

PHYSICS · JEE MAIN

Projectile Motion & Relative Motion

Chapter-wise previous year questions, with answer key

47

PYQS

2020–2025

PAPERS

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TOPICS

Projectile on Flat Surface

River-Boat and Rain-Man Problems

Relative Velocity

- 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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Projectile on Flat Surface · 38 PYQs

Q1 JEE Main 2025 · 8 Apr · Shift 2

Two balls with same mass and initial velocity, are projected at different angles in such a way that maximum height reached by first ball is 8 times higher than that of the second ball. T_1 and T_2 are the total flying times of first and second ball, respectively, then the ratio of T_1 and T_2 is

- (A) 2 : 1
- (B) $\sqrt{2}$: 1
- (C) $2\sqrt{2}$: 1
- (D) 4 : 1

[Step-by-step solution ► prepwiser.in/questions/EXYA2c8Tem](https://www.prepwiser.in/questions/EXYA2c8Tem)

Q2 JEE Main 2025 · 7 Apr · Shift 1

Two projectiles are fired from ground with same initial speeds from same point at angles $(45^\circ + \alpha)$ and $(45^\circ - \alpha)$ with horizontal direction. The ratio of their times of flights is

- (A) $\frac{1+\tan \alpha}{1-\tan \alpha}$
- (B) $\frac{1+\sin 2\alpha}{1-\sin 2\alpha}$
- (C) $\frac{1-\tan \alpha}{1+\tan \alpha}$
- (D) 1

[Step-by-step solution ► prepwiser.in/questions/Gdi5i09D3L](https://www.prepwiser.in/questions/Gdi5i09D3L)

Q3 JEE Main 2025 · 3 Apr · Shift 2

A particle is projected with velocity u so that its horizontal range is three times the maximum height attained by it. The horizontal range of the projectile is given as $\frac{nu^2}{25g}$, where value of n is: (Given, ' g ' is the acceleration due to gravity.)

- (A) 6
- (B) 12
- (C) 18
- (D) 24

[Step-by-step solution ► prepwiser.in/questions/ctkPUstD33](https://www.prepwiser.in/questions/ctkPUstD33)

Q4 JEE Main 2025 · 29 Jan · Shift 1

Two projectiles are fired with same initial speed from same point on ground at angles of $(45^\circ - \alpha)$ and $(45^\circ + \alpha)$, respectively, with the horizontal direction. The ratio of their maximum heights attained is :

- (A) $\frac{1+\sin \alpha}{1-\sin \alpha}$
- (B) $\frac{1+\sin 2\alpha}{1-\sin 2\alpha}$
- (C) $\frac{1-\tan \alpha}{1+\tan \alpha}$
- (D) $\frac{1-\sin 2\alpha}{1+\sin 2\alpha}$

[Step-by-step solution ► prepwiser.in/questions/0g9MdJRkp2](https://www.prepwiser.in/questions/0g9MdJRkp2)

Q5 JEE Main 2025 · 23 Jan · Shift 2

A ball having kinetic energy KE, is projected at an angle of 60° from the horizontal. What will be the kinetic energy of ball at the highest point of its flight?

(A) $\frac{(KE)}{2}$

(B) $\frac{(KE)}{8}$

(C) $\frac{(KE)}{4}$

(D) $\frac{(KE)}{16}$

Step-by-step solution ► [prepwiser.in/questions/Qka06CDV4U](https://www.prepwiser.in/questions/Qka06CDV4U)

Q6 JEE Main 2024 · 8 Apr · Shift 2

The angle of projection for a projectile to have same horizontal range and maximum height is :

(A) $\tan^{-1}\left(\frac{1}{2}\right)$

(B) $\tan^{-1}(2)$

(C) $\tan^{-1}\left(\frac{1}{4}\right)$

(D) $\tan^{-1}(4)$

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

Q7 JEE Main 2024 · 8 Apr · Shift 2

A body of mass M thrown horizontally with velocity v from the top of the tower of height H touches the ground at a distance of 100m from the foot of the tower. A body of mass 2M thrown at a velocity $\frac{v}{2}$ from the top of the tower of height 4H will touch the ground at a distance of _____ m.

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/zjZrDnX0Rx](https://www.prepwiser.in/questions/zjZrDnX0Rx)

Q8 JEE Main 2024 · 5 Apr · Shift 2

The maximum height reached by a projectile is 64m. If the initial velocity is halved, the new maximum height of the projectile is _____ m.

Numerical answer — enter the value.

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

Q9 JEE Main 2024 · 4 Apr · Shift 1

The co-ordinates of a particle moving in x - y plane are given by : $x = 2 + 4t, y = 3t + 8t^2$.

The motion of the particle is :

(A) uniform motion along a straight line.

(B) non-uniformly accelerated.

(C) uniformly accelerated having motion along a straight line.

(D) uniformly accelerated having motion along a parabolic path.

Step-by-step solution ► [prepwiser.in/questions/JyR92j8ZYO](https://www.prepwiser.in/questions/JyR92j8ZYO)

Q10 JEE Main 2024 · 1 Feb · Shift 1

A particle moving in a circle of radius R with uniform speed takes time T to complete one revolution.

If this particle is projected with the same speed at an angle θ to the horizontal, the maximum height attained by it is equal to $4R$. The angle of projection θ is then given by :

- (A) $\sin^{-1} \left[\frac{2gT^2}{\pi^2 R} \right]^{\frac{1}{2}}$
(B) $\sin^{-1} \left[\frac{\pi^2 R}{2gT^2} \right]^{\frac{1}{2}}$
(C) $\cos^{-1} \left[\frac{\pi R}{2gT^2} \right]^{\frac{1}{2}}$
(D) $\cos^{-1} \left[\frac{2gT^2}{\pi^2 R} \right]^{\frac{1}{2}}$

Step-by-step solution ► [prepwiser.in/questions/WLRLo4K8lg](https://www.prepwiser.in/questions/WLRLo4K8lg)

Q11 JEE Main 2024 · 30 Jan · Shift 1

A particle of mass m is projected with a velocity ' u ' making an angle of 30° with the horizontal. The magnitude of angular momentum of the projectile about the point of projection when the particle is at its maximum height h is :

- (A) $\frac{mu^3}{\sqrt{2g}}$
(B) zero
(C) $\frac{\sqrt{3}}{2} \frac{mu^2}{g}$
(D) $\frac{\sqrt{3}}{16} \frac{mu^3}{g}$

Step-by-step solution ► [prepwiser.in/questions/LnD_1Uy5B-](https://www.prepwiser.in/questions/LnD_1Uy5B-)

Q12 JEE Main 2023 · 11 Apr · Shift 2

A projectile is projected at 30° from horizontal with initial velocity 40ms^{-1} . The velocity of the projectile at $t = 2\text{s}$ from the start will be : (Given $g = 10\text{m/s}^2$)

- (A) $20\sqrt{3}\text{ms}^{-1}$ (B) Zero
(C) 20ms^{-1} (D) $40\sqrt{3}\text{ms}^{-1}$

Step-by-step solution ► [prepwiser.in/questions/ciFam7txHS](https://www.prepwiser.in/questions/ciFam7txHS)

Q13 JEE Main 2023 · 11 Apr · Shift 1

A projectile fired at 30° to the ground is observed to be at same height at time 3s and 5s after projection, during its flight. The speed of projection of the projectile is _____ ms^{-1} .

(Given $g = 10\text{ms}^{-2}$)

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/iAgWvN55b4](https://www.prepwiser.in/questions/iAgWvN55b4)

Q14 JEE Main 2023 · 10 Apr · Shift 2

Two projectiles are projected at 30° and 60° with the horizontal with the same speed. The ratio of the maximum height attained by the two projectiles respectively is:

- (A) $1 : \sqrt{3}$ (B) $\sqrt{3} : 1$
(C) $1 : 3$ (D) $2 : \sqrt{3}$

Step-by-step solution ► [prepwiser.in/questions/L_1jyQdNF6](https://www.prepwiser.in/questions/L_1jyQdNF6)

Q15 JEE Main 2023 · 10 Apr · Shift 1

The range of the projectile projected at an angle of 15° with horizontal is 50 m. If the projectile is projected with same velocity at an angle of 45° with horizontal, then its range will be

- (A) $50\sqrt{2}$ m (B) 100 m
(C) $100\sqrt{2}$ m (D) 50 m

Step-by-step solution ► [prepwisser.in/questions/oMufc1kHjG](https://www.prepwisser.in/questions/oMufc1kHjG)

Q16 JEE Main 2023 · 8 Apr · Shift 2

The trajectory of projectile, projected from the ground is given by $y = x - \frac{x^2}{20}$. Where x and y are measured in meter. The maximum height attained by the projectile will be.

- (A) 10 m (B) 5 m
(C) 200 m (D) $10\sqrt{2}$ m

Step-by-step solution ► [prepwisser.in/questions/8EGaPyjKpQ](https://www.prepwisser.in/questions/8EGaPyjKpQ)

Q17 JEE Main 2023 · 8 Apr · Shift 1

Two projectiles A and B are thrown with initial velocities of 40m/s and 60m/s at angles 30° and 60° with the horizontal respectively. The ratio of their ranges respectively is ($g = 10\text{m/s}^2$)

- (A) 4 : 9 (B) $2 : \sqrt{3}$
(C) $\sqrt{3} : 2$ (D) 1 : 1

Step-by-step solution ► [prepwisser.in/questions/tT2YW5kQCD](https://www.prepwisser.in/questions/tT2YW5kQCD)

Q18 JEE Main 2023 · 6 Apr · Shift 1

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

Assertion A : When a body is projected at an angle 45° , its range is maximum.

Reason R : For maximum range, the value of $\sin 2\theta$ should be equal to one.

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

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

Step-by-step solution ► [prepwisser.in/questions/C6Opg7MgyP](https://www.prepwisser.in/questions/C6Opg7MgyP)

Q19 JEE Main 2023 · 1 Feb · Shift 2

For a body projected at an angle with the horizontal from the ground, choose the correct statement.

- (A) Gravitational potential energy is maximum at the highest point.
(B) The vertical component of momentum is maximum at the highest point.
(C) The horizontal component of velocity is zero at the highest point.
(D) The Kinetic Energy (K.E.) is zero at the highest point of projectile motion.

Step-by-step solution ► [prepwisser.in/questions/hDlt81ETLb](https://www.prepwisser.in/questions/hDlt81ETLb)

Q20 JEE Main 2023 · 31 Jan · Shift 1

The initial speed of a projectile fired from ground is u . At the highest point during its motion, the speed of projectile is $\frac{\sqrt{3}}{2}u$. The time of flight of the projectile is :

- (A) $\frac{u}{g}$ (B) $\frac{2u}{g}$
(C) $\frac{u}{2g}$ (D) $\frac{\sqrt{3}u}{g}$

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

Q21 JEE Main 2023 · 31 Jan · Shift 2

Two bodies are projected from ground with same speeds 40ms^{-1} at two different angles with respect to horizontal. The bodies were found to have same range. If one of the body was projected at an angle of 60° , with horizontal then sum of the maximum heights, attained by the two projectiles, is m . (Given $g = 10\text{ms}^{-2}$)

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/cd3s1QIA_g](https://www.prepwiser.in/questions/cd3s1QIA_g)

Q22 JEE Main 2023 · 25 Jan · Shift 2

Two objects are projected with same velocity ' u ' however at different angles α and β with the horizontal. If $\alpha + \beta = 90^\circ$, the ratio of horizontal range of the first object to the 2nd object will be :

- (A) 1 : 1 (B) 2 : 1
(C) 1 : 2 (D) 4 : 1

[Step-by-step solution ► prepwiser.in/questions/iEWnr8s_XW](https://www.prepwiser.in/questions/iEWnr8s_XW)

Q23 JEE Main 2023 · 24 Jan · Shift 1

The maximum vertical height to which a man can throw a ball is 136 m. The maximum horizontal distance upto which he can throw the same ball is :

- (A) 136 m (B) 272 m
(C) 68 m (D) 192 m

[Step-by-step solution ► prepwiser.in/questions/WyMLQrj5i8](https://www.prepwiser.in/questions/WyMLQrj5i8)

Q24 JEE Main 2022 · 29 Jul · Shift 1

An object is projected in the air with initial velocity u at an angle θ . The projectile motion is such that the horizontal range R , is maximum. Another object is projected in the air with a horizontal range half of the range of first object. The initial velocity remains same in both the case. The value of the angle of projection, at which the second object is projected, will be _____ degree.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/xa7E8Avm_y](https://www.prepwiser.in/questions/xa7E8Avm_y)

Q25 JEE Main 2022 · 29 Jul · Shift 1

A ball is projected with kinetic energy E , at an angle of 60° to the horizontal. The kinetic energy of this ball at the highest point of its flight will become :

- (A) Zero (B) $\frac{E}{2}$
(C) $\frac{E}{4}$ (D) E

[Step-by-step solution ► prepwiser.in/questions/i0NC8PRM8v](https://www.prepwiser.in/questions/i0NC8PRM8v)

Q26 JEE Main 2022 · 27 Jul · Shift 2

A body of mass 10kg is projected at an angle of 45° with the horizontal. The trajectory of the body is observed to pass through a point (20, 10). If T is the time of flight, then its momentum vector, at time $t = \frac{T}{\sqrt{2}}$, is _____.

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

- (A) $100\hat{i} + (100\sqrt{2} - 200)\hat{j}$
(B) $100\sqrt{2}\hat{i} + (100 - 200\sqrt{2})\hat{j}$
(C) $100\hat{i} + (100 - 200\sqrt{2})\hat{j}$
(D) $100\sqrt{2}\hat{i} + (100\sqrt{2} - 200)\hat{j}$

Step-by-step solution ► [prepwiser.in/questions/RQVdBZDg8a](https://www.prepwiser.in/questions/RQVdBZDg8a)

Q27 JEE Main 2022 · 26 Jul · Shift 1

If the initial velocity in horizontal direction of a projectile is unit vector $\hat{i}$ and the equation of trajectory is $y = 5x(1 - x)$. The y component vector of the initial velocity is _____ $\hat{j}$. (Take $g = 10\text{m/s}^2$)

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/ya8K7m_Gdc](https://www.prepwiser.in/questions/ya8K7m_Gdc)

Q28 JEE Main 2022 · 26 Jul · Shift 2

Two projectiles are thrown with same initial velocity making an angle of 45° and 30° with the horizontal respectively. The ratio of their respective ranges will be :

- (A) $1 : \sqrt{2}$ (B) $\sqrt{2} : 1$
(C) $2 : \sqrt{3}$ (D) $\sqrt{3} : 2$

Step-by-step solution ► [prepwiser.in/questions/QMTC6R0ShM](https://www.prepwiser.in/questions/QMTC6R0ShM)

Q29 JEE Main 2022 · 26 Jul · Shift 1

Two projectiles thrown at 30° and 45° with the horizontal respectively, reach the maximum height in same time. The ratio of their initial velocities is :

- (A) $1 : \sqrt{2}$ (B) $2 : 1$
(C) $\sqrt{2} : 1$ (D) $1 : 2$

Step-by-step solution ► [prepwiser.in/questions/3dXksZu1t1](https://www.prepwiser.in/questions/3dXksZu1t1)

Q30 JEE Main 2022 · 25 Jul · Shift 2

A ball is projected from the ground with a speed 15 ms^{-1} at an angle θ with horizontal so that its range and maximum height are equal, then ' $\tan \theta$ ' will be equal to :

- (A) $\frac{1}{4}$ (B) $\frac{1}{2}$
(C) 2 (D) 4

Step-by-step solution ► [prepwiser.in/questions/Zt98r1_Uzj](https://www.prepwiser.in/questions/Zt98r1_Uzj)

Q31 JEE Main 2022 · 30 Jun · Shift 1

Two projectiles P_1 and P_2 thrown with speed in the ratio $\sqrt{3} : \sqrt{2}$, attain the same height during their motion. If P_2 is thrown at an angle of 60° with the horizontal, the angle of projection of P_1 with horizontal will be :

- (A) 15° (B) 30°
(C) 45° (D) 60°

Step-by-step solution ► [prepwiser.in/questions/lvYJ6o9smn](https://www.prepwiser.in/questions/lvYJ6o9smn)

Q32 JEE Main 2022 · 29 Jun · Shift 2

A person can throw a ball upto a maximum range of 100 m. How high above the ground he can throw the same ball?

- (A) 25 m (B) 50 m
(C) 100 m (D) 200 m

Step-by-step solution ► [prepwiser.in/questions/SuMvZvhH3F](https://www.prepwiser.in/questions/SuMvZvhH3F)

Q33 JEE Main 2022 · 25 Jun · Shift 2

Given below are two statements. One is labelled as Assertion A and the other is labelled as Reason R.
Assertion A : Two identical balls A and B thrown with same velocity 'u' at two different angles with horizontal attained the same range R. IF A and B reached the maximum height h_1 and h_2 respectively, then $R = 4\sqrt{h_1 h_2}$

Reason R : Product of said heights.

$$h_1 h_2 = \left(\frac{u^2 \sin^2 \theta}{2g} \right) \cdot \left(\frac{u^2 \cos^2 \theta}{2g} \right)$$

Choose the correct answer :

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

Step-by-step solution ► [prepwiser.in/questions/FcX_W0EM03](https://www.prepwiser.in/questions/FcX_W0EM03)

Q34 JEE Main 2022

A ball is projected with speed 20 m/s at an angle of 30° with the horizontal. What is the maximum height reached? (Take $g = 10 \text{ m/s}^2$)

- (A) 5 m (B) 10 m
(C) 15 m (D) 20 m

Step-by-step solution ► [prepwiser.in/questions/1U9iY1-iH-](https://www.prepwiser.in/questions/1U9iY1-iH-)

Q35 JEE Main 2021 · 1 Sep · Shift 2

The ranges and heights for two projectiles projected with the same initial velocity at angles 42° and 48° with the horizontal are R_1 , R_2 and H_1 , H_2 respectively. Choose the correct option :

- (A) $R_1 > R_2$ and $H_1 = H_2$
- (B) $R_1 = R_2$ and $H_1 < H_2$
- (C) $R_1 < R_2$ and $H_1 < H_2$
- (D) $R_1 = R_2$ and $H_1 = H_2$

[Step-by-step solution ► prepwiser.in/questions/yAeK8MvTI0](https://www.prepwiser.in/questions/yAeK8MvTI0)

Q36 JEE Main 2021 · 27 Aug · Shift 2

A player kicks a football with an initial speed of 25 ms^{-1} at an angle of 45° from the ground. What are the maximum height and the time taken by the football to reach at the highest point during motion ? (Take $g = 10 \text{ ms}^{-2}$)

- (A) $h_{\text{max}} = 10 \text{ m}$
 $T = 2.5 \text{ s}$
- (B) $h_{\text{max}} = 15.625 \text{ m}$
 $T = 3.54 \text{ s}$
- (C) $h_{\text{max}} = 15.625 \text{ m}$
 $T = 1.77 \text{ s}$
- (D) $h_{\text{max}} = 3.54 \text{ m}$
 $T = 0.125 \text{ s}$

[Step-by-step solution ► prepwiser.in/questions/BquOoOycV4](https://www.prepwiser.in/questions/BquOoOycV4)

Q37 JEE Main 2021 · 26 Feb · Shift 2

The trajectory of a projectile in a vertical plane is $y = \alpha x - \beta x^2$, where α and β are constants and x & y are respectively the horizontal and vertical distances of the projectile from the point of projection. The angle of projection θ and the maximum height attained H are respectively given by :

- (A) $\tan^{-1} \alpha, \frac{\alpha^2}{4\beta}$
- (B) $\tan^{-1} \alpha, \frac{4\alpha^2}{\beta}$
- (C) $\tan^{-1} \left(\frac{\beta}{\alpha} \right), \frac{\alpha^2}{\beta}$
- (D) $\tan^{-1} \beta, \frac{\alpha^2}{2\beta}$

[Step-by-step solution ► prepwiser.in/questions/5VI6x3ZZfe](https://www.prepwiser.in/questions/5VI6x3ZZfe)

Q38 JEE Main 2020 · 9 Jan · Shift 2

A particle starts from the origin at $t = 0$ with an initial velocity of $3.0 \hat{i}$ m/s and moves in the x-y plane with a constant acceleration $(6\hat{i} + 4\hat{j})$ m/s². The x-coordinate of the particle at the instant when its y-coordinate is 32 m is D meters. The value of D is :-

- (A) 40 (B) 32
(C) 50 (D) 60

[Step-by-step solution](#) ► [prepwiser.in/questions/PcnwfORfj8](https://www.prepwiser.in/questions/PcnwfORfj8)

River-Boat and Rain-Man Problems · 1 PYQs

Q39 JEE Main 2025 · 29 Jan · Shift 1

The maximum speed of a boat in still water is 27 km/h. Now this boat is moving downstream in a river flowing at 9 km/h. A man in the boat throws a ball vertically upwards with speed of 10 m/s. Range of the ball as observed by an observer at rest on the bank is _____ cm. (Take $g = 10$ m/s²)

Numerical answer — enter the value.

[Step-by-step solution](#) ► [prepwiser.in/questions/4Hg9x81JJY](https://www.prepwiser.in/questions/4Hg9x81JJY)

Relative Velocity · 8 PYQs

Q40 JEE Main 2024 · 1 Feb · Shift 2

Train A is moving along two parallel rail tracks towards north with speed 72km/h and train B is moving towards south with speed 108km/h. Velocity of train B with respect to A and velocity of ground with respect to B are (in ms⁻¹):

- (A) -50 and -30 (B) -50 and 30
(C) -30 and 50 (D) 50 and -30

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

Q41 JEE Main 2023 · 13 Apr · Shift 1

Two trains 'A' and 'B' of length ' l ' and ' $4l$ ' are travelling into a tunnel of length ' L ' in parallel tracks from opposite directions with velocities 108km/h and 72km/h, respectively. If train 'A' takes 35s less time than train 'B' to cross the tunnel then, length ' L ' of tunnel is :

(Given $L = 60l$)

- (A) 900 m (B) 1200 m
(C) 1800 m (D) 2700 m

[Step-by-step solution](#) ► [prepwiser.in/questions/8V7GLxbiRV](https://www.prepwiser.in/questions/8V7GLxbiRV)

Q42 JEE Main 2023 · 13 Apr · Shift 2

A passenger sitting in a train A moving at 90km/h observes another train B moving in the opposite direction for 8s. If the velocity of the train B is 54km/h, then length of train B is:

- (A) 80 m (B) 200 m
(C) 120 m (D) 320 m

[Step-by-step solution](#) ► [prepwiser.in/questions/onibZyRHP5](https://www.prepwiser.in/questions/onibZyRHP5)

Q43 JEE Main 2022 · 28 Jul · Shift 1

A NCC parade is going at a uniform speed of 9 km/h under a mango tree on which a monkey is sitting at a height of 19.6 m . At any particular instant, the monkey drops a mango. A cadet will receive the mango whose distance from the tree at time of drop is: (Given $g = 9.8\text{ m/s}^2$)

- (A) 5 m (B) 10 m
(C) 19.8 m (D) 24.5 m

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

Q44 JEE Main 2021 · 26 Aug · Shift 2

A bomb is dropped by fighter plane flying horizontally. To an observer sitting in the plane, the trajectory of the bomb is a :

- (A) hyperbola
(B) parabola in the direction of motion of plane
(C) straight line vertically down the plane
(D) parabola in a direction opposite to the motion of plane

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

Q45 JEE Main 2021 · 20 Jul · Shift 2

A boy reaches the airport and finds that the escalator is not working. He walks up the stationary escalator in time t_1 . If he remains stationary on a moving escalator then the escalator takes him up in time t_2 . The time taken by him to walk up on the moving escalator will be :

- (A) $\frac{t_1 t_2}{t_2 - t_1}$ (B) $\frac{t_1 + t_2}{2}$
(C) $\frac{t_1 t_2}{t_2 + t_1}$ (D) $t_2 - t_1$

[Step-by-step solution ► prepwiser.in/questions/rYdWCCUu8y](https://www.prepwiser.in/questions/rYdWCCUu8y)

Q46 JEE Main 2020 · 2 Sep · Shift 1

Train A and train B are running on parallel tracks in the opposite directions with speeds of 36 km/hour and 72 km/hour , respectively. A person is walking in train A in the direction opposite to its motion with a speed of 1.8 km/hour . Speed (in ms^{-1}) of this person as observed from train B will be close to : (take the distance between the tracks as negligible)

- (A) 30.5 ms^{-1}
(B) 29.5 ms^{-1}
(C) 31.5 ms^{-1}
(D) 28.5 ms^{-1}

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

Q47 JEE Main 2020 · 8 Jan · Shift 1

A particle is moving along the x-axis with its coordinate with the time 't' given by

$x(t) = 10 + 8t - 3t^2$. Another particle is moving the y-axis with its coordinate as a function of time given by $y(t) = 5 - 8t^3$.

At $t = 1$ s, the speed of the second particle as measured in the frame of the first particle is given as $\sqrt{v}$.

Then v (in m/s) is _____.

Numerical answer — enter the value.

Step-by-step solution ► [prepwisar.in/questions/S62nP5M8XI](https://www.prepwisar.in/questions/S62nP5M8XI)

Answer key — Projectile Motion & Relative Motion

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

1	C	2	A	3	D	4	D	5	C	6	D	7	100	8	16
9	D	10	A	11	D	12	A	13	80	14	C	15	B	16	B
17	A	18	A	19	A	20	A	21	80	22	A	23	B	24	15
25	C	26	D	27	5	28	C	29	C	30	D	31	C	32	B
33	A	34	A	35	B	36	C	37	A	38	D	39	2000	40	B
41	C	42	D	43	A	44	C	45	C	46	B	47	580		

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