PYQSide PYQSide.com — free PYQs with solutions Powered by TestBlink

NEET MOTION IN A PLANE — PYQS

Max. Marks: 208 **Questions:** 52

Section A (MCQ) — 52 questions

Q.1 A particle moving with uniform speed in a circular path maintains: [NEET (UG) 2024]

(1) Constant velocity

(2) Constant acceleration

(3) Constant velocity but varying acceleration

(4) Varying velocity and varying acceleration

Scan or tap for the full solution

Q.2 Let ω_1, ω_2 and ω_3 be the angular speed of the second hand, minute hand and hour hand of a smoothly running analog clock, respectively. If x_1, x_2 and x_3 are their respective angular distances in 1 minute then the factor which remains constant (k) is [RE-NEET (UG) 2024]

(1) $\frac{\omega_1}{x_1} = \frac{\omega_2}{x_2} = \frac{\omega_3}{x_3} = k$

(2) $\omega_1 x_1 = \omega_2 x_2 = \omega_3 x_3 = k$

(3) $\omega_1 x_1^2 = \omega_2 x_2^2 = \omega_3 x_3^2 = k$

(4) $\omega_1^2 x_1 = \omega_2^2 x_2 = \omega_3^2 x_3 = k$

Scan or tap for the full solution

Q.3 A bullet is fired from a gun at the speed of 280 m s^{-1} in the direction 30° above the horizontal. The maximum height attained by the bullet is $(g = 9.8\ m\,s^{-2},\ \sin 30° = 0.5)$:- [NEET (UG) 2023]

(1) 2000 m (2) 1000 m (3) 3000 m (4) 2800 m

Scan or tap for the full solution

Q.4 A ball is projected with a velocity, 10 m s^{-1}, at an angle of 60° with the vertical direction. Its speed at the highest point of its trajectory will be [NEET (UG) 2022]

(1) Zero (2) $5\sqrt{3}$ m s^{-1}

(3) 5 m s^{-1} (4) 10 m s^{-1}

Scan or tap for the full solution

Q.5 A cricket ball is thrown by a player at a speed of 20 m/s in a direction 30° above the horizontal. The maximum height attained by the ball during its motion is
(g = 10 m/s^2) [NEET (UG) 2022 (Phase 2)]

(1) 25 m (2) 5 m (3) 10 m (4) 20 m

Scan or tap for the full solution

Q.6 If $\vec{F} = 2\hat{i} + \hat{j} - \hat{k}$ and $\vec{r} = 3\hat{i} + 2\hat{j} - 2\hat{k}$, then the scalar and vector products of $\vec{F}$ and $\vec{r}$ have the magnitudes respectively as [NEET (UG) 2022 (Phase 2)]

(1) 10, 2 (2) 5, $\sqrt{3}$ (3) 4, $\sqrt{5}$ (4) 10, $\sqrt{2}$

Scan or tap for the full solution

Q.7 A particle moving in a circle of radius R with a uniform speed takes a time T to complete one revolution.
If this particle were projected with the same speed at an angle 'θ' to the horizontal, the maximum height attained by it equals 4R. The angle of projection, θ, is then given by : [NEET (UG) 2021]

(1) $\theta = \sin^{-1}\left(\frac{2gT^2}{\pi^2 R}\right)^{1/2}$

(2) $\theta = \cos^{-1}\left(\frac{gT^2}{\pi^2 R}\right)^{1/2}$

(3) $\theta = \cos^{-1}\left(\frac{\pi^2 R}{gT^2}\right)^{1/2}$

(4) $\theta = \sin^{-1}\left(\frac{\pi^2 R}{gT^2}\right)^{1/2}$

Scan or tap for the full solution

Q.8 A car starts from rest and accelerates at 5 m/s^2. At t = 4 s, a ball is dropped out of a window by a person sitting in the car. What is the velocity and acceleration of the ball at t = 6 s? (Take g = 10 m/s^2) [NEET (UG) 2021]

(1) $20\sqrt{2}$ m/s, 10 m/s^2

(2) 20 m/s, 5 m/s^2

(3) 20 m/s, 0

(4) $20\sqrt{2}$ m/s, 0

Scan or tap for the full solution

Q.9 The speed of a swimmer in still water is 20 m/s. The speed of river water is 10 m/s and is flowing due east. If he is standing on the south bank and wishes to cross the river along the shortest path, the angle at which he should make his strokes w.r.t. north is given by : [NEET (UG) 2019]

(1) 0° (2) 60° (3) 45° west (4) 30° west

Scan or tap for the full solution

Q.10 Two particles A and B are moving in uniform circular motion in concentric circles of radii r_A and r_B with speed v_A and v_B respectively. Their time period of rotation is the same. The ratio of angular speed of A to that of B will be : [NEET (UG) 2019]

(1) $v_A:v_B$ (2) 1:1 (3) $r_B:r_A$ (4) $r_A:r_B$

Scan or tap for the full solution

Q.11 The x and y coordinates of the particle at any time are $x = 5t - 2t^2$ and $y = 10t$ respectively, where x and y are in metres and t in seconds. The acceleration of the particle at t = 2 s is [NEET 2017]

(1) 5 m s^{-2} (2) −4 m s^{-2} (3) −8 m s^{-2} (4) 0

Scan or tap for the full solution

Q.12 If the magnitude of sum of two vectors is equal to the magnitude of difference of the two vectors, the angle between these vectors is [NEET 2016 (Phase 1)]

(1) 45° (2) 180° (3) 0° (4) 90°

Scan or tap for the full solution

Q.13 A particle moves so that its position vector is given by $\vec{r} = \cos\omega t\,\hat{x} + \sin\omega t\,\hat{y}$, where ω is a constant. Which of the following is true? [NEET 2016 (Phase 1)]

(1) Velocity is perpendicular to $\vec{r}$ and acceleration is directed towards the origin.

(2) Velocity is perpendicular to $\vec{r}$ and acceleration is directed away from the origin.

(3) Velocity and acceleration both are perpendicular to $\vec{r}$

(4) Velocity and acceleration both are parallel to $\vec{r}$

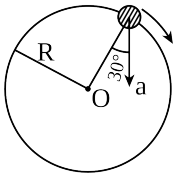
Scan or tap for the full solution

Q.14 A particle of mass 10 g moves along a circle of radius 6.4 cm with a constant tangential acceleration. What is the magnitude of this acceleration if the kinetic energy of the particle becomes equal to 8×10^{-4} J by the end of the second revolution after the beginning of the motion? [NEET 2016 (Phase 1)]

(1) 0.18 m/s^2 (2) 0.2 m/s^2
(3) 0.1 m/s^2 (4) 0.15 m/s^2

Scan or tap for the full solution

Q.15 In the given figure, a = 15 m s^{-2} represents the total acceleration of particle moving in the clockwise direction in a circle of radius R = 2.5 m at a given instant of time. The speed of the particle is [NEET 2016 (Phase 2)]



(1) 4.5 m s^{-1} (2) 5.0 m s^{-1}
(3) 5.7 m s^{-1} (4) 6.2 m s^{-1}

Scan or tap for the full solution

Q.16 If vectors $\vec{A} = \cos\omega t\,\hat{i} + \sin\omega t\,\hat{j}$ and $\vec{B} = \cos\frac{\omega t}{2}\hat{i} + \sin\frac{\omega t}{2}\hat{j}$ are functions of time, then the value of t at which they are orthogonal to each other is [AIPMT 2015]

(1) $t = \frac{\pi}{\omega}$ (2) t = 0 (3) $t = \frac{\pi}{4\omega}$ (4) $t = \frac{\pi}{2\omega}$

Scan or tap for the full solution

Q.17 The position vector of a particle $\vec{R}$ as a function of time is given by $\vec{R} = 4\sin(2\pi t)\hat{i} + 4\cos(2\pi t)\hat{j}$. Where R is in meters, t is in seconds and $\hat{i}$ and $\hat{j}$ denote unit vectors along x-and y-directions, respectively. Which one of the following statements is wrong for the motion of particle? [AIPMT 2015]

(1) Magnitude of the velocity of particle is 8 meter/second.

(2) Path of the particle is a circle of radius 4 meter.

(3) Acceleration vector is along $-\vec{R}$.

(4) Magnitude of acceleration vector is $\frac{v^2}{R}$ where v is the velocity of particle.

Scan or tap for the full solution

Q.18 Two particles A and B, move with constant velocities $\vec{v_1}$ and $\vec{v_2}$. At the initial moment their position vectors are $\vec{r_1}$ and $\vec{r_2}$ respectively. The condition for particles A and B for their collision is [AIPMT 2015]

(1) $\vec{r_1} \times \vec{v_1} = \vec{r_2} \times \vec{v_2}$ (2) $\vec{r_1} - \vec{r_2} = \vec{v_1} - \vec{v_2}$

(3) $\frac{\vec{r_1} - \vec{r_2}}{|\vec{r_1} - \vec{r_2}|} = \frac{\vec{v_2} - \vec{v_1}}{|\vec{v_2} - \vec{v_1}|}$ (4) $\vec{r_1} \cdot \vec{v_1} = \vec{r_2} \cdot \vec{v_2}$

Scan or tap for the full solution

Q.19 A ship A is moving Westwards with a speed of 10 km h^{-1} and a ship B 100 km South of A, is moving Northwards with a speed of 10 km h^{-1}. The time after which the distance between them becomes shortest, is [AIPMT 2015 (Cancelled)]

(1) $5\sqrt{2}$ h (2) $10\sqrt{2}$ h (3) 0 h (4) 5 h

Scan or tap for the full solution

Q.20 A projectile is fired from the surface of the earth with a velocity of 5 m s^{-1} and angle θ with the horizontal. Another projectile fired from another planet with a velocity of 3 m s^{-1} at the same angle follows a trajectory which is identical with the trajectory of the projectile fired from the earth. The value of the acceleration due to gravity on the planet (in m s^{-2}) is
(Given g = 9.8 m s^{-2}) [AIPMT 2014]

(1) 3.5 (2) 5.9 (3) 16.3 (4) 110.8

Scan or tap for the full solution

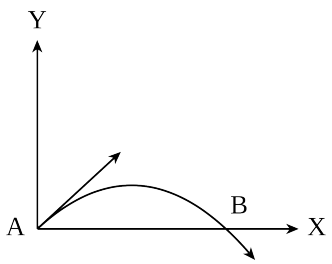
Q.21 A particle is moving such that its position coordinates (x, y) are (2 m, 3 m) at time t = 0, (6 m, 7 m) at time t = 2 s and (13 m, 14 m) at time t = 5 s. Average velocity vector ($\vec{v}_{av}$) from t = 0 to t = 5 s is [AIPMT 2014]

(1) $\frac{1}{5}(13\hat{i} + 14\hat{j})$ (2) $\frac{7}{3}(\hat{i} + \hat{j})$

(3) $2(\hat{i} + \hat{j})$ (4) $\frac{11}{5}(\hat{i} + \hat{j})$

Scan or tap for the full solution

Q.22 The velocity of a projectile at the initial point A is $(2\hat{i} + 3\hat{j})$ m/s. Its velocity (in m/s) at point B is [NEET 2013]



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

Scan or tap for the full solution

Q.23 Vectors $\vec{A}$, $\vec{B}$ and $\vec{C}$ are such that $\vec{A} \cdot \vec{B} = 0$ and $\vec{A} \cdot \vec{C} = 0$. Then the vector parallel to $\vec{A}$ is [NEET 2013 (Karnataka)]

(1) $\vec{A} \times \vec{B}$ (2) $\vec{B} + \vec{C}$ (3) $\vec{B} \times \vec{C}$ (4) $\vec{B}$ and $\vec{C}$

Scan or tap for the full solution

Q.24 The horizontal range and the maximum height of a projectile are equal. The angle of projection of the projectile is [AIPMT 2012 (Prelims)]

(1) $\theta = \tan^{-1}\left(\frac{1}{4}\right)$ (2) $\theta = \tan^{-1}(4)$

(3) $\theta = \tan^{-1}(2)$ (4) θ = 45°

Scan or tap for the full solution

Q.25 A particle has initial velocity $(2\hat{i} + 3\hat{j})$ and acceleration $(0.3\hat{i} + 0.2\hat{j})$. The magnitude of velocity after 10 seconds will be [AIPMT 2012 (Prelims)]

(1) $9\sqrt{2}$ units (2) $5\sqrt{2}$ units (3) 5 units (4) 9 units

Scan or tap for the full solution

Q.26 A projectile is fired at an angle of 45° with the horizontal. Elevation angle of the projectile at its highest point as seen from the point of projection, is [AIPMT 2011 (Mains)]

(1) 45° (2) 60°

(3) $\tan^{-1}\left(\frac{1}{2}\right)$ (4) $\tan^{-1}\left(\frac{\sqrt{3}}{2}\right)$

Scan or tap for the full solution

Q.27 A particle moves in a circle of radius 5 cm with constant speed and time period 0.2π s. The acceleration of the particle is [AIPMT 2011 (Prelims)]

(1) 15 m/s^2 (2) 25 m/s^2 (3) 36 m/s^2 (4) 5 m/s^2

Scan or tap for the full solution

Q.28 A missile is fired for maximum range with an initial velocity of 20 m/s. If g = 10 m/s^2, the range of the missile is [AIPMT 2011 (Prelims)]

(1) 40 m (2) 50 m (3) 60 m (4) 20 m

Scan or tap for the full solution

Q.29 A body is moving with velocity 30 m/s towards east. After 10 seconds its velocity becomes 40 m/s towards north. The average acceleration of the body is [AIPMT 2011 (Prelims)]

(1) 1 m/s^2 (2) 7 m/s^2
(3) $\sqrt{7}$ m/s^2 (4) 5 m/s^2

Scan or tap for the full solution

Q.30 The speed of a projectile at its maximum height is half of its initial speed. The angle of projection is [AIPMT 2010 (Mains)]

(1) 60° (2) 15° (3) 30° (4) 45°

Scan or tap for the full solution

Q.31 A particle moves in x-y plane according to rule $x = a\sin\omega t$ and $y = a\cos\omega t$. The particle follows [AIPMT 2010 (Mains)]

(1) an elliptical path
(2) a circular path
(3) a parabolic path
(4) a straight line path inclined equally to x and y-axes

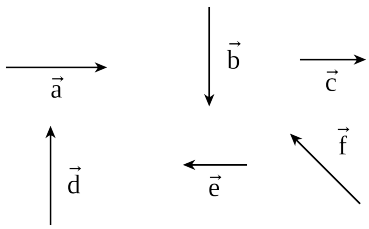
Scan or tap for the full solution

Q.32 A particle has initial velocity $(3\hat{i} + 4\hat{j})$ and has acceleration $(0.4\hat{i} + 0.3\hat{j})$. Its speed after 10 s is [AIPMT 2010 (Prelims)]

(1) 7 units (2) $7\sqrt{2}$ units (3) 8.5 units (4) 10 units

Scan or tap for the full solution

Q.33 Six vectors, $\vec{a}$ through $\vec{f}$ have the magnitudes and directions indicated in the figure. Which of the following statements is true? [AIPMT 2010 (Prelims)]



(1) $\vec{b} + \vec{c} = \vec{f}$ (2) $\vec{d} + \vec{c} = \vec{f}$
(3) $\vec{d} + \vec{e} = \vec{f}$ (4) $\vec{b} + \vec{e} = \vec{f}$

Scan or tap for the full solution

Q.34 A particle of mass m is projected with velocity v making an angle of 45° with the horizontal. When the particle lands on the level ground the magnitude of the change in its momentum will be : [AIPMT 2008]

(1) $mv\sqrt{2}$ (2) zero (3) 2mv (4) $mv/\sqrt{2}$

Scan or tap for the full solution

Q.35 $\vec{A}$ and $\vec{B}$ are two vectors and θ is the angle between them. If $|\vec{A} \times \vec{B}| = \sqrt{3}\,(\vec{A} \cdot \vec{B})$, the value of θ is [AIPMT 2007]

(1) 45° (2) 30° (3) 90° (4) 60°

Scan or tap for the full solution

Q.36 A particle starting from the origin (0, 0) moves in a straight line in the (x, y) plane. Its coordinates at a later time are $(\sqrt{3}, 3)$. The path of the particle makes with the x-axis an angle of [AIPMT 2007]

(1) 45° (2) 60° (3) 0° (4) 30°

Scan or tap for the full solution

Q.37 A car runs at a constant speed on a circular track of radius 100 m, taking 62.8 seconds for every circular lap. The average velocity and average speed for each circular lap respectively is [AIPMT 2006]

(1) 10 m/s, 0 (2) 0, 0
(3) 0, 10 m/s (4) 10 m/s, 10 m/s.

Scan or tap for the full solution

Q.38 For angles of projection of a projectile at angle (45° − θ) and (45° + θ), the horizontal range described by the projectile are in the ratio of [AIPMT 2006]

(1) 2 : 1 (2) 1 : 1 (3) 2 : 3 (4) 1 : 2.

Scan or tap for the full solution

Q.39 The vectors $\vec{A}$ and $\vec{B}$ are such that $|\vec{A} + \vec{B}| = |\vec{A} - \vec{B}|$. The angle between the two vectors is [AIPMT 2006]

(1) 45° (2) 90° (3) 60° (4) 75°

Scan or tap for the full solution

Q.40 Two boys are standing at the ends A and B of a ground where AB = a. The boy at B starts running in a direction perpendicular to AB with velocity v_1. The boy at A starts running simultaneously with velocity v and catches the other in a time t, where t is [AIPMT 2005]

(1) $\dfrac{a}{\sqrt{v^2 + v_1^2}}$ (2) $\dfrac{a}{v + v_1}$

(3) $\dfrac{a}{v - v_1}$ (4) $\sqrt{\dfrac{a^2}{v^2 - v_1^2}}$

Scan or tap for the full solution

Q.41 A stone tied to the end of a string of 1 m long is whirled in a horizontal circle with a constant speed. If the stone makes 22 revolutions in 44 seconds, what is the magnitude and direction of acceleration of the stone? [AIPMT 2005]

(1) π^2 m s^{-2}
and direction along the radius towards the centre

(2) π^2 m s^{-2}
and direction along the radius away from the centre

(3) π^2 m s^{-2}
and direction along the tangent to the circle

(4) $\pi^2/4$ m s^{-2}
and direction along the radius towards the centre.

Scan or tap for the full solution

Q.42 If the angle between the vectors $\vec{A}$ and $\vec{B}$ is θ, the value of the product $(\vec{B}\times\vec{A})\cdot\vec{A}$ is equal to [AIPMT 2005]

(1) $BA^2\sin\theta$ (2) $BA^2\cos\theta$
(3) $BA^2\sin\theta\cos\theta$ (4) zero.

Scan or tap for the full solution

Q.43 If a vector $2\hat{i}+3\hat{j}+8\hat{k}$ is perpendicular to the vector $4\hat{j}-4\hat{i}+\alpha\hat{k}$, then the value of α is [AIPMT 2005]

(1) 1/2 (2) −1/2 (3) 1 (4) −1.

Scan or tap for the full solution

Q.44 If $|\vec{A}\times\vec{B}|=\sqrt{3}\,\vec{A}\cdot\vec{B}$ then the value of $|\vec{A}+\vec{B}|$ is [AIPMT 2004]

(1) $(A^2 + B^2 + AB)^{1/2}$

(2) $\left(A^2+B^2+\frac{AB}{\sqrt{3}}\right)^{1/2}$

(3) A + B

(4) $(A^2+B^2+\sqrt{3}AB)^{1/2}$

Scan or tap for the full solution

Q.45 The vector sum of two forces is perpendicular to their vector differences. In that case, the forces [AIPMT 2003]

(1) are equal to each other
(2) are equal to each other in magnitude
(3) are not equal to each other in magnitude
(4) cannot be predicted.

Scan or tap for the full solution

Q.46 A particle moves along a circle of radius $\left(\frac{20}{\pi}\right)$ m with constant tangential acceleration. If the velocity of the particle is 80 m/s at the end of the second revolution after motion has begun, the tangential acceleration is [AIPMT 2003]

(1) 40 m/s^2 (2) 640π m/s^2
(3) 160π m/s^2 (4) 40π m/s^2

Scan or tap for the full solution

Q.47 A particle A is dropped from a height and another particle B is projected in horizontal direction with speed of 5 m/sec from the same height then correct statement is [AIPMT 2002]

(1) particle A will reach at ground first with respect to particle B
(2) particle B will reach at ground first with respect to particle A
(3) both particles will reach at ground simultaneously
(4) both particles will reach at ground with same speed.

Scan or tap for the full solution

Q.48 If $|\vec{A}+\vec{B}|=|\vec{A}|+|\vec{B}|$, then angle between $\vec{A}$ and $\vec{B}$ will be [AIPMT 2001]

(1) 90° (2) 120° (3) 0° (4) 60°

Scan or tap for the full solution

Q.49 Two particles having mass M and m are moving in a circular path having radius R and r. If their time periods are the same, then the ratio of their angular velocities will be [AIPMT 2001]

(1) $\frac{r}{R}$ (2) $\frac{R}{r}$ (3) 1 (4) $\sqrt{\frac{R}{r}}$

Scan or tap for the full solution

Q.50 A particle is projected making an angle of 45° with horizontal having kinetic energy K. The kinetic energy at highest point will be [AIPMT 2001]

(1) $\frac{K}{\sqrt{2}}$ (2) $\frac{K}{2}$ (3) 2K (4) K

Scan or tap for the full solution

Q.51 The width of river is 1 km. The velocity of boat is 5 km/hr. The boat covered the width of river along the shortest path in 15 min. Then the velocity of river stream is [AIPMT 2000]

(1) 3 km/hr (2) 4 km/hr

(3) $\sqrt{29}$ km/hr (4) $\sqrt{41}$ km/hr

Scan or tap for the full solution

Q.52 Two projectiles of same mass and with same velocity are thrown at an angle 60° and 30° with the horizontal, then which will remain same

[AIPMT 2000]

(1) time of flight

(2) range of projectile

(3) maximum height acquired

(4) all of them

Scan or tap for the full solution

ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	**4**	**1**	**2**	**2**	**2**	**4**	**1**	**1**	**4**	**2**	**2**
Ques.	12	13	14	15	16	17	18	19	20	21	22
Ans.	**4**	**1**	**3**	**3**	**1**	**1**	**3**	**4**	**1**	**4**	**1**
Ques.	23	24	25	26	27	28	29	30	31	32	33
Ans.	**3**	**2**	**2**	**3**	**4**	**1**	**4**	**1**	**2**	**2**	**3**
Ques.	34	35	36	37	38	39	40	41	42	43	44
Ans.	**1**	**4**	**2**	**3**	**2**	**2**	**4**	**1**	**4**	**2**	**1**
Ques.	45	46	47	48	49	50	51	52			
Ans.	**2**	**1**	**3**	**3**	**3**	**2**	**1**	**2**			