

JEE MAIN THREE DIMENSIONAL GEOMETRY — DISTANCE OF A POINT FROM A LINE, FOOT OF PERPENDICULAR — PYQS

Max. Marks: 88
Questions: 22

Section A (MCQ) — 20 questions

- Q.1** Let the image of the point $P(1, 6, a)$ in the line $L: \frac{x}{1} = \frac{y-1}{2} = \frac{z-a+1}{b}$, $b > 0$, be $(\frac{a}{3}, 0, a+c)$. If $S(\alpha, \beta, \gamma)$, $\alpha > 0$, is the point on L such that the distance of S from the foot of perpendicular from the point P on L is $2\sqrt{14}$, then $\alpha + \beta + \gamma$ is equal to :
- [JEE Main 2026 (Online) 6th April Morning Shift]
- (1) 19 (2) 20 (3) 21 (4) 22

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- Q.2** The square of the distance of the point $P(5, 6, 7)$ from the line $\frac{x-2}{2} = \frac{y-5}{3} = \frac{z-2}{4}$ is equal to:

[JEE Main 2026 (Online) 5th April Morning Shift]

- (1) 3 (2) 5 (3) 6 (4) 8

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- Q.3** Let a triangle PQR be such that P and Q lie on the line $\frac{x+3}{8} = \frac{y-4}{2} = \frac{z+1}{2}$ and are at a distance of 6 units from $R(1, 2, 3)$. If (α, β, γ) is the centroid of ΔPQR , then $\alpha + \beta + \gamma$ is equal to :

[JEE Main 2026 (Online) 5th April Evening Shift]

- (1) 4 (2) 5 (3) 6 (4) 8

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- Q.4** If the distance of the point $(a, 2, 5)$ from the image of the point $(1, 2, 7)$ in the line $\frac{x}{1} = \frac{y-1}{1} = \frac{z-2}{2}$ is 4, then the sum of all possible values of a is equal to :

[JEE Main 2026 (Online) 5th April Evening Shift]

- (1) 11 (2) 9 (3) 6 (4) 4

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- Q.5** The square of the distance of the point $(-2, -8, 6)$ from the line $\frac{x-1}{1} = \frac{y-1}{2} = \frac{z}{-1}$ along the line $\frac{x+5}{1} = \frac{y+5}{-1} = \frac{z}{2}$ is equal to:

[JEE Main 2026 (Online) 4th April Morning Shift]

- (1) 3 (2) 6 (3) 8 (4) 12

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- Q.6** If $(2\alpha + 1, \alpha^2 - 3\alpha, \frac{\alpha-1}{2})$ is the image of $(\alpha, 2\alpha, 1)$ in the line $\frac{x-2}{3} = \frac{y-1}{2} = \frac{z}{1}$, then the possible value(s) of α is (are)

[JEE Main 2026 (Online) 4th April Evening Shift]

- (1) Only 3 (2) Only 3 and -1

- (3) Only 3, $\frac{1}{4}$ and -1 (4) Only 3 and $\frac{1}{4}$

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- Q.7** Let a line L passing through the point $(1, 1, 1)$ be perpendicular to both the vectors $2\hat{i} + 2\hat{j} + \hat{k}$ and $\hat{i} + 2\hat{j} + 2\hat{k}$. If $P(a, b, c)$ is the foot of perpendicular from the origin on the line L , then the value of $34(a + b + c)$ is :

[JEE Main 2026 (Online) 2nd April Morning Shift]

- (1) 50 (2) 80 (3) 100 (4) 120

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- Q.8** Let the point A be the foot of perpendicular drawn from the point $P(a, b, 0)$ on the line

$$\frac{x-1}{2} = \frac{y-2}{1} = \frac{z-\alpha}{3}$$

If the midpoint of the line segment PA is $(0, \frac{3}{4}, -\frac{1}{4})$, then the value of $a^2 + b^2 + \alpha^2$ is equal to :

[JEE Main 2026 (Online) 2nd April Evening Shift]

- (1) 1 (2) 2 (3) 6 (4) 9

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- Q.9** Let $Q(a, b, c)$ be the image of the point $P(3, 2, 1)$ in the line $\frac{x-1}{1} = \frac{y}{2} = \frac{z-1}{1}$. Then the distance of Q from the line $\frac{x-9}{3} = \frac{y-9}{2} = \frac{z-5}{-2}$ is

[JEE Main 2026 (Online) 28th January Evening Shift]

- (1) 8 (2) 7 (3) 6 (4) 5

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Q.10 The vertices B and C of a triangle ABC lie on the line $\frac{x}{1} = \frac{1-y}{-2} = \frac{z-2}{3}$. The coordinates of A and B are (1, 6, 3) and (4, 9, α) respectively and C is at a distance of 10 units from B. The area (in sq. units) of $\triangle ABC$ is :

[JEE Main 2026 (Online) 23rd January Morning Shift]

- (1) $20\sqrt{13}$ (2) $5\sqrt{13}$
(3) $15\sqrt{13}$ (4) $10\sqrt{13}$

Scan or tap for the full solution



Q.11 If the image of the point P(1, 2, a) in the line $\frac{x-6}{3} = \frac{y-7}{2} = \frac{z-2}{2}$ is Q(5, b, c), then $a^2 + b^2 + c^2$ is equal to

[JEE Main 2026 (Online) 22nd January Morning Shift]

- (1) 298 (2) 264 (3) 293 (4) 283

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Q.12 Let (α, β, γ) be the co-ordinates of the foot of the perpendicular drawn from the point (5, 4, 2) on the line $\vec{r} = (-\hat{i} + 3\hat{j} + \hat{k}) + \lambda(2\hat{i} + 3\hat{j} - \hat{k})$.

Then the length of the projection of the vector $\alpha\hat{i} + \beta\hat{j} + \gamma\hat{k}$ on the vector $6\hat{i} + 2\hat{j} + 3\hat{k}$ is :

[JEE Main 2026 (Online) 21st January Morning Shift]

- (1) $\frac{18}{7}$ (2) $\frac{15}{7}$ (3) 4 (4) 3

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Q.13 Let the line L pass through the point (-3, 5, 2) and make equal angles with the positive coordinate axes. If the distance of L from the point (-2, r, 1) is $\sqrt{\frac{14}{3}}$, then the sum of all possible values of r is :

[JEE Main 2026 (Online) 21st January Evening Shift]

- (1) 16 (2) 12 (3) 6 (4) 10

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Q.14 Consider the lines $L_1: x - 1 = y - 2 = z$ and $L_2: x - 2 = y = z - 1$. Let the feet of the perpendiculars from the point P(5, 1, -3) on the lines L_1 and L_2 be Q and R respectively. If the area of the triangle PQR is A, then $4A^2$ is equal to :

[JEE Main 2025 (Online) 7th April Evening Shift]

- (1) 151 (2) 147 (3) 139 (4) 143

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Q.15 Let A and B be two distinct points on the line $L: \frac{x-6}{3} = \frac{y-7}{2} = \frac{z-7}{-2}$. Both A and B are at a distance $2\sqrt{17}$ from the foot of perpendicular drawn from the point (1, 2, 3) on the line L. If O is the origin, then $\vec{OA} \cdot \vec{OB}$ is equal to

[JEE Main 2025 (Online) 4th April Morning Shift]

- (1) 49 (2) 21 (3) 47 (4) 62

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Q.16 The distance of the point (7, 10, 11) from the line $\frac{x-4}{1} = \frac{y-4}{0} = \frac{z-2}{3}$ along the line $\frac{x-9}{2} = \frac{y-13}{3} = \frac{z-17}{6}$ is

[JEE Main 2025 (Online) 3rd April Evening Shift]

- (1) 16 (2) 12 (3) 18 (4) 14

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Q.17 Let the vertices Q and R of the triangle PQR lie on the line $\frac{x+3}{5} = \frac{y-1}{2} = \frac{z+4}{3}$, $QR = 5$ and the coordinates of the point P be (0, 2, 3). If the area of the triangle PQR is $\frac{m}{n}$ then :

[JEE Main 2025 (Online) 2nd April Morning Shift]

- (1) $2m - 5\sqrt{21}n = 0$ (2) $m - 5\sqrt{21}n = 0$
(3) $5m - 21\sqrt{2}n = 0$ (4) $5m - 2\sqrt{21}n = 0$

Scan or tap for the full solution



Q.18 If the image of the point P(1, 0, 3) in the line joining the points A(4, 7, 1) and B(3, 5, 3) is Q(α, β, γ), then $\alpha + \beta + \gamma$ is equal to :

[JEE Main 2025 (Online) 2nd April Evening Shift]

- (1) $\frac{46}{3}$ (2) 18 (3) 13 (4) $\frac{47}{3}$

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Q.19 If the image of the point (4, 4, 3) in the line $\frac{x-1}{2} = \frac{y-2}{1} = \frac{z-1}{3}$ is (α, β, γ), then $\alpha + \beta + \gamma$ is equal to

[JEE Main 2025 (Online) 28th January Morning Shift]

- (1) 12 (2) 9 (3) 7 (4) 8

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- Q.20** The square of the distance of the point $\left(\frac{15}{7}, \frac{32}{7}, 7\right)$ from the line $\frac{x+1}{3} = \frac{y+3}{5} = \frac{z+5}{7}$ in the direction of the vector $\hat{i} + 4\hat{j} + 7\hat{k}$ is:

[JEE Main 2025 (Online) 28th January Evening Shift]

- (1) 66 (2) 54 (3) 41 (4) 44

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Section B (Numerical) — 2 questions

- Q.21** Let the image of the point $P(0, -5, 0)$ in the line $\frac{x-1}{2} = \frac{y}{1} = \frac{z+1}{-2}$ be the point R and the image of the point $Q\left(0, \frac{-1}{2}, 0\right)$ in the line $\frac{x-1}{-1} = \frac{y+9}{4} = \frac{z+1}{1}$ be the point S . Then the square of the area of the parallelogram PQRS is _____.

[JEE Main 2026 (Online) 6th April Evening Shift]

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- Q.22** If the image of the point $P(a, 2, a)$ in the line $\frac{x}{2} = \frac{y+a}{1} = \frac{z}{1}$ is Q and the image of Q in the line $\frac{x-2b}{2} = \frac{y-a}{1} = \frac{z+2b}{-5}$ is P , then $a + b$ is equal to _____.

[JEE Main 2026 (Online) 23rd January Evening Shift]

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ANSWER KEY

Section A (MCQ) — 20 questions

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	3	3	3	3	2	1	3	1	2	2	1
Ques.	12	13	14	15	16	17	18	19	20		
Ans.	1	4	2	3	4	1	1	2	1		

Section B (Numerical) — 2 questions

Ques.	21	22					
Ans.	162	3					