

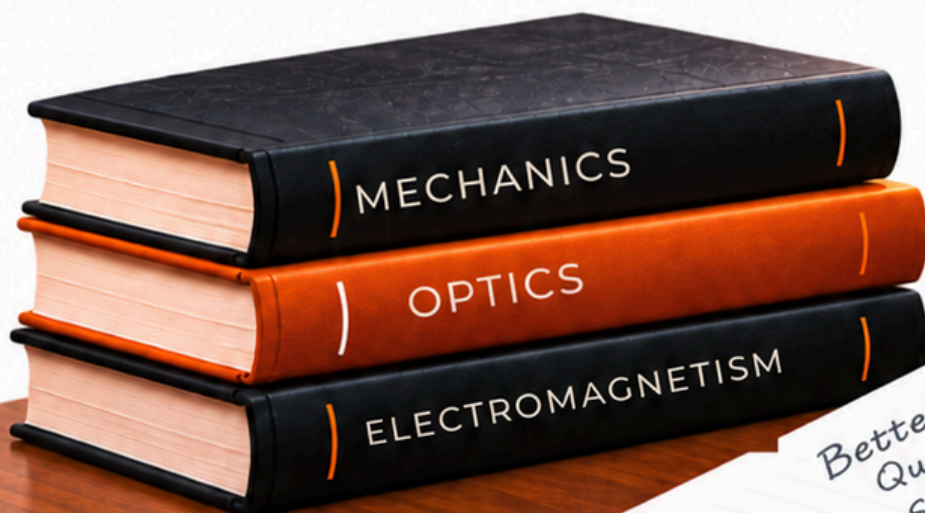
JEE Main Physics

Uniformly accelerated motion PYQ

$$F = ma$$



$$v = u + at$$



Better
Questions
Stronger
Concepts
Brighter Future

Uniformly accelerated motion JEE Main PYQ



Previous Year Questions - Topic-wise Collection

Subject: Physics

Years: 2026-2002

Total Questions: 77

About this PYQ collection

What is inside

A complete topic-wise set of **77 previous year questions** on **Uniformly accelerated motion** from **JEE Main (2026-2014)** and its predecessor **AIEEE (2012-2002)**, across **18 exam years**. **61 questions** are from 2019 onwards, so most of the set reflects the recent NTA pattern.

Questions are arranged to reduce unused page space, with newest-first priority and continuous numbering from 1. Each carries an exam date and shift tag to trace the original paper.

Topic-wise questions

TOPIC	QS	%
Uniformly accelerated motion	77	100%

Question types

TYPE	QS	%
Single-correct MCQ	56	73%
Numerical value	21	27%

Numerical-value questions have no options; all 21 are from 2020 onwards.

How these questions help you

- **Know where the marks are:** uniformly accelerated motion make up **77 of 77 questions (about 100%)**.
- **Build speed and accuracy:** practice the concepts and question styles used in previous papers.
- **Learn the patterns:** the same question styles return year after year.
- **Strengthen other chapters:** these concepts support further study in Physics.

Questions – Uniformly accelerated motion

1. A gas balloon is going up with a constant velocity of 10 m/s . When this balloon reached a height of 75 m , a stone is dropped from it and balloon keeps moving up with the same velocity. The height of the balloon when the stone hits the ground is ____ m.
(Take $g = 10 \text{ m/s}^2$) (8 Apr 2026 | Shift 2)
- (A) 85 (B) 150
(C) 129 (D) 125
-
2. Two masses of 3.4 kg and 2.5 kg are accelerated from an initial speed of 5 m/s and 12 m/s , respectively. The distances traversed by the masses in the 5^{th} second are 104 m and 129 m , respectively. The ratio of their momenta after 10 s is $\frac{x}{8}$. The value of x is _____. (8 Apr 2026 | Shift 2)
-
3. From 18 m height above the ground a ball is dropped from rest. The height above the ground at which the magnitude of velocity equal to the magnitude of acceleration (in the same set of units) due to gravity is ____ m.
(Take $g = 10 \text{ m/s}^2$ and neglect the air resistance) (5 Apr 2026 | Shift 1)
-
4. Water drops fall from a tap on the floor, 5 m below, at regular intervals of time, the first drop strikes the floor when the sixth drop begins to fall. The height at which the fourth drop will be from ground, at the instant when the first drop strikes the ground is ____ m.
($g = 10 \text{ m/s}^2$) (28 Jan 2026 | Shift 1)
- (A) 3.8 (B) 4.0
(C) 4.2 (D) 2.5
-
5. A particle starts moving from time $t = 0$ and its coordinate is given as $x(t) = 4t^3 - 3t$
- A. The particle returns to its original position (origin) 0.866 units later
B. The particle is 1 unit away from origin at its turning point
C. Acceleration of the particle is non-negative
D. The particle is 0.5 units away from origin at its turning point
E. Particle never turns back as acceleration is non-negative
- Choose the **correct** answer from the options given below : (28 Jan 2026 | Shift 2)
- (A) A, C, D Only (B) A, B, C Only
(C) C, E Only (D) A, C Only

6. A paratrooper jumps from an aeroplane and opens a parachute after 2 s of free fall and starts deaccelerating with 3 m/s^2 . At 10 m height from ground, while descending with the help of parachute, the speed of paratrooper is 5 m/s. The initial height of the airplane is _____ m.
($g = 10 \text{ m/s}^2$) (23 Jan 2026 | Shift 2)
- (A) 92.5 (B) 62.5
(C) 20 (D) 82.5
-
7. A particle moves along the x -axis and has its displacement x varying with time t according to the equation:
 $x = c_0(t^2 - 2) + c(t - 2)^2$
where c_0 and c are constants of appropriate dimensions.
Then, which of the following statements is correct? (3 Apr 2025 | Shift 2)
- (A) the acceleration of the particle is $2(c + c_0)$ (B) the acceleration of the particle is $2c_0$
(C) the acceleration of the particle is $2c$ (D) the initial velocity of the particle is $4c$
-
8. Two cars are travelling towards each other at speed of 20 m s^{-1} each. When the cars are 300 m apart, both the drivers apply brakes and the cars retard at the rate of 2 m s^{-2} . The distance between them when they come to rest is : (9 Apr 2024 | Shift 2)
- (A) 25 m (B) 100 m
(C) 50 m (D) 200 m
-
9. A body projected vertically upwards with a certain speed from the top of a tower reaches the ground in t_1 . If it is projected vertically downwards from the same point with the same speed, it reaches the ground in t_2 . Time required to reach the ground, if it is dropped from the top of the tower, is : (6 Apr 2024 | Shift 2)
- (A) $\sqrt{t_1 + t_2}$ (B) $\sqrt{t_1 t_2}$
(C) $\sqrt{\frac{t_1}{t_2}}$ (D) $\sqrt{t_1 - t_2}$
-
10. A particle moves in a straight line so that its displacement x at any time t is given by $x^2 = 1 + t^2$. Its acceleration at any time t is x^{-n} where $n = \underline{\hspace{2cm}}$. (6 Apr 2024 | Shift 2)
-
11. The displacement and the increase in the velocity of a moving particle in the time interval of t to $(t + 1)$ s are 125 m and 50 m/s, respectively. The distance travelled by the particle in $(t + 2)^{\text{th}}$ s is _____ m. (30 Jan 2024 | Shift 1)

12. A body moves on a frictionless plane starting from rest. If S_n is distance moved between $t = n - 1$ and $t = n$ and S_{n-1} is distance moved between $t = n - 2$ and $t = n - 1$, then the ratio $\frac{S_{n-1}}{S_n}$ is $\left(1 - \frac{2}{x}\right)$ for $n = 10$. The value of x is _____. (5 Apr 2024 | Shift 1)
-
13. A body travels 102.5 m in n^{th} second and 115.0 m in $(n + 2)^{\text{th}}$ second. The acceleration is : (4 Apr 2024 | Shift 1)
- (A) 6.25 m/s^2 (B) 5 m/s^2
(C) 12.5 m/s^2 (D) 9 m/s^2
-
14. A bus moving along a straight highway with speed of 72 km/h is brought to halt within 4s after applying the brakes. The distance travelled by the bus during this time (Assume the retardation is uniform) is _____ m. (4 Apr 2024 | Shift 2)
-
15. A particle is moving in one dimension (along x axis) under the action of a variable force. It's initial position was 16 m right of origin. The variation of its position (x) with time (t) is given as $x = -3t^3 + 18t^2 + 16t$, where x is in m and t is in s. The velocity of the particle when its acceleration becomes zero is _____ m/s. (1 Feb 2024 | Shift 1)
-
16. A particle initially at rest starts moving from reference point $x = 0$ along x -axis, with velocity v that varies as $v = 4\sqrt{x} \text{ m/s}$. The acceleration of the particle is _____ ms^{-2} . (1 Feb 2024 | Shift 2)
-
17. The relation between time ' t ' and distance ' x ' is $t = \alpha x^2 + \beta x$, where α and β are constants. The relation between acceleration (a) and velocity (v) is : (31 Jan 2024 | Shift 1)
- (A) $a = -5\alpha v^5$ (B) $a = -3\alpha v^2$
(C) $a = -2\alpha v^3$ (D) $a = -4\alpha v^4$
-
18. A body starts moving from rest with constant acceleration covers displacement S_1 in first $(p - 1)$ seconds and S_2 in first p seconds. The displacement $S_1 + S_2$ will be made in time : (29 Jan 2024 | Shift 1)
- (A) $(2p + 1)s$ (B) $(2p - 1)s$
(C) $(2p^2 - 2p + 1)s$ (D) $\sqrt{(2p^2 - 2p + 1)}s$

19. A particle is moving in a straight line. The variation of position ' x ' as a function of time ' t ' is given as $x = (t^3 - 6t^2 + 20t + 15) \text{ m}$. The velocity of the body when its acceleration becomes zero is : (29 Jan 2024 | Shift 2)
- (A) 6 m/s (B) 10 m/s
(C) 8 m/s (D) 4 m/s
-
20. A body falling under gravity covers two points A and B separated by 80 m in 2 s. The distance of upper point A from the starting point is _____ m (use $g = 10 \text{ ms}^{-2}$). (27 Jan 2024 | Shift 2)
-
21. A ball is thrown vertically upward with an initial velocity of 150 m/s. The ratio of velocity after 3 s and 5 s is $\frac{x+1}{x}$. The value of x is _____.
{ take, $g = 10 \text{ m/s}^2$ } (12 Apr 2023 | Shift 1)
- (A) -5 (B) 10
(C) 5 (D) 6
-
22. Given below are two statements
Statement I : Area under velocity- time graph gives the distance travelled by the body in a given time.
Statement II : Area under acceleration- time graph is equal to the change in velocity- in the given time.
In the light of given statements, choose the correct answer from the options given below. (8 Apr 2023 | Shift 2)
- (A) Both Statement I and Statement II are False. (B) Both Statement I and Statement II are true.
(C) Statement I is incorrect but Statement II is true. (D) Statement I is correct but Statement II is false.
-
23. A particle starts with an initial velocity of 10.0 ms^{-1} along x -direction and accelerates uniformly at the rate of 2.0 ms^{-2} . The time taken by the particle to reach the velocity of 60.0 ms^{-1} is _____. (6 Apr 2023 | Shift 2)
- (A) 30s (B) 6s
(C) 3s (D) 25s
-
24. If the velocity of a body related to displacement x is given by $v = \sqrt{5000 + 24x} \text{ m/s}$, then the acceleration of the body is m/s^2 . (27 Aug 2021 | Shift 1)
-

25. For a train engine moving with speed of 20 ms^{-1} , the driver must apply brakes at a distance of 500 m before the station for the train to come to rest at the station. If the brakes were applied at half of this distance, the train engine would cross the station with speed $\sqrt{x} \text{ ms}^{-1}$. The value of x is _____.
(Assuming same retardation is produced by brakes) (1 Feb 2023 | Shift 2)
-
26. A tennis ball is dropped on to the floor from a height of 9.8 m. It rebounds to a height 5.0 m. Ball comes in contact with the floor for 0.2s. The average acceleration during contact is _____ ms^{-2} .
(Given $g = 10 \text{ ms}^{-2}$) (29 Jan 2023 | Shift 1)
-
27. A ball is thrown up vertically with a certain velocity so that, it reaches a maximum height h . Find the ratio of the times in which it is at height $\frac{h}{3}$ while going up and coming down respectively. (29 Jul 2022 | Shift 1)
- (A) $\frac{\sqrt{2} - 1}{\sqrt{2} + 1}$ (B) $\frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}}$
(C) $\frac{\sqrt{3} - 1}{\sqrt{3} + 1}$ (D) $\frac{1}{3}$
-
28. A juggler throws balls vertically upwards with same initial velocity in air. When the first ball reaches its highest position, he throws the next ball. Assuming the juggler throws n balls per second, the maximum height the balls can reach is (29 Jul 2022 | Shift 2)
- (A) $g/2n$ (B) g/n
(C) $2gn$ (D) $g/2n^2$
-
29. A ball is released from a height h . If t_1 and t_2 be the time required to complete first half and second half of the distance respectively. Then, choose the correct relation between t_1 and t_2 . (29 Jul 2022 | Shift 2)
- (A) $t_1 = (\sqrt{2})t_2$ (B) $t_1 = (\sqrt{2} - 1)t_2$
(C) $t_2 = (\sqrt{2} + 1)t_1$ (D) $t_2 = (\sqrt{2} - 1)t_1$
-
30. A ball is thrown vertically upwards with a velocity of 19.6 ms^{-1} from the top of a tower. The ball strikes the ground after 6 s. The height from the ground up to which the ball can rise will be $\left(\frac{k}{5}\right)$ m. The value of k is _____. (use $g = 9.8 \text{ m/s}^2$) (28 Jul 2022 | Shift 2)

31. 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 $g = 9.8 \text{ m/s}^2$) (28 Jul 2022 | Shift 1)
- (A) 5 m (B) 10 m
(C) 19.8 m (D) 24.5 m
-
32. The velocity of the bullet becomes one third after it penetrates 4 cm in a wooden block. Assuming that bullet is facing a constant resistance during its motion in the block. The bullet stops completely after travelling at $(4 + x)$ cm inside the block. The value of x is : (27 Jul 2022 | Shift 2)
- (A) 2.0 (B) 1.0
(C) 0.5 (D) 1.5
-
33. A car is moving with speed of 150 km/h and after applying the break it will move 27 m before it stops. If the same car is moving with a speed of one third the reported speed then it will stop after travelling _____ m distance. (25 Jul 2022 | Shift 1)
-
34. A particle is moving in a straight line such that its velocity is increasing at 5 ms^{-1} per meter. The acceleration of the particle is _____ ms^{-2} at a point where its velocity is 20 ms^{-1} . (25 Jul 2022 | Shift 2)
-
35. Two balls A and B are placed at the top of 180 m tall tower. Ball A is released from the top at $t = 0 \text{ s}$. Ball B is thrown vertically down with an initial velocity ' u ' at $t = 2 \text{ s}$. After a certain time, both balls meet 100 m above the ground. Find the value of ' u ' in ms^{-1} . [use $g = 10 \text{ ms}^{-2}$] : (29 Jun 2022 | Shift 1)
- (A) 10 (B) 15
(C) 20 (D) 30
-
36. A small toy starts moving from the position of rest under a constant acceleration. If it travels a distance of 10m in $t \text{ s}$, the distance travelled by the toy in the next $t \text{ s}$ will be : (29 Jun 2022 | Shift 2)
- (A) 10 m (B) 20 m
(C) 30 m (D) 40 m

37. When a ball is dropped into a lake from a height 4.9 m above the water level, it hits the water with a velocity v and then sinks to the bottom with the constant velocity v . It reaches the bottom of the lake 4.0 s after it is dropped. The approximate depth of the lake is : (27 Jun 2022 | Shift 2)
- (A) 19.6 m (B) 29.4 m
(C) 39.2 m (D) 73.5 m
-
38. An object is thrown vertically upwards. At its maximum height, which of the following quantity becomes zero? (26 Jun 2022 | Shift 1)
- (A) Momentum (B) Potential Energy
(C) Acceleration (D) Force
-
39. A ball of mass 0.5 kg is dropped from the height of 10 m. The height, at which the magnitude of velocity becomes equal to the magnitude of acceleration due to gravity, is _____ m. [Use $g = 10 \text{ m/s}^2$] (26 Jun 2022 | Shift 1)
-
40. A ball is projected vertically upward with an initial velocity of 50 ms^{-1} at $t = 0\text{s}$. At $t = 2\text{s}$, another ball is projected vertically upward with same velocity. At $t = \text{_____ s}$, second ball will meet the first ball ($g = 10 \text{ ms}^{-2}$). (26 Jun 2022 | Shift 2)
-
41. From the top of a tower, a ball is thrown vertically upward which reaches the ground in 6 s. A second ball thrown vertically downward from the same position with the same speed reaches the ground in 1.5 s. A third ball released, from the rest from the same location, will reach the ground in _____ s. (24 Jun 2022 | Shift 1)
-
42. Water drops are falling from a nozzle of a shower onto the floor, from a height of 9.8 m. The drops fall at a regular interval of time. When the first drop strikes the floor, at that instant, the third drop begins to fall. Locate the position of second drop from the floor when the first drop strikes the floor. (27 Aug 2021 | Shift 2)
- (A) 4.18 m (B) 2.94 m
(C) 2.45 m (D) 7.35 m
-
43. Two spherical balls having equal masses with radius of 5 cm each are thrown upwards along the same vertical direction at an interval of 3s with the same initial velocity of 35 m/s, then these balls collide at a height of m. (Take $g = 10 \text{ m/s}^2$) (26 Aug 2021 | Shift 1)

44. A ball is thrown up with a certain velocity so that it reaches a height 'h'. Find the ratio of the two different times of the ball reaching $\frac{h}{3}$ in both the directions.

(27 Jul 2021 | Shift 1)

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

45. Water droplets are coming from an open tap at a particular rate. The spacing between a droplet observed at 4th second after its fall to the next droplet is 34.3 m. At what rate the droplets are coming from the tap ? (Take $g = 9.8 \text{ m/s}^2$)

(25 Jul 2021 | Shift 1)

- (A) 3 drops / 2 seconds (B) 2 drops / second
(C) 1 drop / second (D) 1 drop / 7 seconds
-

46. The relation between time t and distance x for a moving body is given as $t = mx^2 + nx$, where m and n are constants. The retardation of the motion is : (When v stands for velocity)

(25 Jul 2021 | Shift 2)

- (A) $2mv^3$ (B) $2mnv^3$
(C) $2nv^3$ (D) $2n^2v^3$
-

47. A balloon was moving upwards with a uniform velocity of 10 m/s. An object of finite mass is dropped from the balloon when it was at a height of 75 m from the ground level. The height of the balloon from the ground when object strikes the ground was around :

(takes the value of g as 10 m/s^2)

(25 Jul 2021 | Shift 2)

- (A) 300 m (B) 200 m
(C) 125 m (D) 250 m
-

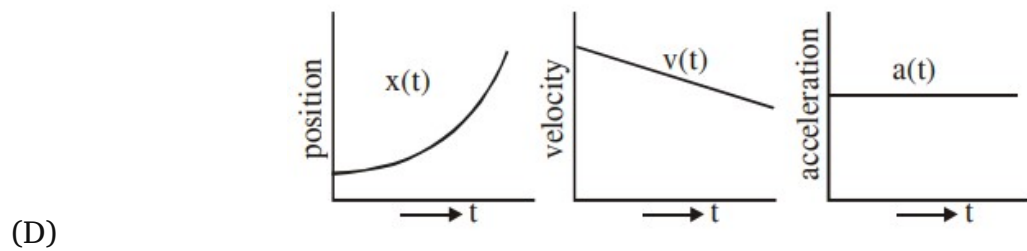
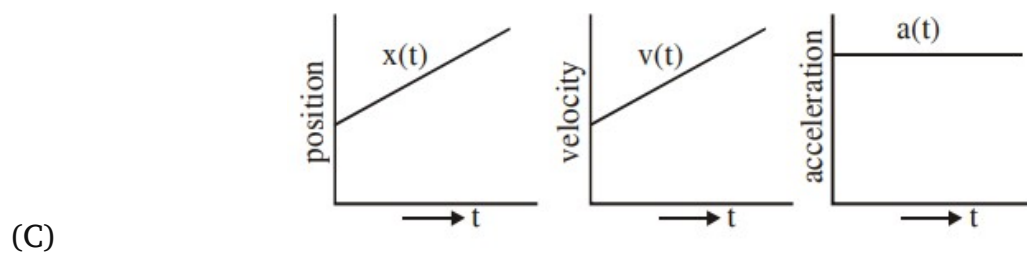
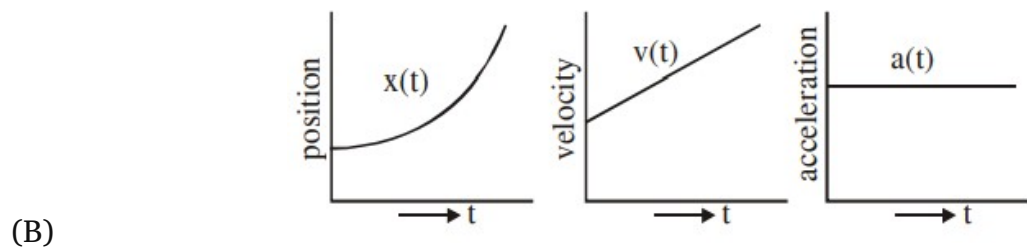
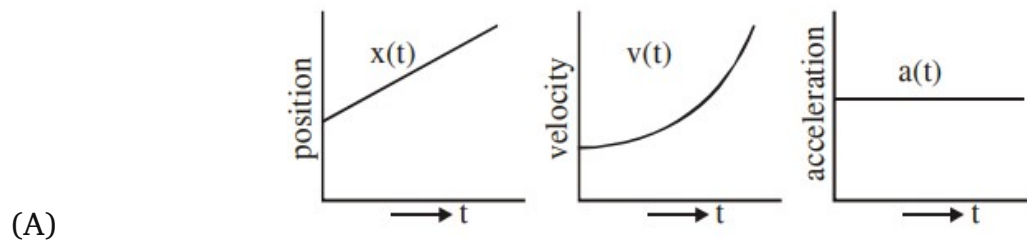
48. A car accelerates from rest at a constant rate α for some time after which it decelerates at a constant rate β to come to rest. If the total time elapsed is t seconds, the total distance travelled is :

(17 Mar 2021 | Shift 1)

- (A) $\frac{4\alpha\beta}{(\alpha+\beta)}t^2$ (B) $\frac{2\alpha\beta}{(\alpha+\beta)}t^2$
(C) $\frac{\alpha\beta}{2(\alpha+\beta)}t^2$ (D) $\frac{\alpha\beta}{4(\alpha+\beta)}t^2$
-

49. The position, velocity and acceleration of a particle moving with a constant acceleration can be represented by :

(18 Mar 2021 | Shift 1)



50. The velocity of a particle is $v = v_0 + gt + Ft^2$. Its position is $x = 0$ at $t = 0$; then its displacement after time ($t = 1$) is :

(17 Mar 2021 | Shift 2)

(A) $v_0 + g + f$

(B) $v_0 + \frac{g}{2} + \frac{F}{3}$

(C) $v_0 + 2g + 3F$

(D) $v_0 + \frac{g}{2} + F$

51. A rubber ball is released from a height of 5 m above the floor. It bounces back repeatedly, always rising to $\frac{81}{100}$ of the height through which it falls. Find the average speed of the ball. (Take $g = 10 \text{ ms}^{-2}$) (17 Mar 2021 | Shift 2)

(A) 2.50 ms^{-1} (B) 3.0 ms^{-1}
(C) 2.0 ms^{-1} (D) 3.50 ms^{-1}

52. A scooter accelerates from rest for time t_1 at constant rate a_1 and then retards at constant rate a_2 for time t_2 and comes to rest. The correct value of $\frac{t_1}{t_2}$ will be :

(26 Feb 2021 | Shift 2)

(A) $\frac{a_1 + a_2}{a_2}$ (B) $\frac{a_1 + a_2}{a_1}$
(C) $\frac{a_2}{a_1}$ (D) $\frac{a_1}{a_2}$

53. An engine of a train, moving with uniform acceleration, passes the signal-post with velocity u and the last compartment with velocity v . The velocity with which middle point of the train passes the signal post is :

(25 Feb 2021 | Shift 1)

(A) $\frac{u + v}{2}$ (B) $\sqrt{\frac{v^2 - u^2}{2}}$
(C) $\frac{v - u}{2}$ (D) $\sqrt{\frac{v^2 + u^2}{2}}$

54. A stone is dropped from the top of a building. When it crosses a point 5 m below the top, another stone starts to fall from a point 25 m below the top. Both stones reach the bottom of building simultaneously. The height of the building is : (25 Feb 2021 | Shift 2)

(A) 50 m (B) 25 m
(C) 45 m (D) 35 m

55. A helicopter rises from rest on the ground vertically upwards with a constant acceleration g . A food packet is dropped from the helicopter when it is at a height h . The time taken by the packet to reach the ground is close to :

[g is the acceleration due to gravity]

(5 Sept 2020 | Shift 1)

(A) $t = 3.4\sqrt{\left(\frac{h}{g}\right)}$ (B) $t = 1.8\sqrt{\left(\frac{h}{g}\right)}$
(C) $t = \sqrt{\frac{2h}{3g}}$ (D) $t = \frac{2}{3}\sqrt{\left(\frac{h}{g}\right)}$

56. The distance x covered by a particle in one dimensional motion varies with time t as $x^2 = at^2 + 2bt + c$. If the acceleration of the particle depends on x as x^{-n} , where n is an integer, the value of n is _____ (9 Jan 2020 | Shift 1)

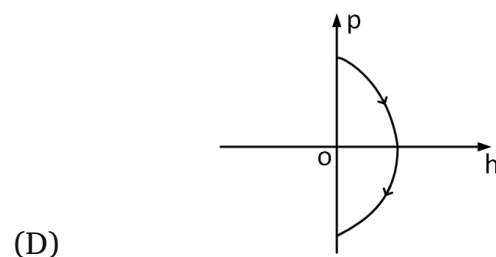
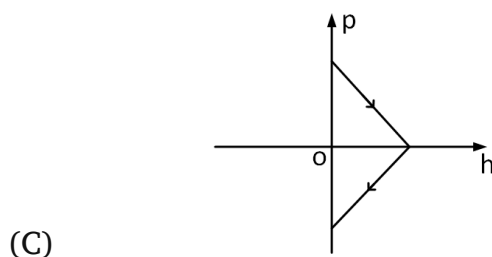
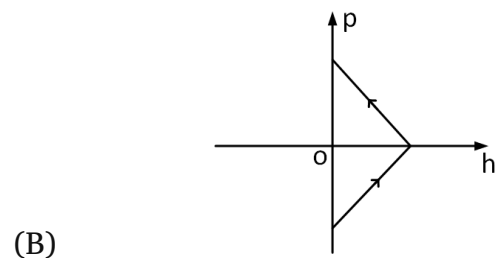
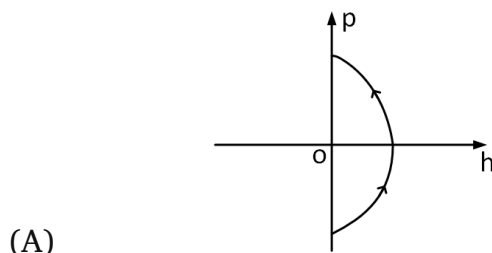
57. A ball is dropped from the top of a 100 m high tower on a planet. In the last $\frac{1}{2}s$ before hitting the ground, it covers a distance of 19 m. Acceleration due to gravity (in ms^{-2}) near the surface on that planet is _____. (8 Jan 2020 | Shift 2)

58. A particle is moving with speed $v = b\sqrt{x}$ along positive x -axis. Calculate the speed of the particle at time $t = \tau$ (assume that the particle is at origin $t = 0$) (12 Apr 2019 | Shift 2)

(A) $\frac{b^2\tau}{\sqrt{2}}$
(C) $\frac{b^2\tau}{2}$

(B) $b^2\tau$
(D) $\frac{b^2\tau}{4}$

59. A ball is thrown vertically up (taken as $+z$ -axis) from the ground. The correct momentum-height (p - h) diagram is : (9 Apr 2019 | Shift 1)



60. An automobile, travelling at 40 km/h, can be stopped at a distance of 40 m by applying brakes. If the same automobile is travelling at 80 km/h, the minimum stopping distance, in metres, is (assume no skidding) : (15 Apr 2018 | Shift 1)

- (A) 45 m
(C) 150 m
(B) 100 m
(D) 160 m

61. The position of a particle as a function of time t , is given by

$$x(t) = at + bt^2 - ct^3$$

where a , b and c are constants. When the particle attains zero acceleration, then its velocity will be :

(9 Apr 2019 | Shift 2)

- (A) $a + \frac{b^2}{c}$ (B) $a + \frac{b^2}{4c}$
(C) $a + \frac{b^2}{3c}$ (D) $a + \frac{b^2}{2c}$
-

62. In a car race on straight road, car A takes a time t less than car B at the finish and passes finishing point with a speed ' v ' more than that of car B. Both the cars start from rest and travel with constant acceleration a_1 and a_2 respectively. Then ' v ' is equal to :

(9 Jan 2019 | Shift 2)

- (A) $\frac{2a_1a_2}{a_1 + a_2}t$ (B) $\sqrt{2a_1a_2}t$
(C) $\sqrt{a_1a_2}t$ (D) $\frac{a_1 + a_2}{2}t$
-

63. From a tower of height H , a particle is thrown vertically upwards with a speed u . The time taken by the particle, to hit the ground, is n times that taken by it to reach the highest point of its path. The relation between H , u and n is:

(6 Apr 2014 | Single sitting)

- (A) $2gH = n^2u^2$ (B) $gH = (n - 2)^2u^2$
(C) $2gH = nu^2(n - 2)$ (D) $gH = (n - 2)u^2$
-

64. A goods train accelerating uniformly on a straight railway track, approaches an electric pole standing on the side of track. Its engine passes the pole with velocity and the guard's room passes with velocity v . The middle wagon of the train passes the pole with a velocity

(19 May 2012 | Single slot)

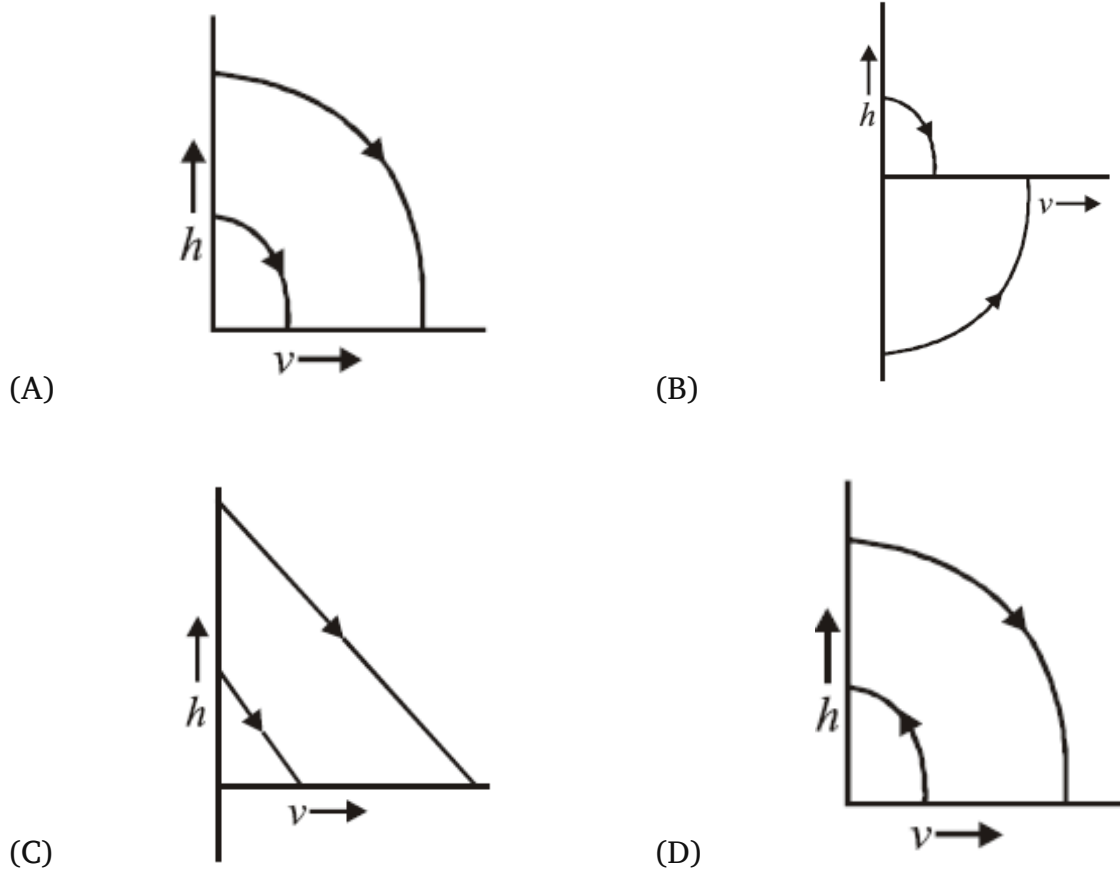
- (A) $(u + v)/(2)$ (B) $(1)/(2)\sqrt{u^2 + v^2}$
(C) $\sqrt{uv}$ (D) $\sqrt{(u^2 + v^2)/(2)}$
-

65. An object, moving with a speed of 6.25 m/s, is decelerated at a rate given by : $\frac{dv}{dt} = -2.5\sqrt{v}$ where v is the instantaneous speed. The time taken by the object, to come to rest, would be :

(1 May 2011 | Single sitting)

- (A) 2 s (B) 4 s
(C) 8 s (D) 1 s
-

66. A ball is dropped vertically downwards from a height above the ground. It hits the ground inelastically and bounces up vertically. Neglecting subsequent motion and air resistance, which of the following graph represents variation between speed (v) and height (h) correctly? (26 May 2012 | Single slot)



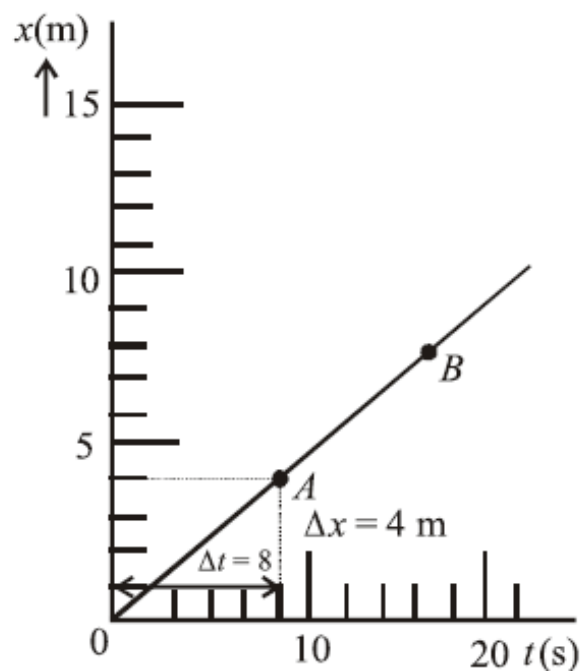
67. The velocity of a particle is $v = v_0 + gt + ft^2$. If its position is $x = 0$ at $t = 0$, then its displacement after unit time ($t = 1$) is (29 Apr 2007 | Single sitting)

- | | |
|-----------------------|---------------------|
| (A) $v_0 + g/2 + f$ | (B) $v_0 + 2g + 3f$ |
| (C) $v_0 + g/2 + f/3$ | (D) $v_0 + g + f$ |

68. A particle located at $x = 0$ at time $t = 0$, starts moving along the positive x -direction with a velocity ' v ' that varies as $v = \alpha\sqrt{x}$. The displacement of the particle varies with time as (30 Apr 2006 | Single sitting)

- | | |
|---------------|-----------|
| (A) t^2 | (B) t |
| (C) $t^{1/2}$ | (D) t^3 |

69. The graph of an object's motion (along the x – axis) is shown in the figure. The instantaneous velocity of the



object at points and are v_A and v_B respectively. Then

(7 May 2012 | Single slot)

- (A) $v_A = v_B = 0.5 \text{ m/s}$ (B) $v_A = 0.5 \text{ m/s} < v_B$
(C) $v_A = 0.5 \text{ m/s} > v_B$ (D) $v_A = v_B = 2 \text{ m/s}$

70. A parachutist after bailing out falls 50 m without friction. When parachute opens, it decelerates at 2 m/s^2 . He reaches the ground with a speed of 3 m/s . At what height, did he bail out?

(8 May 2005 | Single sitting)

- (A) 182 m (B) 91 m
(C) 111 m (D) 293 m

71. The relation between time t and distance x is $t = ax^2 + bx$ where a and b are constants. The acceleration is

(8 May 2005 | Single sitting)

- (A) $2bv^3$ (B) $-2abv^2$
(C) $2av^2$ (D) $-2av^3$

72. A car starting from rest accelerates at the rate f through a distance S , then continues at constant speed for time t and then decelerates at the rate $\frac{f}{2}$ to come to rest. If the total distance traversed is $15S$, then (8 May 2005 | Single sitting)

(A) $S = \frac{1}{6}ft^2$ (B) $S = ft$
(C) $S = \frac{1}{4}ft^2$ (D) $S = \frac{1}{72}ft^2$

73. A ball is released from the top of a tower of height h meters. It takes T seconds to reach the ground. What is the position of the ball in $\frac{T}{3}$ seconds? (23 May 2004 | Single sitting)

(A) $\frac{8h}{9}$ meters from the ground (B) $\frac{7h}{9}$ meters from the ground
(C) $\frac{h}{9}$ meters from the ground (D) $\frac{7h}{18}$ meters from the ground

74. An automobile travelling with speed of 60 km/h, can brake to stop within a distance of 20 m. If the car is going twice as fast, i.e 120 km/h, the stopping distance will be (23 May 2004 | Single sitting)

(A) 60 m (B) 40 m
(C) 20 m (D) 80 m

75. A car, moving with a speed of 50 km/hr, can be stopped by brakes after at least 6 m. If the same car is moving at a speed of 100 km/hr, the minimum stopping distance is (26 Apr 2003 | Single sitting)

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

76. From a building two balls A and B are thrown such that A is thrown upwards and B downwards (both vertically with the same speed). If v_A and v_B are their respective velocities on reaching the ground, then (19 May 2002 | Single sitting)

(A) $v_B > v_A$ (B) $v_A = v_B$
(C) $v_A > v_B$ (D) their velocities depend on their masses.

77. Speeds of two identical cars are u and $4u$ at the specific instant. The ratio of the respective distances in which the two cars are stopped from that instant is :

(19 May 2002 | Single sitting)

- | | |
|-----------|------------|
| (A) 1 : 1 | (B) 1 : 4 |
| (C) 1 : 8 | (D) 1 : 16 |