

MATHEMATICS · JEE MAIN

Three Dimensional Geometry

Chapter-wise previous year questions, with answer key

177

PYQS

2020–2025

PAPERS

7

TOPICS

Direction Cosines and Ratios

Equation of Line in 3D

Equation of Plane

Distance and Angle in 3D

Skew Lines and Shortest Distance

Angle Between Planes

Distance of Point from Plane

- 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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Direction Cosines and Ratios · 10 PYQs

Q1 JEE Main 2025 · 3 Apr · Shift 2

Each of the angles β and γ that a given line makes with the positive y - and z -axes, respectively, is half of the angle that this line makes with the positive x -axis. Then the sum of all possible values of the angle β is

- (A) $\frac{\pi}{2}$ (B) π
(C) $\frac{3\pi}{4}$ (D) $\frac{3\pi}{2}$

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

Q2 JEE Main 2024 · 8 Apr · Shift 1

Let $P(x, y, z)$ be a point in the first octant, whose projection in the xy -plane is the point Q . Let $OP = \gamma$; the angle between OQ and the positive x -axis be θ ; and the angle between OP and the positive z -axis be ϕ , where O is the origin. Then the distance of P from the x -axis is

- (A) $\gamma\sqrt{1 - \sin^2 \phi \cos^2 \theta}$
(B) $\gamma\sqrt{1 + \cos^2 \theta \sin^2 \phi}$
(C) $\gamma\sqrt{1 + \cos^2 \phi \sin^2 \theta}$
(D) $\gamma\sqrt{1 - \sin^2 \theta \cos^2 \phi}$

Step-by-step solution ► [prepwisar.in/questions/36JNtB1hS6](https://www.prepwisar.in/questions/36JNtB1hS6)

Q3 JEE Main 2024 · 29 Jan · Shift 2

Let a unit vector $\hat{u} = x\hat{i} + y\hat{j} + z\hat{k}$ make angles $\frac{\pi}{2}$, $\frac{\pi}{3}$ and $\frac{2\pi}{3}$ with the vectors

$$\frac{1}{\sqrt{2}}\hat{i} + \frac{1}{\sqrt{2}}\hat{k}, \frac{1}{\sqrt{2}}\hat{j} + \frac{1}{\sqrt{2}}\hat{k}$$

and $\frac{1}{\sqrt{2}}\hat{i} + \frac{1}{\sqrt{2}}\hat{j}$ respectively. If

$$\vec{v} = \frac{1}{\sqrt{2}}\hat{i} + \frac{1}{\sqrt{2}}\hat{j} + \frac{1}{\sqrt{2}}\hat{k}$$

then $|\hat{u} - \vec{v}|^2$ is equal to

- (A) $\frac{11}{2}$ (B) $\frac{5}{2}$
(C) 7 (D) 9

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

Q4 JEE Main 2023 · 30 Jan · Shift 1

Let a unit vector $\widehat{OP}$ make angles α, β, γ with the positive directions of the co-ordinate axes OX, OY, OZ respectively, where $\beta \in (0, \frac{\pi}{2})$. If $\widehat{OP}$ is perpendicular to the plane through points $(1, 2, 3), (2, 3, 4)$ and $(1, 5, 7)$, then which one of the following is true?

- (A) $\alpha \in (\frac{\pi}{2}, \pi)$ and $\gamma \in (\frac{\pi}{2}, \pi)$
(B) $\alpha \in (0, \frac{\pi}{2})$ and $\gamma \in (\frac{\pi}{2}, \pi)$
(C) $\alpha \in (\frac{\pi}{2}, \pi)$ and $\gamma \in (0, \frac{\pi}{2})$
(D) $\alpha \in (0, \frac{\pi}{2})$ and $\gamma \in (0, \frac{\pi}{2})$

Step-by-step solution ► [prepwisar.in/questions/IDTrHc7GWE](https://www.prepwisar.in/questions/IDTrHc7GWE)

Q5 JEE Main 2023 · 30 Jan · Shift 2

A vector $\vec{v}$ in the first octant is inclined to the x -axis at 60° , to the y -axis at 45° and to the z -axis at an acute angle. If a plane passing through the points $(\sqrt{2}, -1, 1)$ and (a, b, c) , is normal to $\vec{v}$, then :

(A) $a + b + \sqrt{2}c = 1$

(B) $\sqrt{2}a + b + c = 1$

(C) $\sqrt{2}a - b + c = 1$

(D) $a + \sqrt{2}b + c = 1$

Step-by-step solution ► [prepwisser.in/questions/MC1Px6rwa0](https://www.prepwisser.in/questions/MC1Px6rwa0)

Q6 JEE Main 2022 · 29 Jul · Shift 1

Let a line with direction ratios $a, -4a, -7$ be perpendicular to the lines with direction ratios $3, -1, 2b$ and $b, a, -2$. If the point of intersection of the line $\frac{x+1}{a^2+b^2} = \frac{y-2}{a^2-b^2} = \frac{z}{1}$ and the plane $x - y + z = 0$ is (α, β, γ) , then $\alpha + \beta + \gamma$ is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ► [prepwisser.in/questions/irt5DYW038](https://www.prepwisser.in/questions/irt5DYW038)

Q7 JEE Main 2022 · 27 Jul · Shift 2

If the line of intersection of the planes $ax + by = 3$ and $ax + by + cz = 0$, $a > 0$ makes an angle 30° with the plane $y - z + 2 = 0$, then the direction cosines of the line are :

(A) $\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}, 0$

(B) $\frac{1}{\sqrt{2}}, \pm \frac{1}{\sqrt{2}}, 0$

(C) $\frac{1}{\sqrt{5}}, -\frac{2}{\sqrt{5}}, 0$

(D) $\frac{1}{2}, -\frac{\sqrt{3}}{2}, 0$

Step-by-step solution ► [prepwisser.in/questions/jT6aUSGWIB](https://www.prepwisser.in/questions/jT6aUSGWIB)

Q8 JEE Main 2022 · 27 Jun · Shift 1

If two straight lines whose direction cosines are given by the relations $l + m - n = 0$, $3l^2 + m^2 + cnl = 0$ are parallel, then the positive value of c is :

(A) 6

(B) 4

(C) 3

(D) 2

Step-by-step solution ► [prepwisser.in/questions/bJTP5PGHuO](https://www.prepwisser.in/questions/bJTP5PGHuO)

Q9 JEE Main 2021 · 27 Aug · Shift 2

The angle between the straight lines, whose direction cosines are given by the equations $2l + 2m - n = 0$ and $mn + nl + lm = 0$, is :

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

(B) $\pi - \cos^{-1}\left(\frac{4}{9}\right)$

(C) $\cos^{-1}\left(\frac{8}{9}\right)$

(D) $\frac{\pi}{3}$

Step-by-step solution ► [prepwisser.in/questions/ehaMiGa2SM](https://www.prepwisser.in/questions/ehaMiGa2SM)

Q10 JEE Main 2021 · 25 Feb · Shift 1

Let α be the angle between the lines whose direction cosines satisfy the equations $l + m - n = 0$ and $l^2 + m^2 - n^2 = 0$. Then the value of $\sin^4 \alpha + \cos^4 \alpha$ is :

- (A) $\frac{3}{8}$ (B) $\frac{3}{4}$
(C) $\frac{1}{2}$ (D) $\frac{5}{8}$

[Step-by-step solution ► prepwisar.in/questions/IuNpl5Efki](https://www.prepwisar.in/questions/IuNpl5Efki)

Equation of Line in 3D · 28 PYQs

Q11 JEE Main 2025 · 7 Apr · Shift 2

If the equation of the line passing through the point $(0, -\frac{1}{2}, 0)$ and perpendicular to the lines $\vec{r} = \lambda(\hat{i} + a\hat{j} + b\hat{k})$ and $\vec{r} = (\hat{i} - \hat{j} - 6\hat{k}) + \mu(-b\hat{i} + a\hat{j} + 5\hat{k})$ is $\frac{x-1}{-2} = \frac{y+4}{d} = \frac{z-c}{-4}$, then $a + b + c + d$ is equal to :

- (A) 13
(B) 14
(C) 12
(D) 10

[Step-by-step solution ► prepwisar.in/questions/k4S_N000-u](https://www.prepwisar.in/questions/k4S_N000-u)

Q12 JEE Main 2025 · 4 Apr · Shift 1

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

- (A) 49 (B) 21
(C) 47 (D) 62

[Step-by-step solution ► prepwisar.in/questions/7oN8t-nE3S](https://www.prepwisar.in/questions/7oN8t-nE3S)

Q13 JEE Main 2025 · 29 Jan · Shift 2

Let a straight line L pass through the point $P(2, -1, 3)$ and be perpendicular to the lines $\frac{x-1}{2} = \frac{y+1}{1} = \frac{z-3}{-2}$ and $\frac{x-3}{1} = \frac{y-2}{3} = \frac{z+2}{4}$. If the line L intersects the yz -plane at the point Q , then the distance between the points P and Q is:

- (A) $\sqrt{10}$
(B) 2
(C) $2\sqrt{3}$
(D) 3

[Step-by-step solution ► prepwisar.in/questions/T3TIU6rGPu](https://www.prepwisar.in/questions/T3TIU6rGPu)

Q14 JEE Main 2025 · 29 Jan · Shift 1

Let $\vec{a} = \hat{i} + 2\hat{j} + \hat{k}$ and $\vec{b} = 2\hat{i} + 7\hat{j} + 3\hat{k}$. Let $L_1 : \vec{r} = (-\hat{i} + 2\hat{j} + \hat{k}) + \lambda\vec{a}, \lambda \in \mathbf{R}$ and $L_2 : \vec{r} = (\hat{j} + \hat{k}) + \mu\vec{b}, \mu \in \mathbf{R}$ be two lines. If the line L_3 passes through the point of intersection of L_1 and L_2 and is parallel to $\vec{a} + \vec{b}$, then L_3 passes through the point :

- (A) $(-1, -1, 1)$
- (B) $(2, 8, 5)$
- (C) $(8, 26, 12)$
- (D) $(5, 17, 4)$

[Step-by-step solution ► prepwisar.in/questions/TXN8yGANeC](https://www.prepwisar.in/questions/TXN8yGANeC)

Q15 JEE Main 2025 · 29 Jan · Shift 1

Let $L_1 : \frac{x-1}{1} = \frac{y-2}{-1} = \frac{z-1}{2}$ and $L_2 : \frac{x+1}{-1} = \frac{y-2}{2} = \frac{z}{1}$ be two lines.

Let L_3 be a line passing through the point (α, β, γ) and be perpendicular to both L_1 and L_2 . If L_3 intersects L_1 , then $|5\alpha - 11\beta - 8\gamma|$ equals :

- (A) 25
- (B) 20
- (C) 16
- (D) 18

[Step-by-step solution ► prepwisar.in/questions/hX8vUVtENm](https://www.prepwisar.in/questions/hX8vUVtENm)

Q16 JEE Main 2025 · 22 Jan · Shift 1

Let $L_1 : \frac{x-1}{3} = \frac{y-1}{-1} = \frac{z+1}{0}$ and $L_2 : \frac{x-2}{2} = \frac{y}{0} = \frac{z+4}{\alpha}, \alpha \in \mathbf{R}$, be two lines, which intersect at the point B . If P is the foot of perpendicular from the point $A(1, 1, -1)$ on L_2 , then the value of $26\alpha(PB)^2$ is _____ .

Numerical answer — enter the value.

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

Q17 JEE Main 2025 · 22 Jan · Shift 2

Let a line pass through two distinct points $P(-2, -1, 3)$ and Q , and be parallel to the vector $3\hat{i} + 2\hat{j} + 2\hat{k}$. If the distance of the point Q from the point $R(1, 3, 3)$ is 5, then the square of the area of $\triangle PQR$ is equal to :

- (A) 148
- (B) 144
- (C) 136
- (D) 140

[Step-by-step solution ► prepwisar.in/questions/nK44BPVOTI](https://www.prepwisar.in/questions/nK44BPVOTI)

Q18 JEE Main 2024 · 9 Apr · Shift 1

Let the line L intersect the lines $x - 2 = -y = z - 1, 2(x + 1) = 2(y - 1) = z + 1$ and be parallel to the line $\frac{x-2}{3} = \frac{y-1}{1} = \frac{z-2}{2}$. Then which of the following points lies on L ?

- (A) $(-\frac{1}{3}, 1, -1)$
- (B) $(-\frac{1}{3}, -1, 1)$
- (C) $(-\frac{1}{3}, -1, -1)$
- (D) $(-\frac{1}{3}, 1, 1)$

[Step-by-step solution ► prepwisar.in/questions/RUCIdLDZ7x](https://www.prepwisar.in/questions/RUCIdLDZ7x)

Q19 JEE Main 2024 · 5 Apr · Shift 1

Let d be the distance of the point of intersection of the lines $\frac{x+6}{3} = \frac{y}{2} = \frac{z+1}{1}$ and $\frac{x-7}{4} = \frac{y-9}{3} = \frac{z-4}{2}$ from the point $(7, 8, 9)$. Then $d^2 + 6$ is equal to :

- (A) 75 (B) 78
(C) 72 (D) 69

Step-by-step solution ► [prepwisser.in/questions/6LTSM65ejW](https://www.prepwisser.in/questions/6LTSM65ejW)

Q20 JEE Main 2024 · 4 Apr · Shift 1

Let the point, on the line passing through the points $P(1, -2, 3)$ and $Q(5, -4, 7)$, farther from the origin and at a distance of 9 units from the point P , be (α, β, γ) . Then $\alpha^2 + \beta^2 + \gamma^2$ is equal to :

- (A) 150 (B) 155
(C) 160 (D) 165

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

Q21 JEE Main 2024 · 1 Feb · Shift 2

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

- (A) 18 (B) 24
(C) 26 (D) 36

Step-by-step solution ► [prepwisser.in/questions/oG6HF60n-z](https://www.prepwisser.in/questions/oG6HF60n-z)

Q22 JEE Main 2024 · 31 Jan · Shift 2

A line passes through $A(4, -6, -2)$ and $B(16, -2, 4)$. The point $P(a, b, c)$, where a, b, c are non-negative integers, on the line AB lies at a distance of 21 units, from the point A . The distance between the points $P(a, b, c)$ and $Q(4, -12, 3)$ is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ► [prepwisser.in/questions/bB17UIJoeT](https://www.prepwisser.in/questions/bB17UIJoeT)

Q23 JEE Main 2024 · 29 Jan · Shift 1

Let PQR be a triangle with $R(-1, 4, 2)$. Suppose $M(2, 1, 2)$ is the mid point of PQ . The distance of the centroid of $\triangle PQR$ from the point of intersection of the lines $\frac{x-2}{0} = \frac{y}{2} = \frac{z+3}{-1}$ and $\frac{x-1}{1} = \frac{y+3}{-3} = \frac{z+1}{1}$ is

- (A) 69 (B) $\sqrt{99}$
(C) $\sqrt{69}$ (D) 9

Step-by-step solution ► [prepwisser.in/questions/ZCQlxq0-4y](https://www.prepwisser.in/questions/ZCQlxq0-4y)

Q24 JEE Main 2023 · 13 Apr · Shift 2

The line, that is coplanar to the line $\frac{x+3}{-3} = \frac{y-1}{1} = \frac{z-5}{5}$, is :

- (A) $\frac{x+1}{-1} = \frac{y-2}{2} = \frac{z-5}{4}$
(B) $\frac{x+1}{-1} = \frac{y-2}{2} = \frac{z-5}{5}$
(C) $\frac{x-1}{-1} = \frac{y-2}{2} = \frac{z-5}{5}$
(D) $\frac{x+1}{1} = \frac{y-2}{2} = \frac{z-5}{5}$

Step-by-step solution ► [prepwisser.in/questions/7GivI8ibTx](https://www.prepwisser.in/questions/7GivI8ibTx)

Q25 JEE Main 2023 · 10 Apr · Shift 1

Let P be the point of intersection of the line $\frac{x+3}{3} = \frac{y+2}{1} = \frac{1-z}{2}$ and the plane $x + y + z = 2$. If the distance of the point P from the plane $3x - 4y + 12z = 32$ is q, then q and 2q are the roots of the equation :

(A) $x^2 + 18x - 72 = 0$

(B) $x^2 - 18x - 72 = 0$

(C) $x^2 + 18x + 72 = 0$

(D) $x^2 - 18x + 72 = 0$

Step-by-step solution ► [prepwiser.in/questions/HnrkXKY8ir](https://www.prepwiser.in/questions/HnrkXKY8ir)

Q26 JEE Main 2023 · 6 Apr · Shift 2

If the lines $\frac{x-1}{2} = \frac{2-y}{-3} = \frac{z-3}{\alpha}$ and $\frac{x-4}{5} = \frac{y-1}{2} = \frac{z}{\beta}$ intersect, then the magnitude of the minimum value of $8\alpha\beta$ is _____.

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/tF2lNAZEiw](https://www.prepwiser.in/questions/tF2lNAZEiw)

Q27 JEE Main 2023 · 31 Jan · Shift 1

Let the line $L : \frac{x-1}{2} = \frac{y+1}{-1} = \frac{z-3}{1}$ intersect the plane $2x + y + 3z = 16$ at the point P. Let the point Q be the foot of perpendicular from the point $R(1, -1, -3)$ on the line L. If α is the area of triangle PQR, then α^2 is equal to _____.

Numerical answer — enter the value.

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

Q28 JEE Main 2023 · 29 Jan · Shift 2

If the lines $\frac{x-1}{1} = \frac{y-2}{2} = \frac{z+3}{1}$ and $\frac{x-a}{2} = \frac{y+2}{3} = \frac{z-3}{1}$ intersect at the point P, then the distance of the point P from the plane $z = a$ is :

(A) 28

(B) 22

(C) 10

(D) 16

Step-by-step solution ► [prepwiser.in/questions/bhjjj2egeB](https://www.prepwiser.in/questions/bhjjj2egeB)

Q29 JEE Main 2023 · 24 Jan · Shift 2

If the foot of the perpendicular drawn from $(1, 9, 7)$ to the line passing through the point $(3, 2, 1)$ and parallel to the planes $x + 2y + z = 0$ and $3y - z = 3$ is (α, β, γ) , then $\alpha + \beta + \gamma$ is equal to :

(A) 3

(B) 1

(C) -1

(D) 5

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

Q30 JEE Main 2022 · 28 Jun · Shift 2

Let the image of the point P(1, 2, 3) in the line $L : \frac{x-6}{3} = \frac{y-1}{2} = \frac{z-2}{3}$ be Q. Let R (α, β, γ) be a point that divides internally the line segment PQ in the ratio 1 : 3. Then the value of $22(\alpha + \beta + \gamma)$ is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/Uw0-XvQB29](https://www.prepwiser.in/questions/Uw0-XvQB29)

Q31 JEE Main 2022 · 24 Jun · Shift 1

Let a line having direction ratios, 1, -4, 2 intersect the lines $\frac{x-7}{3} = \frac{y-1}{-1} = \frac{z+2}{1}$ and $\frac{x}{2} = \frac{y-7}{3} = \frac{z}{1}$ at the points A and B. Then $(AB)^2$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/WYgU_n2suR](https://www.prepwiser.in/questions/WYgU_n2suR)

Q32 JEE Main 2021 · 31 Aug · Shift 1

The square of the distance of the point of intersection

of the line $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z+1}{6}$ and the plane $2x - y + z = 6$ from the point $(-1, -1, 2)$ is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/st8MkYD4up](https://www.prepwiser.in/questions/st8MkYD4up)

Q33 JEE Main 2021 · 27 Jul · Shift 2

For real numbers α and $\beta \neq 0$, if the point of intersection of the straight lines

$\frac{x-\alpha}{1} = \frac{y-1}{2} = \frac{z-1}{3}$ and $\frac{x-4}{\beta} = \frac{y-6}{3} = \frac{z-7}{3}$, lies on the plane $x + 2y - z = 8$, then $\alpha - \beta$ is equal to :

(A) 5 (B) 9

(C) 3 (D) 7

[Step-by-step solution ► prepwiser.in/questions/r6ZX141863](https://www.prepwiser.in/questions/r6ZX141863)

Q34 JEE Main 2021 · 25 Jul · Shift 2

If the lines $\frac{x-k}{1} = \frac{y-2}{2} = \frac{z-3}{3}$ and

$\frac{x+1}{3} = \frac{y+2}{2} = \frac{z+3}{1}$ are co-planar, then the value of k is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/GyG8INFm8O](https://www.prepwiser.in/questions/GyG8INFm8O)

Q35 JEE Main 2021 · 25 Feb · Shift 2

A line 'l' passing through origin is perpendicular to the lines

$$l_1 : \vec{r} = (3+t)\hat{i} + (-1+2t)\hat{j} + (4+2t)\hat{k}$$

$$l_2 : \vec{r} = (3+2s)\hat{i} + (3+2s)\hat{j} + (2+s)\hat{k}$$

If the co-ordinates of the point in the first octant on 'l₂' at a distance of $\sqrt{17}$ from the point of intersection of 'l' and 'l₁' are (a, b, c) then 18(a + b + c) is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/W0aHvwL3-W](https://www.prepwiser.in/questions/W0aHvwL3-W)

Q36 JEE Main 2021 · 24 Feb · Shift 1

The distance of the point (1, 1, 9) from the point of intersection of the line $\frac{x-3}{1} = \frac{y-4}{2} = \frac{z-5}{2}$ and the plane $x + y + z = 17$ is :

- (A) $19\sqrt{2}$ (B) $2\sqrt{19}$
(C) 38 (D) $\sqrt{38}$

Step-by-step solution ► [prepwisser.in/questions/0l-VjrHGwt](https://www.prepwisser.in/questions/0l-VjrHGwt)

Q37 JEE Main 2021 · 24 Feb · Shift 2

Let $a, b \in \mathbb{R}$. If the mirror image of the point P(a, 6, 9) with respect to the line

$\frac{x-3}{7} = \frac{y-2}{5} = \frac{z-1}{-9}$ is (20, b, -a-9), then $|a + b|$, is equal to :

- (A) 88 (B) 90
(C) 86 (D) 84

Step-by-step solution ► [prepwisser.in/questions/OP_0S89RC7](https://www.prepwisser.in/questions/OP_0S89RC7)

Q38 JEE Main 2020 · 6 Sep · Shift 2

A plane P meets the coordinate axes at A, B and C respectively. The centroid of $\triangle ABC$ is given to be (1, 1, 2). Then the equation of the line through this centroid and perpendicular to the plane P is :

- (A) $\frac{x-1}{1} = \frac{y-1}{1} = \frac{z-2}{2}$
(B) $\frac{x-1}{2} = \frac{y-1}{1} = \frac{z-2}{1}$
(C) $\frac{x-1}{2} = \frac{y-1}{2} = \frac{z-2}{1}$
(D) $\frac{x-1}{1} = \frac{y-1}{2} = \frac{z-2}{2}$

Step-by-step solution ► [prepwisser.in/questions/EJF7ndug5b](https://www.prepwisser.in/questions/EJF7ndug5b)

Equation of Plane · 48 PYQs

Q39 JEE Main 2023 · 13 Apr · Shift 2

The plane, passing through the points (0, -1, 2) and (-1, 2, 1) and parallel to the line passing through (5, 1, -7) and (1, -1, -1), also passes through the point :

- (A) (0, 5, -2) (B) (2, 0, 1)
(C) (1, -2, 1) (D) (-2, 5, 0)

Step-by-step solution ► [prepwisser.in/questions/6BxeCiLPBs](https://www.prepwisser.in/questions/6BxeCiLPBs)

Q40 JEE Main 2023 · 12 Apr · Shift 1

Let the plane P: $4x - y + z = 10$ be rotated by an angle $\frac{\pi}{2}$ about its line of intersection with the plane $x + y - z = 4$. If α is the distance of the point (2, 3, -4) from the new position of the plane P, then 35α is equal to :

- (A) 126 (B) 105
(C) 85 (D) 90

Step-by-step solution ► [prepwisser.in/questions/RH6mXUtYFv](https://www.prepwisser.in/questions/RH6mXUtYFv)

Q41 JEE Main 2023 · 11 Apr · Shift 1

If equation of the plane that contains the point $(-2, 3, 5)$ and is perpendicular to each of the planes $2x + 4y + 5z = 8$ and $3x - 2y + 3z = 5$ is $\alpha x + \beta y + \gamma z + 97 = 0$ then $\alpha + \beta + \gamma =$

- (A) 15 (B) 16
(C) 17 (D) 18

Step-by-step solution ► [prepwisser.in/questions/YJctHNh4aK](https://www.prepwisser.in/questions/YJctHNh4aK)

Q42 JEE Main 2023 · 10 Apr · Shift 2

Let the image of the point $P(1, 2, 6)$ in the plane passing through the points $A(1, 2, 0)$, $B(1, 4, 1)$ and $C(0, 5, 1)$ be $Q(\alpha, \beta, \gamma)$. Then $(\alpha^2 + \beta^2 + \gamma^2)$ is equal to :

- (A) 76 (B) 62
(C) 70 (D) 65

Step-by-step solution ► [prepwisser.in/questions/qzvM0850p8](https://www.prepwisser.in/questions/qzvM0850p8)

Q43 JEE Main 2023 · 8 Apr · Shift 1

If the equation of the plane containing the line

$$x + 2y + 3z - 4 = 0 = 2x + y - z + 5 \text{ and perpendicular to the plane}$$

$$\vec{r} = (\hat{i} - \hat{j}) + \lambda(\hat{i} + \hat{j} + \hat{k}) + \mu(\hat{i} - 2\hat{j} + 3\hat{k})$$

is $ax + by + cz = 4$, then $(a - b + c)$ is equal to :

- (A) 18 (B) 22
(C) 20 (D) 24

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

Q44 JEE Main 2023 · 6 Apr · Shift 1

If the equation of the plane passing through the line of intersection of the planes $2x - y + z = 3$, $4x - 3y + 5z + 9 = 0$ and parallel to the line $\frac{x+1}{-2} = \frac{y+3}{4} = \frac{z-2}{5}$ is $ax + by + cz + 6 = 0$, then $a + b + c$ is equal to :

- (A) 13 (B) 15
(C) 14 (D) 12

Step-by-step solution ► [prepwisser.in/questions/tH751Cj6xo](https://www.prepwisser.in/questions/tH751Cj6xo)

Q45 JEE Main 2023 · 6 Apr · Shift 2

A plane P contains the line of intersection of the plane $\vec{r} \cdot (\hat{i} + \hat{j} + \hat{k}) = 6$ and $\vec{r} \cdot (2\hat{i} + 3\hat{j} + 4\hat{k}) = -5$. If P passes through the point $(0, 2, -2)$, then the square of distance of the point $(12, 12, 18)$ from the plane P is :

- (A) 310 (B) 620
(C) 1240 (D) 155

Step-by-step solution ► [prepwisser.in/questions/JfioisXCI5](https://www.prepwisser.in/questions/JfioisXCI5)

Q46 JEE Main 2023 · 1 Feb · Shift 2

Let $\alpha x + \beta y + \gamma z = 1$ be the equation of a plane passing through the point $(3, -2, 5)$ and perpendicular to the line joining the points $(1, 2, 3)$ and $(-2, 3, 5)$. Then the value of $\alpha\beta\gamma$ is equal to _____.

Numerical answer — enter the value.

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

Q47 JEE Main 2023 · 1 Feb · Shift 2

Let the plane P pass through the intersection of the planes $2x + 3y - z = 2$ and $x + 2y + 3z = 6$, and be perpendicular to the plane $2x + y - z + 1 = 0$. If d is the distance of P from the point $(-7, 1, 1)$, then d^2 is equal to :

(A) $\frac{250}{83}$

(B) $\frac{250}{82}$

(C) $\frac{15}{53}$

(D) $\frac{25}{83}$

[Step-by-step solution ► prepwiser.in/questions/JsU_j_4VGm](https://www.prepwiser.in/questions/JsU_j_4VGm)

Q48 JEE Main 2023 · 31 Jan · Shift 2

The foot of perpendicular from the origin O to a plane P which meets the co-ordinate axes at the points A, B, C is $(2, a, 4)$, $a \in \mathbb{N}$. If the volume of the tetrahedron OABC is 144 unit^3 , then which of the following points is **NOT** on P ?

(A) $(3, 0, 4)$

(B) $(0, 6, 3)$

(C) $(0, 4, 4)$

(D) $(2, 2, 4)$

[Step-by-step solution ► prepwiser.in/questions/77MHIfPtn0](https://www.prepwiser.in/questions/77MHIfPtn0)

Q49 JEE Main 2023 · 30 Jan · Shift 2

If a plane passes through the points $(-1, k, 0)$, $(2, k, -1)$, $(1, 1, 2)$ and is parallel to the line $\frac{x-1}{1} = \frac{2y+1}{2} = \frac{z+1}{-1}$, then the value of $\frac{k^2+1}{(k-1)(k-2)}$ is :

(A) $\frac{17}{5}$

(B) $\frac{6}{13}$

(C) $\frac{13}{6}$

(D) $\frac{5}{17}$

[Step-by-step solution ► prepwiser.in/questions/UWFuS2zPwt](https://www.prepwiser.in/questions/UWFuS2zPwt)

Q50 JEE Main 2023 · 30 Jan · Shift 1

If the equation of the plane passing through the point $(1, 1, 2)$ and perpendicular to the line $x - 3y + 2z - 1 = 0 = 4x - y + z$ is $Ax + By + Cz = 1$, then $140(C - B + A)$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/5SGB4ozgI1](https://www.prepwiser.in/questions/5SGB4ozgI1)

Q51 JEE Main 2023 · 29 Jan · Shift 1

Let the equation of the plane P containing the line $x + 10 = \frac{8-y}{2} = z$ be $ax + by + 3z = 2(a + b)$ and the distance of the plane P from the point $(1, 27, 7)$ be c. Then $a^2 + b^2 + c^2$ is equal to _____.

Numerical answer — enter the value.

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

Q52 JEE Main 2023 · 25 Jan · Shift 1

Let the equation of the plane passing through the line $x - 2y - z - 5 = 0 = x + y + 3z - 5$ and parallel to the line $x + y + 2z - 7 = 0 = 2x + 3y + z - 2$ be $ax + by + cz = 65$. Then the distance of the point (a, b, c) from the plane $2x + 2y - z + 16 = 0$ is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/qVHBd9NHod](https://www.prepwiser.in/questions/qVHBd9NHod)

Q53 JEE Main 2023 · 24 Jan · Shift 2

Let the plane containing the line of intersection of the planes

$$P_1 : x + (\lambda + 4)y + z = 1 \text{ and}$$

$$P_2 : 2x + y + z = 2$$

pass through the points $(0, 1, 0)$ and $(1, 0, 1)$. Then the distance of

the point $(2\lambda, \lambda, -\lambda)$ from the plane P_2 is :

(A) $2\sqrt{6}$

(B) $3\sqrt{6}$

(C) $4\sqrt{6}$

(D) $5\sqrt{6}$

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

Q54 JEE Main 2022 · 28 Jul · Shift 2

A plane P is parallel to two lines whose direction ratios are $-2, 1, -3$ and $-1, 2, -2$ and it contains the point $(2, 2, -2)$. Let P intersect the co-ordinate axes at the points A, B, C making the intercepts α, β, γ . If V is the volume of the tetrahedron $OABC$, where O is the origin, and $p = \alpha + \beta + \gamma$, then the ordered pair (V, p) is equal to :

(A) $(48, -13)$

(B) $(24, -13)$

(C) $(48, 11)$

(D) $(24, -5)$

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

Q55 JEE Main 2022 · 28 Jul · Shift 2

Let the lines

$$\frac{x-1}{\lambda} = \frac{y-2}{1} = \frac{z-3}{2} \text{ and}$$

$$\frac{x+26}{-2} = \frac{y+18}{3} = \frac{z+28}{\lambda} \text{ be coplanar}$$

and P be the plane containing these two lines.

Then which of the following points does **NOT** lie on P ?

(A) $(0, -2, -2)$

(B) $(-5, 0, -1)$

(C) $(3, -1, 0)$

(D) $(0, 4, 5)$

[Step-by-step solution ► prepwiser.in/questions/k8nQ1SYKWQ](https://www.prepwiser.in/questions/k8nQ1SYKWQ)

Q56 JEE Main 2022 · 27 Jul · Shift 1

If the plane P passes through the intersection of two mutually perpendicular planes $2x + ky - 5z = 1$ and $3kx - ky + z = 5, k < 3$ and intercepts a unit length on positive x -axis, then the intercept made by the plane P on the y -axis is :

- (A) $\frac{1}{11}$ (B) $\frac{5}{11}$
(C) 6 (D) 7

[Step-by-step solution ► prepwiser.in/questions/1QLgLQ8gnr](https://www.prepwiser.in/questions/1QLgLQ8gnr)

Q57 JEE Main 2022 · 27 Jul · Shift 1

Let the line $\frac{x-3}{7} = \frac{y-2}{-1} = \frac{z-3}{-4}$ intersect the plane containing the lines $\frac{x-4}{1} = \frac{y+1}{-2} = \frac{z}{1}$ and $4ax - y + 5z - 7a = 0 = 2x - 5y - z - 3, a \in \mathbb{R}$ at the point $P(\alpha, \beta, \gamma)$. Then the value of $\alpha + \beta + \gamma$ equals _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/Qcn3I0ch4F](https://www.prepwiser.in/questions/Qcn3I0ch4F)

Q58 JEE Main 2022 · 26 Jul · Shift 2

The plane passing through the line $L : lx - y + 3(1-l)z = 1, x + 2y - z = 2$ and perpendicular to the plane $3x + 2y + z = 6$ is $3x - 8y + 7z = 4$. If θ is the acute angle between the line L and the y -axis, then $415 \cos^2 \theta$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/t2XRkO0vyu](https://www.prepwiser.in/questions/t2XRkO0vyu)

Q59 JEE Main 2022 · 29 Jun · Shift 1

Let

$$P_1 : \vec{r} \cdot (2\hat{i} + \hat{j} - 3\hat{k}) = 4$$

be a plane. Let P_2 be another plane which passes through the points $(2, -3, 2), (2, -2, -3)$ and $(1, -4, 2)$. If the direction ratios of the line of intersection of P_1 and P_2 be $16, \alpha, \beta$, then the value of $\alpha + \beta$ is equal to _____.

Numerical answer — enter the value.

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

Q60 JEE Main 2022 · 28 Jun · Shift 1

Let the plane $P : \vec{r} \cdot \vec{a} = d$ contain the line of intersection of two planes

$$\vec{r} \cdot (\hat{i} + 3\hat{j} - \hat{k}) = 6$$

and

$$\vec{r} \cdot (-6\hat{i} + 5\hat{j} - \hat{k}) = 7$$

. If the plane P passes through the point $(2, 3, \frac{1}{2})$, then the value of $\frac{13|\vec{a}|^2}{d^2}$ is equal to :

- (A) 90 (B) 93
(C) 95 (D) 97

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

Q61 JEE Main 2022 · 28 Jun · Shift 2

Let the plane $ax + by + cz = d$ pass through $(2, 3, -5)$ and is perpendicular to the planes $2x + y - 5z = 10$ and $3x + 5y - 7z = 12$. If a, b, c, d are integers $d > 0$ and $\gcd(|a|, |b|, |c|, d) = 1$, then the value of $a + 7b + c + 20d$ is equal to :

- (A) 18 (B) 20
(C) 24 (D) 22

[Step-by-step solution ► prepwisser.in/questions/At4gRqhKar](https://www.prepwisser.in/questions/At4gRqhKar)

Q62 JEE Main 2022 · 27 Jun · Shift 1

Let the mirror image of the point (a, b, c) with respect to the plane $3x - 4y + 12z + 19 = 0$ be $(a - 6, \beta, \gamma)$. If $a + b + c = 5$, then $7\beta - 9\gamma$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/OABgR32SrD](https://www.prepwisser.in/questions/OABgR32SrD)

Q63 JEE Main 2022 · 26 Jun · Shift 1

Let the plane $2x + 3y + z + 20 = 0$ be rotated through a right angle about its line of intersection with the plane $x - 3y + 5z = 8$. If the mirror image of the point $(2, -\frac{1}{2}, 2)$ in the rotated plane is $B(a, b, c)$, then :

- (A) $\frac{a}{8} = \frac{b}{5} = \frac{c}{-4}$
(B) $\frac{a}{4} = \frac{b}{5} = \frac{c}{-2}$
(C) $\frac{a}{8} = \frac{b}{-5} = \frac{c}{4}$
(D) $\frac{a}{4} = \frac{b}{5} = \frac{c}{2}$

[Step-by-step solution ► prepwisser.in/questions/zJqwJ65TKj](https://www.prepwisser.in/questions/zJqwJ65TKj)

Q64 JEE Main 2022 · 25 Jun · Shift 1

Let the lines

$$L_1 : \vec{r} = \lambda (\hat{i} + 2\hat{j} + 3\hat{k}), \lambda \in R$$

$$L_2 : \vec{r} = (\hat{i} + 3\hat{j} + \hat{k}) + \mu (\hat{i} + \hat{j} + 5\hat{k}); \mu \in R$$

,
intersect at the point S. If a plane $ax + by - z + d = 0$ passes through S and is parallel to both the lines L_1 and L_2 , then the value of $a + b + d$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/thHWn6NBSd](https://www.prepwisser.in/questions/thHWn6NBSd)

Q65 JEE Main 2021 · 31 Aug · Shift 2

Suppose, the line $\frac{x-2}{\alpha} = \frac{y-2}{-5} = \frac{z+2}{2}$ lies on the plane $x + 3y - 2z + \beta = 0$. Then $(\alpha + \beta)$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/d-tOc8d7Cj](https://www.prepwisser.in/questions/d-tOc8d7Cj)

Q66 JEE Main 2021 · 31 Aug · Shift 1

Let the equation of the plane, that passes through the point $(1, 4, -3)$ and contains the line of intersection of the

planes $3x - 2y + 4z - 7 = 0$

and $x + 5y - 2z + 9 = 0$, be

$\alpha x + \beta y + \gamma z + 3 = 0$, then $\alpha + \beta + \gamma$ is equal to :

(A) -23

(B) -15

(C) 23

(D) 15

[Step-by-step solution ► prepwisser.in/questions/WrT9qRY-Z2](https://www.prepwisser.in/questions/WrT9qRY-Z2)

Q67 JEE Main 2021 · 27 Aug · Shift 1

Equation of a plane at a distance $\sqrt{\frac{2}{21}}$ from the origin, which contains the line of intersection of the planes $x - y - z - 1 = 0$ and $2x + y - 3z + 4 = 0$, is :

(A) $3x - y - 5z + 2 = 0$

(B) $3x - 4z + 3 = 0$

(C) $-x + 2y + 2z - 3 = 0$

(D) $4x - y - 5z + 2 = 0$

[Step-by-step solution ► prepwisser.in/questions/JPB98MaZhE](https://www.prepwisser.in/questions/JPB98MaZhE)

Q68 JEE Main 2021 · 27 Aug · Shift 2

The equation of the plane passing through the line of intersection of the planes $\vec{r} \cdot (\hat{i} + \hat{j} + \hat{k}) = 1$ and

$$\vec{r} \cdot (2\hat{i} + 3\hat{j} - \hat{k}) + 4 = 0$$

and parallel to the x-axis is :

(A) $\vec{r} \cdot (\hat{j} - 3\hat{k}) + 6 = 0$

(B) $\vec{r} \cdot (\hat{i} + 3\hat{k}) + 6 = 0$

(C) $\vec{r} \cdot (\hat{i} - 3\hat{k}) + 6 = 0$

(D) $\vec{r} \cdot (\hat{j} - 3\hat{k}) - 6 = 0$

[Step-by-step solution ► prepwisser.in/questions/pgH2Fa_V7j](https://www.prepwisser.in/questions/pgH2Fa_V7j)

Q69 JEE Main 2021 · 26 Aug · Shift 1

A plane P contains the line $x + 2y + 3z + 1 = 0 = x - y - z - 6$, and is perpendicular to the plane $-2x + y + z + 8 = 0$. Then which of the following points lies on P?

(A) $(-1, 1, 2)$

(B) $(0, 1, 1)$

(C) $(1, 0, 1)$

(D) $(2, -1, 1)$

[Step-by-step solution ► prepwisser.in/questions/tIUXR2w4zg](https://www.prepwisser.in/questions/tIUXR2w4zg)

Q70 JEE Main 2021 · 26 Aug · Shift 2

Let P be the plane passing through the point (1, 2, 3) and the line of intersection of the planes

$$\vec{r} \cdot (\hat{i} + \hat{j} + 4\hat{k}) = 16$$

and

$$\vec{r} \cdot (-\hat{i} + \hat{j} + \hat{k}) = 6$$

. Then which of the following points does NOT lie on P?

(A) (3, 3, 2)

(B) (6, -6, 2)

(C) (4, 2, 2)

(D) (-8, 8, 6)

[Step-by-step solution ► prepwiser.in/questions/LWxuLFegH5](https://www.prepwiser.in/questions/LWxuLFegH5)

Q71 JEE Main 2021 · 27 Jul · Shift 1

Let the plane passing through the point (-1, 0, -2) and perpendicular to each of the planes $2x + y - z = 2$ and $x - y - z = 3$ be $ax + by + cz + 8 = 0$. Then the value of $a + b + c$ is equal to :

(A) 3

(B) 8

(C) 5

(D) 4

[Step-by-step solution ► prepwiser.in/questions/YCp8n86JNm](https://www.prepwiser.in/questions/YCp8n86JNm)

Q72 JEE Main 2021 · 20 Jul · Shift 2

Consider the line L given by the equation

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

Let Q be the mirror image of the point (2, 3, -1) with respect to L. Let a plane P be such that it passes through Q, and the line L is perpendicular to P. Then which of the following points is on the plane P?

(A) (-1, 1, 2)

(B) (1, 1, 1)

(C) (1, 1, 2)

(D) (1, 2, 2)

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

Q73 JEE Main 2021 · 18 Mar · Shift 2

Let P be a plane containing the line $\frac{x-1}{3} = \frac{y+6}{4} = \frac{z+5}{2}$ and parallel to the line $\frac{x-1}{4} = \frac{y-2}{-3} = \frac{z+5}{7}$. If the point (1, -1, α) lies on the plane P, then the value of $|5\alpha|$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/P2h-qZoIcJ](https://www.prepwiser.in/questions/P2h-qZoIcJ)

Q74 JEE Main 2021 · 17 Mar · Shift 1

If the equation of the plane passing through the line of intersection of the planes $2x - 7y + 4z - 3 = 0$, $3x - 5y + 4z + 11 = 0$ and the point (-2, 1, 3) is $ax + by + cz - 7 = 0$, then the value of $2a + b + c - 7$ is

_____.

Numerical answer — enter the value.

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

Q75 JEE Main 2021 · 17 Mar · Shift 1

The equation of the plane which contains the y-axis and passes through the point (1, 2, 3) is :

(A) $x + 3z = 0$

(B) $3x - z = 0$

(C) $x + 3z = 10$

(D) $3x + z = 6$

[Step-by-step solution ► prepwisser.in/questions/rvBVQc0RW2](https://www.prepwisser.in/questions/rvBVQc0RW2)

Q76 JEE Main 2021 · 16 Mar · Shift 2

If (x, y, z) be an arbitrary point lying on a plane P which passes through the points (42, 0, 0), (0, 42, 0) and (0, 0, 42), then the value of the expression

$$3 + \frac{x - 11}{(y - 19)^2(z - 12)^2} + \frac{y - 19}{(x - 11)^2(z - 12)^2} + \frac{z - 12}{(x - 11)^2(y - 19)^2} - \frac{x + y + z}{14(x - 11)(y - 19)(z - 12)}$$

is equal to :

(A) 3

(B) 39

(C) -45

(D) 0

[Step-by-step solution ► prepwisser.in/questions/-8THH4-aPy](https://www.prepwisser.in/questions/-8THH4-aPy)

Q77 JEE Main 2021 · 26 Feb · Shift 1

Consider the three planes

$P_1 : 3x + 15y + 21z = 9,$

$P_2 : x - 3y - z = 5,$ and

$P_3 : 2x + 10y + 14z = 5$

Then, which one of the following is true?

(A) P_1 and P_2 are parallel.

(B) P_1 , P_2 and P_3 all are parallel.

(C) P_1 and P_3 are parallel.

(D) P_2 and P_3 are parallel.

[Step-by-step solution ► prepwisser.in/questions/ccrytdZ1Q0](https://www.prepwisser.in/questions/ccrytdZ1Q0)

Q78 JEE Main 2021 · 24 Feb · Shift 2

The vector equation of the plane passing through the intersection

of the planes $\vec{r} \cdot (\hat{i} + \hat{j} + \hat{k}) = 1$ and $\vec{r} \cdot (\hat{i} - 2\hat{j}) = -2$, and the point $(1, 0, 2)$ is :

(A) $\vec{r} \cdot (\hat{i} + 7\hat{j} + 3\hat{k}) = \frac{7}{3}$

(B) $\vec{r} \cdot (\hat{i} + 7\hat{j} + 3\hat{k}) = 7$

(C) $\vec{r} \cdot (3\hat{i} + 7\hat{j} + 3\hat{k}) = 7$

(D) $\vec{r} \cdot (\hat{i} - 7\hat{j} + 3\hat{k}) = \frac{7}{3}$

[Step-by-step solution ► prepwiser.in/questions/2diYz9FkUS](https://www.prepwiser.in/questions/2diYz9FkUS)

Q79 JEE Main 2021 · 24 Feb · Shift 1

The equation of the plane passing through the point $(1, 2, -3)$ and perpendicular to the planes

$3x + y - 2z = 5$ and $2x - 5y - z = 7$, is :

(A) $6x - 5y + 2z + 10 = 0$

(B) $3x - 10y - 2z + 11 = 0$

(C) $6x - 5y - 2z - 2 = 0$

(D) $11x + y + 17z + 38 = 0$

[Step-by-step solution ► prepwiser.in/questions/ZDBPXZ5ESz](https://www.prepwiser.in/questions/ZDBPXZ5ESz)

Q80 JEE Main 2020 · 3 Sep · Shift 2

Let a plane P contain two lines

$$\vec{r} = \hat{i} + \lambda (\hat{i} + \hat{j})$$

, $\lambda \in R$ and

$$\vec{r} = -\hat{j} + \mu (\hat{j} - \hat{k})$$

, $\mu \in R$

If $Q(\alpha, \beta, \gamma)$ is the foot of the perpendicular drawn from the point $M(1, 0, 1)$ to P, then $3(\alpha + \beta + \gamma)$ equals _____.

Numerical answer — enter the value.

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

Q81 JEE Main 2020 · 3 Sep · Shift 2

The plane which bisects the line joining, the points $(4, -2, 3)$ and $(2, 4, -1)$ at right angles also passes through the point :

(A) $(4, 0, 1)$

(B) $(0, -1, 1)$

(C) $(0, 1, -1)$

(D) $(4, 0, -1)$

[Step-by-step solution ► prepwiser.in/questions/CB95wM-jnd](https://www.prepwiser.in/questions/CB95wM-jnd)

Q82 JEE Main 2020 · 2 Sep · Shift 1

The plane passing through the points (1, 2, 1), (2, 1, 2) and parallel to the line, $2x = 3y, z = 1$ also passes through the point :

(A) (0, 6, -2)

(B) (-2, 0, 1)

(C) (0, -6, 2)

(D) (2, 0 -1)

[Step-by-step solution ► prepwiser.in/questions/u4FHnuXte_](https://www.prepwiser.in/questions/u4FHnuXte_)

Q83 JEE Main 2020 · 2 Sep · Shift 2

A plane passing through the point (3, 1, 1) contains two lines whose direction ratios are 1, -2, 2 and 2, 3, -1 respectively. If this plane also passes through the point (α , -3, 5), then α is equal to:

(A) -10

(B) 10

(C) 5

(D) -5

[Step-by-step solution ► prepwiser.in/questions/2WtqjzhiDO](https://www.prepwiser.in/questions/2WtqjzhiDO)

Q84 JEE Main 2020 · 9 Jan · Shift 1

If for some α and β in $\mathbb{R}$, the intersection of the following three planes

$$x + 4y - 2z = 1$$

$$x + 7y - 5z = b$$

$$x + 5y + \alpha z = 5$$

is a line in $\mathbb{R}^3$, then $\alpha + \beta$ is equal to :

(A) -10

(B) 0

(C) 10

(D) 2

[Step-by-step solution ► prepwiser.in/questions/Vd3m2fEr3U](https://www.prepwiser.in/questions/Vd3m2fEr3U)

Q85 JEE Main 2020 · 8 Jan · Shift 2

The mirror image of the point (1, 2, 3) in a plane is

$(-\frac{7}{3}, -\frac{4}{3}, -\frac{1}{3})$. Which of the following points lies on this plane ?

(A) (1, -1, 1)

(B) (-1, -1, -1)

(C) (-1, -1, 1)

(D) (1, 1, 1)

[Step-by-step solution ► prepwiser.in/questions/a94tF0Wnz8](https://www.prepwiser.in/questions/a94tF0Wnz8)

Q86 JEE Main 2020 · 7 Jan · Shift 1

Let P be a plane passing through the points (2, 1, 0), (4, 1, 1) and (5, 0, 1) and R be any point (2, 1, 6). Then the image of R in the plane P is :

(A) (4, 3, 2)

(B) (6, 5, -2)

(C) (3, 4, -2)

(D) (6, 5, 2)

[Step-by-step solution ► prepwiser.in/questions/KG7RCbumo7](https://www.prepwiser.in/questions/KG7RCbumo7)

Distance and Angle in 3D · 23 PYQs

Q87 JEE Main 2025 · 28 Jan · Shift 1

Let $A(x, y, z)$ be a point in xy -plane, which is equidistant from three points $(0, 3, 2)$, $(2, 0, 3)$ and $(0, 0, 1)$.

Let $B = (1, 4, -1)$ and $C = (2, 0, -2)$. Then among the statements

(S1) : $\triangle ABC$ is an isosceles right angled triangle, and

(S2) : the area of $\triangle ABC$ is $\frac{9\sqrt{2}}{2}$,

(A) both are false

(B) only (S2) is true

(C) only (S1) is true

(D) both are true

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

Q88 JEE Main 2024 · 5 Apr · Shift 1

If the line $\frac{2-x}{3} = \frac{3y-2}{4\lambda+1} = 4-z$ makes a right angle with the line $\frac{x+3}{3\mu} = \frac{1-2y}{6} = \frac{5-z}{7}$, then $4\lambda + 9\mu$ is equal to :

(A) 4

(B) 13

(C) 5

(D) 6

[Step-by-step solution ► prepwiser.in/questions/UVqC3mglpn](https://www.prepwiser.in/questions/UVqC3mglpn)

Q89 JEE Main 2024 · 31 Jan · Shift 1

Let Q and R be the feet of perpendiculars from the point $P(a, a, a)$ on the lines $x = y, z = 1$ and $x = -y, z = -1$ respectively. If $\angle QPR$ is a right angle, then $12a^2$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/-uocgCW1zm](https://www.prepwiser.in/questions/-uocgCW1zm)

Q90 JEE Main 2023 · 15 Apr · Shift 1

Let the foot of perpendicular of the point $P(3, -2, -9)$ on the plane passing through the points $(-1, -2, -3)$, $(9, 3, 4)$, $(9, -2, 1)$ be $Q(\alpha, \beta, \gamma)$. Then the distance of Q from the origin is :

(A) $\sqrt{38}$

(B) $\sqrt{29}$

(C) $\sqrt{42}$

(D) $\sqrt{35}$

[Step-by-step solution ► prepwiser.in/questions/9WRtW7dxLD](https://www.prepwiser.in/questions/9WRtW7dxLD)

Q91 JEE Main 2023 · 13 Apr · Shift 1

Let the image of the point $(\frac{5}{3}, \frac{5}{3}, \frac{8}{3})$ in the plane $x - 2y + z - 2 = 0$ be P. If the distance of the point $Q(6, -2, \alpha)$, $\alpha > 0$, from P is 13, then α is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/scFukdRy9h](https://www.prepwiser.in/questions/scFukdRy9h)

Q92 JEE Main 2023 · 13 Apr · Shift 1

Let the equation of plane passing through the line of intersection of the planes $x + 2y + az = 2$ and $x - y + z = 3$ be $5x - 11y + bz = 6a - 1$. For $c \in \mathbb{Z}$, if the distance of this plane from the point $(a, -c, c)$ is $\frac{2}{\sqrt{a}}$, then $\frac{a+b}{c}$ is equal to :

(A) -2

(B) 4

(C) 2

(D) -4

[Step-by-step solution ► prepwiser.in/questions/4qrAXiPx9](https://www.prepwiser.in/questions/4qrAXiPx9)

Q93 JEE Main 2023 · 11 Apr · Shift 2

Let the line $l : x = \frac{1-y}{-2} = \frac{z-3}{\lambda}, \lambda \in \mathbb{R}$ meet the plane $P : x + 2y + 3z = 4$ at the point (α, β, γ) . If the angle between the line l and the plane P is $\cos^{-1} \left(\sqrt{\frac{5}{14}} \right)$, then $\alpha + 2\beta + 6\gamma$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/GvQ-Plh9D3](https://www.prepwiser.in/questions/GvQ-Plh9D3)

Q94 JEE Main 2023 · 8 Apr · Shift 1

Let λ_1, λ_2 be the values of λ for which the points $\left(\frac{5}{2}, 1, \lambda\right)$ and $(-2, 0, 1)$ are at equal distance from the plane $2x + 3y - 6z + 7 = 0$. If $\lambda_1 > \lambda_2$, then the distance of the point $(\lambda_1 - \lambda_2, \lambda_2, \lambda_1)$ from the line $\frac{x-5}{1} = \frac{y-1}{2} = \frac{z+7}{2}$ is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/6fmd3eaG2e](https://www.prepwiser.in/questions/6fmd3eaG2e)

Q95 JEE Main 2023 · 8 Apr · Shift 2

For $a, b \in \mathbb{Z}$ and $|a - b| \leq 10$, let the angle between the plane $P : ax + y - z = b$ and the line $l : x - 1 = a - y = z + 1$ be $\cos^{-1} \left(\frac{1}{3} \right)$. If the distance of the point $(6, -6, 4)$ from the plane P is $3\sqrt{6}$, then $a^4 + b^2$ is equal to :

(A) 48

(B) 85

(C) 32

(D) 25

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

Q96 JEE Main 2023 · 31 Jan · Shift 1

Let θ be the angle between the planes $P_1 : \vec{r} \cdot (\hat{i} + \hat{j} + 2\hat{k}) = 9$ and $P_2 : \vec{r} \cdot (2\hat{i} - \hat{j} + \hat{k}) = 15$. Let L be the line that meets P_2 at the point $(4, -2, 5)$ and makes an angle θ with the normal of P_2 . If α is the angle between L and P_2 , then $(\tan^2 \theta) (\cot^2 \alpha)$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/g-Vjcz1HUK](https://www.prepwiser.in/questions/g-Vjcz1HUK)

Q97 JEE Main 2023 · 31 Jan · Shift 2

Let the plane $P : 8x + \alpha_1 y + \alpha_2 z + 12 = 0$ be parallel to

the line $L : \frac{x+2}{2} = \frac{y-3}{3} = \frac{z+4}{5}$. If the intercept of P

on the y -axis is 1, then the distance between P and L is :

(A) $\frac{6}{\sqrt{14}}$

(B) $\sqrt{14}$

(C) $\sqrt{\frac{2}{7}}$

(D) $\sqrt{\frac{7}{2}}$

[Step-by-step solution ► prepwiser.in/questions/zkk842GBRQ](https://www.prepwiser.in/questions/zkk842GBRQ)

Q98 JEE Main 2023 · 30 Jan · Shift 2

Let a line L pass through the point $P(2, 3, 1)$ and be parallel to the line $x + 3y - 2z - 2 = 0 = x - y + 2z$. If the distance of L from the point $(5, 3, 8)$ is α , then $3\alpha^2$ is equal to :

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/euEEe6RvyB](https://www.prepwiser.in/questions/euEEe6RvyB)

Q99 JEE Main 2022 · 29 Jul · Shift 1

If the foot of the perpendicular from the point $A(-1, 4, 3)$ on the plane $P : 2x + my + nz = 4$, is $(-2, \frac{7}{2}, \frac{3}{2})$, then the distance of the point A from the plane P, measured parallel to a line with direction ratios $3, -1, -4$, is equal to :

- (A) 1 (B) $\sqrt{26}$
(C) $2\sqrt{2}$ (D) $\sqrt{14}$

Step-by-step solution ► [prepwisar.in/questions/6waRjZYajT](https://www.prepwisar.in/questions/6waRjZYajT)

Q100 JEE Main 2022 · 26 Jul · Shift 2

The largest value of a , for which the perpendicular distance of the plane containing the lines $\vec{r} = (\hat{i} + \hat{j}) + \lambda(\hat{i} + a\hat{j} - \hat{k})$ and $\vec{r} = (\hat{i} + \hat{j}) + \mu(-\hat{i} + \hat{j} - a\hat{k})$ from the point $(2, 1, 4)$ is $\sqrt{3}$, is _____.

Numerical answer — enter the value.

Step-by-step solution ► [prepwisar.in/questions/dydaqsx6fD0](https://www.prepwisar.in/questions/dydaqsx6fD0)

Q101 JEE Main 2022 · 27 Jun · Shift 2

Let the foot of the perpendicular from the point $(1, 2, 4)$ on the line $\frac{x+2}{4} = \frac{y-1}{2} = \frac{z+1}{3}$ be P. Then the distance of P from the plane $3x + 4y + 12z + 23 = 0$ is :

- (A) 5 (B) $\frac{50}{13}$
(C) 4 (D) $\frac{63}{13}$

Step-by-step solution ► [prepwisar.in/questions/VeOBHF76Nf](https://www.prepwisar.in/questions/VeOBHF76Nf)

Q102 JEE Main 2022 · 26 Jun · Shift 1

If the two lines $l_1 : \frac{x-2}{3} = \frac{y+1}{-2}, z = 2$ and $l_2 : \frac{x-1}{1} = \frac{2y+3}{\alpha} = \frac{z+5}{2}$ are perpendicular, then an angle between the lines l_2 and $l_3 : \frac{1-x}{3} = \frac{2y-1}{-4} = \frac{z}{4}$ is :

- (A) $\cos^{-1} \left(\frac{29}{4} \right)$
(B) $\sec^{-1} \left(\frac{29}{4} \right)$
(C) $\cos^{-1} \left(\frac{2}{29} \right)$
(D) $\cos^{-1} \left(\frac{2}{\sqrt{29}} \right)$

Step-by-step solution ► [prepwisar.in/questions/dp2Xm0OnqY](https://www.prepwisar.in/questions/dp2Xm0OnqY)

Q103 JEE Main 2022 · 25 Jun · Shift 1

Let Q be the mirror image of the point $P(1, 0, 1)$ with respect to the plane $S : x + y + z = 5$. If a line L passing through $(1, -1, -1)$, parallel to the line PQ meets the plane S at R, then QR^2 is equal to :

- (A) 2 (B) 5
(C) 7 (D) 11

Step-by-step solution ► [prepwisar.in/questions/AWRU2m0Yh6](https://www.prepwisar.in/questions/AWRU2m0Yh6)

Q104 JEE Main 2022 · 25 Jun · Shift 2

Let p be the plane passing through the intersection of the planes

$$\vec{r} \cdot (\hat{i} + 3\hat{j} - \hat{k}) = 5$$

and

$$\vec{r} \cdot (2\hat{i} - \hat{j} + \hat{k}) = 3$$

, and the point $(2, 1, -2)$. Let the position vectors of the points X and Y be $\hat{i} - 2\hat{j} + 4\hat{k}$ and $5\hat{i} - \hat{j} + 2\hat{k}$ respectively. Then the points :

- (A) X and $X + Y$ are on the same side of P
- (B) Y and $Y - X$ are on the opposite sides of P
- (C) X and Y are on the opposite sides of P
- (D) $X + Y$ and $X - Y$ are on the same side of P

Step-by-step solution ► [prepwiser.in/questions/P0ImEzT1xg](https://www.prepwiser.in/questions/P0ImEzT1xg)

Q105 JEE Main 2021 · 26 Aug · Shift 2

Let Q be the foot of the perpendicular from the point $P(7, -2, 13)$ on the plane containing the lines

$$\frac{x+1}{6} = \frac{y-1}{7} = \frac{z-3}{8} \text{ and } \frac{x-1}{3} = \frac{y-2}{5} = \frac{z-3}{7}. \text{ Then } (PQ)^2, \text{ is equal to } \underline{\hspace{2cm}}.$$

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/D1xcTrs3OY](https://www.prepwiser.in/questions/D1xcTrs3OY)

Q106 JEE Main 2021 · 27 Jul · Shift 2

The distance of the point $P(3, 4, 4)$ from the point of intersection of the line joining the points $Q(3, -4, -5)$ and $R(2, -3, 1)$ and the plane $2x + y + z = 7$, is equal to $\underline{\hspace{2cm}}$.

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/dI_RliMZ4C](https://www.prepwiser.in/questions/dI_RliMZ4C)

Q107 JEE Main 2021 · 17 Mar · Shift 2

Let P be an arbitrary point having sum of the squares of the distances from the planes $x + y + z = 0$, $lx - nz = 0$ and $x - 2y + z = 0$, equal to 9. If the locus of the point P is $x^2 + y^2 + z^2 = 9$, then the value of $l - n$ is equal to $\underline{\hspace{2cm}}$.

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/AeXVk1zDq7](https://www.prepwiser.in/questions/AeXVk1zDq7)

Q108 JEE Main 2020 · 4 Sep · Shift 2

The distance of the point $(1, -2, 3)$ from

the plane $x - y + z = 5$ measured parallel to

the line $\frac{x}{2} = \frac{y}{3} = \frac{z}{-6}$ is :

- | | |
|-------------------|-------------------|
| (A) 7 | (B) 1 |
| (C) $\frac{1}{7}$ | (D) $\frac{7}{5}$ |

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

If the distance between the plane, $23x - 10y - 2z + 48 = 0$ and the plane

containing the lines $\frac{x+1}{2} = \frac{y-3}{4} = \frac{z+1}{3}$

and

$$\frac{x+3}{2} = \frac{y+2}{6} = \frac{z-1}{\lambda} \quad (\lambda \in \mathbb{R})$$

is equal to $\frac{k}{\sqrt{633}}$, then k is equal to ____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/D5GvY_DFe2](https://www.prepwiser.in/questions/D5GvY_DFe2)

Skew Lines and Shortest Distance · 50 PYQs

Let the values of λ for which the shortest distance between the lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ and $\frac{x-\lambda}{3} = \frac{y-4}{4} = \frac{z-5}{5}$ is $\frac{1}{\sqrt{6}}$ be λ_1 and λ_2 . Then the radius of the circle passing through the points $(0, 0)$, (λ_1, λ_2) and (λ_2, λ_1) is

- (A) 3
- (B) $\frac{5\sqrt{2}}{3}$
- (C) $\frac{\sqrt{2}}{3}$
- (D) 4

[Step-by-step solution ► prepwiser.in/questions/7JUIvDqR25](https://www.prepwiser.in/questions/7JUIvDqR25)

If the shortest distance between the lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ and $\frac{x}{1} = \frac{y}{\alpha} = \frac{z-5}{1}$ is $\frac{5}{\sqrt{6}}$, then the sum of all possible values of α is

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

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

Let the values of p, for which the shortest distance between the lines $\frac{x+1}{3} = \frac{y}{4} = \frac{z}{5}$ and $\vec{r} = (p\hat{i} + 2\hat{j} + \hat{k}) + \lambda(2\hat{i} + 3\hat{j} + 4\hat{k})$ is $\frac{1}{\sqrt{6}}$, be a, b, ($a < b$). Then the length of the latus rectum of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is :

- (A) $\frac{3}{2}$
- (B) 9
- (C) 18
- (D) $\frac{2}{3}$

[Step-by-step solution ► prepwiser.in/questions/WbZUqvYh4w](https://www.prepwiser.in/questions/WbZUqvYh4w)

Q113 JEE Main 2025 · 4 Apr · Shift 1

Let the shortest distance between the lines $\frac{x-3}{3} = \frac{y-\alpha}{-1} = \frac{z-3}{1}$ and $\frac{x+3}{-3} = \frac{y+7}{2} = \frac{z-\beta}{4}$ be $3\sqrt{30}$. Then the positive value of $5\alpha + \beta$ is

- (A) 42 (B) 40
(C) 48 (D) 46

[Step-by-step solution ► prepwisser.in/questions/VzcR9_zpkT](https://www.prepwisser.in/questions/VzcR9_zpkT)

Q114 JEE Main 2025 · 3 Apr · Shift 2

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

- (A) 16 (B) 12
(C) 18 (D) 14

[Step-by-step solution ► prepwisser.in/questions/ahb7dg-y4x](https://www.prepwisser.in/questions/ahb7dg-y4x)

Q115 JEE Main 2025 · 2 Apr · Shift 2

The line L_1 is parallel to the vector $\vec{a} = -3\hat{i} + 2\hat{j} + 4\hat{k}$ and passes through the point $(7, 6, 2)$ and the line L_2 is parallel to the vector $\vec{b} = 2\hat{i} + \hat{j} + 3\hat{k}$ and passes through the point $(5, 3, 4)$. The shortest distance between the lines L_1 and L_2 is :

- (A) $\frac{23}{\sqrt{38}}$ (B) $\frac{21}{\sqrt{38}}$
(C) $\frac{23}{\sqrt{57}}$ (D) $\frac{21}{\sqrt{57}}$

[Step-by-step solution ► prepwisser.in/questions/bz6GnFm6S9](https://www.prepwisser.in/questions/bz6GnFm6S9)

Q116 JEE Main 2025 · 23 Jan · Shift 2

The distance of the line $\frac{x-2}{2} = \frac{y-6}{3} = \frac{z-3}{4}$ from the point $(1, 4, 0)$ along the line $\frac{x}{1} = \frac{y-2}{2} = \frac{z+3}{3}$ is :

- (A) $\sqrt{17}$ (B) $\sqrt{13}$
(C) $\sqrt{15}$ (D) $\sqrt{14}$

[Step-by-step solution ► prepwisser.in/questions/Cp151-qkB](https://www.prepwisser.in/questions/Cp151-qkB)

Q117 JEE Main 2025 · 23 Jan · Shift 2

If the square of the shortest distance between the lines $\frac{x-2}{1} = \frac{y-1}{2} = \frac{z+3}{-3}$ and $\frac{x+1}{2} = \frac{y+3}{4} = \frac{z+5}{-5}$ is $\frac{m}{n}$, where m, n are coprime numbers, then $m + n$ is equal to :

- (A) 14 (B) 6
(C) 21 (D) 9

[Step-by-step solution ► prepwisser.in/questions/gzRHZqOk24](https://www.prepwisser.in/questions/gzRHZqOk24)

Q118 JEE Main 2025 · 22 Jan · Shift 2

The perpendicular distance, of the line $\frac{x-1}{2} = \frac{y+2}{-1} = \frac{z+3}{2}$ from the point $P(2, -10, 1)$, is :

- (A) 6 (B) $4\sqrt{3}$
(C) $3\sqrt{5}$ (D) $5\sqrt{2}$

[Step-by-step solution ► prepwisser.in/questions/CPNa9SrYyX](https://www.prepwisser.in/questions/CPNa9SrYyX)

Q119 JEE Main 2024 · 9 Apr · Shift 1

The shortest distance between the lines $\frac{x-3}{4} = \frac{y+7}{-11} = \frac{z-1}{5}$ and $\frac{x-5}{3} = \frac{y-9}{-6} = \frac{z+2}{1}$ is:

(A) $\frac{185}{\sqrt{563}}$

(B) $\frac{187}{\sqrt{563}}$

(C) $\frac{178}{\sqrt{563}}$

(D) $\frac{179}{\sqrt{563}}$

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

Q120 JEE Main 2024 · 8 Apr · Shift 1

If the shortest distance between the lines

$$L_1 : \vec{r} = (2 + \lambda)\hat{i} + (1 - 3\lambda)\hat{j} + (3 + 4\lambda)\hat{k}, \quad \lambda \in \mathbb{R}$$
$$L_2 : \vec{r} = 2(1 + \mu)\hat{i} + 3(1 + \mu)\hat{j} + (5 + \mu)\hat{k}, \quad \mu \in \mathbb{R}$$

is $\frac{m}{\sqrt{n}}$, where $\gcd(m, n) = 1$, then the value of $m + n$ equals

(A) 384

(B) 387

(C) 390

(D) 377

[Step-by-step solution ► prepwiser.in/questions/u1-59va7BE](https://www.prepwiser.in/questions/u1-59va7BE)

Q121 JEE Main 2024 · 6 Apr · Shift 1

The shortest distance between the lines $\frac{x-3}{2} = \frac{y+15}{-7} = \frac{z-9}{5}$ and $\frac{x+1}{2} = \frac{y-1}{1} = \frac{z-9}{-3}$ is

(A) $8\sqrt{3}$

(B) $6\sqrt{3}$

(C) $5\sqrt{3}$

(D) $4\sqrt{3}$

[Step-by-step solution ► prepwiser.in/questions/gGZcEMwZh6](https://www.prepwiser.in/questions/gGZcEMwZh6)

Q122 JEE Main 2024 · 6 Apr · Shift 2

If the shortest distance between the lines $\frac{x-\lambda}{3} = \frac{y-2}{-1} = \frac{z-1}{1}$ and $\frac{x+2}{-3} = \frac{y+5}{2} = \frac{z-4}{4}$ is $\frac{44}{\sqrt{30}}$, then the largest possible value of $|\lambda|$ is equal to _____.

Numerical answer — enter the value.

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

Q123 JEE Main 2024 · 4 Apr · Shift 1

If the shortest distance between the lines $\frac{x+2}{2} = \frac{y+3}{3} = \frac{z-5}{4}$ and $\frac{x-3}{1} = \frac{y-2}{-3} = \frac{z+4}{2}$ is $\frac{38}{3\sqrt{5}}k$, and $\int_0^k [x^2] dx = \alpha - \sqrt{\alpha}$, where $[x]$ denotes the greatest integer function, then $6\alpha^3$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/6l6Fgo4x4K](https://www.prepwiser.in/questions/6l6Fgo4x4K)

Let the line of the shortest distance between the lines

$$L_1 : \vec{r} = (\hat{i} + 2\hat{j} + 3\hat{k}) + \lambda(\hat{i} - \hat{j} + \hat{k}) \text{ and}$$

$$L_2 : \vec{r} = (4\hat{i} + 5\hat{j} + 6\hat{k}) + \mu(\hat{i} + \hat{j} - \hat{k})$$

intersect L_1 and L_2 at P and Q respectively. If (α, β, γ) is the mid point of the line segment PQ, then $2(\alpha + \beta + \gamma)$ is equal to _____.

Numerical answer — enter the value.

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

If the shortest distance between the lines

$\frac{x-\lambda}{-2} = \frac{y-2}{1} = \frac{z-1}{1}$ and $\frac{x-\sqrt{3}}{1} = \frac{y-1}{-2} = \frac{z-2}{1}$ is 1, then the sum of all possible values of λ is :

- (A) 0 (B) $2\sqrt{3}$
(C) $3\sqrt{3}$ (D) $-2\sqrt{3}$

[Step-by-step solution ► prepwiser.in/questions/n6bMXj_SOg](https://www.prepwiser.in/questions/n6bMXj_SOg)

The shortest distance, between lines L_1 and L_2 , where $L_1 : \frac{x-1}{2} = \frac{y+1}{-3} = \frac{z+4}{2}$ and L_2 is the line, passing through the points $A(-4, 4, 3)$, $B(-1, 6, 3)$ and perpendicular to the line $\frac{x-3}{-2} = \frac{y}{3} = \frac{z-1}{1}$, is

- (A) $\frac{141}{\sqrt{221}}$ (B) $\frac{24}{\sqrt{117}}$
(C) $\frac{42}{\sqrt{117}}$ (D) $\frac{121}{\sqrt{221}}$

[Step-by-step solution ► prepwiser.in/questions/vYN9Lc4P-h](https://www.prepwiser.in/questions/vYN9Lc4P-h)

If d_1 is the shortest distance between the lines $x + 1 = 2y = -12z$, $x = y + 2 = 6z - 6$ and d_2 is the shortest distance between the lines

$$\frac{x-1}{2} = \frac{y+8}{-7} = \frac{z-4}{5}, \frac{x-1}{2} = \frac{y-2}{1} = \frac{z-6}{-3}$$

, then the value of $\frac{32\sqrt{3}d_1}{d_2}$ is :

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/OihrNQG1mZ](https://www.prepwiser.in/questions/OihrNQG1mZ)

Let O be the origin, and M and N be the points on the lines $\frac{x-5}{4} = \frac{y-4}{1} = \frac{z-5}{3}$ and $\frac{x+8}{12} = \frac{y+2}{5} = \frac{z+11}{9}$ respectively such that MN is the shortest distance between the given lines. Then $\vec{OM} \cdot \vec{ON}$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/44MSDCGqje](https://www.prepwiser.in/questions/44MSDCGqje)

Q129 JEE Main 2024 · 27 Jan · Shift 1

If the shortest distance between the lines

$\frac{x-4}{1} = \frac{y+1}{2} = \frac{z}{-3}$ and $\frac{x-\lambda}{2} = \frac{y+1}{4} = \frac{z-2}{-5}$ is $\frac{6}{\sqrt{5}}$, then the sum of all possible values of λ is :

(A) 10 (B) 5

(C) 7 (D) 8

[Step-by-step solution ► prepwiser.in/questions/vM8ErShnmO](https://www.prepwiser.in/questions/vM8ErShnmO)

Q130 JEE Main 2023 · 15 Apr · Shift 1

Let S be the set of all values of λ , for which the shortest distance between

the lines $\frac{x-\lambda}{0} = \frac{y-3}{4} = \frac{z+6}{1}$ and $\frac{x+\lambda}{3} = \frac{y}{-4} = \frac{z-6}{0}$ is 13. Then $8 \left| \sum_{\lambda \in S} \lambda \right|$ is equal to :

(A) 306 (B) 304

(C) 308 (D) 302

[Step-by-step solution ► prepwiser.in/questions/wBi9Pu-8q7](https://www.prepwiser.in/questions/wBi9Pu-8q7)

Q131 JEE Main 2023 · 13 Apr · Shift 1

The distance of the point $(-1, 2, 3)$ from the plane $\vec{r} \cdot (\hat{i} - 2\hat{j} + 3\hat{k}) = 10$ parallel to the line of the shortest distance between the lines $\vec{r} = (\hat{i} - \hat{j}) + \lambda(2\hat{i} + \hat{k})$ and $\vec{r} = (2\hat{i} - \hat{j}) + \mu(\hat{i} - \hat{j} + \hat{k})$ is :

(A) $3\sqrt{6}$ (B) $3\sqrt{5}$

(C) $2\sqrt{6}$ (D) $2\sqrt{5}$

[Step-by-step solution ► prepwiser.in/questions/2RfW3toCQ5](https://www.prepwiser.in/questions/2RfW3toCQ5)

Q132 JEE Main 2023 · 12 Apr · Shift 1

Let the lines $l_1 : \frac{x+5}{3} = \frac{y+4}{1} = \frac{z-\alpha}{-2}$ and $l_2 : 3x + 2y + z - 2 = 0 = x - 3y + 2z - 13$ be coplanar. If the point $P(a, b, c)$ on l_1 is nearest to the point $Q(-4, -3, 2)$, then $|a| + |b| + |c|$ is equal to

(A) 12 (B) 14

(C) 10 (D) 8

[Step-by-step solution ► prepwiser.in/questions/dIh3aksWdF](https://www.prepwiser.in/questions/dIh3aksWdF)

Q133 JEE Main 2023 · 11 Apr · Shift 1

Let a line l pass through the origin and be perpendicular to the lines

$$l_1 : \vec{r} = (\hat{i} - 11\hat{j} - 7\hat{k}) + \lambda(\hat{i} + 2\hat{j} + 3\hat{k}), \lambda \in \mathbb{R}$$

and

$$l_2 : \vec{r} = (-\hat{i} + \hat{k}) + \mu(2\hat{i} + 2\hat{j} + \hat{k}), \mu \in \mathbb{R}$$

If P is the point of intersection of l and l_1 , and $Q(\alpha, \beta, \gamma)$ is the foot of perpendicular from P on l_2 , then $9(\alpha + \beta + \gamma)$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/J6moNy9Qur](https://www.prepwiser.in/questions/J6moNy9Qur)

Q134 JEE Main 2023 · 10 Apr · Shift 1

The shortest distance between the lines $\frac{x+2}{1} = \frac{y}{-2} = \frac{z-5}{2}$ and $\frac{x-4}{1} = \frac{y-1}{2} = \frac{z+3}{0}$ is :

- (A) 8 (B) 7
(C) 6 (D) 9

Step-by-step solution ► [prepwiser.in/questions/n-Fu-H6zgd](https://www.prepwiser.in/questions/n-Fu-H6zgd)

Q135 JEE Main 2023 · 8 Apr · Shift 1

The shortest distance between the lines $\frac{x-4}{4} = \frac{y+2}{5} = \frac{z+3}{3}$ and $\frac{x-1}{3} = \frac{y-3}{4} = \frac{z-4}{2}$ is :

- (A) $3\sqrt{6}$ (B) $6\sqrt{2}$
(C) $6\sqrt{3}$ (D) $2\sqrt{6}$

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

Q136 JEE Main 2023 · 8 Apr · Shift 2

Let P_1 be the plane $3x - y - 7z = 11$ and P_2 be the plane passing through the points $(2, -1, 0)$, $(2, 0, -1)$, and $(5, 1, 1)$. If the foot of the perpendicular drawn from the point $(7, 4, -1)$ on the line of intersection of the planes P_1 and P_2 is (α, β, γ) , then $\alpha + \beta + \gamma$ is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/KcY49dFcIn](https://www.prepwiser.in/questions/KcY49dFcIn)

Q137 JEE Main 2023 · 1 Feb · Shift 1

The shortest distance between the lines

$$\frac{x-5}{1} = \frac{y-2}{2} = \frac{z-4}{-3} \text{ and}$$

$$\frac{x+3}{1} = \frac{y+5}{4} = \frac{z-1}{-5} \text{ is :}$$

- (A) $7\sqrt{3}$ (B) $5\sqrt{3}$
(C) $4\sqrt{3}$ (D) $6\sqrt{3}$

Step-by-step solution ► [prepwiser.in/questions/MRu6VxXyRL](https://www.prepwiser.in/questions/MRu6VxXyRL)

Q138 JEE Main 2023 · 31 Jan · Shift 1

Let the shortest distance between the lines

$$L : \frac{x-5}{-2} = \frac{y-\lambda}{0} = \frac{z+\lambda}{1}, \lambda \geq 0 \text{ and}$$

$$L_1 : x + 1 = y - 1 = 4 - z \text{ be } 2\sqrt{6}. \text{ If } (\alpha, \beta, \gamma) \text{ lies on } L,$$

then which of the following is NOT possible?

- (A) $\alpha + 2\gamma = 24$ (B) $2\alpha + \gamma = 7$
(C) $\alpha - 2\gamma = 19$ (D) $2\alpha - \gamma = 9$

Step-by-step solution ► [prepwiser.in/questions/BfYBS6_ua](https://www.prepwiser.in/questions/BfYBS6_ua)

Q139 JEE Main 2023 · 30 Jan · Shift 1

The line l_1 passes through the point $(2, 6, 2)$ and is perpendicular to the plane $2x + y - 2z = 10$. Then the shortest distance between the line l_1 and the line $\frac{x+1}{2} = \frac{y+4}{-3} = \frac{z}{2}$ is :

- (A) 9 (B) 7
(C) $\frac{19}{3}$ (D) $\frac{13}{3}$

Step-by-step solution ► [prepwisar.in/questions/-24xhCBkSV](https://www.prepwisar.in/questions/-24xhCBkSV)

Q140 JEE Main 2023 · 29 Jan · Shift 2

The shortest distance between the lines $\frac{x-1}{2} = \frac{y+8}{-7} = \frac{z-4}{5}$ and $\frac{x-1}{2} = \frac{y-2}{1} = \frac{z-6}{-3}$ is :

- (A) $2\sqrt{3}$ (B) $3\sqrt{3}$
(C) $4\sqrt{3}$ (D) $5\sqrt{3}$

Step-by-step solution ► [prepwisar.in/questions/cIdtXt01zg](https://www.prepwisar.in/questions/cIdtXt01zg)

Q141 JEE Main 2023 · 25 Jan · Shift 2

The shortest distance between the lines $x + 1 = 2y = -12z$ and $x = y + 2 = 6z - 6$ is :

- (A) 3 (B) $\frac{5}{2}$
(C) $\frac{3}{2}$ (D) 2

Step-by-step solution ► [prepwisar.in/questions/PQ1ePj5PsE](https://www.prepwisar.in/questions/PQ1ePj5PsE)

Q142 JEE Main 2023 · 25 Jan · Shift 1

Consider the lines L_1 and L_2 given by

$$L_1 : \frac{x-1}{2} = \frac{y-3}{1} = \frac{z-2}{2}$$

$$L_2 : \frac{x-2}{1} = \frac{y-2}{2} = \frac{z-3}{3}.$$

A line L_3 having direction ratios $1, -1, -2$, intersects L_1 and L_2 at the points P and Q respectively. Then the length of line segment PQ is

- (A) $4\sqrt{3}$ (B) $2\sqrt{6}$
(C) 4 (D) $3\sqrt{2}$

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

Q143 JEE Main 2023 · 25 Jan · Shift 2

If the shortest distance between the line joining the points $(1, 2, 3)$ and $(2, 3, 4)$, and the line $\frac{x-1}{2} = \frac{y+1}{-1} = \frac{z-2}{0}$ is α , then $28\alpha^2$ is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ► [prepwisar.in/questions/95SYHeVIBm](https://www.prepwisar.in/questions/95SYHeVIBm)

Q144 JEE Main 2023 · 24 Jan · Shift 2

If the shortest between the lines $\frac{x+\sqrt{6}}{2} = \frac{y-\sqrt{6}}{3} = \frac{z-\sqrt{6}}{4}$ and $\frac{x-\lambda}{3} = \frac{y-2\sqrt{6}}{4} = \frac{z+2\sqrt{6}}{5}$ is 6, then the square of sum of all possible values of λ is :

Numerical answer — enter the value.

Step-by-step solution ► [prepwisar.in/questions/rrbu3TNJC7](https://www.prepwisar.in/questions/rrbu3TNJC7)

Q145 JEE Main 2022 · 25 Jul · Shift 2

The shortest distance between the lines $\frac{x+7}{-6} = \frac{y-6}{7} = z$ and $\frac{7-x}{2} = y-2 = z-6$ is :

(A) $2\sqrt{29}$

(B) 1

(C) $\sqrt{\frac{37}{29}}$

(D) $\frac{\sqrt{29}}{2}$

[Step-by-step solution ► prepwiser.in/questions/BoMfCy4Rcg](https://www.prepwiser.in/questions/BoMfCy4Rcg)

Q146 JEE Main 2022 · 25 Jul · Shift 1

The line of shortest distance between the lines $\frac{x-2}{0} = \frac{y-1}{1} = \frac{z}{1}$ and $\frac{x-3}{2} = \frac{y-5}{2} = \frac{z-1}{1}$ makes an angle of $\cos^{-1}\left(\sqrt{\frac{2}{27}}\right)$ with the plane $P : ax - y - z = 0, (a > 0)$. If the image of the point $(1, 1, -5)$ in the plane P is (α, β, γ) , then $\alpha + \beta - \gamma$ is equal to _____.

Numerical answer — enter the value.

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

Q147 JEE Main 2022 · 27 Jun · Shift 2

The shortest distance between the lines

$\frac{x-3}{2} = \frac{y-2}{3} = \frac{z-1}{-1}$ and $\frac{x+3}{2} = \frac{y-6}{1} = \frac{z-5}{3}$, is :

(A) $\frac{18}{\sqrt{5}}$

(B) $\frac{22}{3\sqrt{5}}$

(C) $\frac{46}{3\sqrt{5}}$

(D) $6\sqrt{3}$

[Step-by-step solution ► prepwiser.in/questions/pFRGSNTX9i](https://www.prepwiser.in/questions/pFRGSNTX9i)

Q148 JEE Main 2022 · 25 Jun · Shift 2

Let l_1 be the line in xy -plane with x and y intercepts $\frac{1}{8}$ and $\frac{1}{4\sqrt{2}}$ respectively, and l_2 be the line in zx -plane with x and z intercepts $-\frac{1}{8}$ and $-\frac{1}{6\sqrt{3}}$ respectively. If d is the shortest distance between the line l_1 and l_2 , then d^{-2} is equal to _____.

Numerical answer — enter the value.

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

Q149 JEE Main 2022 · 24 Jun · Shift 1

If the shortest distance between the lines

$$\vec{r} = (-\hat{i} + 3\hat{k}) + \lambda(\hat{i} - a\hat{j})$$

and

$$\vec{r} = (-\hat{j} + 2\hat{k}) + \mu(\hat{i} - \hat{j} + \hat{k})$$

is $\sqrt{\frac{2}{3}}$, then the integral value of a is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/-ykv5F4QW](https://www.prepwiser.in/questions/-ykv5F4QW)

Q150 JEE Main 2022 · 24 Jun · Shift 2

If the shortest distance between the lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{\lambda}$ and $\frac{x-2}{1} = \frac{y-4}{4} = \frac{z-5}{5}$ is $\frac{1}{\sqrt{3}}$, then the sum of all possible value of λ is :

- (A) 16 (B) 6
(C) 12 (D) 15

Step-by-step solution ► [prepwiser.in/questions/c-K1KAyOq7](https://www.prepwiser.in/questions/c-K1KAyOq7)

Q151 JEE Main 2021 · 1 Sep · Shift 2

The distance of line $3y - 2z - 1 = 0 = 3x - z + 4$ from the point $(2, -1, 6)$ is :

- (A) $\sqrt{26}$ (B) $2\sqrt{5}$
(C) $2\sqrt{6}$ (D) $4\sqrt{2}$

Step-by-step solution ► [prepwiser.in/questions/_pie6jR2dW](https://www.prepwiser.in/questions/_pie6jR2dW)

Q152 JEE Main 2021 · 20 Jul · Shift 2

The lines $x = ay - 1 = z - 2$ and $x = 3y - 2 = bz - 2$, ($ab \neq 0$) are coplanar, if :

- (A) $b = 1, a \in \mathbb{R} - \{0\}$ (B) $a = 1, b \in \mathbb{R} - \{0\}$
(C) $a = 2, b = 2$ (D) $a = 2, b = 3$

Step-by-step solution ► [prepwiser.in/questions/XyG88d3vU-](https://www.prepwiser.in/questions/XyG88d3vU-)

Q153 JEE Main 2021 · 20 Jul · Shift 1

If the shortest distance between the lines

$$\vec{r}_1 = \alpha \hat{i} + 2\hat{j} + 2\hat{k} + \lambda(\hat{i} - 2\hat{j} + 2\hat{k})$$

, $\lambda \in \mathbb{R}$, $\alpha > 0$ and

$$\vec{r}_2 = -4\hat{i} - \hat{k} + \mu(3\hat{i} - 2\hat{j} - 2\hat{k})$$

, $\mu \in \mathbb{R}$ is 9, then α is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/pKQ786yfvv](https://www.prepwiser.in/questions/pKQ786yfvv)

Q154 JEE Main 2021 · 16 Mar · Shift 2

If the foot of the perpendicular from point $(4, 3, 8)$ on the line $L_1 : \frac{x-a}{l} = \frac{y-2}{3} = \frac{z-b}{4}$, $l \neq 0$ is $(3, 5, 7)$, then the shortest distance between the line L_1 and line $L_2 : \frac{x-2}{3} = \frac{y-4}{4} = \frac{z-5}{5}$ is equal to :

- (A) $\frac{1}{\sqrt{6}}$ (B) $\frac{1}{2}$
(C) $\frac{1}{\sqrt{3}}$ (D) $\sqrt{\frac{2}{3}}$

Step-by-step solution ► [prepwiser.in/questions/qU1mr9B_DB](https://www.prepwiser.in/questions/qU1mr9B_DB)

Q155 JEE Main 2021 · 24 Feb · Shift 2

Let λ be an integer. If the shortest distance between the lines

$x - \lambda = 2y - 1 = -2z$ and $x = y + 2\lambda = z - \lambda$ is $\frac{\sqrt{7}}{2\sqrt{2}}$, then the value of $|\lambda|$ is _____.

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/vRt9qa_ti](https://www.prepwiser.in/questions/vRt9qa_ti)

Q156 JEE Main 2020 · 6 Sep · Shift 1

The shortest distance between the lines

$$\frac{x-1}{0} = \frac{y+1}{-1} = \frac{z}{1}$$

and $x + y + z + 1 = 0$, $2x - y + z + 3 = 0$ is :

(A) 1

(B) $\frac{1}{2}$

(C) $\frac{1}{\sqrt{2}}$

(D) $\frac{1}{\sqrt{3}}$

[Step-by-step solution ► prepwiset.in/questions/vbhOdkRcp1](https://www.prepwiset.in/questions/vbhOdkRcp1)

Q157 JEE Main 2020 · 5 Sep · Shift 2

If for some $\alpha \in \mathbb{R}$, the lines

$$L_1 : \frac{x+1}{2} = \frac{y-2}{-1} = \frac{z-1}{1} \text{ and}$$

$$L_2 : \frac{x+2}{\alpha} = \frac{y+1}{5-\alpha} = \frac{z+1}{1} \text{ are coplanar,}$$

then the line L_2 passes through the point :

(A) (10, 2, 2)

(B) (2, -10, -2)

(C) (10, -2, -2)

(D) (-2, 10, 2)

[Step-by-step solution ► prepwiset.in/questions/Rgm2bfmfKd](https://www.prepwiset.in/questions/Rgm2bfmfKd)

Q158 JEE Main 2020 · 9 Jan · Shift 1

The projection of the line segment joining the points (1, -1, 3) and (2, -4, 11) on the line joining the points (-1, 2, 3) and (3, -2, 10) is _____.

Numerical answer — enter the value.

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

Q159 JEE Main 2020 · 8 Jan · Shift 1

The shortest distance between the lines

$$\frac{x-3}{3} = \frac{y-8}{-1} = \frac{z-3}{1} \text{ and}$$

$$\frac{x+3}{-3} = \frac{y+7}{2} = \frac{z-6}{4} \text{ is :}$$

(A) 3

(B) $\frac{7}{2}\sqrt{30}$

(C) $3\sqrt{30}$

(D) $2\sqrt{30}$

[Step-by-step solution ► prepwiset.in/questions/NaXRz0aMrO](https://www.prepwiset.in/questions/NaXRz0aMrO)

Angle Between Planes · 4 PYQs

Q160 JEE Main 2022 · 28 Jun · Shift 1

The acute angle between the planes P_1 and P_2 , when P_1 and P_2 are the planes passing through the intersection of the planes $5x + 8y + 13z - 29 = 0$ and $8x - 7y + z - 20 = 0$ and the points $(2, 1, 3)$ and $(0, 1, 2)$, respectively, is :

- (A) $\frac{\pi}{3}$ (B) $\frac{\pi}{4}$
(C) $\frac{\pi}{6}$ (D) $\frac{\pi}{12}$

Step-by-step solution ► [prepwisar.in/questions/xjGy7TzTMI](https://www.prepwisar.in/questions/xjGy7TzTMI)

Q161 JEE Main 2022 · 26 Jun · Shift 2

If the plane $2x + y - 5z = 0$ is rotated about its line of intersection with the plane $3x - y + 4z - 7 = 0$ by an angle of $\frac{\pi}{2}$, then the plane after the rotation passes through the point :

- (A) $(2, -2, 0)$ (B) $(-2, 2, 0)$
(C) $(1, 0, 2)$ (D) $(-1, 0, -2)$

Step-by-step solution ► [prepwisar.in/questions/_S7IASG7Yk](https://www.prepwisar.in/questions/_S7IASG7Yk)

Q162 JEE Main 2022 · 24 Jun · Shift 2

Let the points on the plane P be equidistant from the points $(-4, 2, 1)$ and $(2, -2, 3)$. Then the acute angle between the plane P and the plane $2x + y + 3z = 1$ is :

- (A) $\frac{\pi}{6}$ (B) $\frac{\pi}{4}$
(C) $\frac{\pi}{3}$ (D) $\frac{5\pi}{12}$

Step-by-step solution ► [prepwisar.in/questions/L9R_OFANAy](https://www.prepwisar.in/questions/L9R_OFANAy)

Q163 JEE Main 2021 · 1 Sep · Shift 2

Let the acute angle bisector of the two planes $x - 2y - 2z + 1 = 0$ and $2x - 3y - 6z + 1 = 0$ be the plane P. Then which of the following points lies on P?

- (A) $(3, 1, -\frac{1}{2})$ (B) $(-2, 0, -\frac{1}{2})$
(C) $(0, 2, -4)$ (D) $(4, 0, -2)$

Step-by-step solution ► [prepwisar.in/questions/KQkkwOSMF8](https://www.prepwisar.in/questions/KQkkwOSMF8)

Distance of Point from Plane · 14 PYQs

Q164 JEE Main 2023 · 10 Apr · Shift 2

Let the line $\frac{x}{1} = \frac{6-y}{2} = \frac{z+8}{5}$ intersect the lines $\frac{x-5}{4} = \frac{y-7}{3} = \frac{z+2}{1}$ and $\frac{x+3}{6} = \frac{3-y}{3} = \frac{z-6}{1}$ at the points A and B respectively. Then the distance of the mid-point of the line segment AB from the plane $2x - 2y + z = 14$ is :

- (A) 3 (B) $\frac{10}{3}$
(C) 4 (D) $\frac{11}{3}$

Step-by-step solution ► [prepwisar.in/questions/za1zKG10CF](https://www.prepwisar.in/questions/za1zKG10CF)

Q165 JEE Main 2023 · 31 Jan · Shift 2

Let P be the plane, passing through the point $(1, -1, -5)$ and perpendicular to the line joining the points $(4, 1, -3)$ and $(2, 4, 3)$. Then the distance of P from the point $(3, -2, 2)$ is :

- (A) 5 (B) 4
(C) 6 (D) 7

Step-by-step solution ► [prepwisser.in/questions/k0SeU4AF9S](https://www.prepwisser.in/questions/k0SeU4AF9S)

Q166 JEE Main 2023 · 24 Jan · Shift 1

The distance of the point $(7, -3, -4)$ from the plane passing through the points $(2, -3, 1)$, $(-1, 1, -2)$ and $(3, -4, 2)$ is :

- (A) $4\sqrt{2}$ (B) 4
(C) 5 (D) $5\sqrt{2}$

Step-by-step solution ► [prepwisser.in/questions/wKqWM0bkRv](https://www.prepwisser.in/questions/wKqWM0bkRv)

Q167 JEE Main 2022 · 28 Jul · Shift 1

The foot of the perpendicular from a point on the circle $x^2 + y^2 = 1, z = 0$ to the plane $2x + 3y + z = 6$ lies on which one of the following curves?

- (A) $(6x + 5y - 12)^2 + 4(3x + 7y - 8)^2 = 1, z = 6 - 2x - 3y$
(B) $(5x + 6y - 12)^2 + 4(3x + 5y - 9)^2 = 1, z = 6 - 2x - 3y$
(C) $(6x + 5y - 14)^2 + 9(3x + 5y - 7)^2 = 1, z = 6 - 2x - 3y$
(D) $(5x + 6y - 14)^2 + 9(3x + 7y - 8)^2 = 1, z = 6 - 2x - 3y$

Step-by-step solution ► [prepwisser.in/questions/ovasgyGYR8](https://www.prepwisser.in/questions/ovasgyGYR8)

Q168 JEE Main 2022 · 25 Jul · Shift 2

A plane E is perpendicular to the two planes $2x - 2y + z = 0$ and $x - y + 2z = 4$, and passes through the point $P(1, -1, 1)$. If the distance of the plane E from the point $Q(a, a, 2)$ is $3\sqrt{2}$, then $(PQ)^2$ is equal to :

- (A) 9 (B) 12
(C) 21 (D) 33

Step-by-step solution ► [prepwisser.in/questions/80B61htqBD](https://www.prepwisser.in/questions/80B61htqBD)

Q169 JEE Main 2022 · 25 Jul · Shift 1

Let P be the plane containing the straight line $\frac{x-3}{9} = \frac{y+4}{-1} = \frac{z-7}{-5}$ and perpendicular to the plane containing the straight lines $\frac{x}{2} = \frac{y}{3} = \frac{z}{5}$ and $\frac{x}{3} = \frac{y}{7} = \frac{z}{8}$. If d is the distance of P from the point $(2, -5, 11)$, then d^2 is equal to :

- (A) $\frac{147}{2}$ (B) 96
(C) $\frac{32}{3}$ (D) 54

Step-by-step solution ► [prepwisser.in/questions/l48kchnnhk](https://www.prepwisser.in/questions/l48kchnnhk)

Q170 JEE Main 2022 · 29 Jun · Shift 2

Let $\frac{x-2}{3} = \frac{y+1}{-2} = \frac{z+3}{-1}$ lie on the plane $px - qy + z = 5$, for some $p, q \in \mathbb{R}$. The shortest distance of the plane from the origin is :

- (A) $\sqrt{\frac{3}{109}}$ (B) $\sqrt{\frac{5}{142}}$
(C) $\frac{5}{\sqrt{71}}$ (D) $\frac{1}{\sqrt{142}}$

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

Q171 JEE Main 2022 · 29 Jun · Shift 1

Let d be the distance between the foot of perpendiculars of the points $P(1, 2, -1)$ and $Q(2, -1, 3)$ on the plane $-x + y + z = 1$. Then d^2 is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/MRHtYb7zfr](https://www.prepwiser.in/questions/MRHtYb7zfr)

Q172 JEE Main 2022 · 29 Jun · Shift 1

If the mirror image of the point $(2, 4, 7)$ in the plane $3x - y + 4z = 2$ is (a, b, c) , then $2a + b + 2c$ is equal to :

- (A) 54 (B) 50
(C) -6 (D) -42

Step-by-step solution ► [prepwiser.in/questions/Wj85y7IVcs](https://www.prepwiser.in/questions/Wj85y7IVcs)

Q173 JEE Main 2022 · 26 Jun · Shift 2

If the lines

$$\vec{r} = (\hat{i} - \hat{j} + \hat{k}) + \lambda (3\hat{j} - \hat{k})$$

and

$$\vec{r} = (\alpha\hat{i} - \hat{j}) + \mu (2\hat{i} - 3\hat{k})$$

are co-planar, then the distance of the plane containing these two lines from the point $(\alpha, 0, 0)$ is :

- (A) $\frac{2}{9}$ (B) $\frac{2}{11}$
(C) $\frac{4}{11}$ (D) 2

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

Q174 JEE Main 2021 · 27 Jul · Shift 1

Let a plane P pass through the point $(3, 7, -7)$ and contain the line, $\frac{x-2}{-3} = \frac{y-3}{2} = \frac{z+2}{1}$. If distance of the plane P from the origin is d , then d^2 is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/luc2PXv-4e](https://www.prepwiser.in/questions/luc2PXv-4e)

Q175 JEE Main 2021 · 18 Mar · Shift 1

The equation of the planes parallel to the plane $x - 2y + 2z - 3 = 0$ which are at unit distance from the point $(1, 2, 3)$ is $ax + by + cz + d = 0$. If $(b - d) = k(c - a)$, then the positive value of k is :

Numerical answer — enter the value.

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

Q176 JEE Main 2021 · 26 Feb · Shift 2

If the mirror image of the point (1, 3, 5) with respect to the plane

$4x - 5y + 2z = 8$ is (α, β, γ) , then $5(\alpha + \beta + \gamma)$ equals :

- (A) 39 (B) 41
(C) 47 (D) 43

[Step-by-step solution ► prepwiser.in/questions/057o_uKING](https://www.prepwiser.in/questions/057o_uKING)

Q177 JEE Main 2020 · 4 Sep · Shift 1

If the equation of a plane P, passing through the intersection of the planes, $x + 4y - z + 7 = 0$ and $3x + y + 5z = 8$ is $ax + by + 6z = 15$ for some $a, b \in \mathbb{R}$, then the distance of the point (3, 2, -1) from the plane P is.....

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/m6Gkr0BfNn](https://www.prepwiser.in/questions/m6Gkr0BfNn)

Answer key — Three Dimensional Geometry

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

1	C	2	A	3	B	4	A	5	D	6	10	7	B	8	A
9	A	10	D	11	B	12	C	13	D	14	C	15	A	16	216
17	C	18	A	19	A	20	B	21	A	22	22	23	C	24	B
25	D	26	18	27	180	28	A	29	D	30	125	31	84	32	61
33	D	34	1	35	44	36	D	37	A	38	C	39	D	40	A
41	A	42	D	43	B	44	C	45	B	46	6	47	A	48	A
49	C	50	15	51	355	52	9	53	B	54	B	55	D	56	D
57	12	58	125	59	28	60	B	61	D	62	137	63	A	64	5
65	7	66	A	67	D	68	A	69	B	70	C	71	D	72	D
73	38	74	4	75	B	76	A	77	C	78	B	79	D	80	5
81	D	82	B	83	C	84	C	85	A	86	B	87	C	88	D
89	12	90	C	91	15	92	D	93	11	94	9	95	C	96	9
97	B	98	158	99	B	100	2	101	A	102	B	103	B	104	C
105	96	106	7	107	0	108	B	109	3	110	B	111	C	112	D
113	D	114	D	115	A	116	D	117	D	118	C	119	B	120	B
121	D	122	43	123	48	124	21	125	B	126	A	127	16	128	9
129	D	130	A	131	C	132	C	133	5	134	D	135	A	136	11
137	D	138	A	139	A	140	C	141	D	142	B	143	18	144	384
145	A	146	3	147	A	148	51	149	2	150	A	151	C	152	A
153	6	154	A	155	1	156	D	157	B	158	8	159	C	160	A
161	C	162	C	163	B	164	C	165	A	166	D	167	B	168	C
169	C	170	B	171	26	172	C	173	B	174	3	175	4	176	C
177	3														

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