

PHYSICS · JEE MAIN

Newton's Laws of Motion

Chapter-wise previous year questions, with answer key

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PYQS

2020–2025

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TOPICS

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- 1 Attempt each question on paper first — they're grouped by topic, newest papers first.
- 2 Check yourself against the answer key at the end.
- 3 Got one wrong? Tap “Step-by-step solution” under it for the full working.

Stuck on a question?

Every question has a free step-by-step solution on PrepWiser — tap “Step-by-step solution” under it.

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Newton's Second Law · 19 PYQs

Q1 JEE Main 2025 · 8 Apr · Shift 2

A body of mass 2 kg moving with velocity of $\vec{v}_{in} = 3\hat{i} + 4\hat{j} \text{ ms}^{-1}$ enters into a constant force field of 6N 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 force field is.

- (A) $3\hat{i} + 4\hat{j} + \sqrt{5}\hat{k}$
- (B) $4\hat{i} + 3\hat{j} + 5\hat{k}$
- (C) $3\hat{i} + 4\hat{j} - 5\hat{k}$
- (D) $3\hat{i} + 4\hat{j} + 5\hat{k}$

[Step-by-step solution ► prepwisser.in/questions/7WGXdtfNIL](https://www.prepwisser.in/questions/7WGXdtfNIL)

Q2 JEE Main 2024 · 8 Apr · Shift 1

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

- (A) 150 N
- (B) 3 N
- (C) 30 N
- (D) 300 N

[Step-by-step solution ► prepwisser.in/questions/_-B6qvyUg_](https://www.prepwisser.in/questions/_-B6qvyUg_)

Q3 JEE Main 2024 · 5 Apr · Shift 2

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 :

- (A) $\frac{\pi}{2}$
- (B) $\frac{\pi}{3}$
- (C) $\frac{\pi}{4}$
- (D) $\frac{\pi}{6}$

[Step-by-step solution ► prepwisser.in/questions/HV9GktdGV3](https://www.prepwisser.in/questions/HV9GktdGV3)

Q4 JEE Main 2024 · 1 Feb · Shift 2

A body of mass 4kg 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 :

- (A) $2\hat{i} + \hat{j} + \hat{k}$
- (B) $4\hat{i} + 2\hat{j} + 2\hat{k}$
- (C) $-2\hat{i} - \hat{j} - \hat{k}$
- (D) $2\hat{i} + 3\hat{j} + 3\hat{k}$

[Step-by-step solution ► prepwisser.in/questions/PMUQCOMbIU](https://www.prepwisser.in/questions/PMUQCOMbIU)

Q5 JEE Main 2023 · 15 Apr · Shift 1

The position vector of a particle related to time t is given by

$$\vec{r} = (10t\hat{i} + 15t^2\hat{j} + 7\hat{k})\text{ m}$$

The direction of net force experienced by the particle is :

(A) Positive x - axis

(B) Positive y - axis

(C) Positive z - axis

(D) In x - y plane

[Step-by-step solution ► prepwiser.in/questions/ud1v3ZdBFp](https://www.prepwiser.in/questions/ud1v3ZdBFp)

Q6 JEE Main 2023 · 12 Apr · Shift 1

Three forces $F_1 = 10\text{N}$, $F_2 = 8\text{N}$, $F_3 = 6\text{N}$ are acting on a particle of mass 5kg . The forces F_2 and F_3 are applied perpendicularly so that particle remains at rest. If the force F_1 is removed, then the acceleration of the particle is:

(A) 4.8ms^{-2}

(B) 7ms^{-2}

(C) 2ms^{-2}

(D) 0.5ms^{-2}

[Step-by-step solution ► prepwiser.in/questions/C_mMMtwtoC](https://www.prepwiser.in/questions/C_mMMtwtoC)

Q7 JEE Main 2023 · 11 Apr · Shift 2

A body of mass 500g moves along x -axis such that it's velocity varies with displacement x according to the relation $v = 10\sqrt{x}\text{m/s}$ the force acting on the body is:-

(A) 166 N

(B) 5 N

(C) 25 N

(D) 125 N

[Step-by-step solution ► prepwiser.in/questions/RJlM6ZrMnc](https://www.prepwiser.in/questions/RJlM6ZrMnc)

Q8 JEE Main 2023 · 8 Apr · Shift 1

At any instant the velocity of a particle of mass 500g is $(2t\hat{i} + 3t^2\hat{j})\text{ms}^{-1}$. If the force acting on the particle at $t = 1\text{s}$ is $(\hat{i} + x\hat{j})\text{N}$. Then the value of x will be:

(A) 2

(B) 4

(C) 6

(D) 3

[Step-by-step solution ► prepwiser.in/questions/GLAjbApGod](https://www.prepwiser.in/questions/GLAjbApGod)

Q9 JEE Main 2023 · 29 Jan · Shift 2

A force acts for 20 s on a body of mass 20 kg , starting from rest, after which the force ceases and then body describes 50 m in the next 10 s . The value of force will be:

(A) 40 N

(B) 20 N

(C) 5 N

(D) 10 N

[Step-by-step solution ► prepwiser.in/questions/qME8-RYrTt](https://www.prepwiser.in/questions/qME8-RYrTt)

Q10 JEE Main 2023 · 24 Jan · Shift 1

Given below are two statements :

Statement I : An elevator can go up or down with uniform speed when its weight is balanced with the tension of its cable.

Statement II : Force exerted by the floor of an elevator on the foot of a person standing on it is more than his/her weight when the elevator goes down with increasing speed.

In the light of the above statements, choose the correct 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

[Step-by-step solution ► prepwiser.in/questions/6GeYFq9uGV](https://www.prepwiser.in/questions/6GeYFq9uGV)

Q11 JEE Main 2023 · 24 Jan · Shift 1

A spherical body of mass 2 kg starting from rest acquires a kinetic energy of 10000 J at the end of 5th second. The force acted on the body is _____ N.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/84409oRvzf](https://www.prepwiser.in/questions/84409oRvzf)

Q12 JEE Main 2022 · 26 Jul · Shift 1

A monkey of mass 50kg climbs on a rope which can withstand the tension (T) of 350N. If monkey initially climbs down with an acceleration of 4m/s^2 and then climbs up with an acceleration of 5m/s^2 . Choose the correct option ($g = 10\text{m/s}^2$).

- (A) $T = 700\text{N}$ while climbing upward
- (B) $T = 350\text{N}$ while going downward
- (C) Rope will break while climbing upward
- (D) Rope will break while going downward

[Step-by-step solution ► prepwiser.in/questions/VdMnmGcNGf](https://www.prepwiser.in/questions/VdMnmGcNGf)

Q13 JEE Main 2022 · 25 Jun · Shift 1

A force on an object of mass 100 g is $(10\hat{i} + 5\hat{j})$ N. The position of that object at $t = 2$ s is $(a\hat{i} + b\hat{j})$ m after starting from rest. The value of $\frac{a}{b}$ will be _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/k7tEJ-1rSh](https://www.prepwiser.in/questions/k7tEJ-1rSh)

Q14 JEE Main 2021 · 27 Jul · Shift 2

A particle of mass M originally at rest is subjected to a force whose direction is constant but magnitude varies with time according to the relation

$$F = F_0 \left[1 - \left(\frac{t-T}{T} \right)^2 \right]$$

Where F_0 and T are constants. The force acts only for the time interval $2T$. The velocity v of the particle after time $2T$ is :

- (A) $2F_0T/M$
- (B) $F_0T/2M$
- (C) $4F_0T/3M$
- (D) $F_0T/3M$

[Step-by-step solution ► prepwiser.in/questions/TwjFFUUYwd](https://www.prepwiser.in/questions/TwjFFUUYwd)

Q15 JEE Main 2021 · 25 Jul · Shift 2

A force $\vec{F} = (40\hat{i} + 10\hat{j})N$ acts on a body of mass 5 kg. If the body starts from rest, its position vector $\vec{r}$ at time $t = 10$ s, will be :

- (A) $(100\hat{i} + 400\hat{j})m$
- (B) $(100\hat{i} + 100\hat{j})m$
- (C) $(400\hat{i} + 100\hat{j})m$
- (D) $(400\hat{i} + 400\hat{j})m$

[Step-by-step solution ► prepwiser.in/questions/JWZv1uhlc7](https://www.prepwiser.in/questions/JWZv1uhlc7)

Q16 JEE Main 2021 · 16 Mar · Shift 2

A body of mass 2 kg moves under a force of $(2\hat{i} + 3\hat{j} + 5\hat{k})N$. It starts from rest and was at the origin initially. After 4s, its new coordinates are (8, b, 20). The value of b is _____. (Round off to the Nearest Integer)

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/Mvlt7B2lb5](https://www.prepwiser.in/questions/Mvlt7B2lb5)

Q17 JEE Main 2021 · 26 Feb · Shift 1

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

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/tIIFWFIPCD](https://www.prepwiser.in/questions/tIIFWFIPCD)

Q18 JEE Main 2020 · 6 Sep · Shift 2

A particle moving in the xy plane experiences a velocity dependent force

$$\vec{F} = k(v_y \hat{i} + v_x \hat{j}), \text{ where } v_x \text{ and } v_y \text{ are the}$$

x and y components of its velocity $\vec{v}$. If $\vec{a}$ is the

acceleration of the particle, then

which of the following statements is true for the particle?

- (A) kinetic energy of particle is constant in time
- (B) quantity $\vec{v} \times \vec{a}$ is constant in time
- (C) quantity $\vec{v} \cdot \vec{a}$ is constant in time
- (D) $\vec{F}$ arises due to a magnetic field

[Step-by-step solution ► prepwiser.in/questions/Kz9Oux3mGB](https://www.prepwiser.in/questions/Kz9Oux3mGB)

Q19 JEE Main 2020

Which of the following are correct statements about Newton's Second Law?

- (A) Force equals rate of change of momentum
- (B) $F = ma$ only when mass is constant
- (C) It is valid in non-inertial frames without modification
- (D) Net force zero implies constant velocity

[Step-by-step solution ► prepwiser.in/questions/1B6lkXIfPt](https://www.prepwiser.in/questions/1B6lkXIfPt)

Free Body Diagrams · 1 PYQs

Q20 JEE Main 2024 · 6 Apr · Shift 2

A body of weight 200N is suspended from a tree branch through a chain of mass 10kg. The branch pulls the chain by a force equal to (if $g = 10\text{m/s}^2$):

- (A) 300 N
- (B) 100 N
- (C) 150 N
- (D) 200 N

[Step-by-step solution ► prepwiser.in/questions/eoFL_ZP_qF](https://www.prepwiser.in/questions/eoFL_ZP_qF)

Pulley and Wedge Systems · 2 PYQs

Q21 JEE Main 2024 · 9 Apr · Shift 1

A light unstretchable string passing over a smooth light pulley connects two blocks of masses m_1 and m_2 . If the acceleration of the system is $\frac{g}{8}$, then the ratio of the masses $\frac{m_2}{m_1}$ is:

- (A) 5 : 3
- (B) 8 : 1
- (C) 9 : 7
- (D) 4 : 3

[Step-by-step solution ► prepwiser.in/questions/LeGum62Fua](https://www.prepwiser.in/questions/LeGum62Fua)

Q22 JEE Main 2024 · 6 Apr · Shift 1

A light string passing over a smooth light pulley connects two blocks of masses m_1 and m_2 (where $m_2 > m_1$). If the acceleration of the system is $\frac{g}{\sqrt{2}}$, then the ratio of the masses $\frac{m_1}{m_2}$ is:

- (A) $\frac{1+\sqrt{5}}{\sqrt{5}-1}$ (B) $\frac{\sqrt{3}+1}{\sqrt{2}-1}$
(C) $\frac{\sqrt{2}-1}{\sqrt{2}+1}$ (D) $\frac{1+\sqrt{5}}{\sqrt{2}-1}$

[Step-by-step solution](#) ► [prepwiser.in/questions/ds07ui2lgI](https://www.prepwiser.in/questions/ds07ui2lgI)

Newton's First Law · 1 PYQs

Q23 JEE Main 2023 · 10 Apr · Shift 2

Given below are two statements: one is labelled as Assertion **A** and the other is labelled as Reason **R**

Assertion A : An electric fan continues to rotate for some time after the current is switched off.

Reason R : Fan continues to rotate due to inertia of motion.

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

- (A) A is not correct but R is correct
(B) A is correct but R is not correct
(C) Both A and R are correct and R is the correct explanation of A
(D) Both A and R are correct but R is NOT the correct explanation of A

[Step-by-step solution](#) ► [prepwiser.in/questions/4IKUSfwc17](https://www.prepwiser.in/questions/4IKUSfwc17)

Pseudo Force and Non-Inertial Frames · 1 PYQs

Q24 JEE Main 2021 · 26 Feb · Shift 1

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. [$g = 10 \text{ m/s}^2$]

Numerical answer — enter the value.

[Step-by-step solution](#) ► [prepwiser.in/questions/bEpB4ijqoX](https://www.prepwiser.in/questions/bEpB4ijqoX)

Answer key — Newton's Laws of Motion

Numbers match the question numbers above. For full working, open the solution link under each question.

1	D	2	C	3	A	4	A	5	B	6	C	7	C	8	D
9	C	10	D	11	40	12	C	13	2	14	C	15	C	16	12
17	500	18	B	19	A, B, D	20	A	21	C	22	C	23	C	24	492

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