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NEET MOTION IN A STRAIGHT LINE — PYQS

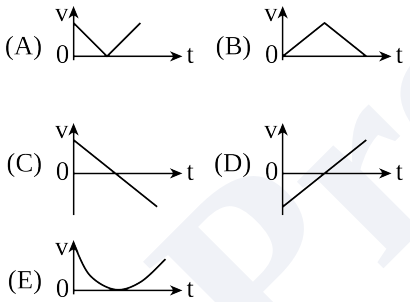
Max. Marks: 180 **Questions:** 45

Section A (MCQ) — 45 questions

Q.1 When a ruler falls vertically, 5 different persons catch it with different reaction times.
($g = 9.8\ ms^{-2}$)
What is the correct order of the distance travelled by the ruler for each person ?
A. Person A has reaction time of 0.20 s
B. Person B has reaction time of 0.22 s
C. Person C has reaction time of 0.18 s
D. Person D has reaction time of 0.19 s
E. Person E has reaction time of 0.21 s
[NEET (UG) 2026]
(1) B > E > A > C > D (2) C > D > A > E > B
(3) C > D > A > B > E (4) B > E > A > D > C

Scan or tap for the full solution

Q.2 The following plots show variation of velocity (v) with time (t), of a ball thrown vertically upward, and falling back. Which of the following plots is/are correct? [NEET (UG) 2026]



(1) B only (2) A and E only
(3) C only (4) D only

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Q.3 Consider a particle moving along a straight line, whose position as a function of time is given by $s(t) = \alpha t^2 - \beta t + \gamma$, where $\alpha = 1\ m\ s^{-2}$, $\beta = 6\ m\ s^{-1}$ and $\gamma = 5$ m. The average speed of the particle, in $m\ s^{-1}$ from t = 0 to t = 6 s is: [RE-NEET (UG) 2026]
(1) 0 (2) 12 (3) 6 (4) 3

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Q.4 In some appropriate units, time (t) and position (x) relation of a moving particle is given by $t = x^2 + x$. The acceleration of the particle is [NEET (UG) 2025]
(1) $+\frac{2}{(x+1)^3}$ (2) $+\frac{2}{2x+1}$
(3) $-\frac{2}{(x+2)^3}$ (4) $-\frac{2}{(2x+1)^3}$

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Q.5 Two cities X and Y are connected by a regular bus service with a bus leaving in either direction every T min. A girl is driving scooty with a speed of 60 km/h in the direction X to Y notices that a bus goes past her every 30 minutes in the direction of her motion, and every 10 minutes in the opposite direction. Choose the correct option for the period T of the bus service and the speed (assumed constant) of the buses. [NEET (UG) 2025]
(1) 10 min, 90 km/h (2) 15 min, 120 km/h
(3) 9 min, 40 km/h (4) 25 min, 100 km/h

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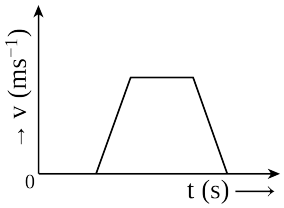
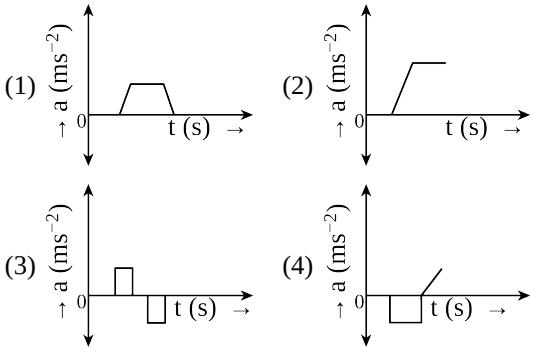
Q.6 The velocity (v)– time (t) plot of the motion of a body is shown below:



The acceleration (a)– time (t) graph that best suits this motion is : [NEET (UG) 2024]



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Q.7 A particle is moving along x-axis with its position (x) varying with time (t) as $x = \alpha t^4 + \beta t^2 + \gamma t + \delta$. The ratio of its initial velocity to its initial acceleration, respectively, is: [RE-NEET (UG) 2024]

(1) 2α:δ (2) γ:2δ (3) 4α:β (4) γ:2β

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Q.8 A vehicle travels half the distance with speed v and the remaining distance with speed 2v. Its average speed is : [NEET (UG) 2023]

(1) $\frac{2v}{3}$ (2) $\frac{4v}{3}$ (3) $\frac{3v}{4}$ (4) $\frac{v}{3}$

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Q.9 A horizontal bridge is built across a river. A student standing on the bridge throws a small ball vertically upwards with a velocity 4 m s^{-1}. The ball strikes the water surface after 4 s. The height of bridge above water surface is (Take g = 10 m s^{-2}) [NEET (UG) 2023]

(1) 60 m (2) 64 m (3) 68 m (4) 56 m

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Q.10 A bullet from a gun is fired on a rectangular wooden block with velocity u. When bullet travels 24 cm through the block along its length horizontally, velocity of bullet becomes $\frac{u}{3}$. Then it further penetrates into the block in the same direction before coming to rest exactly at the other end of the block. The total length of the block is : [NEET (UG) 2023]

(1) 24 cm (2) 28 cm (3) 30 cm (4) 27 cm

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Q.11 The ratio of the distances travelled by a freely falling body in the 1st, 2nd, 3rd and 4th second [NEET (UG) 2022]

(1) 1:2:3:4 (2) 1:4:9:16
(3) 1:3:5:7 (4) 1:1:1:1

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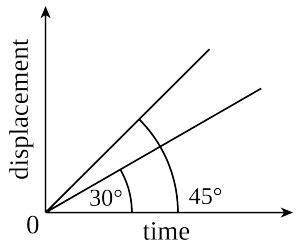
Q.12 The displacement-time graphs of two moving particles make angles of 30° and 45° with the x-axis as shown in the figure. The ratio of their respective velocity is [NEET (UG) 2022]



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

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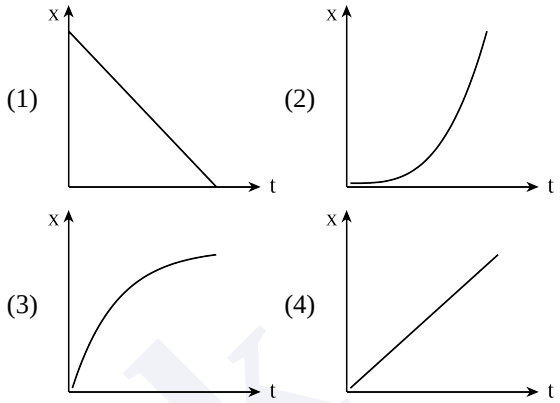
Q.13 The position-time (x - t) graph for positive acceleration is [NEET (UG) 2022 (Phase 2)]



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Q.14 A small block slides down on a smooth inclined plane, starting from rest at time t = 0. Let S_n be the distance travelled by the block in the interval t = n − 1 to t = n. Then the ratio $\frac{S_n}{S_{n+1}}$ is : [NEET (UG) 2021]

(1) $\frac{2n}{2n-1}$ (2) $\frac{2n-1}{2n}$ (3) $\frac{2n-1}{2n+1}$ (4) $\frac{2n+1}{2n-1}$

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Q.15 A ball is thrown vertically downward with a velocity of 20 m/s from the top of a tower. It hits the ground after some time with a velocity of 80 m/s. The height of the tower is : (g = 10 m/s^2) [NEET (UG) 2020]

(1) 340 m (2) 320 m (3) 300 m (4) 360 m

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Q.16 When an object is shot from the bottom of a long smooth inclined plane kept at an angle 60° with horizontal, it can travel a distance x_1 along the plane. But when the inclination is decreased to 30° and the same object is shot with the same velocity, it can travel x_2 distance. Then $x_1:x_2$ will be : [NEET (UG) 2019]

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

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Q.17 A toy car with charge q moves on a frictionless horizontal plane surface under the influence of a uniform electric field $\vec{E}$. Due to the force $q\vec{E}$, its velocity increases from 0 to 6 m s^{-1} in one second duration. At that instant the direction of the field is reversed. The car continues to move for two more seconds under the influence of this field. The average velocity and the average speed of the toy car between 0 to 3 seconds are respectively

[NEET 2018]

(1) 2 m s^{-1}, 4 m s^{-1} (2) 1 m s^{-1}, 3 m s^{-1}
(3) 1 m s^{-1}, 3.5 m s^{-1} (4) 1.5 m s^{-1}, 3 m s^{-1}

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Q.18 Preeti reached the metro station and found that the escalator was not working. She walked up the stationary escalator in time t_1. On another day, if she remains stationary on the moving escalator, then the escalator takes her up in time t_2. The time taken by her to walk up on the moving escalator will be

[NEET 2017]

(1) $\frac{t_1t_2}{t_2-t_1}$ (2) $\frac{t_1t_2}{t_2+t_1}$ (3) t_1-t_2 (4) $\frac{t_1+t_2}{2}$

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Q.19 If the velocity of a particle is $v = At + Bt^2$, where A and B are constants, then the distance travelled by it between 1 s and 2 s is [NEET 2016 (Phase 1)]

(1) $\frac{3}{2}A+\frac{7}{3}B$ (2) $\frac{A}{2}+\frac{B}{3}$
(3) $\frac{3}{2}A+4B$ (4) 3A + 7B

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Q.20 Two cars P and Q start from a point at the same time in a straight line and their positions are represented by
$x_P(t) = (at + bt^2)$ and $x_Q(t) = (ft - t^2)$.
At what time do the cars have the same velocity ?

[NEET 2016 (Phase 2)]

(1) $\frac{a-f}{1+b}$ (2) $\frac{a+f}{2(b-1)}$
(3) $\frac{a+f}{2(1+b)}$ (4) $\frac{f-a}{2(1+b)}$

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Q.21 A particle of unit mass undergoes one-dimensional motion such that its velocity varies according to $v(x) = \beta x^{-2n}$, where β and n are constants and x is the position of the particle. The acceleration of the particle as a function of x, is given by

[AIPMT 2015 (Cancelled)]

(1) $-2\beta^2x^{-2n+1}$ (2) $-2n\beta^2e^{-4n+1}$
(3) $-2n\beta^2x^{-2n-1}$ (4) $-2n\beta^2x^{-4n-1}$

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Q.22 A stone falls freely under gravity. It covers distances h_1, h_2 and h_3 in the first 5 seconds, the next 5 seconds and the next 5 seconds respectively. The relation between h_1, h_2 and h_3 is [NEET 2013]

(1) $h_2 = 3h_1$ and $h_3 = 3h_2$
(2) $h_1 = h_2 = h_3$
(3) $h_1 = 2h_2 = 3h_3$
(4) $h_1 = \frac{h_2}{3} = \frac{h_3}{5}$

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Q.23 The displacement 'x' (in meter) of a particle of mass 'm' (in kg) moving in one dimension under the action of a force, is related to time 't' (in sec) by $t = \sqrt{x} + 3$. The displacement of the particle when its velocity is zero, will be [NEET 2013 (Karnataka)]

(1) 4 m (2) 0 m (zero)
(3) 6 m (4) 2 m

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Q.24 A stone is dropped from a height h. It hits the ground with a certain momentum P. If the same stone is dropped from a height 100% more than the previous height, the momentum when it hits the ground will change by [AIPMT 2012 (Mains)]

(1) 68% (2) 41% (3) 200% (4) 100%

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Q.25 The motion of a particle along a straight line is described by equation $x = 8 + 12t - t^3$ where x is in metre and t in second. The retardation of the particle when its velocity becomes zero is

[AIPMT 2012 (Prelims)]

(1) 24 m s^{-2} (2) zero
(3) 6 m s^{-2} (4) 12 m s^{-2}

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Q.26 A particle covers half of its total distance with speed v_1 and the rest half distance with speed v_2. Its average speed during the complete journey is

[AIPMT 2011 (Mains)]

(1) $\frac{v_1+v_2}{2}$ (2) $\frac{v_1v_2}{v_1+v_2}$
(3) $\frac{2v_1v_2}{v_1+v_2}$ (4) $\frac{v_1^2v_2^2}{v_1^2+v_2^2}$

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Q.27 A boy standing at the top of a tower of 20 m height drops a stone. Assuming g = 10 m s^{-2}, the velocity with which it hits the ground is [AIPMT 2011 (Prelims)]

(1) 10.0 m/s (2) 20.0 m/s
(3) 40.0 m/s (4) 5.0 m/s

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Q.28 A particle moves a distance x in time t according to equation $x = (t + 5)^{-1}$. The acceleration of particle is proportional to [AIPMT 2010 (Prelims)]

(1) $(\text{velocity})^{3/2}$ (2) $(\text{distance})^2$
(3) $(\text{distance})^{-2}$ (4) $(\text{velocity})^{2/3}$

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Q.29 A ball is dropped from a high rise platform at t = 0 starting from rest. After 6 seconds another ball is thrown downwards from the same platform with a speed v. The two balls meet at t = 18 s. What is the value of v?
(Take g = 10 m/s^2) [AIPMT 2010 (Prelims)]

(1) 75 m/s (2) 55 m/s (3) 40 m/s (4) 60 m/s

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Q.30 A particle starts its motion from rest under the action of a constant force. If the distance covered in first 10 seconds is S_1 and that covered in the first 20 seconds is S_2, then [AIPMT 2009]

(1) $S_2 = 3S_1$ (2) $S_2 = 4S_1$
(3) $S_2 = S_1$ (4) $S_2 = 2S_1$

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Q.31 A bus is moving with a speed of 10 m s^{-1} on a straight road. A scooterist wishes to overtake the bus in 100 s. If the bus is at a distance of 1 km from the scooterist, with what speed should the scooterist chase the bus? [AIPMT 2009]

(1) 40 m s^{-1} (2) 25 m s^{-1}
(3) 10 m s^{-1} (4) 20 m s^{-1}

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Q.32 A particle moves in a straight line with a constant acceleration. It changes its velocity from 10 m s^{-1} to 20 m s^{-1} while passing through a distance 135 m in t second. The value of t is [AIPMT 2008]

(1) 12 (2) 9 (3) 10 (4) 1.8

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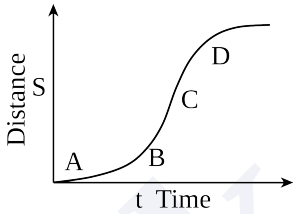
Q.33 The distance travelled by a particle starting from rest and moving with an acceleration $\frac{4}{3}\,\text{m}\,s^{-2}$, in the third second is [AIPMT 2008]

(1) $\frac{10}{3}$ m (2) $\frac{19}{3}$ m (3) 6 m (4) 4 m

Scan or tap for the full solution

Q.34 A particle shows distance - time curve as given in this figure. The maximum instantaneous velocity of the particle is around the point [AIPMT 2008]



(1) D (2) A (3) B (4) C

Scan or tap for the full solution

Q.35 A particle moving along x-axis has acceleration f, at time t, given by $f = f_0\left(1 - \frac{t}{T}\right)$, where f_0 and T are constants. The particle at t = 0 has zero velocity. In the time interval between t = 0 and the instant when f = 0, the particle's velocity (v_x) is [AIPMT 2007]

(1) $\frac{1}{2}f_0T^2$ (2) f_0T^2 (3) $\frac{1}{2}f_0T$ (4) f_0T

Scan or tap for the full solution

Q.36 A car moves from X to Y with a uniform speed v_u and returns to X with a uniform speed v_d. The average speed for this round trip is [AIPMT 2007]

(1) $\sqrt{v_u v_d}$ (2) $\frac{v_d v_u}{v_d + v_u}$
(3) $\frac{v_u + v_d}{2}$ (4) $\frac{2v_d v_u}{v_d + v_u}$

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Q.37 The position x of a particle with respect to time t along x-axis is given by $x = 9t^2 - t^3$ where x is in metres and t in seconds. What will be the position of this particle when it achieves maximum speed along the +x direction? [AIPMT 2007]

(1) 54 m (2) 81 m (3) 24 m (4) 32 m

Scan or tap for the full solution

Q.38 A particle is thrown vertically upward. Its velocity at half of the height is 10 m/s, then the maximum height attained by it is (g = 10 m/s^2) [AIPMT 2001]

(1) 8 m (2) 20 m (3) 10 m (4) 16 m

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Q.39 Two bodies A (of mass 1 kg) and B (of mass 3 kg) are dropped from heights of 16 m and 25 m, respectively. The ratio of the time taken by them to reach the ground is [AIPMT 2006]

(1) 4/5 (2) 5/4 (3) 12/5 (4) 5/12

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Q.40 A particle moves along a straight line OX. At a time t (in seconds) the distance x (in metres) of the particle from O is given by $x = 40 + 12t - t^3$. How long would the particle travel before coming to rest ? [AIPMT 2006]

(1) 16 m (2) 24 m (3) 40 m (4) 56 m

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Q.41 A ball is thrown vertically upward. It has a speed of 10 m/s when it has reached one half of its maximum height. How high does the ball rise? (Take $g = 10\ m/s^2$.) [AIPMT 2005]

(1) 10 m (2) 5 m (3) 15 m (4) 20 m

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Q.42 The displacement x of a particle varies with time t as $x = ae^{-\alpha t} + be^{\beta t}$, where a, b, α and β are positive constants. The velocity of the particle will [AIPMT 2005]

(1) be independent of β

(2) drop to zero when α = β

(3) go on decreasing with time

(4) go on increasing with time.

Solution

Q.43 A man throws balls with the same speed vertically upwards one after the other at an interval of 2 seconds. What should be the speed of the throw so that more than two balls are in the sky at any time ? (Given $g = 9.8\ m/s^2$) [AIPMT 2003]

(1) more than 19.6 m/s

(2) at least 9.8 m/s

(3) any speed less than 19.6 m/s

(4) only with speed 19.6 m/s.

Solution

Q.44 If a ball is thrown vertically upwards with speed u, the distance covered during the last t seconds of its ascent is [AIPMT 2003]

(1) ut (2) $\frac{1}{2}gt^2$

(3) $ut - \frac{1}{2}gt^2$ (4) (u + gt)t.

Scan or tap for the full solution

Q.45 Motion of a particle is given by equation $s = (3t^3 + 7t^2 + 14t + 8)$ m. The value of acceleration of the particle at t = 1 s is [AIPMT 2000]

(1) $10\ m/s^2$ (2) $32\ m/s^2$ (3) $23\ m/s^2$ (4) $16\ m/s^2$

Scan or tap for the full solution

ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	**4**	**3**	**4**	**4**	**2**	**3**	**4**	**2**	**2**	**4**	**3**
Ques.	12	13	14	15	16	17	18	19	20	21	22
Ans.	**4**	**2**	**3**	**3**	**3**	**2**	**2**	**1**	**4**	**4**	**4**
Ques.	23	24	25	26	27	28	29	30	31	32	33
Ans.	**2**	**2**	**4**	**3**	**2**	**1**	**1**	**2**	**4**	**2**	**1**
Ques.	34	35	36	37	38	39	40	41	42	43	44
Ans.	**4**	**3**	**4**	**1**	**3**	**1**	**1**	**1**	**4**	**1**	**2**
Ques.	45										
Ans.	**2**										

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