

JEE MAIN LAWS OF MOTION — PYQS

Max. Marks: 92

Questions: 23

Section A (MCQ) — 21 questions

- Q.1** A car moving with a speed of 54 km/h takes a turn of radius 20 m. A simple pendulum is suspended from the ceiling of the car. Determine the angle made by the string of the pendulum with the vertical during the turning. (Take $g = 10 \text{ m/s}^2$)

[JEE Main 2026 (Online) 8th April Evening Shift]

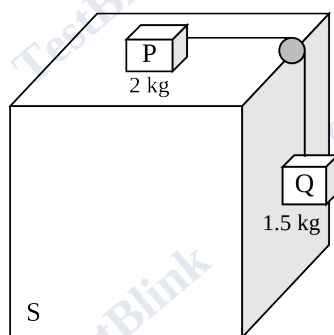
- (1) $\tan^{-1}(0.5)$ (2) $\tan^{-1}(0.75)$
(3) $\tan^{-1}(1.125)$ (4) $\tan^{-1}(0.25)$

Scan or tap for the full solution



- Q.2** Two blocks (P and Q) with respectively masses 2 kg and 1.5 kg are joined by a massless thread. These blocks are mounted on a frictionless pulley which is fixed on the edge of a cube (S), as shown in the figure below. Block P is positioned on the top surface which has no friction and block Q is in contact with side-surface, having coefficient of friction μ . The cube (S) moves towards the right with acceleration of $\frac{g}{2}$, where g is gravitational acceleration. During this movement the block P and Q remain stationary. The value of μ is _____. (take $g = 10 \text{ m/s}^2$)

[JEE Main 2026 (Online) 6th April Morning Shift]



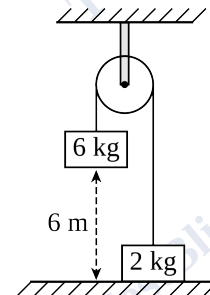
- (1) 0.33 (2) 0.67 (3) 1 (4) 0.5

Scan or tap for the full solution



- Q.3** The velocity at which 6 kg mass (shown in figure) strikes the ground when it is released from a height of 6 m above the ground is _____ m/s. Assume pulley is massless and string is light and inextensible. (Take $g = 10 \text{ m/s}^2$)

[JEE Main 2026 (Online) 6th April Evening Shift]



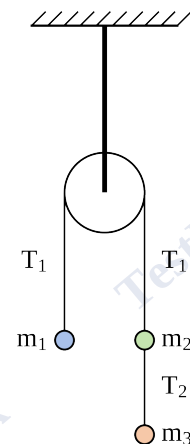
- (1) 7.74 (2) 7.20 (3) 6.55 (4) 4.50

Scan or tap for the full solution



- Q.4** Three masses $m_1 = 4 \text{ kg}$, $m_2 = 4 \text{ kg}$ and $m_3 = 6 \text{ kg}$ are suspended from a fixed smooth frictionless pulley as shown in the figure below. The value of T_1/T_2 is _____. (take $g = 10 \text{ m/s}^2$)

[JEE Main 2026 (Online) 5th April Morning Shift]



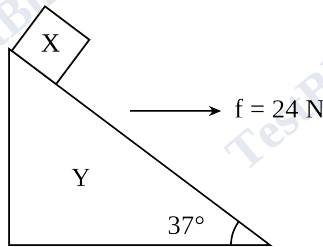
- (1) 5/3 (2) 2/3 (3) 3/5 (4) 2/5

Scan or tap for the full solution



- Q.5** A wedge Y with mass of 10 kg and all frictionless surfaces and the inclined surface making 37° with horizontal. A block X with mass 2 kg is placed at the highest point of the wedge as shown in figure is at rest. At $t = 0$ wedge (Y) is pulled toward right with constant force (f) of 24 N. Taking the block X at rest at $t = 0$, the time taken by it to slide down 8.8 m on the slope, while Y is on the move, is _____ s. (take $\tan(37^\circ) = 3/4$ and $g = 10 \text{ m/s}^2$)

[JEE Main 2026 (Online) 5th April Morning Shift]



- (1) 2 (2) 4 (3) $\sqrt{2}$ (4) $2\sqrt{2}$

Scan or tap for the full solution



Q.6 The time taken by a block of mass m to slide down from the highest point to the lowest point on a rough inclined plane is 50 % more compared to the time taken by the same block on identical inclined smooth plane. Both inclined planes are at 45° with the horizontal. The coefficient of kinetic friction between the rough inclined surface and block is _____. [JEE Main 2026 (Online) 4th April Morning Shift]

- (1) $3/4$ (2) $2/3$ (3) $5/9$ (4) $4/9$

Scan or tap for the full solution



Q.7 At $t = 0$, a body of mass 100 g starts moving under the influence of a force $(5\hat{i} + 10\hat{j})$ N. After 2 s its position is $(2x\hat{i} + 5y\hat{j})$ m. The ratio $x:y$ is _____. [JEE Main 2026 (Online) 4th April Evening Shift]

- (1) 1 : 2 (2) 2 : 5 (3) 5 : 2 (4) 5 : 4

Scan or tap for the full solution



Q.8 A 0.5 kg mass is in contact against the inner wall of a cylindrical drum of radius 4 m rotating about its vertical axis. The minimum rotational speed of the drum to enable the mass to remain stuck to the wall (without falling) is 5 rad/s. The coefficient of friction between the drum's inner wall surface and mass is _____. (Take $g = 10 \text{ m/s}^2$) [JEE Main 2026 (Online) 2nd April Evening Shift]

- (1) 0.1 (2) 0.5 (3) 0.7 (4) 0.3

Scan or tap for the full solution



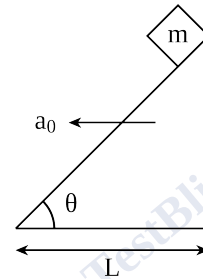
Q.9 A block of mass 5 kg is moving on an inclined plane which makes an angle of 30° with the horizontal. Friction coefficient between the block and inclined plane surface is $\frac{\sqrt{3}}{2}$. The force to be applied on the block so that the block will move down without acceleration is _____ N. ($g = 10 \text{ m/s}^2$). [JEE Main 2026 (Online) 28th January Morning Shift]

- (1) 25 (2) 12.5 (3) 15 (4) 7.5

Scan or tap for the full solution



Q.10 A small block of mass m slides down from the top of a frictionless inclined surface, while the inclined plane is moving towards left with constant acceleration a_0 . The angle between the inclined plane and ground is θ and its base length is L . Assuming that initially the small block is at the top of the inclined plane, the time it takes to reach the lowest point of the inclined plane is _____. [JEE Main 2026 (Online) 28th January Evening Shift]



- (1) $\sqrt{\frac{2L}{g \sin \theta - a_0 \cos \theta}}$
 (2) $\sqrt{\frac{4L}{g \sin 2\theta - a_0(1 + \cos 2\theta)}}$
 (3) $\sqrt{\frac{2L}{g \sin 2\theta - a_0(1 + \cos 2\theta)}}$
 (4) $\sqrt{\frac{4L}{g \cos^2 \theta - a_0 \sin \theta \cos \theta}}$

Scan or tap for the full solution



Q.11 A flexible chain of mass m hangs between two fixed points at the same level. The inclination of the chain with the horizontal at the two points of support is 30° . Considering the equilibrium of each half of the chain, the tension of the chain at the lowest point is _____. [JEE Main 2026 (Online) 24th January Evening Shift]

- (1) mg (2) $\frac{\sqrt{3}}{2}mg$
 (3) $\frac{1}{2}mg$ (4) $\sqrt{3}mg$

Scan or tap for the full solution



Q.12 A block is sliding down on an inclined plane of slope θ and at an instant $t = 0$ this block is given an upward momentum so that it starts moving up on the inclined surface with velocity u . The distance (S) travelled by the block before its velocity becomes zero, is _____. ($g = \text{gravitational acceleration}$) [JEE Main 2026 (Online) 23rd January Evening Shift]

(1) $\frac{2u^2}{g\cos\theta}$

(2) $\frac{u^2}{\sqrt{2}g\cos\theta}$

(3) $\frac{u^2}{2g\sin\theta}$

(4) $\frac{u^2}{2g\cos\theta}$

Scan or tap for the full solution



Q.13 A body of mass 14 kg initially at rest explodes and breaks into three fragments of masses in the ratio 2:2:3. The two pieces of equal masses fly off perpendicular to each other with a speed of 18 m/s each. The velocity of the heavier fragment is _____ m/s.

[JEE Main 2026 (Online) 23rd January Evening Shift]

- (1)
- $24\sqrt{2}$
- (2) 12 (3)
- $12\sqrt{2}$
- (4)
- $10\sqrt{2}$

Scan or tap for the full solution



Q.14 A 4 kg mass moves under the influence of a force $\vec{F} = (4t^3\hat{i} - 3t\hat{j})$ N where t is the time in second. If mass starts from origin at t = 0, the velocity and position after t = 2 s will be:

[JEE Main 2026 (Online) 21st January Morning Shift]

(1) $\vec{v} = 3\hat{i} + \frac{3}{2}\hat{j}$ $\vec{r} = \frac{6}{5}\hat{i} + \hat{j}$

(2) $\vec{v} = 4\hat{i} - \frac{3}{2}\hat{j}$ $\vec{r} = \frac{6}{5}\hat{i} - \hat{j}$

(3) $\vec{v} = 4\hat{i} - \frac{3}{2}\hat{j}$ $\vec{r} = \frac{8}{5}\hat{i} - \hat{j}$

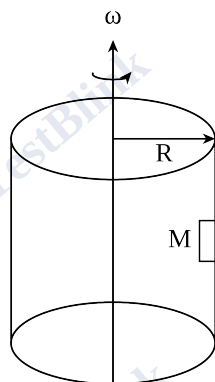
(4) $\vec{v} = 4\hat{i} + \frac{5}{2}\hat{j}$ $\vec{r} = \frac{8}{5}\hat{i} + 2\hat{j}$

Scan or tap for the full solution



Q.15 A large drum having radius R is spinning around its axis with angular velocity ω , as shown in figure. The minimum value of ω so that a body of mass M remains stuck to the inner wall of the drum, taking the coefficient of friction between the drum surface and mass M as μ , is :

[JEE Main 2026 (Online) 21st January Evening Shift]



(1) $\sqrt{\frac{2g}{\mu R}}$

(2) $\sqrt{\frac{g}{2\mu R}}$

(3) $\sqrt{\frac{\mu g}{R}}$

(4) $\sqrt{\frac{g}{\mu R}}$

Scan or tap for the full solution



Q.16 A body of mass 2 kg moving with velocity of $\vec{v}_{in} = 3\hat{i} + 4\hat{j}$ m s⁻¹ enters into a constant force field of 6 N directed along positive z-axis. If the body remains in the field for a period of $\frac{5}{3}$ seconds, then velocity of the body when it emerges from the force field is:

[JEE Main 2025 (Online) 8th April Evening Shift]

(1) $3\hat{i} + 4\hat{j} + \sqrt{5}\hat{k}$

(2) $4\hat{i} + 3\hat{j} + 5\hat{k}$

(3) $3\hat{i} + 4\hat{j} - 5\hat{k}$

(4) $3\hat{i} + 4\hat{j} + 5\hat{k}$

Scan or tap for the full solution



Q.17 A cubic block of mass m is sliding down on an inclined plane at 60° with an acceleration of $\frac{g}{2}$, the value of coefficient of kinetic friction is

[JEE Main 2025 (Online) 7th April Morning Shift]

(1) $\frac{\sqrt{3}}{2}$

(2) $\frac{\sqrt{2}}{3}$

(3) $1 - \frac{\sqrt{3}}{2}$

(4) $\sqrt{3} - 1$

Scan or tap for the full solution



Q.18 An object with mass 500 g moves along x-axis with speed $v = 4\sqrt{x}$ m/s. The force acting on the object is :

[JEE Main 2025 (Online) 7th April Evening Shift]

(1) 8 N

(2) 4 N

(3) 5 N

(4) 6 N

Scan or tap for the full solution



Q.19 A body of mass m is suspended by two strings making angles θ_1 and θ_2 with the horizontal ceiling with tensions T_1 and T_2 simultaneously. T_1 and T_2 are related by $T_1 = \sqrt{3}T_2$, the angles θ_1 and θ_2 are

[JEE Main 2025 (Online) 4th April Morning Shift]

(1) $\theta_1 = 30^\circ, \theta_2 = 60^\circ$ with $T_2 = \frac{3mg}{4}$

(2) $\theta_1 = 45^\circ, \theta_2 = 45^\circ$ with $T_2 = \frac{3mg}{4}$

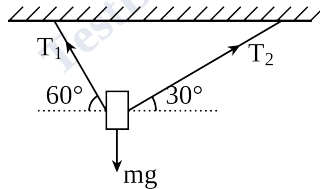
(3) $\theta_1 = 30^\circ, \theta_2 = 60^\circ$ with $T_2 = \frac{4mg}{5}$

(4) $\theta_1 = 60^\circ, \theta_2 = 30^\circ$ with $T_2 = \frac{mg}{2}$

Scan or tap for the full solution



Q.20



A body of mass 1 kg is suspended with the help of two strings making angles as shown in figure. Magnitudes of tensions T_1 and T_2 , respectively, are (in N) :
(Take acceleration due to gravity 10 m/s^2)

[JEE Main 2025 (Online) 2nd April Evening Shift]

- (1) $5\sqrt{3}, 5$ (2) $5\sqrt{3}, 5\sqrt{3}$
(3) $5, 5$ (4) $5, 5\sqrt{3}$

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Q.21 A balloon and its content having mass M is moving up with an acceleration ' a '. The mass that must be released from the content so that the balloon starts moving up with an acceleration ' $3a$ ' will be (Take ' g ' as acceleration due to gravity)

[JEE Main 2025 (Online) 28th January Evening Shift]

- (1) $\frac{3Ma}{2a+g}$ (2) $\frac{2Ma}{3a+g}$ (3) $\frac{3Ma}{2a-g}$ (4) $\frac{2Ma}{3a-g}$

Scan or tap for the full solution



Section B (Numerical) — 2 questions

Q.22 A block takes t time to slide down a plane inclined at 45° to the horizontal. If the surface is made smooth (frictionless), the block takes time $\frac{t}{2}$ to slide down the plane. The coefficient of friction between the block and the inclined plane is $\left(\frac{\alpha}{100}\right)$. The value of α is _____.

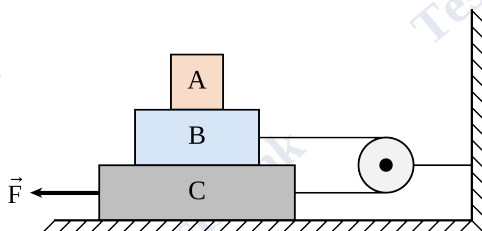
[JEE Main 2026 (Online) 6th April Evening Shift]

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Q.23 In the given figure the blocks A, B and C weigh 4 kg, 6 kg and 8 kg respectively. The coefficient of sliding friction between any two surfaces is 0.5. The force $\vec{F}$ required to slide the block C with constant speed is _____ N. (Use $g = 10 \text{ m/s}^2$)

[JEE Main 2026 (Online) 24th January Morning Shift]



Scan or tap for the full solution



ANSWER KEY

Section A (MCQ) — 21 questions

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	3	2	1	1	1	3	4	1	2	2	2
Ques.	12	13	14	15	16	17	18	19	20	21	
Ans.	3	3	3	4	4	4	2	4	1	2	

Section B (Numerical) — 2 questions

Ques.	22	23					
Ans.	75	210					