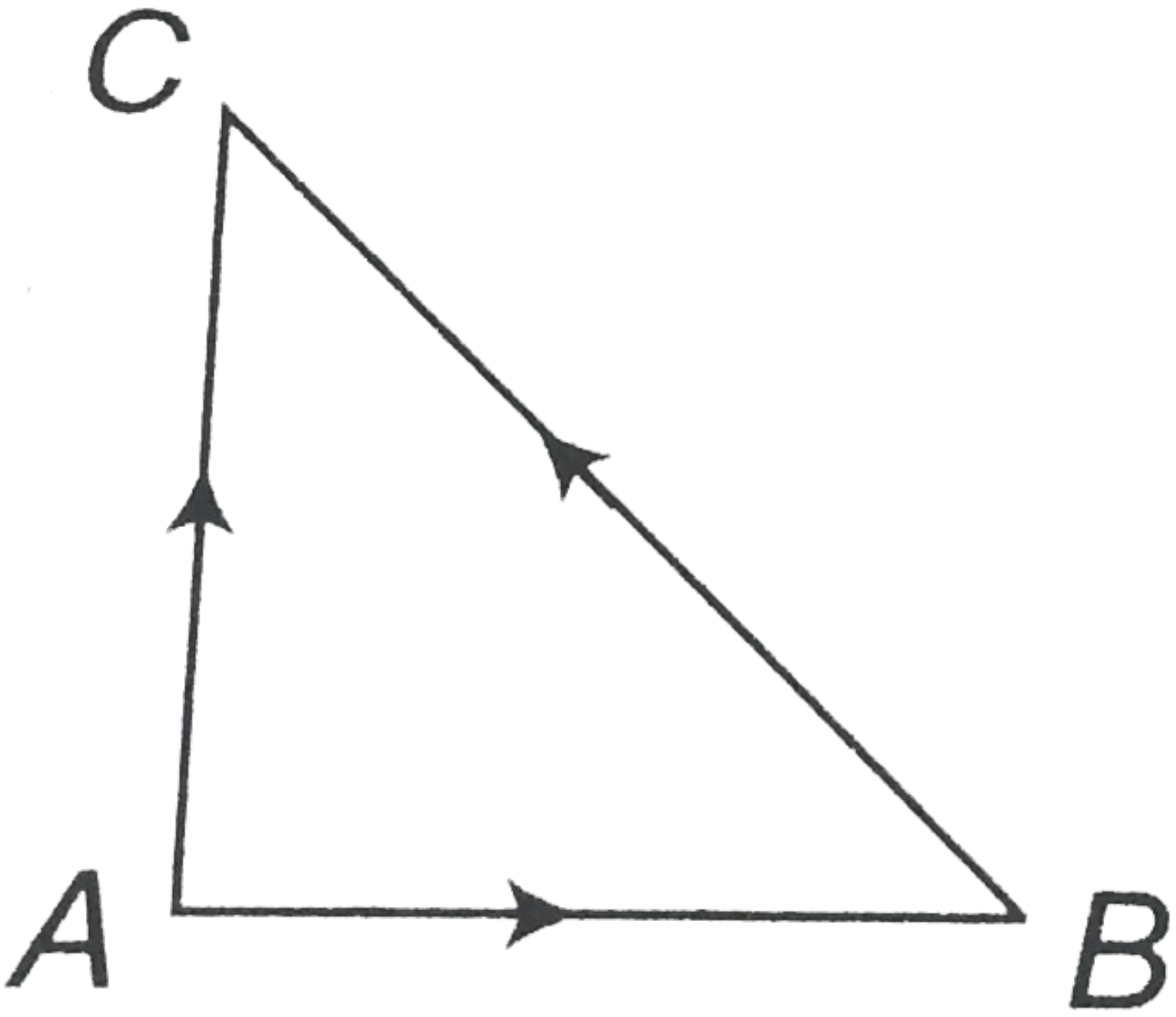
Q-48 - 14156256

Three forces start acting simultaneously on a particle moving with velocity $\overrightarrow{v}$. 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) $\overrightarrow{v}$ remaining unchanged

(B) less than $\overrightarrow{v}$

(C) greater than $\overrightarrow{v}$

(D) $\overrightarrow{v}$ in the direction of the largest force BC

CORRECT ANSWER: A

SOLUTION:

Net force =0

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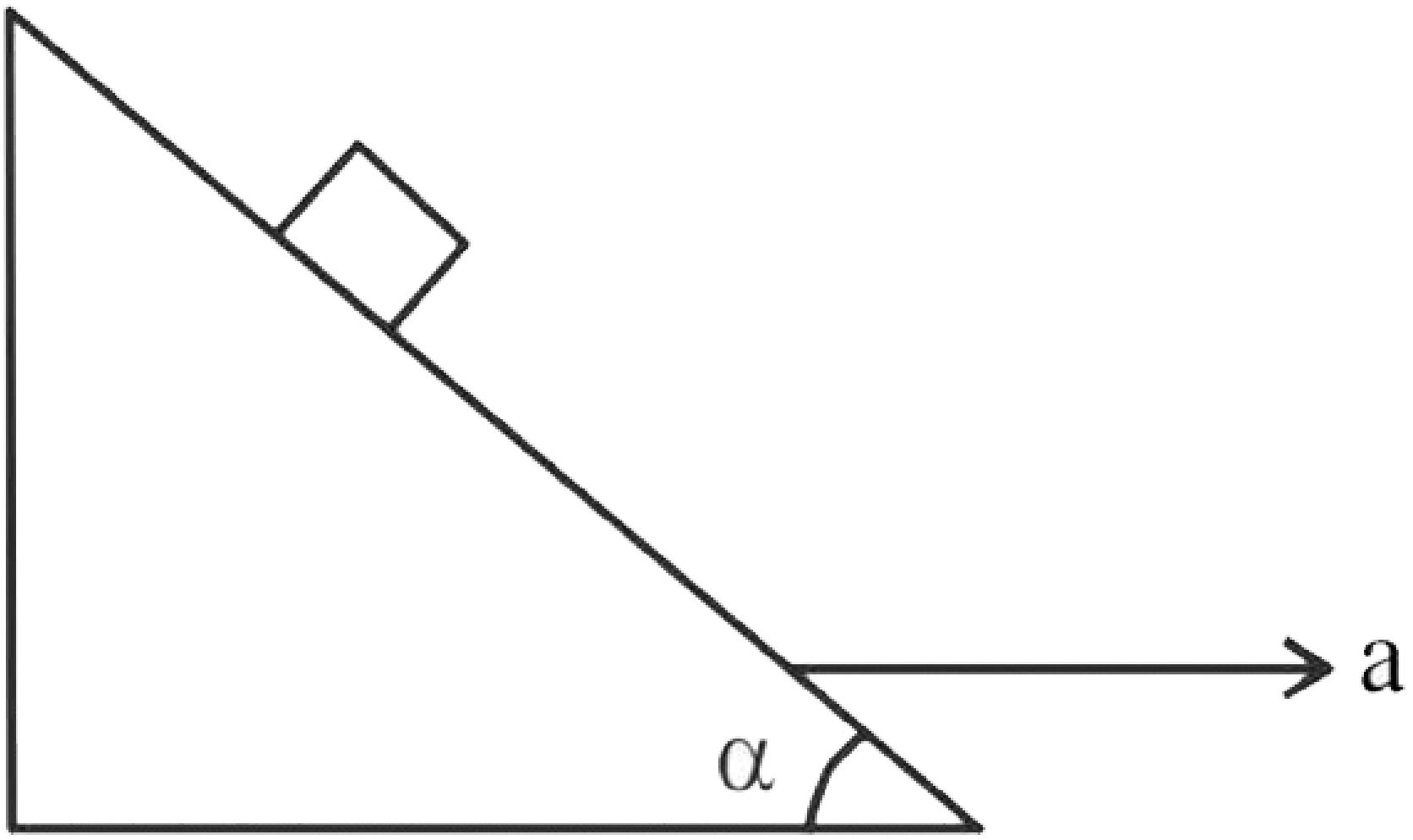
Q-49 - 10058561

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) (a) $g \cos ec\alpha$

(B) (b) $g / \tan \alpha$

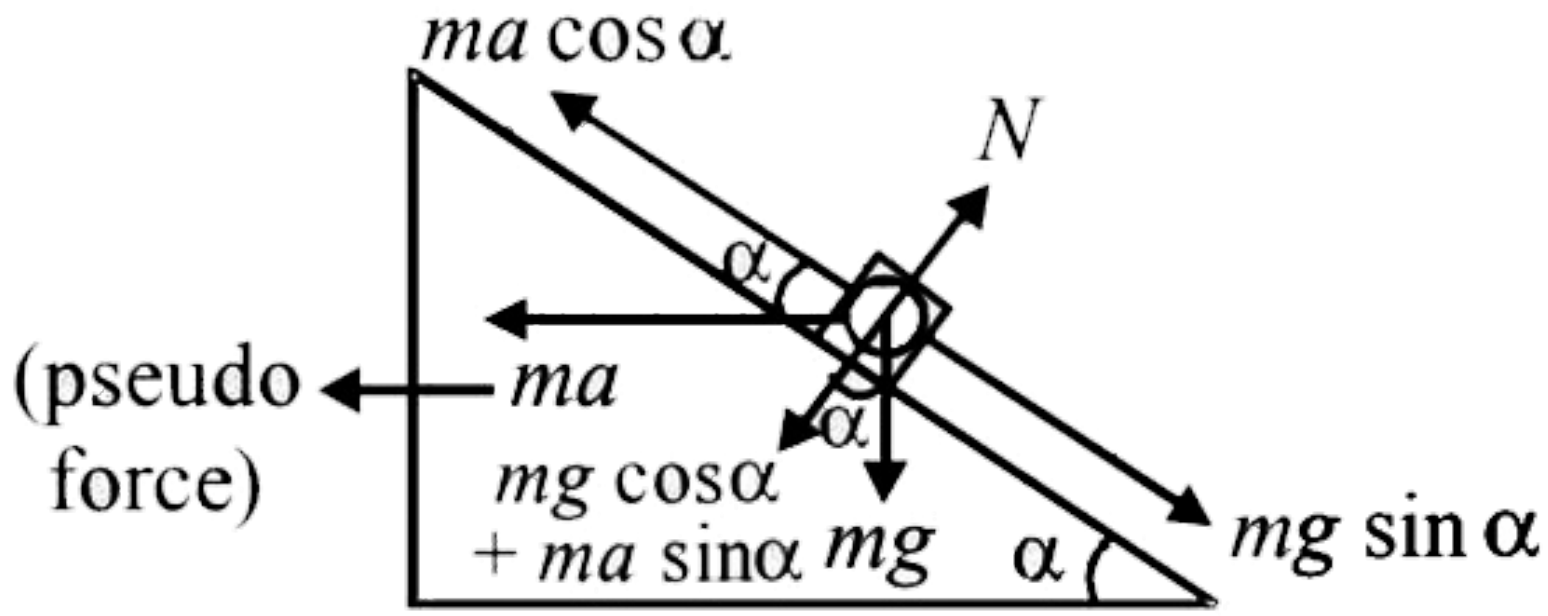
(C) (c) $g \tan \alpha$

(D) (d) g

CORRECT ANSWER: C

SOLUTION:

From diagram,



For block to remain stationary,

$$mg\sin\alpha = ma\cos\alpha$$

$$\Rightarrow a = g\tan\alpha$$

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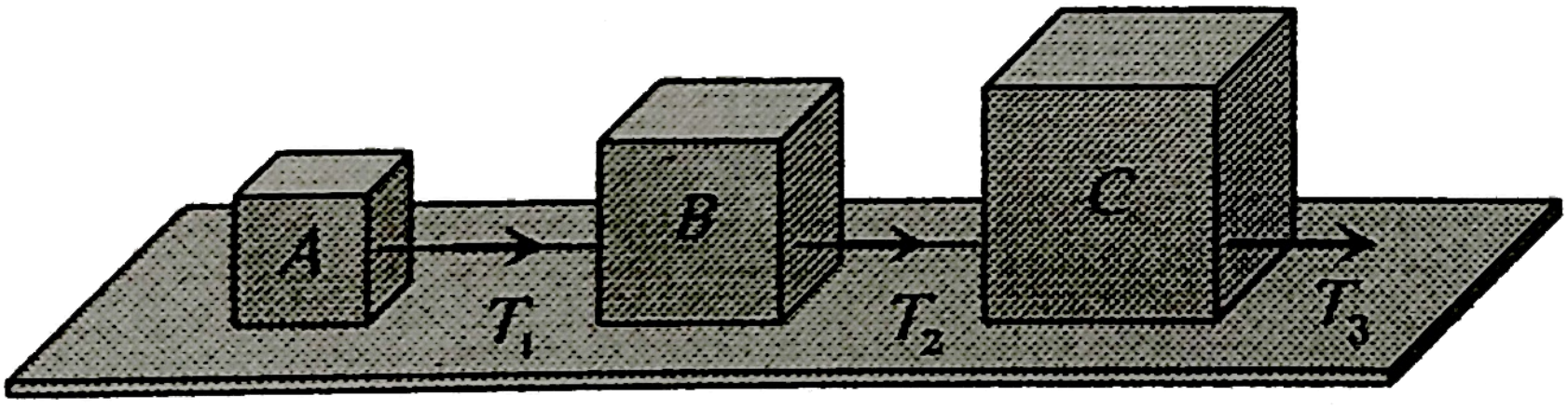
Q-50 - 15821525

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

CORRECT ANSWER: B

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Q-51 - 15821528

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) $\frac{m_2+m_3}{m_1+m_2+m_3}T$

CORRECT ANSWER: C

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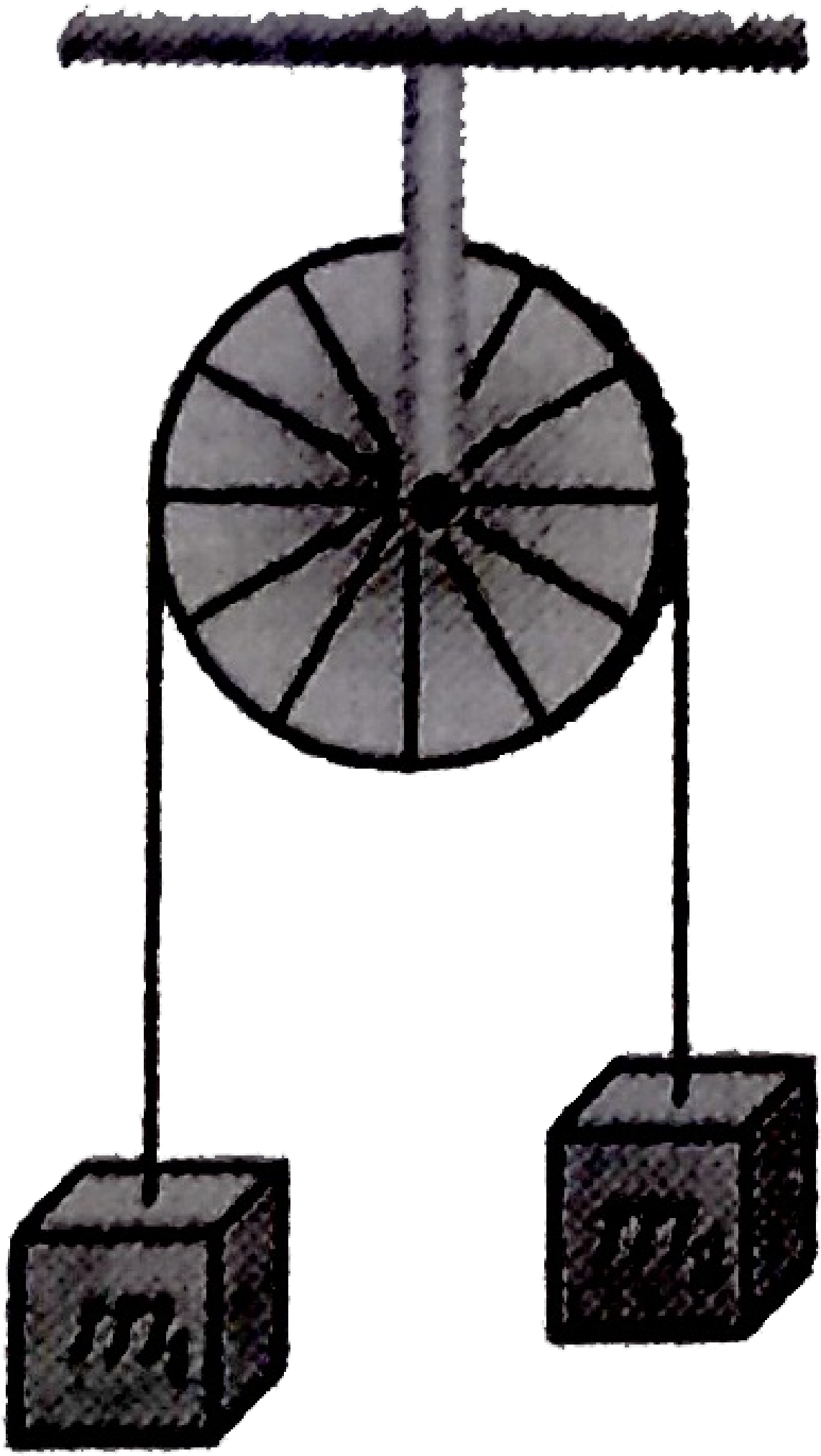
Q-52 - 15821538

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) $10m / s^2$

CORRECT ANSWER: C

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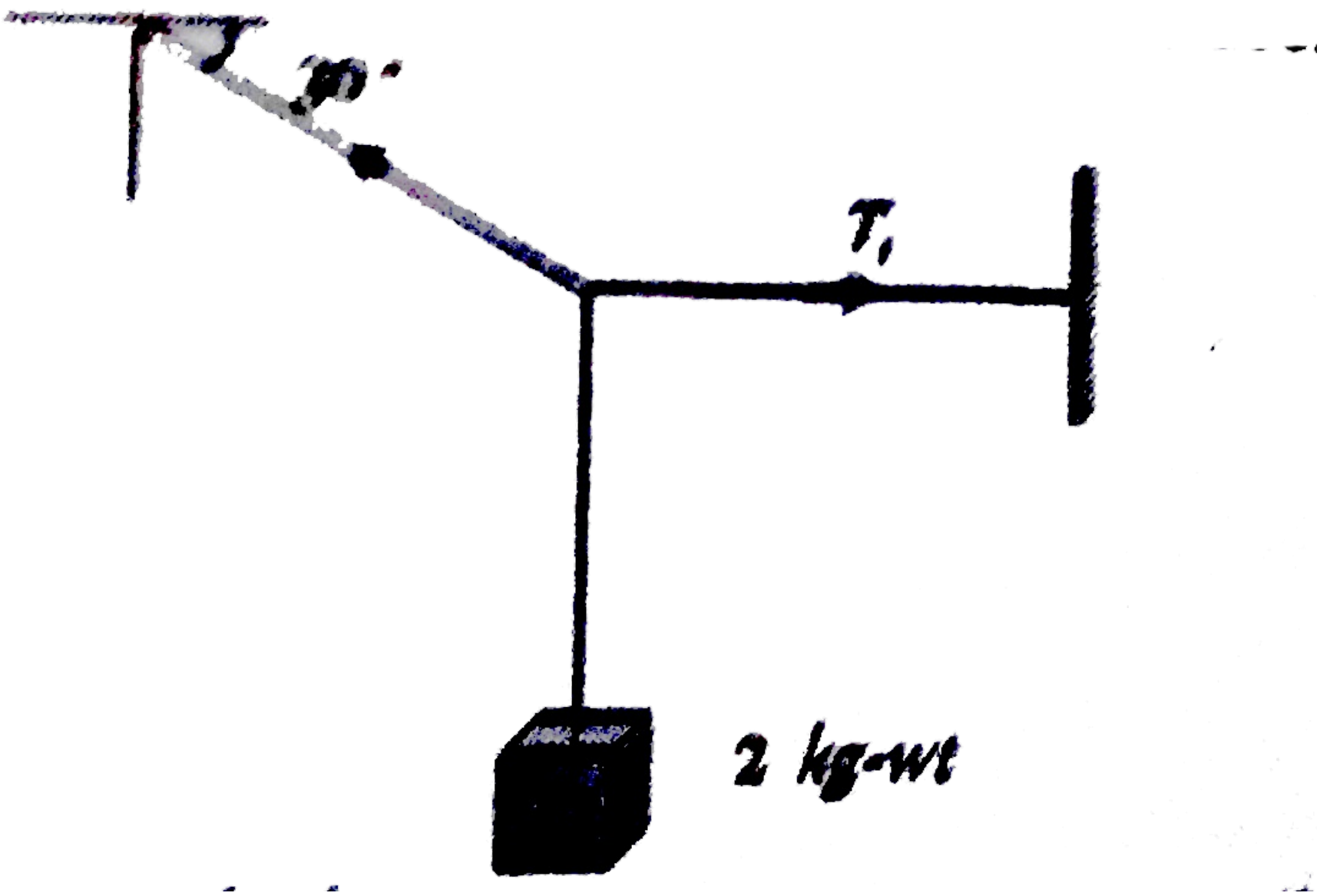
Q-53 - 15821540

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

CORRECT ANSWER: C

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Q-54 - 15821559

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

CORRECT ANSWER: C

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Q-55 - 15821531

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) $4.38m/s^2, 9.86N$

CORRECT ANSWER: A

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Q-56 - 10058522

A horizontal uniform rope of length L, resting on a frictionless horizontal surface, is pulled at one end by force F. What is the tension in the rope at a distance l from the end where the force is applied?

CORRECT ANSWER: A

SOLUTION:

From equation (i) $T = \frac{M}{L}(L - l)a$

Also, $F = Ma \ \therefore$

$$\frac{T}{F} = \left(\frac{L - l}{L}\right) \Rightarrow T$$

$$= F\left(1 - \frac{l}{L}\right)$$

Q-57 - 15821513

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

CORRECT ANSWER: B

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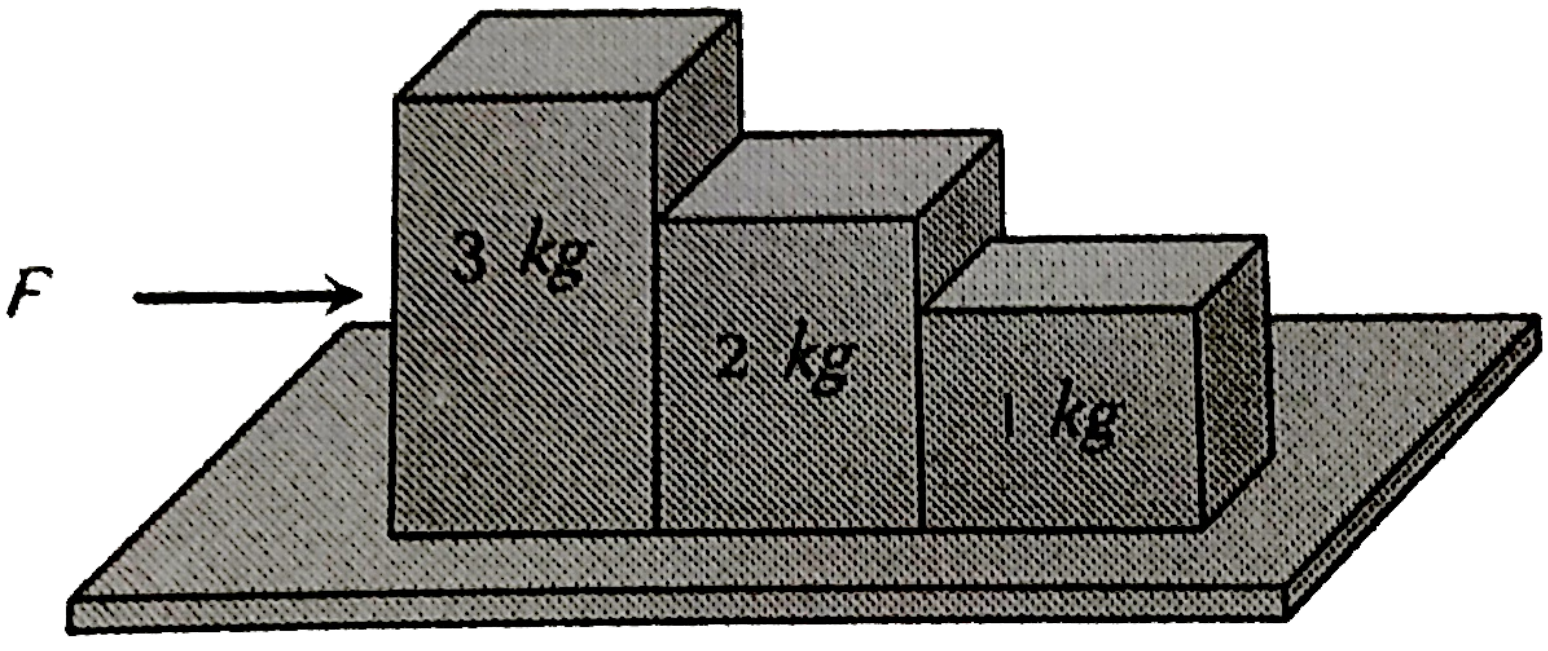
Q-58 - 15821512

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

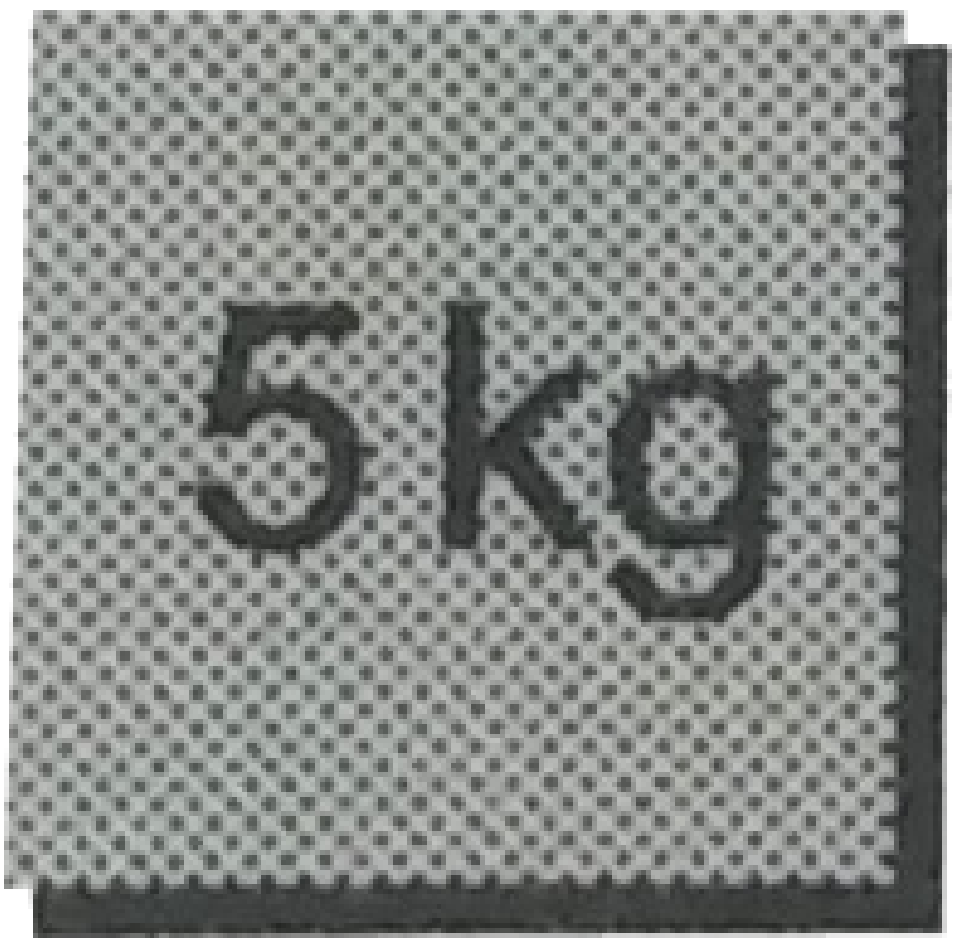
(C) Both A and B

(D) Neither A nor B

CORRECT ANSWER: A

Q-59 - 14156206

Two blocks 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' be the tensions in the two parts of the string, then



(A) zero

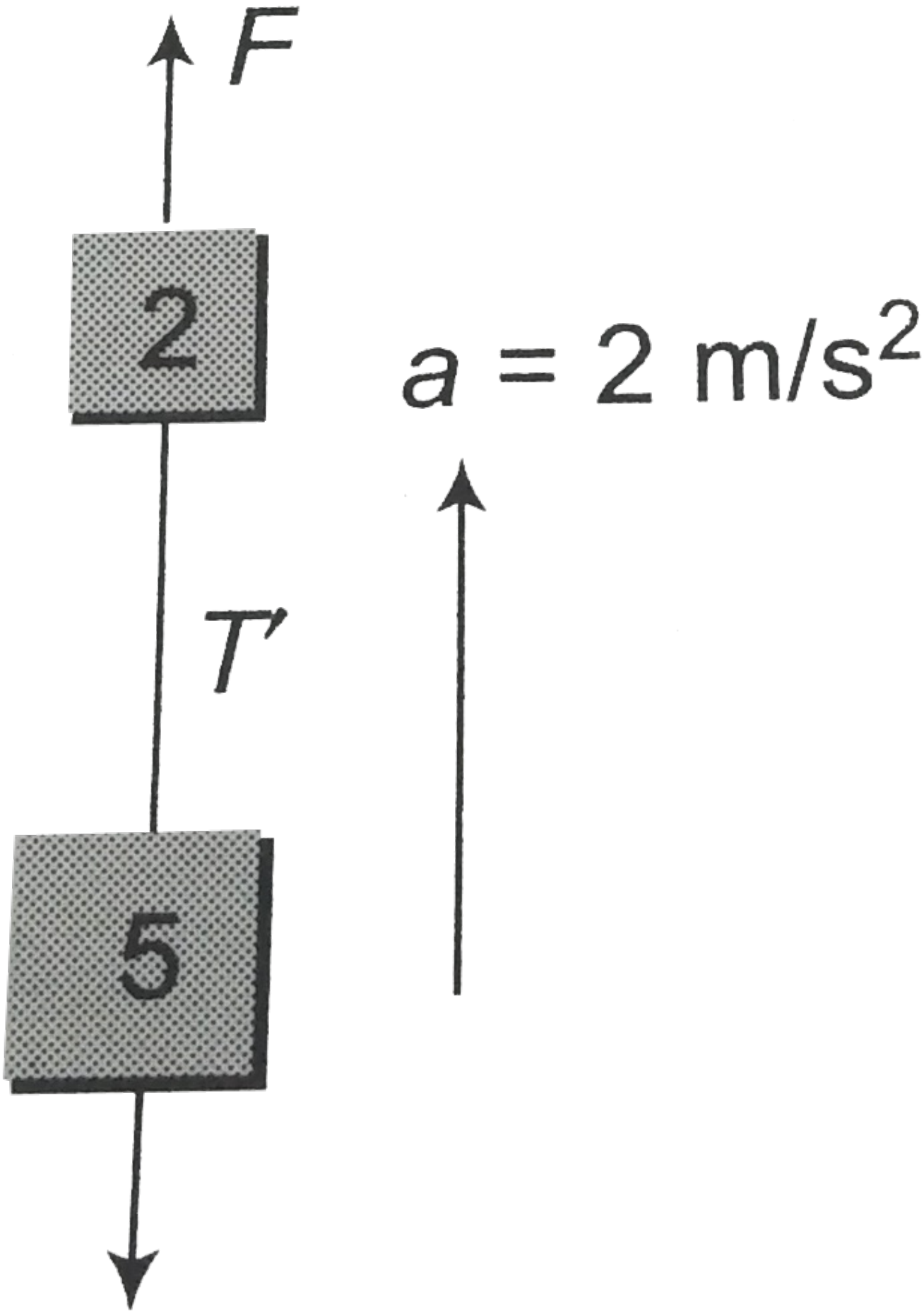
(B) 3,3 N

(C) 13,3 N

(D) 19,6 N

CORRECT ANSWER: C

SOLUTION:

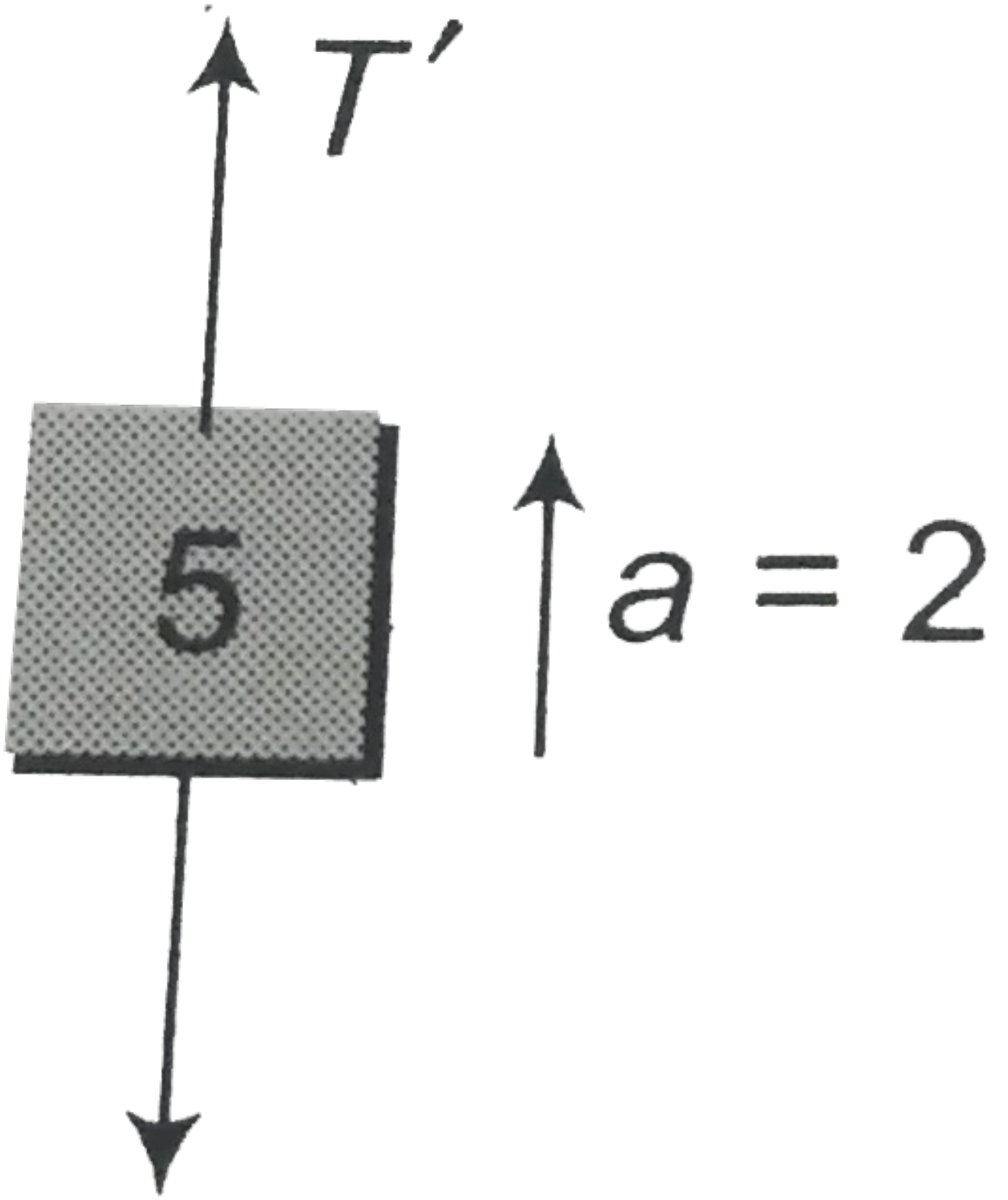


$$(2 + 5)g = 70$$

$$F = 70 = (2 + 5)a$$

$$= 7 \times 2$$

$$F84N = T'$$



$F = 70 = (2 + 5)a$

$= 7 \times 2$

$T' = 60N$

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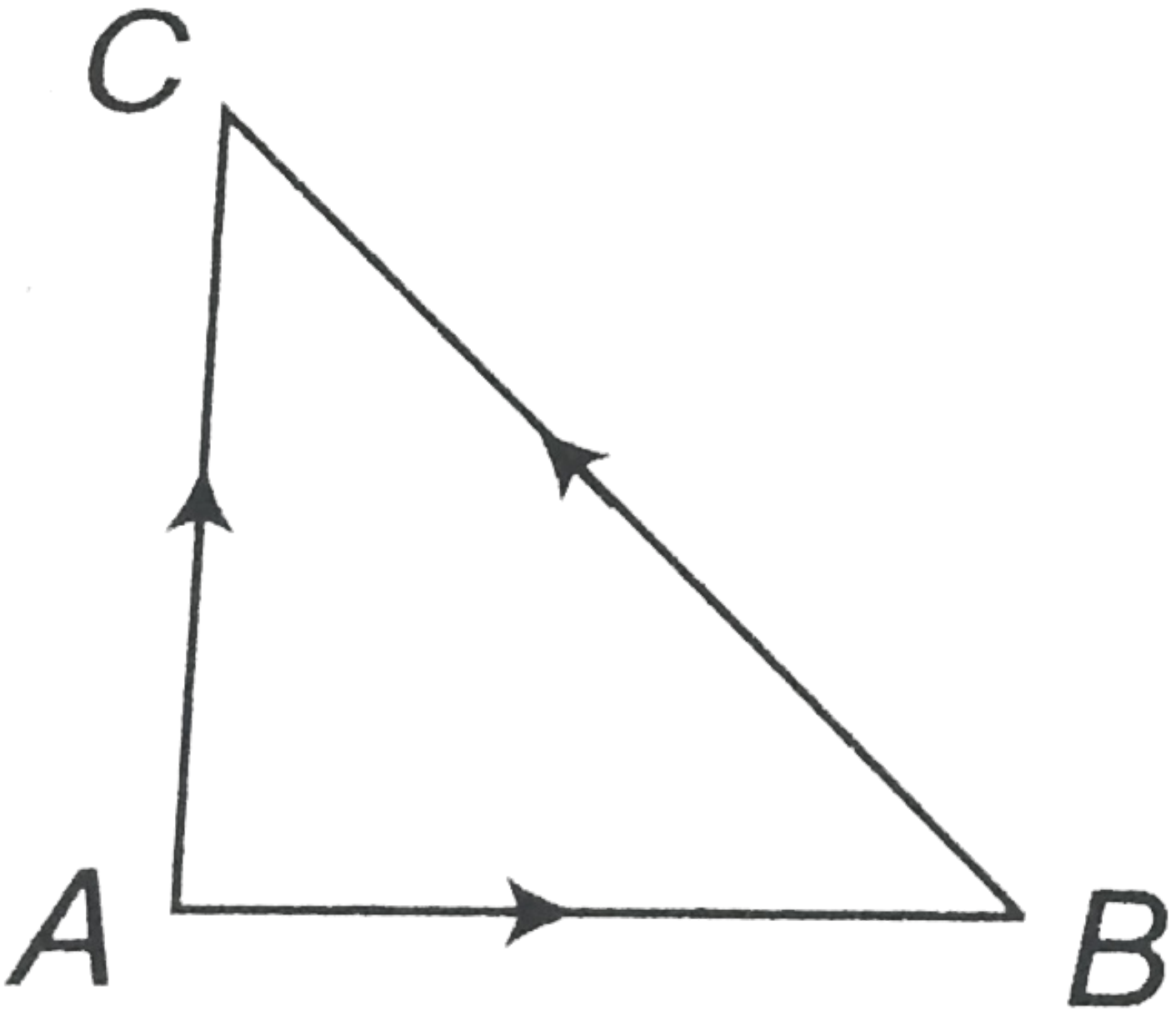
Q-60 - 14156256

Three forces start acting simultaneously on a particle moving with velocity $\overrightarrow{v}$. 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) $\overrightarrow{v}$ remaining unchanged

(B) less than $\overrightarrow{v}$

(C) greater than $\overrightarrow{v}$

(D) $\overrightarrow{v}$ in the direction of the largest force BC

CORRECT ANSWER: A

SOLUTION:

Net force =0