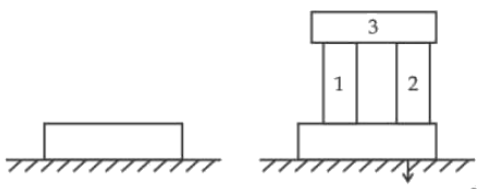
JEE Main 2021 | Force and Motion

Question 1

(Only one correct answer) 2021

A steel block of $10\ kg$ rests on horizontal floor as shown. When three iron cylinders are placed on its as shown, the block and cylinders go down with an acceleration $0.2\ m/s^2$. Then normal reaction R' by the floor if mass of the iron cylinders are equal and of $20\ kg$ each, is $\ldots\ldots N$. (Take $g = 10\ m/s^2$ and $\mu_s = 0.2$)

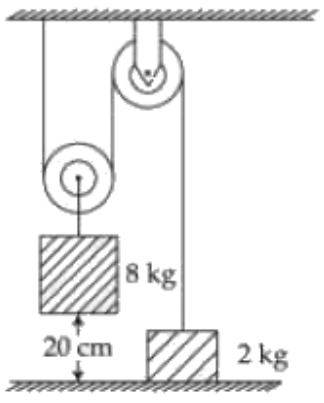


- (a) 686
- (b) 714
- (c) 684
- (d) 716

Question 2

(Only one correct answer) 2021

The boxes of masses $2\ kg$ and $8\ kg$ are connected by a massless string passing over smooth pulleys. Calculate the time taken by box of mass $8\ kg$ to strike the ground starting from rest. (use $g = 10\ m/s^2$):



- (a) $0.25\ s$
- (b) $0.34\ s$
- (c) $0.2\ s$
- (d) $0.4\ s$

Question 3

2021

(Only one correct answer)

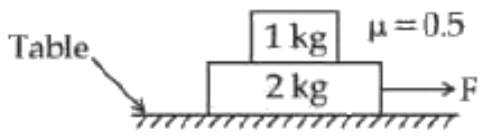
Particle of mass m is suspended from a ceiling through a string of length L. The particle moves in a horizontal circle of radius r such that $r = \frac{L}{\sqrt{2}}$. The speed of particle will be :

- (a) $\sqrt{\frac{rg}{2}}$
- (b) $2\sqrt{rg}$
- (c) $\sqrt{2rg}$
- (d) $\sqrt{rg}$

Question 4

(Integer type question) 2021

The coefficient of static friction between two blocks is 0.5 and the table is smooth. The maximum horizontal force that can be applied to move the blocks together is ..... N. (take $g = 10\ ms^{-2}$)



Question 5

(Only one correct answer) 2021

Statement-I : If three forces $\overrightarrow{F_1}$, $\overrightarrow{F_2}$ and $\overrightarrow{F_3}$ are represented by three sides of triangle and $\overrightarrow{F_1} + \overrightarrow{F_2} = -\overrightarrow{F_3}$, then three forces are concurrent forces and satisfy the condition for equilibrium :

Statement-II : A triangle made up of three forces $\overrightarrow{F_1}$, $\overrightarrow{F_2}$ and $\overrightarrow{F_3}$ as its sides taken in the same order, satisfy the condition for translatory equilibrium. In the light of the above statements, choose the most appropriate answer from the options given below :

- (a) Both Statement-I and Statement-II are false.
- (b) Both Statement-I and Statement-II are true.
- (c) Statement-I is false but Statement-II is true.
- (d) Statement-I is true but Statement-II is false.

Question 6

(Integer type question) 2021

A car is moving on a plane inclined at 30° to the horizontal with an acceleration of $10\ ms^{-2}$ parallel to the plane upward. A bob is suspended by a string from the roof of car. The angle in degrees which the string makes with the vertical is ..... (Given $= 10\ ms^{-2}$)

Question 7

(Integer type question) 2021

An inclined plane is bent in such a way that the vertical cross section is given by $y = \frac{x^2}{4}$ where y is in vertical and x in horizontal direction. If the upper surface of this curved plane is rough with coefficient of friction $\mu = 0.5$, the maximum height in cm at which a stationary block will not slip downward is ..... cm.

Question 8

(Integer type question) 2021

A body mass of $1\ kg$ rests on a horizontal floor with which it has a coefficient of static friction $\frac{1}{\sqrt{3}}$. It is desired to make the body move by applying the minimum possible force $F\ N$. The value of F will be ..... (Round off the Nearest Integer) [Take $g = 10\ ms^{-2}$]

Question 9

(Only one correct answer) 2021

A particle projected with velocity v_0 along x-axis. A damping force is acting on the particle which is proportional to the square of the distance from the origin i.e., $ma = -\alpha x^2$. The distance at which the particle stops

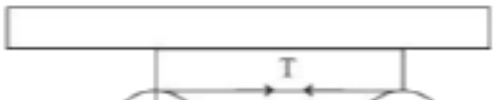
- (a) $\left(\frac{2mv_0}{3\alpha}\right)^{\frac{1}{3}}$
- (b) $\left(\frac{2mv_0^2}{3\alpha}\right)^{\frac{1}{2}}$
- (c) $\left(\frac{3mv_0^2}{2\alpha}\right)^{\frac{1}{2}}$
- (d) $\left(\frac{3mv_0^2}{2\alpha}\right)^{\frac{1}{3}}$

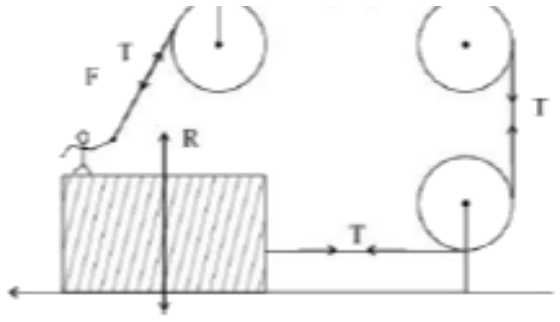
Question 10

(Integer type question) 2021

A boy of mass $4\ kg$ is standing on a piece of wood having mass $5\ kg$. If the coefficient of friction between the wood and the floor is 0.5, the maximum force that the boy can exert on the rope so that the piece of wood does not move from its place is ..... N.

(Round off to the Nearest Integer)





Question 11

(Integer type question) 2021

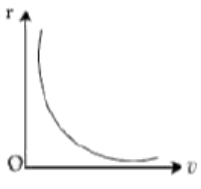
A small bob tied at one end of a thin string of length $1\ m$ is describing a vertical circle so that the maximum and minimum tension in the string are in the ratio $5:1$. The velocity of the bob at the highest position is ..... m/s. (Take $g = 10\ m/s^2$)

Question 12

(Only one correct answer) 2021

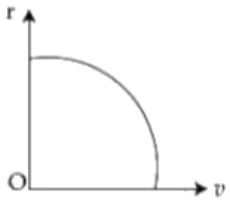
A particle of mass m moves in a circular orbit under the central potential field, $U(r) = C/r$, where C is a positive constant. The correct - velocity graph of the particle's motion is :

○ (a)

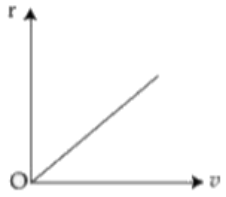


○ (a)

○ (a)



○ (a)



Question 13

(Integer type question) 2021

The potential energy (U) of a diatomic molecule is a function dependent on r (interatomic distance) as $U = \frac{\alpha}{r^{10}} - \frac{\beta}{r^5} - 3$ where, α and β are positive constants. The equilibrium distance between two atoms will be $\left(\frac{2\alpha}{\beta}\right)^{\frac{a}{b}}$, where $a =$.....

Question 14

(Integer type question)

A body of mass $'m'$ is launched up on a rough inclined plane making an angle of 30° with the horizontal. The coefficient of friction between the body and plane is $\frac{\sqrt{x}}{5}$ if the time of ascent is half of the time of descent. The value of x is .....

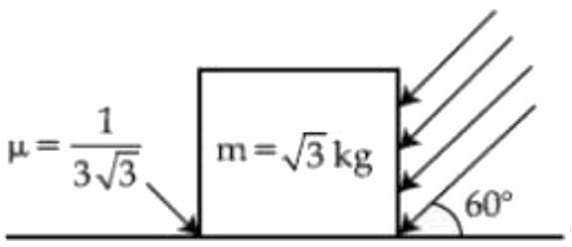
2021

Question 15

(Integer type question)

As shown in the figure, a block of mass $\sqrt{3}\ kg$ is kept on a horizontal rough surface of coefficient of friction $\frac{1}{3\sqrt{3}}$. The critical force to be applied on the vertical surface as shown at an angle 60° with horizontal such that it does not move, will be $3x$. The value of x will be ($g = 10\ m/s^2$; $\sin 60^\circ = \frac{\sqrt{3}}{2}$; $\cos 60^\circ = \frac{1}{2}$)

2021



Question 16

(Only one correct answer)

Two masses A and B, each of mass M are fixed together by a massless spring. A force acts on the mass B as shown in figure. If the mass A starts moving away from mass B with acceleration $'a'$, then the acceleration of mass B will be:

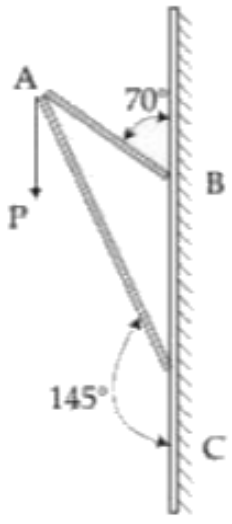
2021

- (a) $\frac{MF}{F+ma}$
- (b) $\frac{F-Ma}{M}$
- (c) $\frac{Ma-F}{M}$
- (d) $\frac{F+Ma}{M}$

Question 17

(Integer type question) 2021

Consider a frame that is made up of two thin massless rods AB and AC as shown in the figure. A vertical force P of magnitude $100\ N$ is applied at point A of the frame.



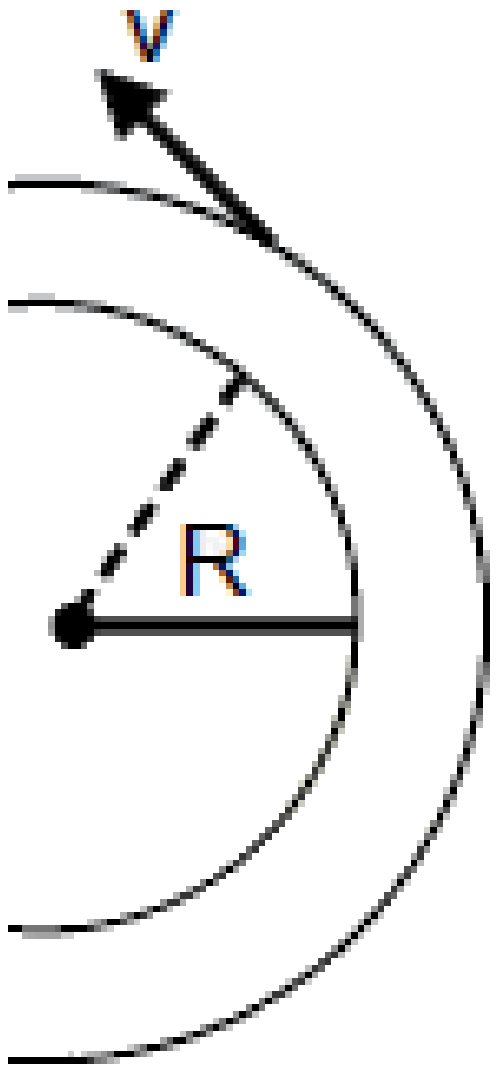
Suppose the force $\overrightarrow{P}$ is resolved parallel to the arms AB and AC of the frame. The magnitude of the resolved component along the arm AC is $x\ N$.

The value of x, to the nearest integer, is [Given : $\sin(35^\circ) = 0.573, \cos(35^\circ) = 0.819$ $\sin(110^\circ) = 0.939, \cos(110^\circ) = -0.342$]

Question 18

(Only one correct answer) 2021

A modern grand - prix racing car of mass m is travelling on a flat track in a circular arc of radius R with a speed v. If the coefficient of static friction between the tyres and the track is μ_s, then the magnitude of negative lift F_L, acting downwards on the car is (Assume forces on the four tyres are identical and $g =$ acceleration due to gravity



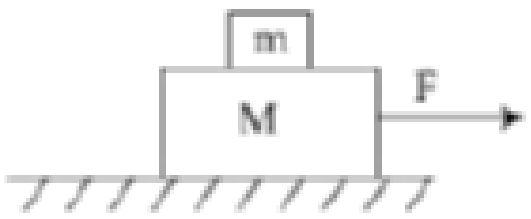
○ (a) $m\left(g - \frac{v^2}{\mu_s R}\right)$

- (b) $-m\left(g+\frac{v^2}{\mu_s R}\right)$
- (c) $m\left(\frac{v^2}{\mu_s R}+g\right)$
- (d) $m\left(\frac{v^2}{\mu_s R}-g\right)$

Question 19

(Integer type question) 2021

Two block $(m=0.5\ kg$ and $M=4.5\ kg)$ are arranged on a horizontal frictionless table as shown in figure. The coefficient of static friction between the two blocks is $\frac{3}{7}$. Then the maximum horizontal force that can be applied on the larger block so that the block move together is ..... N. (Round off to the Nearest integer) [Take g as $9.8\ ms^{-1}$]



Question 20

(Integer type question) 2021

The coefficients of static friction between a wooden block of mass $0.5\ kg$ and a vertical rough wall is 0.2. The magnitude of horizontal force that should be applied on the block to keep it adhere to the wall will be ..... N. $[g=10\ ms^{-2}]$

Question 21

(Only one correct answer) 2021

The normal reaction $'N'$ for a vehicle of $800\ kg$ mass, negotiating a turn on a 30° banked road at maximum possible speed without skidding is $.....\times 10^3\ kg\ m/s^2$. (Given $\cos 30^\circ=0.87,\ \mu_s=0.2$)

- (a) 7.2
- (b) 12.4
- (c) 10.2
- (d) 6.96

Question 22

(Integer type question) 2021

A person standing on a spring balance inside a stationary lift measures $60\ kg$. The weight of that

person if the lift descends with uniform downward acceleration of $1.8\ m/s^2$ will be ..... N. ($g = 10\ m/s^2$)

Question 23

(Only one correct answer) 2021

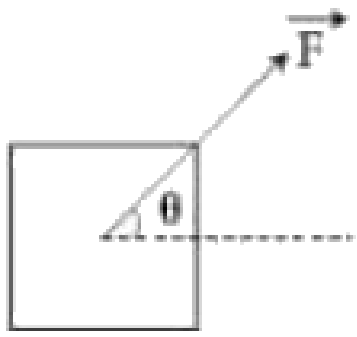
A block of $200\ g$ mass moves with a uniform speed in a horizontal circular groove, with vertical side walls of radius $20\ cm$. If the block takes $40\ s$ to complete one round, the normal force by the side walls of the groove is :

- (a) $6.28 \times 10^{-3}\ N$
- (b) $0.0314\ N$
- (c) $9.859 \times 10^{-2}\ N$
- (d) $9.859 \times 10^{-4}\ N$

Question 24

(Only one correct answer) 2021

A block of mass m slides along a floor while a force of magnitude F is applied to it at an angle θ as shown in figure. The coefficient of kinetic friction is μ_k. Then, the block's acceleration $'a'$ is given by: (g is acceleration due to gravity)



- (a) $\frac{F}{m}\cos\theta - \mu_k\left(g + \frac{F}{m}\sin\theta\right)$
- (b) $\frac{F}{m}\cos\theta - \mu_k\left(g - \frac{F}{m}\sin\theta\right)$
- (c) $-\frac{F}{m}\cos\theta - \mu_k\left(g - \frac{F}{m}\sin\theta\right)$
- (d) $\frac{F}{m}\cos\theta + \mu_k\left(g - \frac{F}{m}\sin\theta\right)$

Question 25

(Only one correct answer) 2021

Statement I : A cyclist is moving on an unbanked road with a speed of $7\ kmh^{-1}$ and takes a sharp circular turn along a path of radius of $2\ m$ without reducing the speed. The static friction coefficient is 0.2. The cyclist will not slip and pass the curve. ($g = 9.8\ m/s^2$)

Statement II : If the road banked at an angle of 45°, cyclist can cross the curve of $2\ m$ radius with the speed of $18.5\ kmh^{-1}$ without slipping.

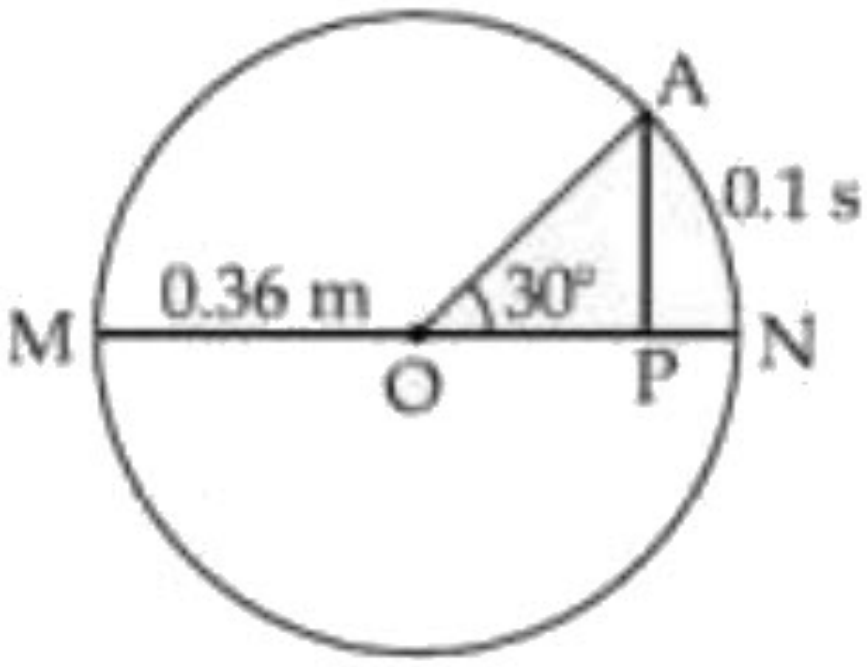
In the light of the above statements, choose the correct answer from the options given below.

- (a) Statement I is correct and statement II is incorrect
- (b) Both statement I and statement II are false
- (c) Statement I is incorrect and statement II is correct
- (d) Both statement I and statement II are true

Question 26

(Only one correct answer) 2021

The point A moves with a uniform speed along the circumference of a circle of radius $0.36\ m$ and covers 30° in $0.1\ s$. The perpendicular projection $'P'$ from $'A'$ on the diameter MN represents the simple harmonic motion of $'P'$. The restoration force per unit mass when P touches M will be:

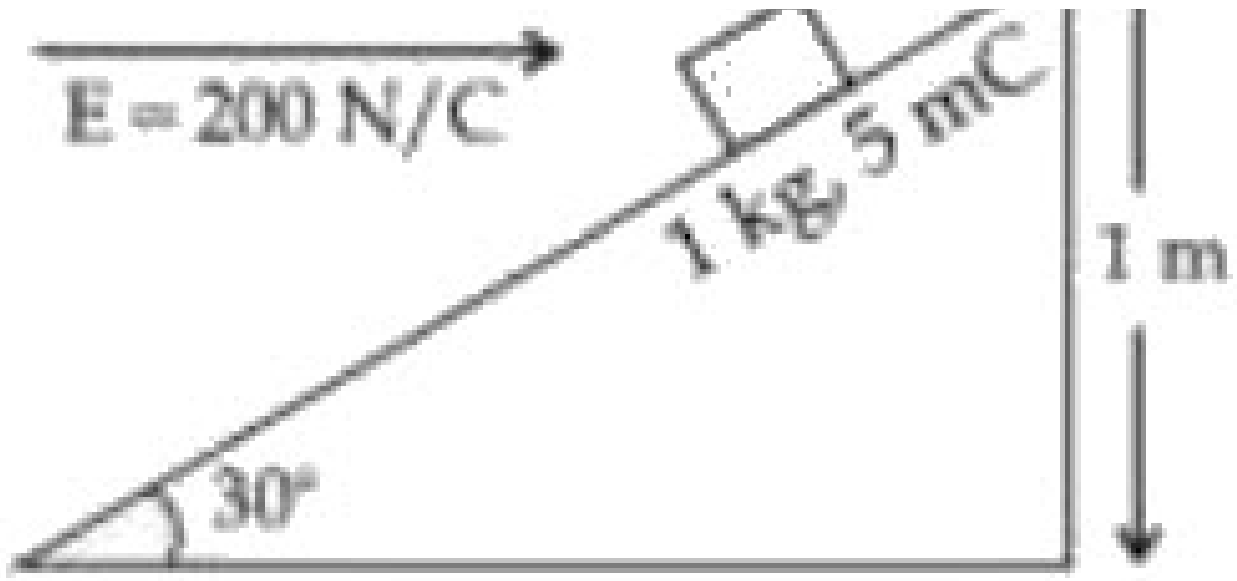


- (a) $0.49\ N$
- (b) $100\ N$
- (c) $50\ N$
- (d) $9.87\ N$

Question 27

(Only one correct answer) 2021

An inclined plane making an angle of 30° with the horizontal is placed in a uniform horizontal electric field $200\ \frac{N}{C}$ as shown in the figure. A body of mass $1\ kg$ and charge $5\ mC$ is allowed to slide down from rest at a height of $1\ m$. If the coefficient of friction is 0.2, find the time taken by the body to reach the bottom. [$g = 9.8\ m/s^2$; $\sin 30^{\circ} = \frac{1}{2}$; $\cos 30^{\circ} = \frac{\sqrt{3}}{2}$]



(a) $2.3\ s$

(b) $0.46\ s$

(c) $1.3\ s$

(d) $0.92\ s$

Question 28

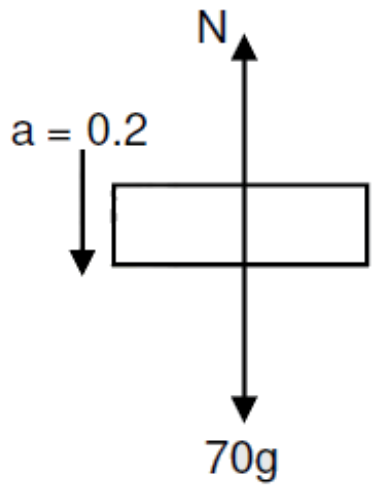
(Integer type question) 2021

A boy pushes a box of mass $2\ kg$ with a force $\overrightarrow{F} = (20\hat{i} + 10\hat{j})\ N$ on a frictionless surface. If the box was initially at rest, then ..... m is displacement along the x-axis after $10\ s$.

Answer 1

Correct answers is A

Solution:

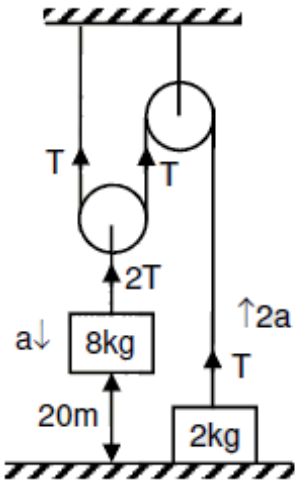


$$70\ g - N = 70 \times 0.2$$
$$N = 700 - 14;$$
$$N = 686$$

Answer 2

Correct answers is D

Solution:



$8g - 2T = 8a$
$T - 2g = 4a$
$4g = 16a$
$\implies a = \dfrac{5}{2}\ m/s^2$

Thus, $s = ut + \dfrac{1}{2}at^2$

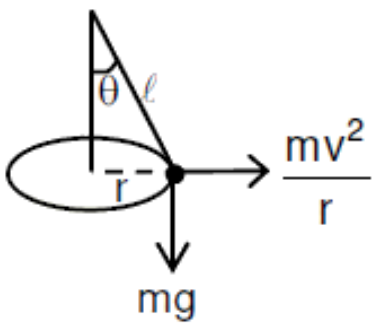
$0.2 = 0 + \dfrac{1}{2} \times \dfrac{5}{2} \times t^2$

$t = 0.4\ s$

Answer 3

Correct answers is D

Solution:



$\sin\theta = \dfrac{1}{\sqrt{2}}$

$\theta = 45^\circ$

$\tan\theta = \dfrac{\dfrac{mv^2}{r}}{mg} = \dfrac{v^2}{Rg} = 1$

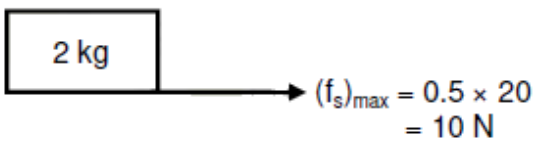
$v^2 = rg$

$v = \sqrt{rg}$

Answer 4

Solution:

For $F_{\max}$ with relative rest, f_s between $2\ kg$ & $1\ kg$ must be maximum.



$$a_{\text{comman}} \leq a_{\max}$$
$$\frac{F}{3} \leq \frac{10}{2}$$
$$F \leq 15$$

Answer 5

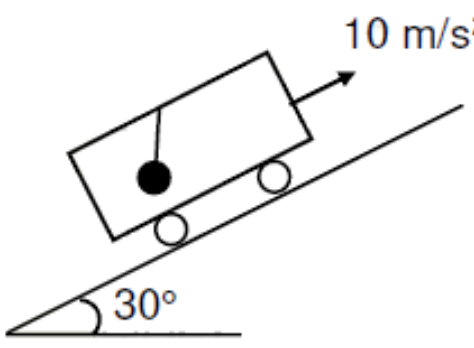
Correct answers is B

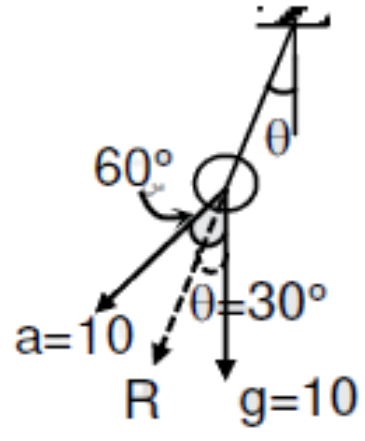
Solution:

Correct option is (b).

Answer 6

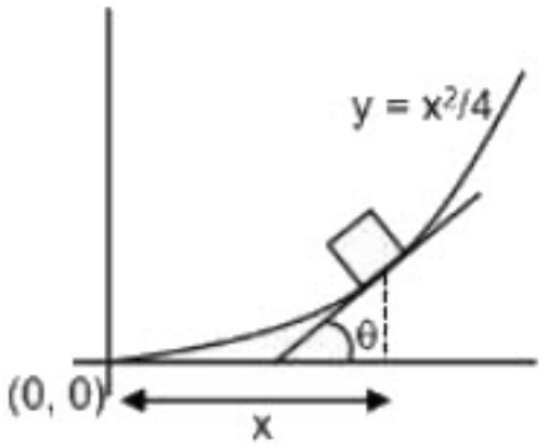
Solution:





Answer 7

Solution:



$$\frac{dy}{dx} = \frac{x}{2} = \tan\theta = \mu$$
$$x = 2\mu$$
$$y = \frac{x^2}{4} = \frac{4\mu^2}{4} = \frac{1}{4}\, m = 25\, cm$$

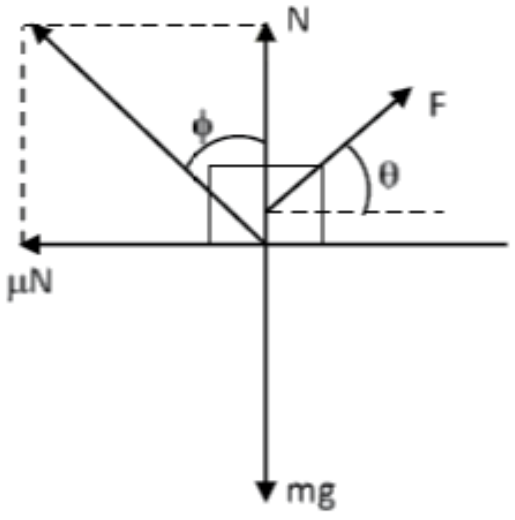
Answer 8

Solution:

$$\tan\phi = \frac{\mu_s N}{N} = \mu_s$$

$$\sin\phi = \frac{\mu_s}{\sqrt{\mu_s^2 + 1}}$$

Block is in limiting equilibrium



Lammi's theorem

$$\frac{F}{\sin(\pi - \phi)} = \frac{mg}{\sin(90 - \theta + \phi)}$$

$$F = \frac{mg\sin\phi}{\cos(\phi - \theta)}$$

$$\text{When} \quad \theta = \phi \qquad F \text{ is minimum}$$

$$F_{\min} = mg\sin\phi = \frac{mg\mu_s}{\sqrt{\mu_s^2 + 1}} = \frac{mg \times \frac{1}{\sqrt{3}}}{\sqrt{\frac{1}{3} + 1}} = 5\ N$$

Answer 9

Correct answers is D

Solution:

$$mv\frac{dv}{dx} = -\alpha x^2$$

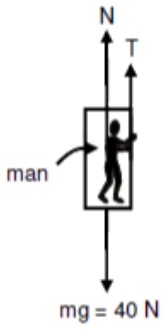
$$\int_{v_0}^{0} vdv = -\frac{\alpha}{m}\int_{0}^{x} x^2 dx$$

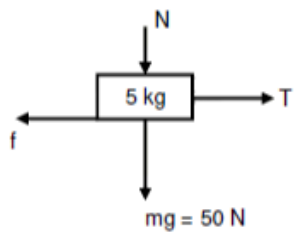
$$\frac{v_0^2}{2} = \frac{\alpha}{m}.\frac{x^3}{3}$$

$$x = \left(\frac{3mv_0^2}{2\alpha}\right)^{\frac{1}{3}}$$

Answer 10

Solution:

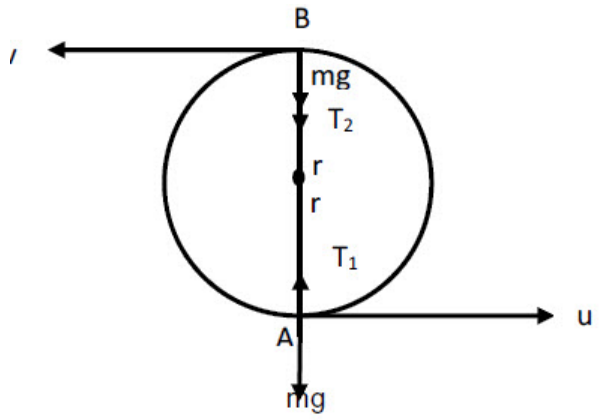




$$N + T = 40 \quad \text{and} \quad T = f$$
$$T = \mu N + mg = 0.5(N + 50)$$
$$N = 2T - 50$$
$$2T - 50 + T = 40$$
$$T = 30$$

Answer 11

Solution:



we know that $T_{\max} - T_{\min} = 6\ mg$

and given that $\dfrac{T_{\max}}{T_{\min}} = 5$

Solving there $T_{\max} = \dfrac{15}{2}\ mg$ and $T_{\min} = \dfrac{3}{2}\ mg$

$$T_2 = T_{\min} = \frac{mv^2}{r} - mg\ ; \quad \frac{5}{2}\ mg = \frac{mv^2}{r}$$

$$V = 5\ m/s$$

Answer 12

Correct answers is A

Solution:

$$F_r = -\frac{dU}{dr} = -\frac{C}{r^2}$$

Using the newton's 2nd law $F_r = ma_r = \dfrac{mv^2}{r}$

we get

$$v = \sqrt{\frac{C}{rm}}\ ; \quad v \propto \frac{1}{r^{1/2}}$$

Answer 13

Solution:

$$U = \frac{\alpha}{r^{10}} - \frac{\beta}{r^5} - 3$$

$$F = -\frac{dU}{dr} = \frac{\alpha(-10)}{r^{11}} - \frac{\beta(-5)}{r^6}$$

At Equilibrium $F = 0$

$$\frac{\alpha(10)}{r^{11}} = \frac{\beta(5)}{r^6}$$

$$r^5 = \frac{10\alpha}{5\beta}$$

$$r = \left(\frac{2\alpha}{\beta}\right)^{\frac{1}{5}}$$

$$\frac{a}{b} = \frac{1}{5}$$

$$\therefore \qquad a = 1 \quad \text{and} \quad b = 5$$

Answer 14

Solution:

$$S = \frac{1}{2} a_A t_A^2 \text{ ...(i)}$$

$$S = \frac{1}{2} a_D t_D^2 \text{ ...(ii)}$$

From Equation (i) and (ii)

$$\frac{t_A^2}{t_D^2} = \frac{a_D}{a_A}$$

$$\implies \frac{t_A^2}{t_D^2} = \frac{g\sin\theta - \mu g\cos\theta}{g\sin\theta + \mu g\cos\theta}$$

$$\implies \frac{t_A}{t_D} = \sqrt{\frac{g\sin\theta - \mu g\cos\theta}{g\sin\theta + \mu g\cos\theta}}$$

$$\implies \frac{1}{2} = \sqrt{\frac{1 - \sqrt{3}\mu}{1 + \sqrt{3}\mu}}$$

$$\implies 1 + \sqrt{3}\mu = 4 - 4\sqrt{3}\mu$$

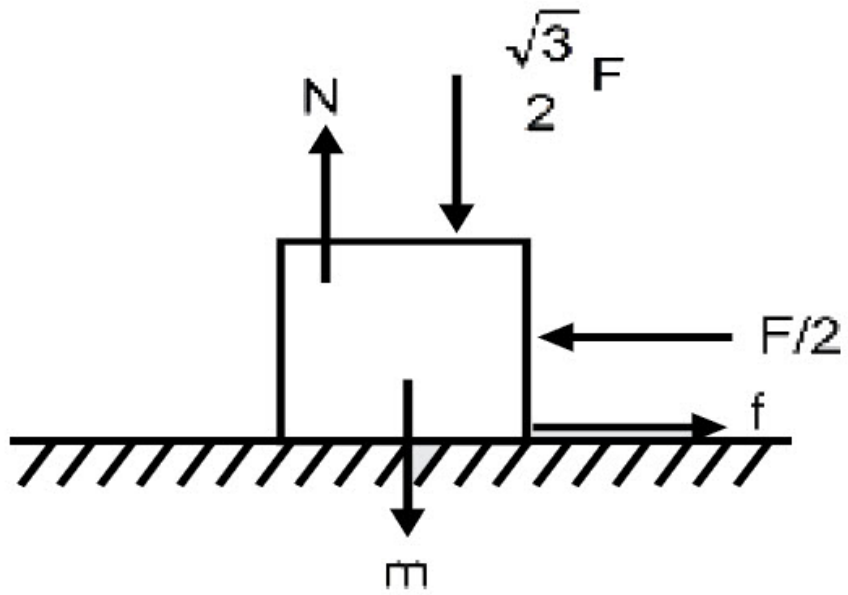
$$\implies 5\sqrt{3}\mu = 3$$

$$\implies \mu = \frac{\sqrt{3}}{5}$$

Answer 15

Solution:

$$N = \frac{\sqrt{3}F}{2} + mg$$



For no slipping

$$\frac{F}{2} \leq f_{\max} \leq \mu\left(\frac{\sqrt{3}}{2}F + mg\right)$$

$$\frac{F}{2} \leq \frac{1}{3\sqrt{3}}\left(\frac{\sqrt{3}}{2}F + mg\right) \leq \frac{F}{6} + \frac{g}{3}\ ;$$

$$\frac{F}{2} - \frac{F}{6} \leq \frac{g}{3}$$

$$\frac{F}{3} \leq \frac{g}{3}$$

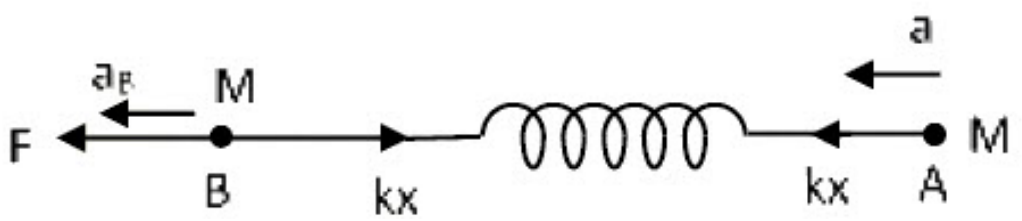
$$F \leq 10$$

So, $x = \dfrac{10}{3}$

Answer 16

Correct answers is B

Solution:



$$a_A = \frac{kx}{M}$$

$$a_B = \frac{F - kx}{M} = \frac{F - Ma}{M} = \frac{F}{M} - a$$

Answer 17

Solution:

Component along AC

$$= 100\cos 35^\circ = 100 \times 0.819 = 82\ N$$

Answer 18

Correct answers is D

Solution:

$$\frac{mv^2}{R} = \mu_s N \quad \Longrightarrow \quad N = \frac{mv^2}{\mu_s R}$$

$$mg + F = N\,; \quad F = N - mg\,; \quad F = \frac{mv^2}{\mu_s R} - mg$$

Answer 19

Solution:

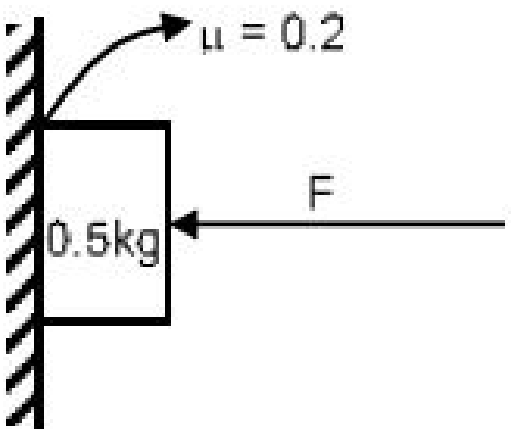
Maximum acceleration of $0.5\ kg$ block is

$$= \frac{f}{m} = \frac{3}{7} \times \frac{0.5 \times g}{0.5} = \frac{3}{7} \times 9.8$$

$$F_{\max} = (m + M)a_{\max} = 5 \times \frac{3}{7} \times 9.8 = 21\ N$$

Answer 20

Solution:



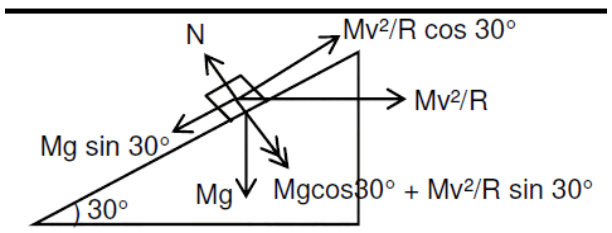
$$\mu F = mg$$

$$F = \frac{mg}{\mu} = \frac{0.5 \times 10}{0.2} = 25\ N$$

Answer 21

Correct answers is C

Solution:



Perpendicular to inclined plane

$$N = mg\cos 30^\circ + \frac{mv^2}{R}\sin 30^\circ$$

$$N - mg\cos 30^\circ = \frac{mv^2}{R}\sin 30^\circ \ \text{...(i)}$$

Along inclined plane

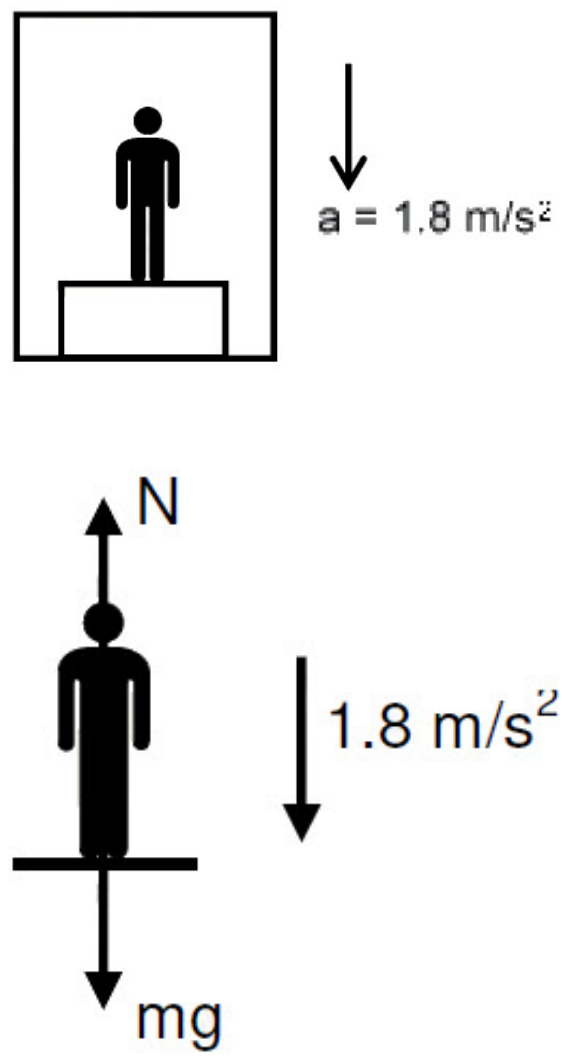
$$mg\sin 30^\circ + \mu_s N = \frac{mv^2}{R}\cos 30^\circ \ \text{...(ii)}$$

Dividing (i) by (ii)

$$\frac{N - mg\cos 30^\circ}{mg\sin 30^\circ + \mu_s N} = \tan 30^\circ$$
$$N = 10.2 \times 10^3 \ kg\, m/s^2$$

Answer 22

Solution:



FBD of man

$$mg - N = 1.8\ m$$
$$N = m(10 - 1.8) = 60 \times 8.2 = 492\ N$$

Thus weight of the man will be $492\ N$

Answer 23

Correct answers is D

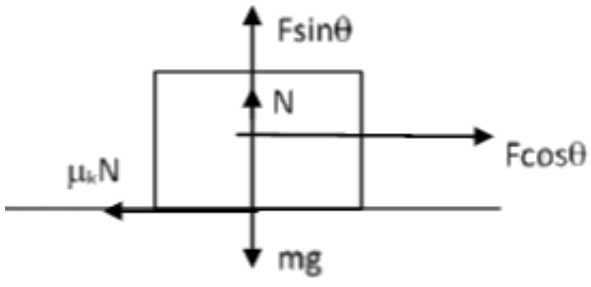
Solution:

$$N = f_c = mr\omega^2 = 0.2 \times 0.2 \times (\pi/20)^2$$
$$\implies \qquad = 4 \times 10^{-2} \times \frac{\pi^2}{400} = 9.859 \times 10^{-4}\ N$$

Answer 24

Correct answers is B

Solution:



$$N + F\sin\theta = mg$$

$$a = \frac{F\cos\theta - \mu_k N}{m}$$

$$= \frac{F\cos\theta - \mu_k(mg - F\sin\theta)}{m}$$

$$= \frac{F(\cos\theta + \mu_k \sin\theta) - \mu_k mg}{m}$$

Answer 25

Correct answers is D

Solution:

With no banking

$$f_L = \mu N = \mu mg = \frac{mV_{\max}^2}{R}$$

$$\mu mg = \frac{mV_{\max}^2}{R}$$

$$V_{\max} = \sqrt{\mu gR} = \sqrt{0.2 \times 10 \times 2} = 2\ m/s$$

given speed $= 7\ km/hr = \frac{7000}{3600}\ m/s = \frac{70}{36} = 1.94\ m/s$

as given speed $< V_{\max}$, so it will not slip

Statement-1 is correct

for banked road : (minimum & maximum speed)

$$V_{\max} = \sqrt{\frac{gR(\mu + \tan\theta)}{(1 - \mu\tan\theta)}} \qquad V_{\min} = \sqrt{\frac{gR(\tan\theta - \mu)}{(1 + \mu\tan\theta)}}$$

$$V_{\max} = \sqrt{\frac{10 \times 2(0.2 + \tan 45)}{(1 - 0.2\tan 45)}} \qquad V_{\min} = \sqrt{\frac{10 \times 2(1 - 0.2)}{(1 + 0.2)}}$$

$$V_{\max} = \sqrt{\frac{20 \times 1.2}{0.8}} \qquad V_{\min} = 3.65\ m/s$$

Given speed $= 18.5\ km/hr$

$$V = \frac{18.5 \times 1000}{3600} = 5.13\ m/s$$

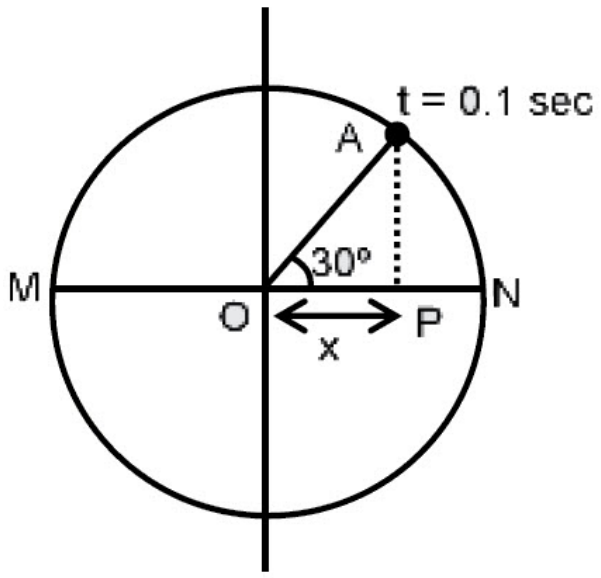
$$\text{As,} \qquad V_{\min} < V < V_{\max} \qquad \therefore \quad \text{it will not slip}$$

Answer 26

Correct answers is D

Solution:

When P touches M, particle A is at position M.



At that moment, restoration force, i.e. centripetal force, $F = m\omega^2 r$

or restoration force per unit mass, i.e. $\frac{F}{m} = \omega^2 r = \left(\frac{5\pi}{3}\right)^2 \times 0.36$

$= 9.87$ N

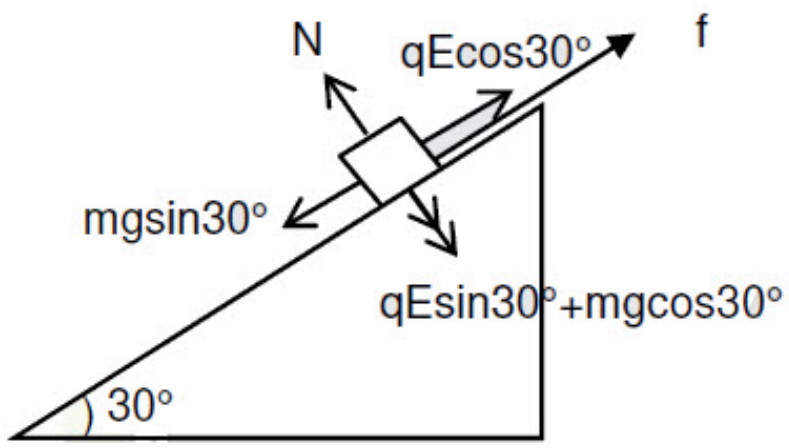
Answer 27

Correct answers is C

Solution:

$$N = qE\sin 30^\circ + mg\cos 30^\circ$$

$$N = 5 \times 10^{-3} \times 200 \times \frac{1}{2} + 1 \times 10 \times \frac{\sqrt{3}}{2} = 9.16$$



Acceleration

$$a = \frac{mg\sin 30^\circ - qE\cos 30^\circ - \mu N}{m}$$

$$a = \frac{5 - 0.866 - 1.832}{1} = 2.302$$

$$t = \sqrt{\frac{2l}{a}} = \sqrt{\frac{2 \times 2}{2.302}} = 1.31\ s$$

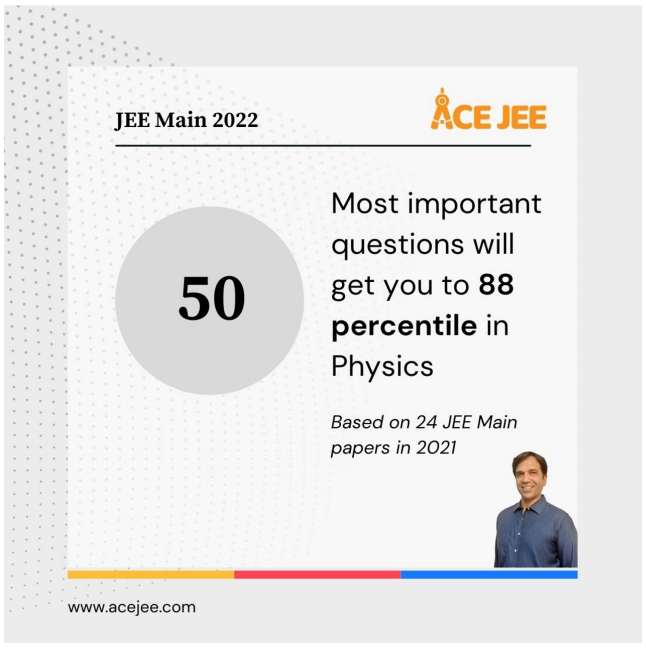
Answer 28

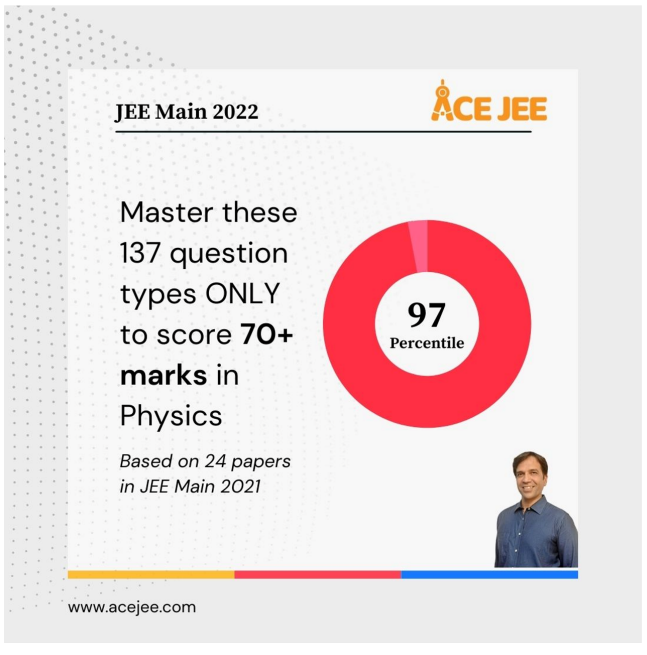
Solution:

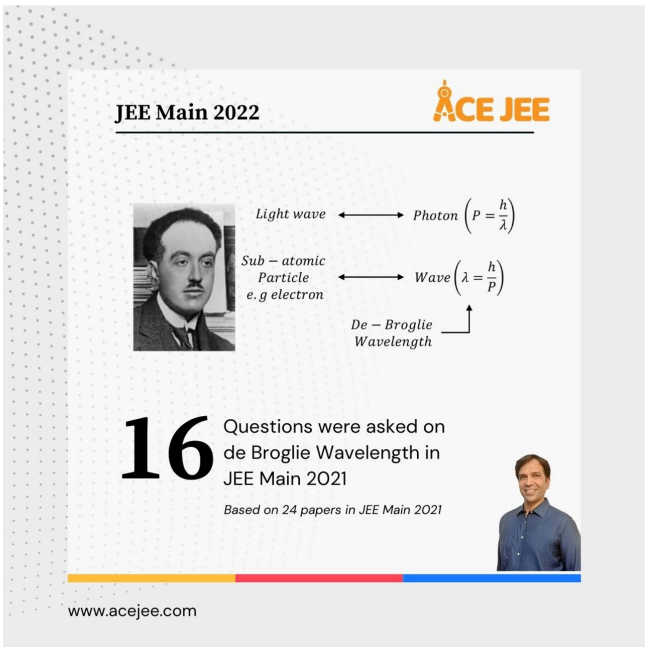
$$F = 20\hat{i} + 10\hat{j}$$

$$a = \frac{F}{m} = \frac{20\hat{i} + 10\hat{j}}{2} = 10\hat{i} + 5\hat{j}$$

$$x = \frac{1}{2} \times a_x t^2 = \frac{1}{2} \times (10) \times (10)^2 = 500\ m$$







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