

JEE MAIN LAWS OF MOTION — NEWTON'S SECOND LAW AND MOMENTUM — PYQS

Max. Marks: 36

Questions: 9

Section A (MCQ) — 9 questions

- Q.1** 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.2** 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) $\vec{v} = 4\hat{i} + \frac{5}{2}\hat{j}$ $\vec{r} = \frac{8}{5}\hat{i} + 2\hat{j}$

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full solution

- Q.3** A body of mass 2 kg moving with velocity of $\vec{v}_{in} = 3\hat{i} + 4\hat{j}$ ms^{-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) $3\hat{i} + 4\hat{j} + 5\hat{k}$

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full solution

- Q.4** 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

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- Q.5** 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

- Q.6** A player caught a cricket ball of mass 150 g moving at a speed of 20 m/s. If the catching process is completed in 0.1 s, the magnitude of force exerted by the ball on the hand of the player is:

[JEE Main 2024 (Online) 8th April Morning Shift]

- (1) 150 N (2) 3 N (3) 30 N (4) 300 N

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full solution

- Q.7** A particle moves in x - y plane under the influence of a force $\vec{F}$ such that its linear momentum is $\vec{p}(t) = \hat{i}\cos(kt) - \hat{j}\sin(kt)$. If k is constant, the angle between $\vec{F}$ and $\vec{p}$ will be :

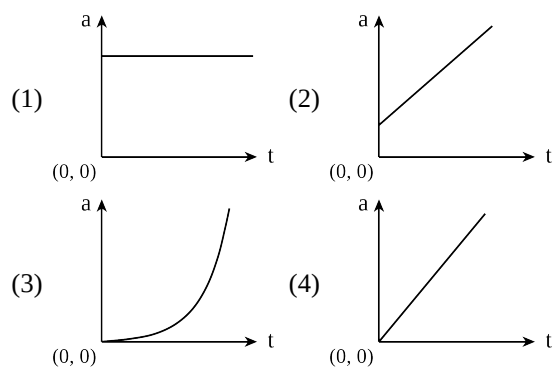
[JEE Main 2024 (Online) 5th April Evening Shift]

- (1) $\frac{\pi}{2}$ (2) $\frac{\pi}{3}$ (3) $\frac{\pi}{4}$ (4) $\frac{\pi}{6}$

Scan or tap for the
full solution

- Q.8** A wooden block, initially at rest on the ground, is pushed by a force which increases linearly with time t . Which of the following curve best describes acceleration of the block with time :

[JEE Main 2024 (Online) 4th April Morning Shift]



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Q.9 A body of mass 4 kg experiences two forces $\vec{F}_1 = 5\hat{i} + 8\hat{j} + 7\hat{k}$ and $\vec{F}_2 = 3\hat{i} - 4\hat{j} - 3\hat{k}$. The acceleration acting on the body is :

[JEE Main 2024 (Online) 1st February Evening Shift]

- (1) $2\hat{i} + \hat{j} + \hat{k}$ (2) $4\hat{i} + 2\hat{j} + 2\hat{k}$
 (3) $-2\hat{i} - \hat{j} - \hat{k}$ (4) $2\hat{i} + 3\hat{j} + 3\hat{k}$

Scan or tap for the full solution



ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9		
Ans.	4	3	4	2	2	3	1	4	1		