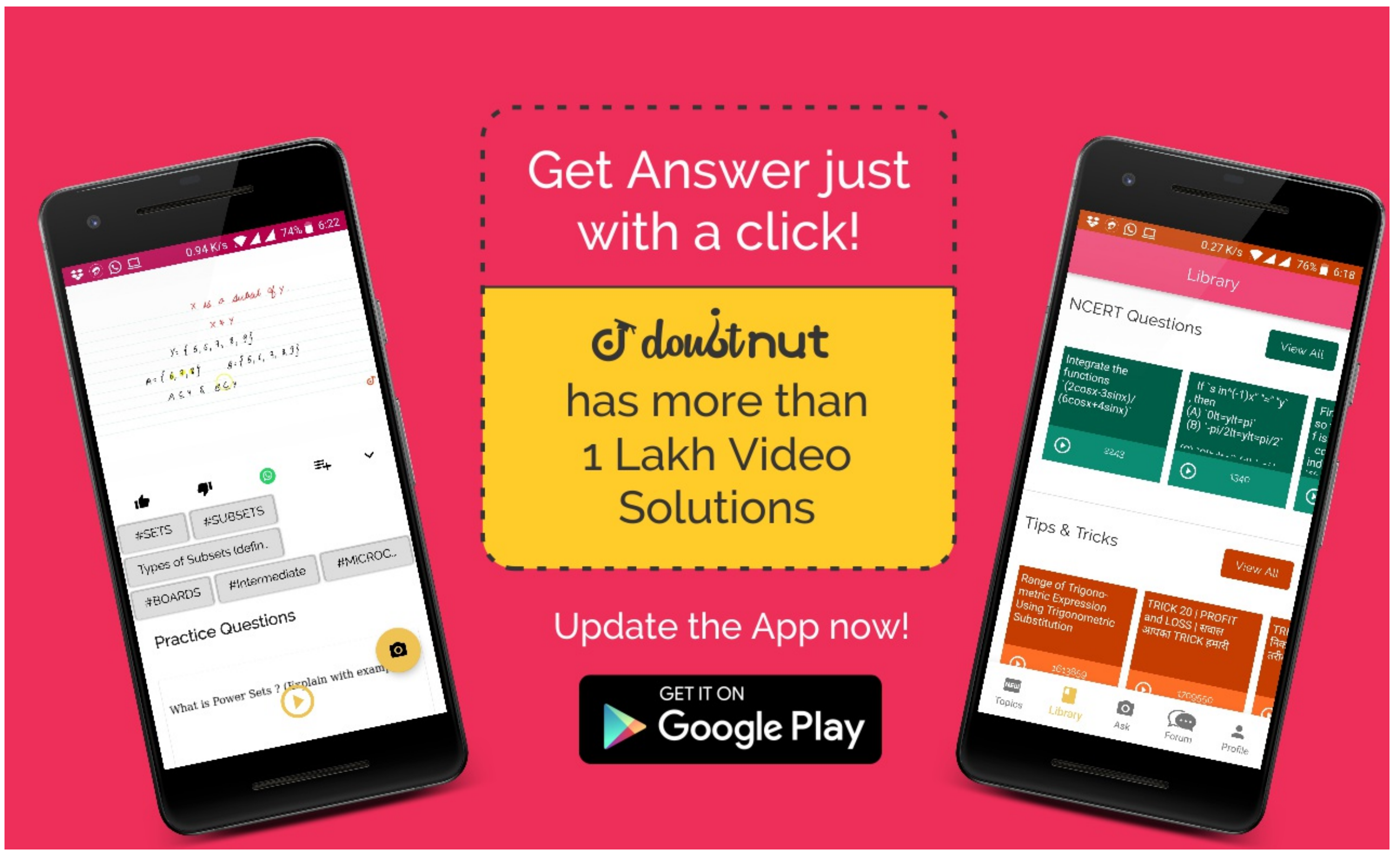
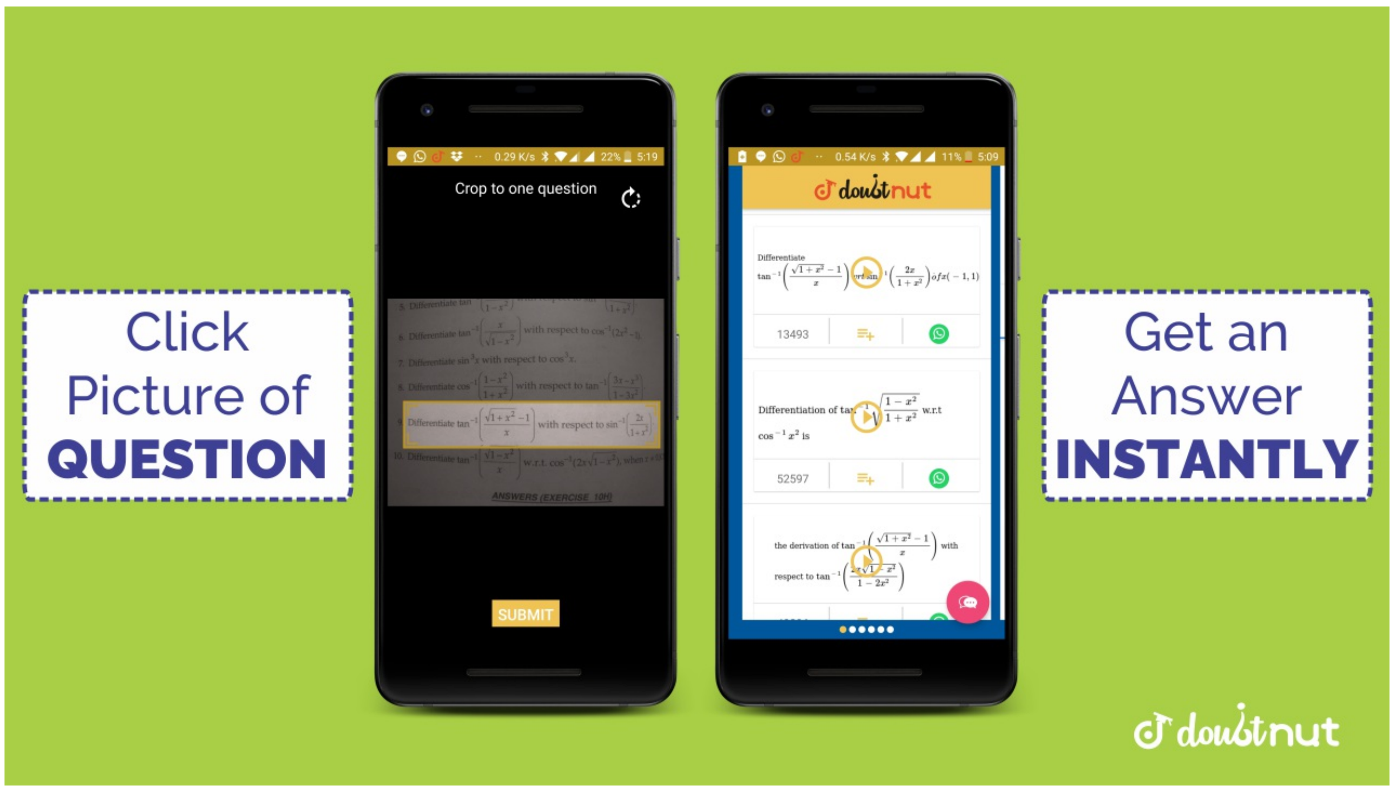
CENGAGE / G TEWANI MATHS SOLUTIONS

CHAPTER THREE DIMENSIONAL GEOMETRY || VECTORS AND 3D GEOMETRY

Ques No.	Question
1	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios** If $\alpha, \beta, and \gamma$ are the an gles which a directed line makes with the positive directions of the co-ordinates axes, then find the value of $\sin^2\alpha+\sin^2\beta+\sin^2\gamma$. Watch Free Video Solution on Doubtnut
2	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios** A line OP through origin O is inclined at $30^0 and 45^0 \to OX and OY$, respectivley. Then find the angle at which it is inclined to OZ. Watch Free Video Solution on Doubtnut
3	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios** ABC is a triangle and A=(2,3,5),B=(-1,3,2) and C= $(\lambda, 5, \mu)$. If the median through A is equally inclined to the axes, then find the value of λ and μ Watch Free Video Solution on Doubtnut
4	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios** A line passes through the points $(6, -7, -1) and (2, -3, 1)$. Find te direction cosines off the line if the line makes an acute angle with the positive direction of the x-axis. Watch Free Video Solution on Doubtnut
5	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios** Find the ratio in which the $y-z$ plane divides the join of the points $(-2, 4, 7) and (3, -5, 8)$. Watch Free Video Solution on Doubtnut

doubtnut पढ़ना हुआ आसान	
6	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios** If $A(3, 2, -4)$, $B(5, 4, -6) and C(9, 8, -10)$ are three collinear points, then find the ratio in which point C divides AB. Watch Free Video Solution on Doubtnut
7	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios** If the sum of the squares of the distance of a point from the three coordinate axes is 36, then find its distance from the origin. Watch Free Video Solution on Doubtnut
8	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios** A line makes angles $\alpha, \beta, \gamma and \delta$ with the diagonals of a cube. Show that $\cos^2\alpha + \cos^2\beta + \cos^2\gamma + \cos^2\delta = 4/3.$ Watch Free Video Solution on Doubtnut
9	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios** Find the angle between the line whose direction cosines are given by $l + m + n = 0 and 2l^2 + 2m^2 - n^2 - 0.$

	[Watch Free Video Solution on Doubtnut]
10	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios** A mirror and a source of light are situated at the origin O and at a point on OX, respectively. A ray of light from the source strikes the mirror and is reflected. If the direction ratios of the normal to the plane are $1, -1, 1,$ then find the DCs of the reflected ray. [Watch Free Video Solution on Doubtnut]
11	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of Straigth Line Passing Through A Given Point And Parallel To A Given Vector** The Cartesian equation of a line is $\frac{x-3}{2}=\frac{y+1}{-2}=\frac{z-3}{5}$. Find the vector equation of the line. [Watch Free Video Solution on Doubtnut]
	
12	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of Straigth Line Passing Through A Given Point And Parallel To A Given Vector** The Cartesian equations of a line are $6x-2=3y+1=2z-2.$ Find its direction ratios and also find a vector equation of the line. [Watch Free Video Solution on Doubtnut]
13	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of Line Passing Through Two Given Point** A line passes through the point with position vector $2\hat{i}-3\hat{j}+4\hat{k}$ and is in the direction of $3\hat{i}+4\hat{j}-5\hat{k}$. Find the equations of the line in vector and Cartesian forms.

	Watch Free Video Solution on Doubtnut
14	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of Line Passing Through Two Given Point** Find the vector equation of line passing through $A(3, 4-7) and B(1, -1, 6)$. Also find its Cartesian equations. Watch Free Video Solution on Doubtnut
15	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of Line Passing Through Two Given Point** Find Cartesian and vector equation of the line which passes through the point $(-2, 4, -5)$ and parallel to the line given by $\frac{x+3}{3} = \frac{y-4}{5} = \frac{z+8}{6}$. Watch Free Video Solution on Doubtnut
16	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of Line Passing Through Two Given Point** Find the equation of a line which passes through the point $(2, 3, 4)$ and which has equal intercepts on the axes. Watch Free Video Solution on Doubtnut
17	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of Line Passing Through Two Given Point** Find the points where line $\frac{x-1}{2} = \frac{y+2}{-1} = \frac{z}{1}$ intersects $xy, yz and zx$ planes. Watch Free Video Solution on Doubtnut
doubtnut पढ़ना हुआ आसान	
	CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of Line Passing Through Two Given Point

18	Find the equation of line $x + y - z - 3 = 0 = 2x + 3y + z + 4$ in symmetric form. Find the direction of the line. Watch Free Video Solution on Doubtnut
19	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of Line Passing Through Two Given Point** Find the vector equation of line passing through the point $(1, 2, -4)$ and perpendicular to the two lines: $\frac{x-8}{3} = \frac{y+19}{-16} = \frac{z-10}{7} and \frac{x-15}{3} = \frac{y-29}{8} = \frac{z-5}{-5}$ Watch Free Video Solution on Doubtnut
20	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of Line Passing Through Two Given Point** If $\vec{r} = \left(\hat{i} + 2\hat{j} + 3\hat{k}\right) + \lambda\left(\hat{i} - \hat{j} + \hat{k}\right) and \vec{r} = \left(\hat{i} + 2\hat{j} + 3\hat{k}\right) + \mu\left(\hat{i} + \hat{j} + \hat{k}\right)$ are two lines, then find the equation of acute angle bisector of two lines. Watch Free Video Solution on Doubtnut
21	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of Line Passing Through Two Given Point** Find the equation of the line drawn through point (1, 0, 2) to meet the line $\frac{x+1}{3} = \frac{y-2}{-2} = \frac{z1}{-1}$ at right angles. Watch Free Video Solution on Doubtnut
	CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of Line Passing Through Two Given Point Line L_1 is parallel to vector $\vec{\alpha} = -3\hat{i} + 2\hat{j} + 4\hat{k}$ and passes through a point

22	$A(7, 6, 2)$ and line L_2 is parallel vector $\vec{\beta} = 2\hat{i} + \hat{j} + 3\hat{k}$ and point $B(5, 3, 4)$. Now a line L_3 parallel to a vector $\vec{r} = 2\hat{i} - 2\hat{j} - \hat{k}$ intersects the lines $L_1 and L_2$ at points $C and D$, respectively, then find $\left|\vec{C} D\right|$. Watch Free Video Solution on Doubtnut
23	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of Line Passing Through Two Given Point** Find the coordinates of a point on the $\frac{x-1}{2} = \frac{y+1}{-3} = z$ atg a distance $4\sqrt{14}$ from the point $(1, -1, 0)$. Watch Free Video Solution on Doubtnut
24	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Angle Between Two Lines** Find the angel between the following pair of lines: $\vec{r} = 2\hat{i} - 5\hat{j} + \hat{k}$ $+ \lambda\left(3\hat{i} + 2\hat{j} + 6\hat{k}\right) and \vec{r}$ $= 7\hat{i} - 6\hat{k} + \mu\left(\hat{i} + 2\hat{j}\right.$ $\left. + 2\hat{k}\right)$ $\frac{x}{2} = \frac{y}{2} = \frac{z}{1} and \frac{x-5}{4}$ $= \frac{y-2}{1} = \frac{z-3}{8}$ Watch Free Video Solution on Doubtnut
	CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Angle Between Two Lines

25	Find the values p so that line $\frac{1-x}{3}=\frac{7y-14}{2p}=\frac{z-3}{2} and \frac{7-7x}{3p}=\frac{y-5}{1}=\frac{6-z}{5}$ are at right angles. Watch Free Video Solution on Doubtnut
26	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Angle Between Two Lines** Find the acute angle between the lines $\frac{x-1}{l}=\frac{y+1}{m}=\frac{1}{n} and =\frac{x+1}{m}=\frac{y-3}{n}=\frac{z-1}{l} where l > m > n,$ $and l, m, n$ are the roots of the cubic equation $x^3+x^2-4x=4.$ Watch Free Video Solution on Doubtnut
27	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Angle Between Two Lines** Fid the condition if lines $x=ay+b, z=cy+d and x =a'y+b', z=c'y+d'$ are perpendicular. Watch Free Video Solution on Doubtnut
28	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Perpendicular Distance Of A Point From A Line** Find the coordinates of the foot of the perpendicular drawn from point $A(1, 0, 3)$ to the join of points $B(4, 7, 1) and C(3, 5, 3)$. Watch Free Video Solution on Doubtnut
29	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Perpendicular Distance Of A Point From A Line** Find the length of the perpendicular drawn from point $(2, 3, 4)$ to line $\frac{4-x}{2}=\frac{y}{6}=\frac{1-z}{3}$. Watch Free Video Solution on Doubtnut

doubtnut पढ़ना हुआ आसान	
30	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Shortest Distance Between Two Lines** Find the shortest distance between the lines $\frac{x-1}{2}=\frac{y-2}{3}=\frac{z-3}{4} and \frac{x-2}{3}=\frac{y-4}{4}=\frac{z-5}{5}$. Watch Free Video Solution on Doubtnut
31	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Shortest Distance Between Two Lines** Determine whether the following pair of lines intersect or not. (1) $\vec{r}=\hat{i}-5\hat{j}+\lambda\left(2\hat{i}+\hat{k}\right);$ $\vec{r}=2\hat{i}-\hat{j}+\mu\left(\hat{i}+\hat{j}-\hat{k}\right)$ (2) $\vec{r}=\hat{i}+\hat{j}-\hat{k}+\lambda\left(3\hat{i}-\hat{j}\right); \vec{r}=4\hat{i}-\hat{k}+\mu\left(2\hat{i}+3\hat{k}\right)$ Watch Free Video Solution on Doubtnut
	CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Shortest Distance Between Two Lines Find the shortest distance between lines

32	$\overrightarrow{r} = \left(\hat{i} + 2\hat{j} + \hat{k}\right)$ $+ \lambda\left(2\hat{i} + \hat{j} + 2\hat{k}\right) and \overrightarrow{r}$ $= 2\hat{i} - \hat{j} - \hat{k} + \mu\left(2\hat{i} + \hat{j}\right.$ $\left.+ 2\hat{k}\right).$ Watch Free Video Solution on Doubtnut
33	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Shortest Distance Between Two Lines** If the straight lines $x = -1 + s, y = 3 - \lambda s, z$ $= 1 + \lambda s and x = \frac{t}{2}, y = 1$ $+ t, z = 2 - t,$ with paramerters $s and t,$ respectivley, are coplanar, then find $\lambda.$ Watch Free Video Solution on Doubtnut
34	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** Find the equation of a line which passes through the point $(1, 1, 1)$ and intersects the lines $\frac{x-1}{2} = \frac{y-2}{3}$ $= \frac{z-3}{4} and \frac{x+2}{1}$ $= \frac{y-3}{2} = \frac{z+1}{4}.$ Watch Free Video Solution on Doubtnut
35	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** Find the equation of plane which is at a distance $\frac{4}{\sqrt{14}}$ from the origin and is normal to vector $2\hat{i} + \hat{j} - 3\hat{k}.$ Watch Free Video Solution on Doubtnut

36

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane

Find the unit vector perpendicular to the plane $\overrightarrow{r}2\hat{i}+\hat{j}+2\hat{k}=5$.

Watch Free Video Solution on Doubtnut

37

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane

Find the vector equation of a line passing through $3\hat{i}-5\hat{j}+7\hat{k}$ and perpendicular to theplane $3x-4y+5z=8$.

Watch Free Video Solution on Doubtnut

38

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane

Find the equation of the plane passing through the point $(2, 3, 1)$ having $(5, 3, 2)$ as the direction ratio is of the normal to the plane.

Watch Free Video Solution on Doubtnut

39

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane

The foot of the perpendicular drawn from the origin to a plane is $(1, 2, -3)$. Find the equation of the plane. or If O is the origin and the coordinates of P is $(1, 2, -3)$, then find the equation of the plane passing through P and perpendicular to OP.

Watch Free Video Solution on Doubtnut

40

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane

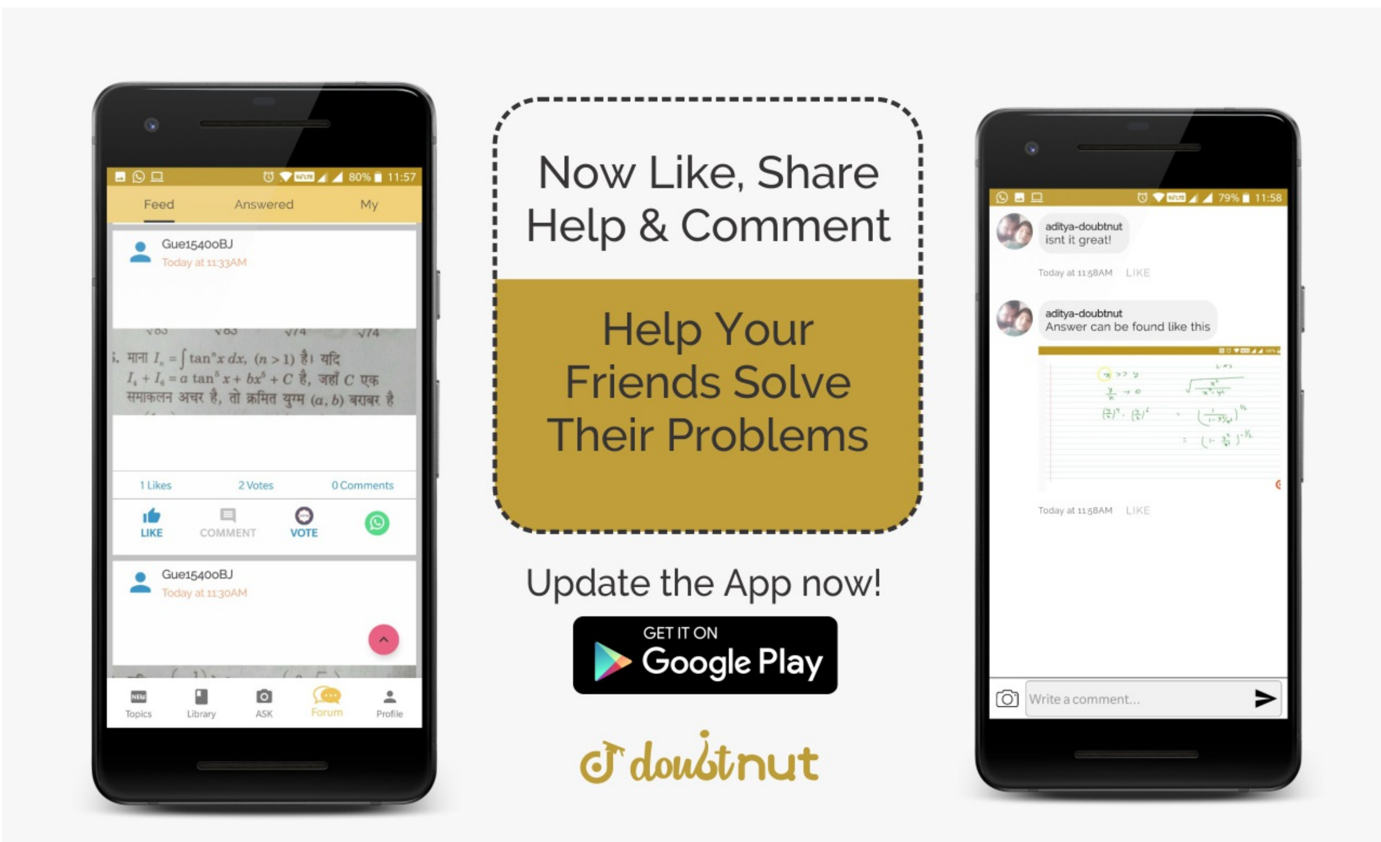
Find the equation of the plane such that image of point $(1, 2, 3)$ in it is$(-1, 0, 1)$.

Watch Free Video Solution on Doubtnut

41	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** Find the equation of the plane passing through $A(2, 2, -1), B(3, 4, 2) and C(7, 0, 6)$. Also find a unit vector perpendicular to this plane. Watch Free Video Solution on Doubtnut
	
42	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** Show that the line of intersection of the planes $\overrightarrow{r}\hat{i}+2\hat{j}+3\hat{k}=0 and \overrightarrow{r}$ $=\left(3\hat{i}+2\hat{j}+\hat{k}\right)=0$ is equally inclined to $i and k$. Also find the angle it makes with j. Watch Free Video Solution on Doubtnut
43	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** Find the vector equation of the following planes in Cartesian form: $\overrightarrow{r}=\hat{i}-\hat{j}+\lambda\left(\hat{i}+\hat{j}+\hat{k}\right)$ $+\mu\left(\hat{i}-2\hat{j}+3\hat{k}\right)$. Watch Free Video Solution on Doubtnut
	CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane Prove that the plane $\overrightarrow{r}=\left(\hat{i}+2\hat{j}-\hat{k}\right)=3$ contains the line

44	$\vec{r} = \hat{i} + \hat{j} + \lambda\left(2\hat{i} + \hat{j} + 4\hat{k}\right)$. Watch Free Video Solution on Doubtnut
45	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** Find the equation of the plane which is parallel to the lines $\vec{r} = \hat{i} + \hat{j} + \lambda\left(2\hat{i} + \hat{j} + 4\hat{k}\right) and \frac{x+1}{-3} = \frac{y-3}{2} = \frac{z+2}{1}$ and is passing through the point $(0, 1, -1)$. Watch Free Video Solution on Doubtnut
46	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** If a plane meets the equations axes at $A, BandC$ such that the centroid of the triangle is $(1, 2, 4)$, then find the equation of the plane. Watch Free Video Solution on Doubtnut
47	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** Find the equation of the plane passing through $(3, 4, -1)$, which is parallel to the plane $\vec{r}\, 2\hat{i} - 3\hat{j} + 5\hat{k} + 7 = 0$. Watch Free Video Solution on Doubtnut

48	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Angle Between Two Planes** Find the angel between the planes $2x + y - 2x + 3$ $= 0 and \overrightarrow{r} 6\hat{i} + 3\hat{j} + 2\hat{k} = 5$. Watch Free Video Solution on Doubtnut
49	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Angle Between Two Planes** Show that $ax + by + r = 0, by + cz$ $+ p = 0 and cz + ax + q$ $= 0$ are perpendicular to $x - y, y - z and z - x$ planes, respectively. Watch Free Video Solution on Doubtnut
50	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Line Of Intersection Of Two Planes** Reduce the equation of line $x - y + 2z = 5 adn 3x + y$ $+ z = 6$ in symmetrical form. Or Find the line of intersection of planes $x - y + 2z = 5 and 3x + y$ $+ z = 6.$ Watch Free Video Solution on Doubtnut
	CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Line Of Intersection Of Two Planes Find the angle between the lines

51	$x - 3y - 4 = 0, 4y - z + 5 = 0 and x + 3y - 11 = 0, 2y = z + 6 = 0.$ Watch Free Video Solution on Doubtnut
52	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Line Of Intersection Of Two Planes** If the line $x = y = z$ intersect the line $s \in A\dot{x} + s \in B\dot{y} + s \in C\dot{z} = 2d^2, s \in 2A\dot{x} + s \in 2B\dot{y} + s \in 2C\dot{z} = d^2,$ then find the value of $\frac{\sin A}{2}\frac{\sin B}{2}\frac{\sin C}{2} where A, B, C$ are the angles of a triangle. Watch Free Video Solution on Doubtnut
53	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Line Of Intersection Of Two Planes** Find the point of intersection of line passing through $(0, 0, 1)$ and the intersection lines $x + 2u + z = 1, \ -x + y - 2z and x + y = 2, x + z = 2$ with the xy plane. Watch Free Video Solution on Doubtnut
doubtnut पढ़ना हुआ आसान	
	CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Line Of Intersection Of Two Planes

54	A horizontal plane $4x - 3y + 7z = 0$ is given. Find a line of greatest slope passes through the point $(2, 1, 1)$ in the plane $2x + y - 5z = 0$. Watch Free Video Solution on Doubtnut
55	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Line Of Intersection Of Two Planes** Find the equation of the plane passing through the points $(-1, 1, 1)$ and $(1, -1, 1)$ and perpendicular to the plane $x + 2y + 2z = 5$. Watch Free Video Solution on Doubtnut
56	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Line Of Intersection Of Two Planes** Find the equation of the plane containing line $\frac{x+1}{-3} = \frac{y-3}{2} = \frac{z+2}{1}$ and point $(0, 7, -7)$. Watch Free Video Solution on Doubtnut
57	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Line Of Intersection Of Two Planes** Find the distance of the point $P(3, 8, 2)$ from the line $\frac{1}{2}(x-1) = \frac{1}{4}(y-3)$ $= \frac{1}{3}(z-2)$ measured parallel to the plane $3x + 2y - 2z + 15 = 0$. Watch Free Video Solution on Doubtnut
58	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Line Of Intersection Of Two Planes** Find the distance of the point $(1, 0, -3)$ from the plane $x - y - z = 9$ measured parallel to the line $\frac{x-2}{2} = \frac{y+2}{2} = \frac{z-6}{-6}$. Watch Free Video Solution on Doubtnut
59	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Line Of Intersection Of Two Planes** Find the equation of the projection of the line $\frac{x-1}{2} = \frac{y+1}{-1} = \frac{z-3}{4}$ on the plane $x + 2y + z = 9$. Watch Free Video Solution on Doubtnut

60	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Angle Between A Line And A Plane** Find the angle between the line $\overrightarrow{r} = \hat{i} + 2\hat{j} - \hat{k}$ $+ \lambda\left(\hat{i} - \hat{j} + \hat{k}\right)$ and the plane $\overrightarrow{r}\dot{2\hat{i}} - \hat{j} + \hat{k} = 4.$ Watch Free Video Solution on Doubtnut
61	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Angle Between A Line And A Plane** Find the vector equation of the line passing through $(1, 2, 3)$ and parallel to the planes $\overrightarrow{r}\dot{\hat{i}} - \hat{j} + 2\hat{k} and \overrightarrow{r}\dot{3\hat{i}} + \hat{j} + \hat{k}$ $= 6.$ Watch Free Video Solution on Doubtnut
62	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of A Plane Passing Through The Line Of Intersection Of Two Planes** Find the equation the plane which contain the line of intersection of the planes $\overrightarrow{r}\dot{\hat{i}} + 2\hat{j} + 3\hat{k} - 4$ $= 0 and \overrightarrow{r}\dot{2\hat{i}} + \hat{j} - \hat{k} + 5$ $= 0$ and which is perpendicular to the plane $\overrightarrow{r}\left(5\hat{i} + 3\hat{j} - 6\hat{k}\right) + 8 = 0$. Watch Free Video Solution on Doubtnut

63	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of A Plane Passing Through The Line Of Intersection Of Two Planes** Find the equation of a plane containing the line of intersection of the planes $x + y + z - 6 = 0 and 2x$ $+ 3y + 4z + 5 = 0$ passing through $(1, 1, 1)$. Watch Free Video Solution on Doubtnut
64	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of A Plane Passing Through The Line Of Intersection Of Two Planes** The plane $ax + by = 0$ is rotated through an angle α about its line of intersection with the plane $z = 0$. Show that he equation to the plane in the new position is $aby \pm z\sqrt{a^2 + b^2} and \alpha = 0$. Watch Free Video Solution on Doubtnut
65	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Distance Of A Point From A Plane** Find the length and the foot of the perpendicular from the point $(7, 14, 5)$ to the plane $2x + 4y - z = 2$. Watch Free Video Solution on Doubtnut
66	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Distance Between Parallel Planes** Find the locus of a point, the sum of squares of whose distance from the planes $x - z = 0, x - 2y + z$ $= 0 and x + y + z = 0 is 36$. Watch Free Video Solution on Doubtnut

67	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Distance Between Parallel Planes** A ray of light passing through the point $A(1, 2, 3)$, strikews the plane $xy + z = 12atB$ and on reflection passes through point $C(3, 5, 9)_.$ Find the coordinate so point $B_.$ Watch Free Video Solution on Doubtnut
68	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Distance Between Parallel Planes** Find the distance between the parallel planes $x + 2y - 2z + 1 = 0and2x$ $+ 4y - 4z + 5 = 0.$ Watch Free Video Solution on Doubtnut
69	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Distance Between Parallel Planes** Find the image of the line $\frac{x-1}{9} = \frac{y-2}{-1} = \frac{z+3}{-3}$ in the plane $3x - 3y + 10z - 26 = 0.$ Watch Free Video Solution on Doubtnut
70	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of A Plane Bisecting The Angle Between Two Planes** Find the equations of the bisectors of the angles between the planes $2x - y + 2z + 3 = 0and3x$ $- 2y + 6z + 8 = 0$ and specify the plane which bisects the acute angle and the plane which bisects the obtuse angle. Watch Free Video Solution on Doubtnut
71	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Two Sides Of A Plane** Find the equation of a sphere whose centre is $(3, 1, 2)$ radius is $5.$ Watch Free Video Solution on Doubtnut

72	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Two Sides Of A Plane** Find the equation of the sphere passing through $(0, 0, 0), (1, 0, 0),$ $(- , 1, 0)and(0, 0, 1).$ Watch Free Video Solution on Doubtnut
73	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Two Sides Of A Plane** Find the equation of the sphere which has centre at the origin and touches the line $2(x + 1) = 2 - y = z + 3.$ Watch Free Video Solution on Doubtnut
74	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Two Sides Of A Plane** Find the equation of the sphere which passes through $(10, 0), (0, 1, 0)and(0, 0, 1)$ and whose centre lies on the plane $3x - y + z = 2.$ Watch Free Video Solution on Doubtnut
75	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Two Sides Of A Plane** Find the equation of a sphere which passes through $(1, 0, 0)(0, 1, 0)and(0, 0, 1),$ and has radius as small as possible. Watch Free Video Solution on Doubtnut
	CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Two Sides Of A Plane Find the locus of appoint which moves such that the sum of the squares of its distance from the points

76

$A(1, 2, 3)$,
$B(2, -3, 5) and C(0, 7,$
$4) is 120.$

Watch Free Video Solution on Doubtnut

77

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Two Sides Of A Plane

Find the equation of the sphere described on the joint of points $A and B$ having position vectors
$2\hat{i} + 6\hat{j} - 7\hat{k} and -2\hat{i} + 4\hat{j}$
$-3\hat{k}$,
respectively, as the diameter. Find the center and the radius of the sphere.

Watch Free Video Solution on Doubtnut

78

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Two Sides Of A Plane

Find the radius of the circular section in which the sphere $\left|\vec{r}\right| = 5$ is cut by the plane
$\vec{r}\hat{i} + \dot{\hat{j}} + \hat{k} = 3\sqrt{3}.$

Watch Free Video Solution on Doubtnut

79

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Two Sides Of A Plane

Show that the plane $2x - 2y + z + 12 = 0$ touches the sphere
$x^2 + y^2 + z^2 - 2x - 4 + 2z$
$-3 = 0.$

	Watch Free Video Solution on Doubtnut
80	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Two Sides Of A Plane** A variable plane passes through a fixed point (a, b, c) and cuts the coordinate axes at points $A, B, andC_.$ Show that eh locus of the centre of the sphere $OABCis\frac{a}{x}+\frac{b}{y}+\frac{c}{z}=2.$ Watch Free Video Solution on Doubtnut
81	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Two Sides Of A Plane** A sphere of constant radius $k,$ passes through the origin and meets the axes at $A, BandC_.$ Prove that the centroid of triangle ABC lies on the sphere $9\left(x^2+y^2+z^2\right)=4k^2_.$ Watch Free Video Solution on Doubtnut
82	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Two Sides Of A Plane** If the x-coordinate of a point P on the join of $Q(22, 1)andR(5, 1,$ $-2)is4,$ then find its $z-$ coordinate. Watch Free Video Solution on Doubtnut
83	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Two Sides Of A Plane** Find the distance of the point $P(a, b, c)$ from the x-axis. Watch Free Video Solution on Doubtnut

	
84	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Two Sides Of A Plane** If $\vec{r}$ is a vector of magnitude 21 and has direction ratios $2, \ -3 and 6,$ then find $\vec{r}$. Watch Free Video Solution on Doubtnut
85	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Two Sides Of A Plane** If $P(x, y, z)$ is a point on the line segment joining $Q(2, 2, 4) and R(3, 5, 6)$ such that the projections of $\vec{O} P$ on the axes are 13/5, 19/5 and 26/5, respectively, then find the ratio in which P divides QR. Watch Free Video Solution on Doubtnut
86	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Two Sides Of A Plane** If O is the origin, $OP = 3$ with direction ratios $-1, 2, and -2,$ then find the coordinates of P. Watch Free Video Solution on Doubtnut
87	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Two Sides Of A Plane** If a line makes angles $\alpha, \beta and \gamma$ with threew-dimensional coordinate axes, respectively, then find the value of $\cos 2\alpha + \cos 2\beta + \cos 2\gamma$. Watch Free Video Solution on Doubtnut
88	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Two Sides Of A Plane** A line makes angles $\alpha, \beta and \gamma$ with the coordinate axes. If $\alpha + \beta = 90^0,$ then find γ.

	Watch Free Video Solution on Doubtnut
89	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Two Sides Of A Plane** The line joining the points $(-2, 1, -8) and (a, b, c)$ is parallel to the line whose direction ratios are $6, 2, and 3.$ Find the values of a, b and c Watch Free Video Solution on Doubtnut
	
90	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Two Sides Of A Plane** A parallelepiped is formed by planes drawn through the points $P(6, 8, 10) and (3, 4, 8)$ parallel to the coordinate planes. Find the length of edges and diagonal of the parallelepiped. Watch Free Video Solution on Doubtnut
91	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Regular Tetrahedron** Find the angle between any two diagonals of a cube. Watch Free Video Solution on Doubtnut
92	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Direction ratios of two lines are $a, b, c and 1/bc, 1/ca, 1/ab$. Then the lines are ________. Watch Free Video Solution on Doubtnut
	CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres Find the angle between the lines whose direction cosines are connected by the

93	relations $l+m+n=0 and 2lm + 2nl - mn = 0.$ Watch Free Video Solution on Doubtnut
94	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Find the point where line which passes through point $(1, 2, 3)$ and is parallel to line $\vec{r} = \hat{i} + \hat{j} + 2\hat{k} + \lambda\left(\hat{i} - 2\hat{j} + 3\hat{k}\right)$ meets the xy-plane. Watch Free Video Solution on Doubtnut
95	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Find the equation of the line passing through the points $(1, 2, 3) and (-1, 0, 4)$. Watch Free Video Solution on Doubtnut
doubtnut पढ़ना हुआ आसान	
	CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres Find the equation of the line passing through the point $(-1, 2, 3)$ and perpendicular to the lines

96	$\frac{x}{2} = \frac{y-1}{-3}$ $= \frac{z+2}{-2} and \frac{x+3}{-1}$ $= \frac{y+3}{2} = \frac{z-1}{3}.$ Watch Free Video Solution on Doubtnut
97	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Find the equation of the line passing through the intersection of $\frac{x-1}{2} = \frac{y-2}{-3}$ $= \frac{z-3}{4} and \frac{x-4}{5}$ $= \frac{y-1}{2} = z.$ and also through the point $(2, 1, -2).$ Watch Free Video Solution on Doubtnut
98	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** The straight line $\frac{x-3}{3} = \frac{y-2}{1} = \frac{z-1}{0}$ is (a)Parallel to x-axis (b)Parallel to the y-axis (c)Parallel to the z-axis (d)Perpendicular to the z-axis Watch Free Video Solution on Doubtnut
99	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Find the angel between the lines $2x = 3y = -z and 6x =$ $-y = -4z.$ Watch Free Video Solution on Doubtnut
100	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** If the lines

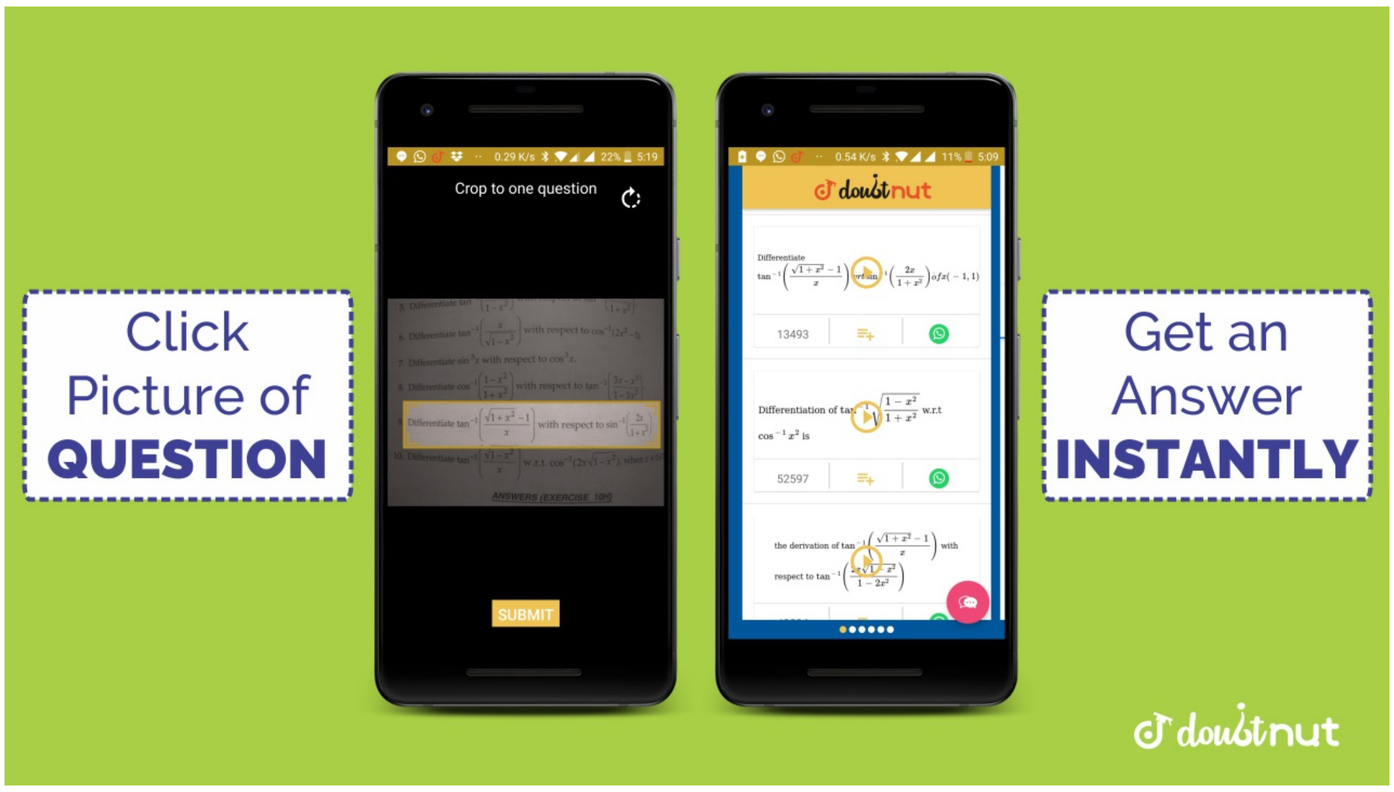
	$\frac{x-1}{-3}=\frac{y-2}{2k}=\frac{z-3}{-2} and \frac{x-1}{3k}=\frac{y-5}{1}=\frac{z-6}{-5}$ are at right angle, then find the value of k. Watch Free Video Solution on Doubtnut
101	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** The equations of motion of a rocket are $x=2t, y=-4t and z=4t,$ where time t is given in seconds, and the coordinates of a moving points in kilometers. What is the path of the rocket? At what distance will be the rocket from the starting point $O(0,0,0)$ in $10s$? Watch Free Video Solution on Doubtnut
doubtnut पढ़ना हुआ आसान	
102	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Find the length of the perpendicular drawn from the point$(5,4,-1)$ to the line $\vec{r}=\hat{i}+\lambda\left(2\hat{i}+9\hat{j}+5\hat{k}\right)$, wher λ is a parameter.

	Watch Free Video Solution on Doubtnut
103	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Find the image of point $(1, 2, 3)$ in the line $\frac{x-6}{3} = \frac{y-7}{2} = \frac{z-7}{-2}$. Watch Free Video Solution on Doubtnut
104	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Find the shortest distance between the lines $\vec{r} = (1-\lambda)\hat{i} + (\lambda-2)\hat{j}$ $+ (3-2\lambda)\hat{k} and \vec{r}$ $= (\mu+1)\hat{i} + (2\mu+1)\hat{k}$. Watch Free Video Solution on Doubtnut
105	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Find the shortest distance between the z-axis and the line, $x + y + 2z - 3 = 0, 2x + 3y$ $+ 4z - 4 = 0.$ Watch Free Video Solution on Doubtnut
106	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** If the lines $\frac{x-1}{2} = \frac{y+1}{3}$ $= \frac{z-1}{4} and \frac{x-3}{1}$ $= \frac{y-k}{2} = \frac{z}{1}$ intersect, then find the value of k. Watch Free Video Solution on Doubtnut
107	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Find the plane of the intersection of

	$x^2 + y^2 + z^2 + 2x + 2y + 2$ $= 0 and 4x^2 + 4y^2 + 4z^2$ $+ 4x + 4y + 4z - 1 = 0.$ Watch Free Video Solution on Doubtnut
doubtnut पढ़ना हुआ आसान	
108	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Find the radius of the circular section of the sphere $\left\|\vec{r}\right\| = 5$ by the plane $\vec{r}\hat{i} + 2\hat{j} - \hat{k} = 4\sqrt{3}$. Watch Free Video Solution on Doubtnut
109	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** A point $P(x, y, z)$ is such that $3PA = 2PB$, where $A and B$ are the point $(1, 3, 4) and (1, -2, -1)$, irrespectivley. Find the equation to the locus of the point P and verify that the locus is a sphere. Watch Free Video Solution on Doubtnut
110	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** The extremities of a diameter of a sphere lie on the positive y- and positive z-axes at distance 2 and 4, respectively. Show that the sphere passes through the origin and find the radius of the sphere. Watch Free Video Solution on Doubtnut
	CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres

111	A plane passes through a fixed point (a, b, c). Show that the locus of the foot of the perpendicular to it from the origin is the sphere $x^2 + y^2 + z^2 - ax - by - cz = 0$. Watch Free Video Solution on Doubtnut
112	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Find the angle between the line $\frac{x-1}{3} = \frac{y-1}{2} = \frac{z-1}{4}$ and the plane $2x + y - 3z + 4 = 0$. Watch Free Video Solution on Doubtnut
113	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Find the distance between the line $\frac{x+1}{-3} = \frac{y-3}{2} = \frac{z-2}{1}$ and the plane $x + y + z + 3 = 0$. Watch Free Video Solution on Doubtnut
doubtnut पढ़ना हुआ आसान	
114	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Find the distance of the point $(-1, -5, -10)$ from the point of intersection of the line $\frac{x-2}{3} = \frac{y+1}{4} = \frac{z-2}{12}$ and plane $x - y + z = 5$. Watch Free Video Solution on Doubtnut
	CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres

115	Find the equation of the plane passing through the point $(-1,3,2)$ and perpendicular to each of the planes $x+2y+3z=5and3x+3y$ $+z=0.$ Watch Free Video Solution on Doubtnut
116	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Find the equation of the plane containing the lines $\frac{x-5}{4}=\frac{y-7}{4}$ $=\frac{z+3}{-5}and\frac{x-8}{7}$ $=\frac{y-4}{1}=\frac{z-5}{3}.$ Watch Free Video Solution on Doubtnut
117	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Find the equation of the plane passing through the points $(1,0,-1)and(3,2,2)$ and parallel to the line $x-1=\frac{1-y}{2}=\frac{z-2}{3}.$ Watch Free Video Solution on Doubtnut
118	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Find the equation of the plane passing through the straight line $\frac{x-1}{2}=\frac{y+2}{-3}=\frac{z}{5}$ and perpendicular to the plane $x-y+z+2=0.$ Watch Free Video Solution on Doubtnut
119	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Find the equation of the plane perpendicular to the line $\frac{x-1}{2}=\frac{y-3}{-1}=\frac{z-4}{2}$ and passing through the origin. Watch Free Video Solution on Doubtnut

	
120	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Find the equation of the plane passing through the line $\frac{x-1}{5}=\frac{y+2}{6}=\frac{z-3}{4}$ and point $(4, 3, 7)$. Watch Free Video Solution on Doubtnut
121	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Find the angle between the line $\vec{r}=\left(\vec{i}+2\vec{j}-\vec{k}\right)$ $+\lambda\left(\vec{i}-\vec{j}+\vec{k}\right)$ and the normal to the plane $\vec{r}\cdot\left(2\vec{i}-\vec{j}+\vec{k}\right)=4.$ Watch Free Video Solution on Doubtnut
122	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Find the equation of the plane which passes through the point $(1, 2, 3)$ and which is at the minimum distance from the point $(-1, 0, 2)$. Watch Free Video Solution on Doubtnut
	CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres

123	Find the direction ratios of orthogonal projection of line $\frac{x-1}{1}=\frac{y+1}{-2}=\frac{z-2}{3}$ in the plane $x-y+2z-3=0.$ also find the direction ratios of the image of the line in the plane. Watch Free Video Solution on Doubtnut
124	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Find the equation of a plane which is parallel to the plane $x-2y+2z=5$ and whose distance from thepoint $(1, 2, 3)$ is 1. Watch Free Video Solution on Doubtnut
125	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Find the equation of a plane which passes through the point $(1, 2, 3)$ and which is equally inclined to the planes $x-2y+2z-3=0and8x$ $-4y+z-7=0.$ Watch Free Video Solution on Doubtnut
doubtnut पढ़ना हुआ आसान	
126	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Find the equation of the image of the plane $x-2y+2z-3=0$ in plane $x+y+z-1=0.$ Watch Free Video Solution on Doubtnut
127	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Find the equation of the plane through the points $(23, 1)and(4, -5, 3)$ and parallel to the x-axis.

	Watch Free Video Solution on Doubtnut
128	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Find the vector equation of the line passing through $(1, 2, 3)$ and parallel to the planes $\overrightarrow{r}\hat{i}-\dot{\hat{j}}+2\hat{k}and\overrightarrow{r}3\hat{i}+\dot{\hat{j}}+\hat{k}$ $=6.$ Watch Free Video Solution on Doubtnut
129	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Find the value of m for which thestraight line $3x-2y+z+3=0=4x$ $+3y+4z+1$ is parallel to the plane $2x-y+mz-2=0.$ Watch Free Video Solution on Doubtnut
130	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Show that the lines $\frac{x-a+d}{\alpha-\delta}=\frac{y-a}{\alpha}$ $=\frac{z-a-d}{\alpha+\delta}$ and $\frac{x-b+c}{\beta-\gamma}=\frac{y-b}{\beta}$ $=\frac{z-b-c}{\beta+\gamma}$ are coplanar. Watch Free Video Solution on Doubtnut
131	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios** If the direction cosines of a variable line in two adjacent points be $l, M, n \text{ and } l+\delta l, m+\delta m$ $+n+\delta n$ the small angle $\delta\theta$as between the two positions is given by Watch Free Video Solution on Doubtnut

132

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of A Plane Passing Through The Line Of Intersection Of Two Planes

Find the equation of the plane through the points $(1, 0, -1), (3, 2, 2)$ and parallel to the line $\frac{x-1}{1} = \frac{y-1}{-2} = \frac{z-2}{3}$.

Watch Free Video Solution on Doubtnut

133

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of A Plane Passing Through The Line Of Intersection Of Two Planes

A variable plane passes through a fixed point (α, β, γ) and meets the axes at $A, B, andC_.$ show that the locus of the point of intersection of the planes through $A, BandC$ parallel to the coordinate planes is $\alpha x^{-1} + \beta y^{-1} + \gamma z^{-1} = 1.$

Watch Free Video Solution on Doubtnut

134

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios

Show that the straight lines whose direction cosines are given by the equations
$al + bm + cn = 0and \widehat{\quad} 2$

$+ zm^2 = vn^2 + wn^2 = 0$
are parallel or perpendicular as
$\frac{a^2}{u} + \frac{b^2}{v} + \frac{c^2}{w} = 0 \text{ or } a^2(v$
$+ w) + b^2(w + u)$
$+ c^2(u + v) = 0.$

Watch Free Video Solution on Doubtnut

135

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Perpendicular Distance Of A Point From A Line

The perpendicular distance of a corner of uni cube from a diagonal not passing

	through it is Watch Free Video Solution on Doubtnut
136	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** A point P moves on a plane $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=1.$ A plane through P and perpendicular to OP meets the coordinate axes at $A, BandC$. If the planes through $A, BandC$ parallel to the planes $x=0, y=0andz=0,$ respectively, intersect at $Q,$ find the locus of Q. Watch Free Video Solution on Doubtnut
137	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of A Plane Passing Through The Line Of Intersection Of Two Planes** If the planes $x-cy-bz=0, cx=y$ $+az=0andbx+ay-z$ $=0$ pass through a straight line, then find the value of $a^2+b^2+c^2+2ab\cdot$ Watch Free Video Solution on Doubtnut
doubtnut पढ़ना हुआ आसान	
138	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios** P is a point and $PMandPN$ are the perpendicular form $P \to z-xandx-y$ planes. If OP makes angles $\theta, \alpha, \beta and \gamma$ with the plane OMN and the $x-y, y-zandz-x$ planes, respectively, then prove that $\cos ec^2\theta=\cos ec^2\alpha$ $+\cos ec^2\beta+\cos ec^2\gamma$. Watch Free Video Solution on Doubtnut

139	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Distance Of A Point From A Plane** A variable plane $lx + my + nz = p(wherel,$ m, n are direction cosines of normal$)$ intersects the coordinate axes at points$A, BandC$, respectively. Show that the foot of the normal on the plane from the origin is the orthocenter of triangle ABC and hence find the coordinate of the circumcentre of triangle ABC. Watch Free Video Solution on Doubtnut
140	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Angle Between A Line And A Plane** Let $x - y\sin\alpha - zs \in \beta = 0, xs$ $\in \alpha = zs \in \gamma - y$ $= 0andx\sin\beta + y\sin\gamma - z$ $= 0$ be the equations of the planes such that $\alpha + \beta + \gamma = \pi/2(where\alpha,$ $\beta and\gamma \neq 0)$. Then show that there is a common line of intersection of the three given planes. Watch Free Video Solution on Doubtnut
141	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Distance Of A Point From A Plane** Let a plane $ax + by + cz + 1 = 0,$ $wherea, b, c$ are parameters, make an angle 60^0 with the line $x = y = z, 45^0$ with the line $x = y - z = 0$ andθ with the plane $x = 0$. The distance of the plane from point $(2, 1, 1)$ is 3 units. Find the value of θ and the equation of the plane. Watch Free Video Solution on Doubtnut
142	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of A Plane Passing Through The Line Of Intersection Of Two Planes** Prove that for all values of $\lambda and\mu$, the planes $\frac{2x}{a} + \frac{y}{b} + \frac{2z}{c} - 1$ $+ \lambda\left(\frac{x}{a} - \frac{2y}{b} - \frac{z}{c} - 2\right)$ $= 0$ and

$$\frac{4x}{a} + \frac{3y}{b} - 5 + \mu\left(\frac{5y}{b} - \frac{4z}{c} + 3\right) = 0$$

intersect on the same line.

Watch Free Video Solution on Doubtnut

143

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane

If P is any point on the plane $lx + my + nz = pandQ$ is a point on the line OP such that $OP\dot{O}Q = p^2$, then find the locus of the point Q.

Watch Free Video Solution on Doubtnut

144

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Regular Tetrahedron

If a variable plane forms a tetrahedron of constant volume $64k^3$ with the co-ordinate planes, then the locus of the centroid of the tetrahedron is:

Watch Free Video Solution on Doubtnut

145

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Regular Tetrahedron

Prove that the volume of tetrahedron bounded by the planes

$$\vec{r}\, m\hat{j} + n\hat{k} = 0,\ \vec{r}\, n\hat{k} + l\hat{i} = 0,\ \vec{r}\, l\hat{i} + m\hat{j} = 0,$$

$$\vec{r}\, l\hat{i} + m\hat{j} + n\hat{k} = \pi s \frac{2p^3}{3lmn}$$

Watch Free Video Solution on Doubtnut

146	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** In a three-dimensional xyz space , the equation $x^2 - 5x + 6 = 0$ represents a. Points b. planes c. curves d. pair of straight lines Watch Free Video Solution on Doubtnut
147	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios** The line $\frac{x-2}{3} = \frac{y+1}{2} = \frac{z-1}{-1}$ intersects the curve $xy = c^2, z = 0$ if c is equal to a. ± 1 b. $\pm 1/3$ c. $\pm\sqrt{5}$ d. none of these Watch Free Video Solution on Doubtnut
148	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** Let the equations of a line and plane be $\frac{x+3}{2} = \frac{y-4}{3} = \frac{z+5}{2} and 4x - 2y - z = 1,$ respectively, then a. the line is parallel to the plane b. the line is perpendicular to the plane c. the line lies in the plane d. none of these Watch Free Video Solution on Doubtnut
149	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Distance Of A Point From A Plane** The length of the perpendicular form the origin to the plane passing through the point a and containing the line $\vec{r} = \vec{b} + \lambda\vec{c}$ is a. $\frac{[\vec{a}\,\vec{b}\,\vec{c}]}{\lvert \vec{a}\times\vec{b} + \vec{b}\times\vec{c} + \vec{c}\times\vec{a} \rvert}$ b. $\frac{[\vec{a}\,\vec{b}\,\vec{c}]}{\lvert \vec{a}\times\vec{b} + \vec{b}\times\vec{c} \rvert}$ c. $\frac{[\vec{a}\,\vec{b}\,\vec{c}]}{\lvert \vec{b}\times\vec{c} + \vec{c}\times\vec{a} \rvert}$ d. $\frac{[\vec{a}\,\vec{b}\,\vec{c}]}{\lvert \vec{c}\times\vec{a} + \vec{a}\times\vec{b} \rvert}$ Watch Free Video Solution on Doubtnut

150

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios

The distance of point $A(-2,3,1)$ from the line PQ through $P(-3,5,2)$, which makes equal angles with the axes is a. $2/\sqrt{3}$ b. $14/\sqrt{3}$ c. $16/\sqrt{3}$ d. $5/\sqrt{3}$

Watch Free Video Solution on Doubtnut

151

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane

The Cartesian equation of the plane

$\vec{r} = (1+\lambda-\mu)\hat{i}$

$+ (2-\lambda)\hat{j}$

$+ (3-2\lambda+2\mu)\hat{k}$

is a. $2x+y=5$ b. $2x-y=5$ c. $2x+z=5$ d. $2x-z=5$

Watch Free Video Solution on Doubtnut

152

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Line Of Intersection Of Two Planes

A unit vector parallel to the intersection of the planes

$\vec{r}\hat{i} - \dot{\hat{j}} + \hat{k}$

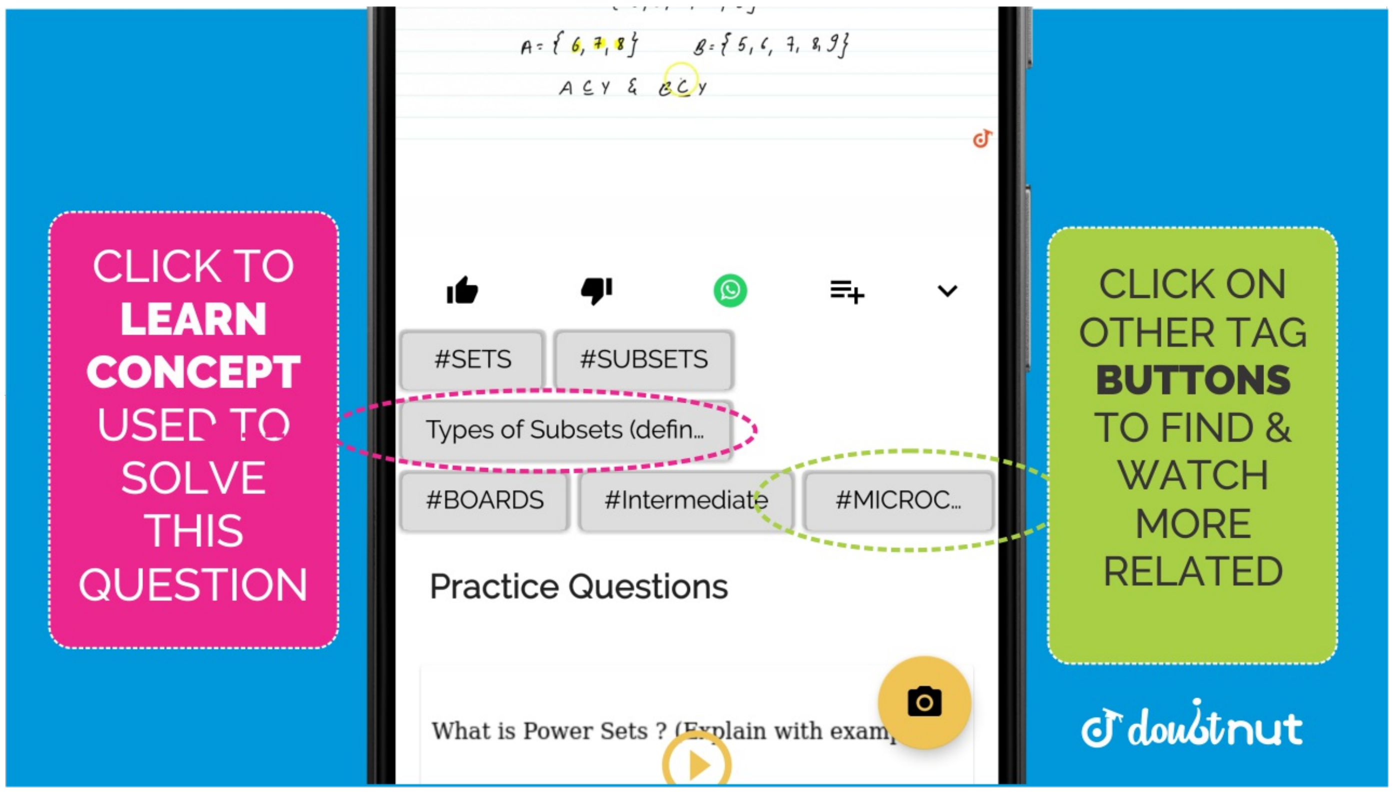
$= 5 and \vec{r} 2\hat{i} + \dot{\hat{j}} - 3\hat{k} = 4$

a. $\frac{2\hat{i}+5\hat{j}-3\hat{k}}{\sqrt{38}}$ b. $\frac{-2\hat{i}+5\hat{j}-3\hat{k}}{\sqrt{38}}$ c. $\frac{2\hat{i}+5\hat{j}-3\hat{k}}{\sqrt{38}}$ d. $\frac{-2\hat{i}-5\hat{j}-3\hat{k}}{\sqrt{38}}$

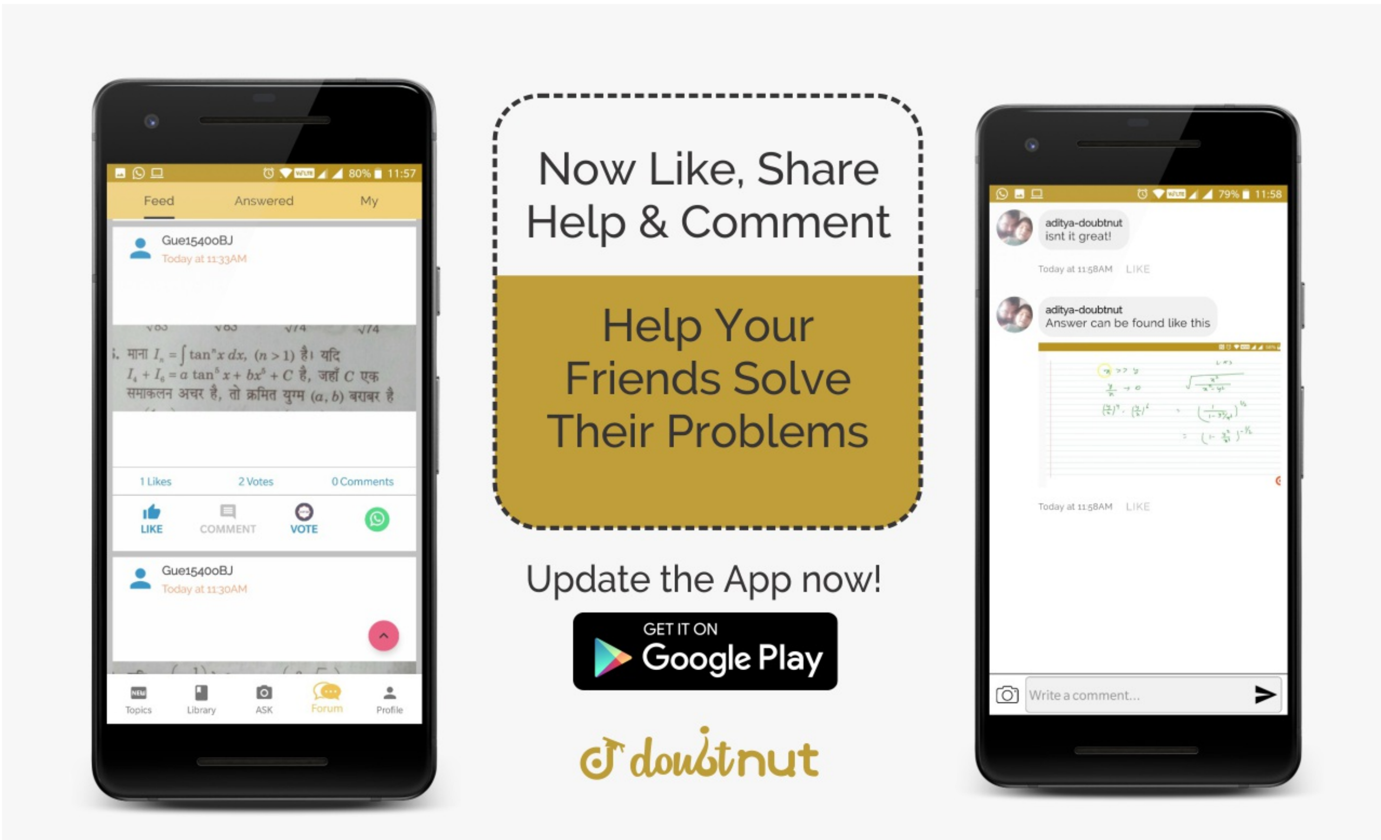
Watch Free Video Solution on Doubtnut

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Distance Of A Point From A Plane

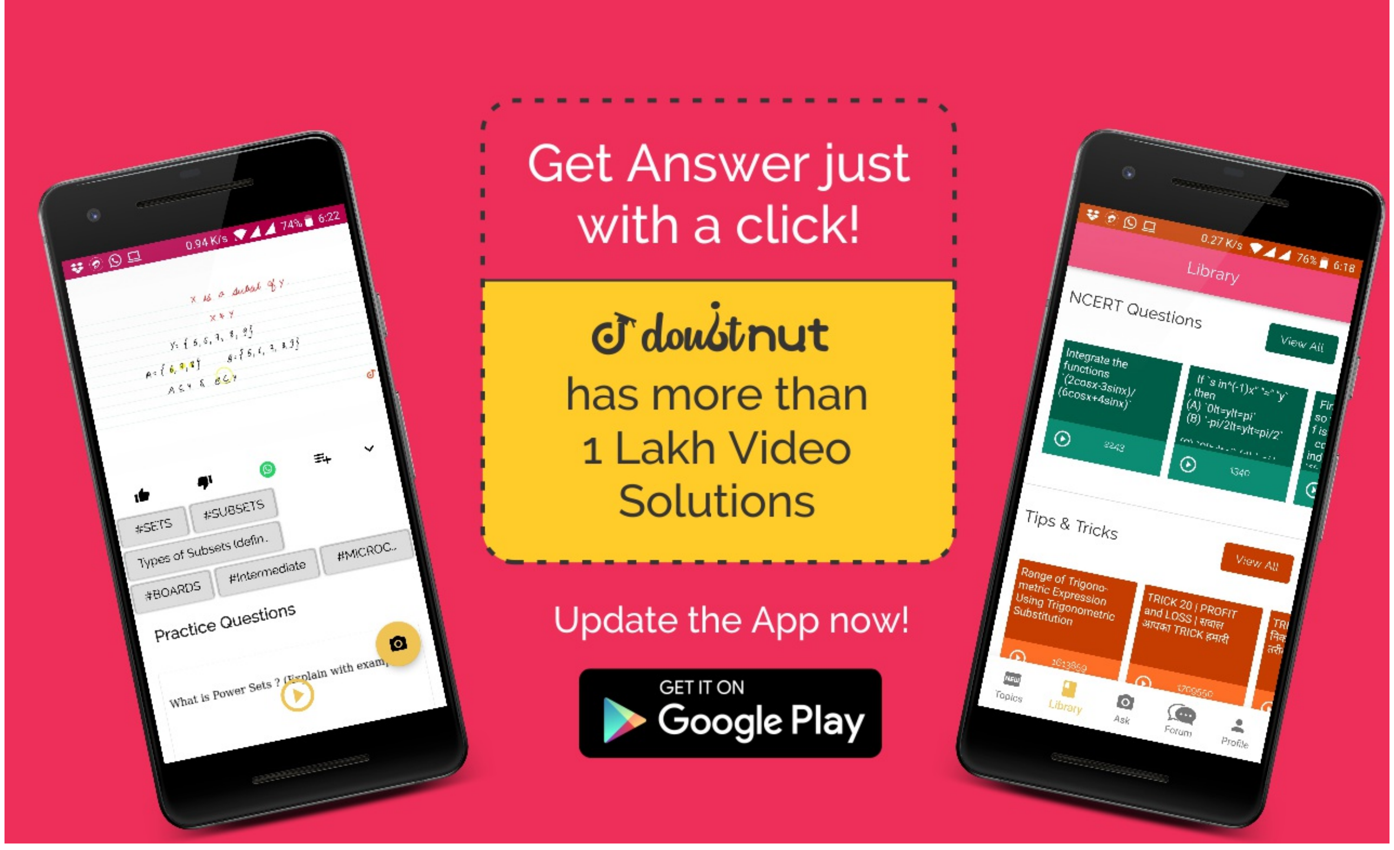
Let L_1 be the line

153	$\overrightarrow{r}_1 = 2\hat{i} + \hat{j} - \hat{k} + \lambda\left(i + 2\hat{k}\right)$ and let L_2 be the line $\overrightarrow{r}_2 = 3\hat{i} + \hat{j} + \mu\left(i + \hat{j} - \hat{k}\right)$. Let π be the plane which contains the line L_1 and is parallel to L_2. The distance of the plane π from the origin is a. $\sqrt{6}$ b. $1/7$ c. $\sqrt{2/7}$ d. none of these Watch Free Video Solution on Doubtnut
154	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** For the line $\frac{x-1}{1} = \frac{y-2}{2} = \frac{z-3}{3}$, which one of the following is incorrect? a. it lies in the plane $x - 2y + z = 0$ b. it is same as line $\frac{x}{1} = \frac{y}{2} = \frac{z}{3}$ c. it passes through $(2, 3, 5)$ d. it is parallel t the plane$x - 2y + z - 6 = 0$ Watch Free Video Solution on Doubtnut
155	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** The value of m for which straight lein $3x - 2y + z + 3 = 0 = 4x - 3y + 4z + 1$ is parallel to the plane $2x - y + mz - 2 = 0$ is a. -2 b. 8 c. -18 d. 11 Watch Free Video Solution on Doubtnut
doubtnut पढ़ना हुआ आसान	
	CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane

156	The intercept made by the plane $\vec{r}\dot{\vec{n}} = q$ on the x-axis is a. $\frac{q}{\hat{i}\dot{\vec{n}}}$ b. $\frac{\hat{i}\dot{\vec{n}}}{q}$ c. $\frac{\hat{i}\dot{\vec{n}}}{q}$ d. $\frac{q}{\lvert\vec{n}\rvert}$ Watch Free Video Solution on Doubtnut
157	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Line Of Intersection Of Two Planes** Equation of a line in the plane $\pi \equiv 2x - y + z - 4 = 0$ which is perpendicular to the line l whse equation is $\frac{x-2}{1} = \frac{y-2}{-1} = \frac{z-3}{-2}$ and which passes through the point of intersection of $l and \pi$ is a. $\frac{x-2}{1} = \frac{y-1}{5} = \frac{z-1}{-1}$ b. $\frac{x-1}{3} = \frac{y-3}{5} = \frac{z-5}{-1}$ c. $\frac{x+2}{2} = \frac{y+1}{-1} = \frac{z+1}{1}$ d. $\frac{x-2}{2} = \frac{y-1}{-1} = \frac{z-1}{1}$ Watch Free Video Solution on Doubtnut
158	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Distance Of A Point From A Plane** If the foot of the perpendicular from the origin to plane is $P(a, b, c)$, the equation of the plane is a. $\frac{x}{a} = \frac{y}{b} = \frac{z}{c} = 3$ b. $ax + by + cz = 3$ c. $ax + by + cz = a^2 + b^2 + c^2$ d. $ax + by + cz = a + b + c$ Watch Free Video Solution on Doubtnut
159	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** The equation of the plane which passes through the point of intersection of lines $\frac{x-1}{3} = \frac{y-2}{1} = \frac{z-3}{2}$, and $\frac{x-3}{1} = \frac{y-1}{2} = \frac{z-2}{3}$ and at greatest distance from point $(0, 0, 0)$ is a. $4x + 3y + 5z = 25$ b. $4x + 3y = 5z = 50$ c. $3x + 4y + 5z = 49$ d. $x + 7y - 5z = 2$ Watch Free Video Solution on Doubtnut
	CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Shortest Distance Between Two Lines Let $A\left(\vec{a}\right) and B\left(\vec{b}\right)$ be points on two skew lines

160	$\vec{r} = \vec{a} + \lambda\vec{p}\, and\, \vec{r} = \vec{b} + u\vec{q}$ and the shortest distance between the skew lines is $1, where \vec{p}\, and\, \vec{q}$ are unit vectors forming adjacent sides of a parallelogram enclosing an area of 1/2 units. If angle between AB and the line of shortest distance is 60^0, then $AB =$ a. $\frac{1}{2}$ b. 2 c. 1 d. $\lambda R = \{10\}$ Watch Free Video Solution on Doubtnut
161	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** Let $A(1, 1, 1), B(2, 3, 5) and C(-1, 0, 2)$ be three points, then equation of a plane parallel to the plane ABC which is at distance 2 is a. $2x - 3y + z + 2\sqrt{14} = 0$ b. $2x - 3y + z - \sqrt{14} = 0$ c. $2x - 3y + z + 2 = 0$ d. $2x - 3y + z - 2 = 0$ Watch Free Video Solution on Doubtnut
doubtnut पढ़ना हुआ आसान	
162	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios** The point on the line $\frac{x-2}{1} = \frac{y+3}{-2} = \frac{z+5}{-2}$ at a distance of 6 from the point $(2, -3, -5)$ is a. $(3, -5, -3)$ b. $(4, -7, -9)$ c. $0, 2, -1$ d. none of these Watch Free Video Solution on Doubtnut
163	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Perpendicular Distance Of A Point From A Line** The coordinates o the foot of the perpendicular drawn from the origin to the line joining the point $(-9, 4, 5) and (10, 0, -1)$ will be a. $(-3, 2, 1)$ b. $(1, 2, 2)$ c. $4, 5, 3$ d. none of these

	Watch Free Video Solution on Doubtnut
164	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios** If $P_1 : \vec{r} . \vec{n}_1 - d_1 = 0$ $P_2 : \vec{r} . \vec{n}_2 - d_2 = 0$ and $P_3 : \vec{r} . \vec{n}_3 - d_3 = 0$ are three non-coplanar vectors, then three lines $P_1 = 0,\ P_2 = 0;\ P_2 = 0, P_3 = 0$; $P_3 = 0\ P_1 = 0$ are Watch Free Video Solution on Doubtnut
165	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios** The length of projection of the line segment joining the points $(1, 0, -1) and (-1, 2, 2)$ on the plane $x + 3y - 5z = 6$ is equal to a. 2 b. $\sqrt{\frac{271}{53}}$ c. $\sqrt{\frac{472}{31}}$ d. $\sqrt{\frac{474}{35}}$ Watch Free Video Solution on Doubtnut
166	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** The number of planes that are equidistant from four non-coplanar points is a. 3 b. 4 c. 7 d. 9 Watch Free Video Solution on Doubtnut
167	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Distance Of A Point From A Plane** In a three-dimensional coordinate system, $P, Q, and R$ are images of a point $A(a, b, c)$ in the $x - y, y - z and z - x$ planes, respectively. If G is the centroid of triangle $PQR,$ then area of triangle AOG is (O is the origin) a. 0 b. $a^2 + b^2 + c^2$ c. $\frac{2}{3}(a^2 + b^2 + c^2)$ d. none of these Watch Free Video Solution on Doubtnut
doubtnut पढ़ना हुआ आसान	

	
168	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Regular Tetrahedron** A plane passing through $(1,1,1)$ cuts positive direction of coordinates axes at $A, BandC,$ then the volume of tetrahedron $OABC$ satisfies a. $V \leq \frac{9}{2}$ b. $V \geq \frac{9}{2}$ c. $V = \frac{9}{2}$ d. none of these Watch Free Video Solution on Doubtnut
169	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Shortest Distance Between Two Lines** If lines $x = y = zandx = \frac{y}{2} = \frac{z}{3}$ and third line passing through $(1, 1, 1)$ form a triangle of area $\sqrt{6}$ units, then the point of intersection of third line with the second line will be a. $(1, 2, 3)$ b. $2, 4, 6$ c. $\frac{4}{3}, \frac{6}{3}, \frac{12}{3}$ d. none of these Watch Free Video Solution on Doubtnut
170	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Shortest Distance Between Two Lines** The point of intersection of the line passing through $(0, 0, 1)$ and intersecting the lines $x + 2y + z = 1, \ - x + y$ $- 2z = 2$ and $x + y = 2, x + z = 2$ with xy plane is a. $\left(\frac{5}{3}, \ - \frac{1}{3}, 0\right)$ b. $(1, 1, 0)$ c. $\left(\frac{2}{3}, \frac{1}{3}, 0\right)$ d. $\left(- \frac{5}{3}, \frac{1}{3}, 0\right)$ Watch Free Video Solution on Doubtnut
	CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Shortest Distance Between Two Lines

171	Shortest distance between the lines $\frac{x-1}{1}=\frac{y-1}{1}=\frac{z-1}{1} and \frac{x-2}{1}=\frac{y-3}{1}=\frac{z-4}{1}$ is equal to a. $\sqrt{14}$ b. $\sqrt{7}$ c. $\sqrt{2}$ d. none of these Watch Free Video Solution on Doubtnut
172	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Distance Of A Point From A Plane** Distance of point $P\left(\vec{p}\right)$ from the plane $\vec{r}\dot{\vec{n}}=0$ is a. $\left\|\vec{p}\dot{\vec{n}}\right\|$ b. $\frac{\left\|\vec{p}\times\vec{n}\right\|}{\left\|\vec{n}\right\|}$ c. $\frac{\left\|\vec{p}\dot{\vec{n}}\right\|}{\left\|\vec{n}\right\|}$ d. none of these Watch Free Video Solution on Doubtnut
173	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Distance Of A Point From A Plane** The reflection of the point $\vec{a}$ in the plane $\vec{r}\dot{\vec{n}}=q$ is a. $\vec{a}+\frac{\left(\vec{q}-\vec{a}\dot{\vec{n}}\right)}{\left\|\vec{n}\right\|}$ b. $\vec{a}+2\left(\frac{\left(\vec{q}-\vec{a}\dot{\vec{n}}\right)}{\left\|\vec{n}\right\|}\right)\vec{n}$ c. $\vec{a}+\frac{2\left(\vec{q}+\vec{a}\dot{\vec{n}}\right)}{\left\|\vec{n}\right\|^2}\vec{n}$ d. none of these Watch Free Video Solution on Doubtnut
doubtnut पढ़ना हुआ आसान	

174	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** Line $\vec{r} = \vec{a} + \lambda \vec{b}$ will not meet the plane $\vec{r} \cdot \vec{n} = q,$ if a. $\vec{b} \cdot \vec{n} = 0, \vec{a} \cdot \vec{n} = q$ b. $\vec{b} \cdot \vec{n} \neq 0, \vec{a} \cdot \vec{n} \neq q$ c. $\vec{b} \cdot \vec{n} = 0, \vec{a} \cdot \vec{n} \neq q$ d. $\vec{b} \cdot \vec{n} \neq 0, \vec{a} \cdot \vec{n} = q$ Watch Free Video Solution on Doubtnut
175	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios** If a line makes an angle of $\frac{\pi}{4}$ with the positive direction of each of x-axis and y-axis, then the angel that the line makes with the positive direction of the z-axis is a. $\frac{\pi}{3}$ b. $\frac{\pi}{4}$ c. $\frac{\pi}{2}$ d. $\frac{\pi}{6}$ Watch Free Video Solution on Doubtnut
176	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** The ratio in which the plane $\vec{r} \cdot \vec{i} - 2\vec{j} + 3\vec{k} = 17$ divides the line joining the points $-2\vec{i} + 4\vec{j} + 7\vec{k} and 3\vec{i}$ $-5\vec{j} + 8\vec{k}$ is a. $1:5$ b. $1:10$ c. $3:5$ d. $3:10$ Watch Free Video Solution on Doubtnut
177	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Distance Of A Point From A Plane** The image of the point $(-1, 3, 4)$ in the plane $x - 2y = 0$ is a. $\left(-\frac{17}{3}, -\frac{19}{3}, 4\right)$ b. $(15, 11, 4)$ c. $\left(-\frac{17}{3}, -\frac{19}{3}, 1\right)$ d. $\left(\frac{9}{5}, \frac{-13}{5}, 4\right)$

[Watch Free Video Solution on Doubtnut]

178

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane

The distance between the line $\vec{r} = 2\hat{i} - 2\hat{j} + 3\hat{k} + \lambda\left(\hat{i} - \hat{j} + 4\hat{k}\right)$ and the plane $\vec{r}\cdot\hat{i} + 5\hat{j} + \hat{k} = 5$ is a. $\frac{10}{3\sqrt{3}}$ b. $\frac{10}{9}$ c. $\frac{10}{3}$ d. $\frac{3}{10}$

[Watch Free Video Solution on Doubtnut]

179

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios

Let L be the line of intersection of the planes $2x + 3y + z = 1 and x + 3y + 2z = 2.$

If L makes an angle α with the positive x-axis, then $\cos\alpha$ equals a. $\frac{1}{2}$ b. 1 c. $\frac{1}{\sqrt{2}}$ d. $\frac{1}{\sqrt{3}}$

[Watch Free Video Solution on Doubtnut]

180

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Perpendicular Distance Of A Point From A Line

The length of the perpendicular drawn from $(1, 2, 3)$ to the line $\frac{x-6}{3} = \frac{y-7}{2} = \frac{z-7}{-2}$ is a. 4 b. 5 c. 6 d. 7

[Watch Free Video Solution on Doubtnut]

181	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios** If angle θ bertween the line $\frac{x+1}{1}=\frac{y-1}{2}=\frac{z-2}{2}$ and the plane $2x-y+\sqrt{\lambda}z+4=0$ is such that $s\int h\eta=1/3,$ the value of λ is a. $-\frac{3}{5}$ b. $\frac{5}{3}$ c. $-\frac{4}{3}$ d. $\frac{3}{4}$ Watch Free Video Solution on Doubtnut
182	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Two Sides Of A Plane** The intersection of the spheres $x^2+y^2+z^2+7x-2y-z=13andx^2+y^2+z^2-3x+3y+4z=8$ is the same as the intersection of one of the spheres and the plane a. $x-y-z=1$ b. $x-2y-z=1$ c. $x-y-2z=1$ d. $2x-y-z=1$ Watch Free Video Solution on Doubtnut
183	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** A plane makes intercepts $OA, OBandOC$ whose measurements are a, b and c on the $OX, OYandOZ$ axes. The area of triangle ABC is a. $\frac{1}{2}(ab+bc+ca)$ b. $\frac{1}{2}abc(a+b+c)$ c. $\frac{1}{2}(a^2b^2+b^2c^2+c^2a^2)^{1/2}$ d. $\frac{1}{2}(a+b+c)^2$ Watch Free Video Solution on Doubtnut
184	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios** A line makes an angel θ with each of the x-and z-axes. If the angel $\beta,$ which it makes with the y-axis, is such that $\sin^2\beta=3\sin^2\theta$,then $\cos^2\theta$ equals a. $\frac{2}{3}$ b. $\frac{1}{5}$ c. $\frac{3}{5}$ d. $\frac{2}{5}$ Watch Free Video Solution on Doubtnut
185	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** The shortest distance from the plane $12x+4y+3z=327$ to the sphere $x^2+y^2+z^2+4x-2y-6z=155$ is a. 39 b. 26 c. $41-\frac{4}{13}$ d. 13

[Watch Free Video Solution on Doubtnut]

186

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of A Plane Passing Through The Line Of Intersection Of Two Planes

A tetrahedron has vertices
$O(0, 0, 0), A(1, 2, 1),$
$B(2, 1, 3), and C(-1, 1, 2),$

then angle between face $OAB and ABC$ will be a. $\cos^{-1}\left(\frac{17}{31}\right)$ b. 30^0 c. 90^0 d. $\cos^{-1}\left(\frac{19}{35}\right)$

[Watch Free Video Solution on Doubtnut]

187

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres

The radius of the circle in which the sphere
$x^2 + y^2 + z^2 + 2z - 2y - 4z$
$- 19 = 0$
is cut by the plane $x + 2y + 2z + 7 = 0$ is a. 2 b. 3 c. 4 d. 1

[Watch Free Video Solution on Doubtnut]

188	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** The lines $\frac{x-2}{1}=\frac{y-3}{1}=\frac{z-4}{-k} and \frac{x-1}{k}=\frac{y-4}{2}=\frac{z-5}{1}$ are coplanar if a. $k=1 \text{ or } -1$ b. $k=0 \text{ or } -3$ c. $k=3 \text{ or } -3$ d. $k=0 \text{ or } -1$ Watch Free Video Solution on Doubtnut
189	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Shortest Distance Between Two Lines** The point of intersection of the lines $\frac{x-5}{3}=\frac{y-7}{-1}=\frac{z+2}{1} and =\frac{x+3}{-36}=\frac{y-3}{2}=\frac{z-6}{4}$ is a. $\left(21, \frac{5}{3}, \frac{10}{3}\right)$ b. $(2, 10, 4)$ c. $(-3, 3, 6)$ d. $(5, 7, -2)$ Watch Free Video Solution on Doubtnut
190	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Distance Of A Point From A Plane** Two systems of rectangular axes have the same origin. If a plane cuts them at distance $a, b, c$and a', b', c' from the origin, then a. $\frac{1}{a^2}+\frac{1}{b^2}+\frac{1}{c^2}+\frac{1}{a'^2}+\frac{1}{b'^2}+\frac{1}{c'^2}=0$ b. $\frac{1}{a^2}-\frac{1}{b^2}-\frac{1}{c^2}+\frac{1}{a'^2}-\frac{1}{b'^2}-\frac{1}{c'^2}=0$ c. $\frac{1}{a^2}+\frac{1}{b^2}+\frac{1}{c^2}-\frac{1}{a'^2}-\frac{1}{b'^2}-\frac{1}{c'^2}=0$ d. $\frac{1}{a^2}+\frac{1}{b^2}+\frac{1}{c^2}+\frac{1}{a'^2}+\frac{1}{b'^2}+\frac{1}{c'^2}=0$

Watch Free Video Solution on Doubtnut

191

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane

The plane which passes through the point $(3, 2, 0)$ and the line $\frac{x-3}{1}=\frac{y-6}{5}=\frac{z-4}{4}$ is a. $x-y+z=1$ b. $x+y+z=5$ c. $x+2y-z=1$ d. $2x-y+z=5$

Watch Free Video Solution on Doubtnut

192

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios

The direction ratios of a normal to the plane through $(1, 0, 0) and (0, 1, 0)$, which makes and angle of $\frac{\pi}{4}$ with the plane $x+y=3,$ are a. $\langle 1, \sqrt{2}, 1\rangle$ b. $\langle 1, 1, \sqrt{2}\rangle$ c. $\langle 1, 1, 2\rangle$ d. $\langle \sqrt{2}, 1, 1\rangle$

Watch Free Video Solution on Doubtnut

193

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of Straigth Line Passing Through A Given Point And Parallel To A Given Vector

The centre of the circle given by

$\vec{r}\hat{i}+2\hat{j}+2\hat{k}=15and\left|\vec{r}-\left(\hat{j}+2\hat{k}\right)\right|=4$

is a. $(0, 1, 2)$ b. $(1, 3, 5)$ c. $(-1, 3, 4)$ d. none of these

Watch Free Video Solution on Doubtnut

194	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Shortest Distance Between Two Lines** The lines which intersect the skew lines $y = mx, z = c; y = -mx,$ $z = -c$ and the x-axis lie on the surface a. $cz = mxy$ b. $xy = cmz$ c. $cy = mxz$ d. none of these Watch Free Video Solution on Doubtnut
195	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Perpendicular Distance Of A Point From A Line** Distance of the point $P\left(\vec{p}\right)$ from the line $\vec{r} = \vec{a} + \lambda\vec{b}$ is a. $\left\lvert\left(\vec{a}-\vec{p}\right) + \frac{\left(\left(\vec{p}-\vec{a}\right)\dot{\vec{b}}\right)\vec{b}}{\left\lvert\vec{b}\right\rvert^2}\right\rvert$ b. $\left\lvert\left(\vec{b}-\vec{p}\right) + \frac{\left(\left(\vec{p}-\vec{a}\right)\dot{\vec{b}}\right)\vec{b}}{\left\lvert\vec{b}\right\rvert^2}\right\rvert$ c. $\left\lvert\left(\vec{a}-\vec{p}\right) + \frac{\left(\left(\vec{p}-\vec{b}\right)\dot{\vec{b}}\right)\vec{b}}{\left\lvert\vec{b}\right\rvert^2}\right\rvert$ d. none of these Watch Free Video Solution on Doubtnut

196

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Distance Of A Point From A Plane

From the point $P(a, b, c)$, let perpendiculars $PLandPM$ be drawn to $YOZandZOX$ planes, respectively. Then the equation of the plane OLM is a. $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=0$ b. $\frac{x}{a}+\frac{y}{b}-\frac{z}{c}=0$ c. $\frac{x}{a}-\frac{y}{b}-\frac{z}{c}=0$ d. $\frac{x}{a}-\frac{y}{b}+\frac{z}{c}=0$

Watch Free Video Solution on Doubtnut

197

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane

The plane $\vec{r}\cdot\vec{n}=q$ will contain the line $\vec{r}=\vec{a}+\lambda\vec{b}$, if a. $b.n\neq 0, a.n\neq q$ b. $b.n=, a.n\neq q$ c. $b.n=0, a.n=q$ d. $b.n\neq 0, a.n=q$

Watch Free Video Solution on Doubtnut

198

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane

The projection of point $P(\vec{p})$ on the plane $\vec{r}\cdot\vec{n}=qis(\vec{s})$, then a. $\vec{s}=\frac{(q-\vec{p}\cdot\vec{n})\vec{n}}{|\vec{n}|^2}$ b. $\vec{s}=p+\frac{(q-\vec{p}\cdot\vec{n})\vec{n}}{|\vec{n}|^2}$ c. $\vec{s}=p-\frac{(\vec{p}\cdot\vec{n})\vec{n}}{|\vec{n}|^2}$ d.

	$\vec{s} = p - \frac{\left(q - \vec{p}\dot{\vec{n}}\right)\vec{n}}{\left\|\vec{n}\right\|^2}$ Watch Free Video Solution on Doubtnut
199	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Angle Between A Line And A Plane** The angle between i line of the intersection of the plane $\vec{r}\hat{i} + 2\dot{\hat{j}} + 3\hat{k}$ $= 0 and \vec{r} 3\hat{i} + 3\dot{\hat{j}} + \hat{k} = 0$ is a. $\cos^{-1}\left(\frac{1}{3}\right)$ b. $c0s^{-1}\left(\frac{1}{\sqrt{3}}\right)$ c. $\cos^{-1}\left(\frac{2}{\sqrt{3}}\right)$ d. none of these Watch Free Video Solution on Doubtnut
200	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios** The line $\frac{x+6}{5} = \frac{y+10}{3} = \frac{z+14}{8}$ is the hypotenuse of an isosceles right-angled triangle whose opposite vertex is $(7, 2, 4)$. Then which of the following in not the side of the triangle? a. $\frac{x-7}{2} = \frac{y-2}{-3} = \frac{z-4}{6}$ b. $\frac{x-7}{3} = \frac{y-2}{6} = \frac{z-4}{2}$ c. $\frac{x-7}{3} = \frac{y-2}{5} = \frac{z-4}{-1}$ d. none of these Watch Free Video Solution on Doubtnut
201	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Distance Between Parallel Planes** The equation of the plane which passes through the line of intersection of planes $\vec{r}\dot{\vec{n}}_1 = , q_1, \vec{r}\dot{\vec{n}}_2 = q_2$ and the is parallel to the line of intersection of planers $\vec{r}\dot{\vec{n}}_3 = q_3 and \vec{r}\dot{\vec{n}}_4 - q_4$ is Watch Free Video Solution on Doubtnut
202	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of Line Passing Through Two Given Point** Consider triangle AOB in the $x - y$ plane, where $A \equiv (1, 0, 0), B$ $\equiv (0, 2, 0) and O \equiv (0, 0, 0)$. The new position of O, when triangle is rotated about side AB by 90^0 can be a. $\left(\frac{4}{5}, \frac{3}{5}, \frac{2}{\sqrt{5}}\right)$ b. $\left(\frac{-3}{5}, \frac{\sqrt{2}}{5}, \frac{2}{\sqrt{5}}\right)$ c. $\left(\frac{4}{5}, \frac{2}{5}, \frac{2}{\sqrt{5}}\right)$ d. $\left(\frac{4}{5}, \frac{2}{5}, \frac{1}{\sqrt{5}}\right)$

203

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane

Let $\vec{a} = \hat{i} + \hat{j} and \vec{b} = 2\hat{i} - \hat{k}$, then the point of intersection of the lines $\vec{r} \times \vec{a} = \vec{b} \times \vec{a}$ and $\vec{r} \times \vec{b} = \vec{a} \times \vec{b}$ is a. $(3, -1, 1)$ b. $(3, 1, -1)$ c. $(-3, 1, 1)$ d. $(-3, -1, -1)$

204

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Perpendicular Distance Of A Point From A Line

The coordinates of the point P on the line

$$\vec{r} = \left(\hat{i} + \hat{j} + \hat{k}\right)$$

$$+ \lambda\left(-\hat{i} + \hat{j} - \hat{k}\right)$$

which is nearest to the origin is a. $\left(\frac{2}{4}, \frac{4}{3}, \frac{2}{3}\right)$ b. $\left(-\frac{2}{3}, -\frac{4}{3}, \frac{2}{3}\right)$ c. $\left(\frac{2}{3}, -\frac{4}{3}, \frac{2}{3}\right)$ d. none of these

205

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane

The ratio in which the line segment joining the points whose position vectors are

$$2\hat{i} - 4\hat{j} - 7\hat{k} and - 3\hat{i} + 5\hat{j}$$

$$- 8\hat{k}$$

is divided by the plane whose equation is $\hat{r}\hat{i} - 2\dot{\hat{j}} + 3\hat{k} = 13$ is a. $13:12$ internally b. $12:25$ externally c. $13:25$ internally d. $37:25$ internally

206	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Distance Of A Point From A Plane** Given $\vec{\alpha} = 3\hat{i} + \hat{j} + 2\hat{k} and \vec{\beta} = \hat{i} - 2\hat{j} - 4\hat{k}$ are the position vectors of the points $A and B$. Then the distance of the point $\hat{i} + \hat{j} + \hat{k}$ from the plane passing through B and perpendicular to AB is a. 5 b. 10 c. 15 d. 20 Watch Free Video Solution on Doubtnut
207	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios** $L_1 and L_2$ and two lines whose vector equations are $L_1 : \vec{r} = \lambda\left(\left(\cos\theta + \sqrt{3}\right)\hat{i}\left(\sqrt{2}\sin\theta\right)\hat{j} + \left(\cos\theta - \sqrt{3}\right)\hat{k}\right)$ $L_2 : \vec{r} = \mu\left(a\hat{i} + b\hat{j} + c\hat{k}\right)$, where $\lambda and \mu$ are scalars and α is the acute angel between $L_1 and L_2$. If the angel α is independent of θ, then the value of α is a. $\frac{\pi}{6}$ b. $\frac{\pi}{4}$ c. $\frac{\pi}{3}$ d. $\frac{\pi}{2}$ Watch Free Video Solution on Doubtnut
208	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Shortest Distance Between Two Lines** The shortest distance between the lines $\frac{x-3}{3} = \frac{y-8}{-1} = \frac{z-3}{1} and \frac{x+3}{-3} = \frac{y+7}{2} = \frac{z-6}{4}$ is a. $\sqrt{30}$ b. $2\sqrt{30}$ c. $5\sqrt{30}$ d. $3\sqrt{30}$ Watch Free Video Solution on Doubtnut
	CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Perpendicular Distance Of A Point From A Line The line through $\hat{i} + 3\hat{j} + 2\hat{k}$ and $\perp$ to the line

209

$\vec{r} = \left(\hat{i} + 2\hat{j} - \hat{k}\right) + \lambda\left(2\hat{i} + \hat{j} + \hat{k}\right) and \vec{r} = \left(2\hat{i} + 6\hat{j} + \hat{k}\right) + \mu\left(\hat{i} + 2\hat{j} + 3\hat{k}\right)$

is a.

$\vec{r} = \left(\hat{i} + 2\hat{j} - \hat{k}\right) + \lambda\left(-\hat{i} + 5\hat{j} - 3\hat{k}\right)$

b.

$\vec{r} = \hat{i} + 3\hat{j} + 2\hat{k} + \lambda\left(\hat{i} - 5\hat{j} + 3\hat{k}\right)$

c.

$\vec{r} = \hat{i} + 3\hat{j} + 2\hat{k} + \lambda\left(\hat{i} + 5\hat{j} + 3\hat{k}\right)$

d.

$\vec{r} = \hat{i} + 3\hat{j} + 2\hat{k} + \lambda\left(-\hat{i} - 5\hat{j} - 3\hat{k}\right)$

Watch Free Video Solution on Doubtnut

210

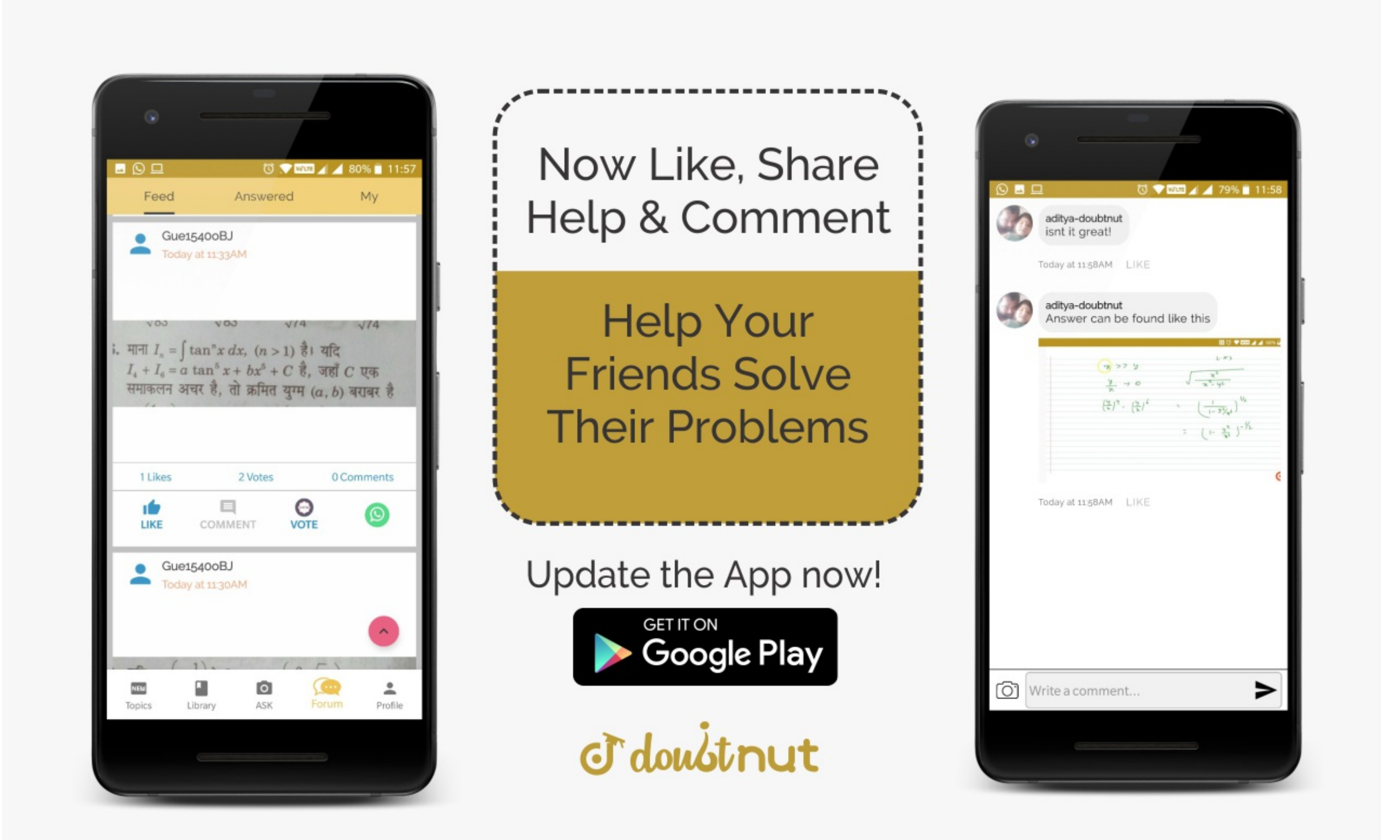
CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane

The equation of the plane passing through lines

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

is a. $11x - y - 3z = 35$ b. $11x + y - 3z = 35$ c. $11x - y + 3z = 35$ d. none of these

	Watch Free Video Solution on Doubtnut
211	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of A Plane Passing Through The Line Of Intersection Of Two Planes** The three planes $4y+6z=5, 2x+3y+5z$ $=5and6x+5y+9z=10$ a. meet in a point b. have a line in common c. form a triangular prism d. none of these Watch Free Video Solution on Doubtnut
212	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of A Plane Passing Through The Line Of Intersection Of Two Planes** The equation of the plane through the line of intersection of the planes $ax+by+cz+d=0$ and $a'x+b'y+c'z+d'=0$ parallel to the line $y=0$ and $z=0$ is Watch Free Video Solution on Doubtnut
213	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** Equation of the pane passing through the points $(2,2,1)and(9,3,6), and \perp$ to the plane $2x+6y+6z-1=0$ is a. $3x+4y+5z=9$ b. $3x+4y-5z=9$ c. $3x+4y-5z=9$ d. none of these Watch Free Video Solution on Doubtnut
214	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Distance Of A Point From A Plane** Value of λ such that the line $\frac{x-1}{2}=\frac{y-1}{3}=\frac{z-1}{\lambda}$ is $\perp$ to normal to the plane $\overrightarrow{r}2\overrightarrow{i}+3\overrightarrow{\dot{j}}+4\overrightarrow{k}=0$ is a. $-\frac{13}{4}$ b. $-\frac{17}{4}$ c. 4 d. none of these Watch Free Video Solution on Doubtnut
215	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of A Plane Passing Through The Line Of Intersection Of Two Planes** The equation of the plane through the intersection of the planes $x+2y+3z-4=0nd4x$ $+3y+2z+1=0$ and passing through the origin is a. $17x+14y+11z=0$ b. $7x+4y+z=0$ c. $x+14+11z=0$ d. $17x+y+z=0$ Watch Free Video Solution on Doubtnut

	
216	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of A Plane Passing Through The Line Of Intersection Of Two Planes** The plane $4x+7y+4z+81=0$ is rotated through a right angle about its line of intersection with the plane $5x+3y+10z=25$. The equation of the plane in its new position is a. $x-4y+6z=106$ b. $x-8y+13z=103$ c. $x-4y+6z=110$ d. $x-8y+13z=105$ Watch Free Video Solution on Doubtnut
217	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of A Plane Passing Through The Line Of Intersection Of Two Planes** The vector equation of the plane passing through the origin and the line of intersection of the planes $\vec{r}\cdot\vec{a}=\lambda and \vec{r}\cdot\vec{b}=\mu$ is a. $\vec{r}\cdot\lambda\vec{a}-\mu\vec{b}=0$ b. $\vec{r}\cdot\lambda\vec{b}-\mu\vec{a}=0$ c. $\vec{r}\cdot\lambda\vec{a}+\mu\vec{b}=0$ d. $\vec{r}\cdot\lambda\vec{b}+\mu\vec{a}=0$ Watch Free Video Solution on Doubtnut
218	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of Straigth Line Passing Through A Given Point And Parallel To A Given Vector** The lines $\vec{r}=\vec{a}$ $+\lambda\left(\vec{b}\times\vec{c}\right) and \vec{r}=\vec{b}$ $+\mu\left(\vec{c}\times\vec{a}\right)$ will intersect if a. $\vec{a}\times\vec{c}=\vec{b}\times\vec{c}$ b. $\vec{a}\cdot\vec{c}=\vec{b}\cdot\vec{c}$ c. $b\times\vec{a}=\vec{c}\times\vec{a}$ d. none of these Watch Free Video Solution on Doubtnut

219

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane

The projection of the line $\frac{x+1}{-1}=\frac{y}{2}=\frac{z-1}{3}$ on the plane $x-2y+z=6$ is the line of intersection of this plane with the plane a. $2x+y+2=0$ b. $3x+y-z=2$ c. $2x-3y+8z=3$ d. none of these

Watch Free Video Solution on Doubtnut

220

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios

The direction cosines of a line satisfy the relations
$\lambda(l+m)=nandmn+nl$
$+lm=0.$
The value of λ, for which the two lines are perpendicular to each other, is a. 1 b. 2 c. $1/2$ d. none of these

Watch Free Video Solution on Doubtnut

221

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres

The intercepts made on the axes by the plane the which bisects the line joining the points $(1,2,3)$ and $(-3,4,5)$ at right angles are a. $\left(-\frac{9}{2},9,9\right)$ b. $\left(\frac{9}{2},9,9\right)$ c. $\left(9,-\frac{9}{2},9\right)$ d. $\left(9,\frac{9}{2},9,\right)$

Watch Free Video Solution on Doubtnut

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Shortest Distance Between Two Lines

The pair of lines whose direction cosines are given by the equations

222	$3l + m + 5n = 0and6mn$ $- 2nl + 5lm = 0$ are a. parallel b. perpendicular c. inclined at $\cos^{-1}\left(\frac{1}{6}\right)$ d. none of these Watch Free Video Solution on Doubtnut
223	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** A sphere of constant radius $2k$ passes through the origin and meets the axes in $A, B, andC_{.}$ The locus of a centroid of the tetrahedron $OABC$ is a. $x^2 + y^2 + z^2 = 4k^2$ b. $x^2 + y^2 + z^2 = k^2$ c. $2\left(k^2 + y^2 + z\right)^2 = k^2$ d. none of these Watch Free Video Solution on Doubtnut
224	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Perpendicular Distance Of A Point From A Line** A plane passes through a fixed point $(a, b, c)_{.}$ The locus of the foot of the perpendicular to it from the origin is a sphere of radius a. $\frac{1}{2}\sqrt{a^2 + b^2 + c^2}$ b. $\sqrt{a^2 + b^2 + c^2}$ c. $a^2 + b^2 + c^2$ d. $\frac{1}{2}\left(a^2 + b^2 + c^2\right)$ Watch Free Video Solution on Doubtnut
225	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** What is the nature of the intersection of the set of planes $x + ay + (b + c)z + d = 0,$ $x + by + (a + a)z + d$ $= 0andx + cy + (a + b)z$ $+ d = 0?$ a. they meet at a point b. the form a triangular prism c. the pass through a line d. they are at equal distance from the origin Watch Free Video Solution on Doubtnut
	CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Distance Of A Point From A Plane Find the equation of a straight line in the plane $\vec{r} \cdot \vec{n} = d$ which is parallel to $\vec{r} = \vec{a} + \lambda \vec{b}$ and passes through the foot of the perpendicular drawn from point $P\left(\vec{a}\right) \to \vec{r} \dot{\vec{n}}$ $= d\left(where \vec{n} \dot{\vec{b}} = 0\right)_{.}$ a.

226	$\vec{r} = \vec{a} + \left(\frac{d - \vec{a} \cdot \vec{n}}{n^2}\right) n + \lambda \vec{b}$ b. $\vec{r} = \vec{a} + \left(\frac{d - \vec{a} \cdot \vec{n}}{n}\right) n + \lambda \vec{b}$ c. $\vec{r} = \vec{a} + \left(\frac{\vec{a} \cdot \vec{n} - d}{n^2}\right) n + \lambda \vec{b}$ d. $\vec{r} = \vec{a} + \left(\frac{\vec{a} \cdot \vec{n} - d}{n}\right) n + \lambda \vec{b}$ Watch Free Video Solution on Doubtnut
227	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Distance Of A Point From A Plane** What is the equation of the plane which passes through the z-axis and is perpendicular to the line $\frac{x-a}{\cos\theta} = \frac{y+2}{s\int h\eta} = \frac{z-3}{0}$? a. $x + ytan\theta = 0$ b. $y + xtan\theta = 0$ c. $x\cos\theta - y\sin\theta = 0$ d. $x\sin\theta - y\cos\theta = 0$ Watch Free Video Solution on Doubtnut
	CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios A straight line L on the xy-plane bisects the angle between $OXandOY$. What are

228	the direction cosines of L? a. $\langle (1/\sqrt{2}), (1/\sqrt{2}), 0\rangle$ b. $\langle (1/2), (\sqrt{3}/2), 0\rangle$ c. $\langle 0, 0, 1\rangle$ d. $\left\langle \begin{matrix} 2/3 \\ 2/3 \\ 1/3 \end{matrix} \right\rangle$ Watch Free Video Solution on Doubtnut
229	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** For what value (s) of a will the two points $(1, a, 1) and (-3, 0, a)$ lie on opposite sides of the plane $3x + 4y - 12z + 13 = 0$? Watch Free Video Solution on Doubtnut
230	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** If the plane $\frac{x}{2} + \frac{y}{3} + \frac{z}{6} = 1$ cuts the axes of coordinates at points, $A, B, and C$, then find the area of the triangle $ABC_.$ a. $18 sq_.$ unit b. $36 sq_.$ unit c. $3\sqrt{14} sq_.$ unit d. $2\sqrt{14} sq_.$ unit Watch Free Video Solution on Doubtnut
231	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Distance Of A Point From A Plane** Let PM be the perpendicular from the point $P(1, 2, 3)$ to the $x - y$ plane. If $\overrightarrow{O}P$ makes an angle θ with the positive direction of the $z -$ axis and $\overrightarrow{O}M$ makes an angle ϕ with the positive direction of $x -$ axis, $where O$ is the origin and $\theta and \phi$ are acute angels, then a. $\cos\theta\cos\phi = 1/\sqrt{14}$ b. $\sin\theta\sin\phi = 2/\sqrt{14}$ c. $\tan\phi = 2$ d. $\tan\theta = \sqrt{5}/3$ Watch Free Video Solution on Doubtnut
232	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Angle Between A Line And A Plane** Let P_1 denote the equation of a plane to which the vector $\left(\hat{i} + \hat{j}\right)$ is normal and which contais the line whose equation is $\overrightarrow{r} = \hat{i} + \hat{j} + \hat{k}$ $+ \lambda\left(\hat{i} - \hat{j} - \hat{k}\right) and P_2$ denote the equation of the plane containing the line L and a point with position vector $\hat{j}_.$ Which of the following holds good? a. The equation of P_1 is x+y=2. b. The equation of P_2 is $\overrightarrow{r}.(i - 2j + k) = 2$ c. The acute angle between P_1 and P_2 is $\cot^{-1}\sqrt{3}$ d. The angle between plane P_2 and the line L is $\tan^{-1}\sqrt{3}$ Watch Free Video Solution on Doubtnut

233

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of A Plane Passing Through The Line Of Intersection Of Two Planes

If the planes

$\overrightarrow{r}\hat{i} + \dot{\hat{j}} + \hat{k} = q_1,$

$\overrightarrow{r}\hat{i} + 2a\dot{\hat{j}} + \hat{k}$

$= q_2 and \overrightarrow{r} a\hat{i} + a^2\dot{\hat{j}} + \hat{k}$

$= q_3$

intersect in a line, then the value of a is a. 1 b. $1/2$ c. 2 d. 0

Watch Free Video Solution on Doubtnut

234

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios

A line with direction cosines proportional to $1, -5, and -2$ meets lines

$x = y + 5 = z + 1 and x + 5$

$= 3y = 2z.$

The coordinates of each of the points of the intersection are given by a. $(2, -3, 1)$ b. $(1, 2, 3)$ c. $(0, 5/3, 5/2)$ d. $(3, -2, 2)$

Watch Free Video Solution on Doubtnut

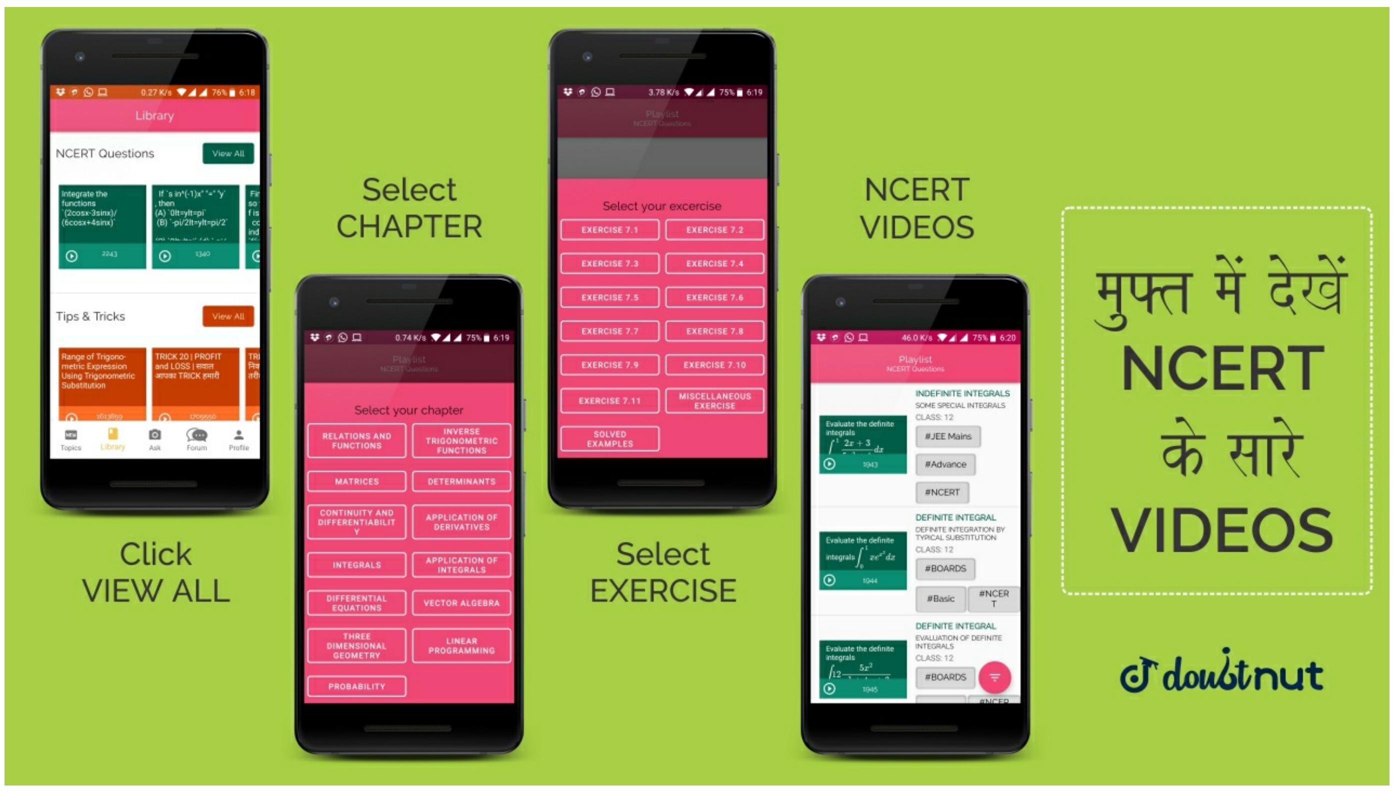
235

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of A Plane Passing Through The Line Of Intersection Of Two Planes

Let $P = 0$ be the equation of a plane passing through the line of intersection of the planes $2x - y = 0 and 3z - y = 0$ and perpendicular to the plane $4x + 5y - 3z = 8.$ Then the points which lie on the plane $P = 0$ is/are a. $(0, 9, 17)$ b. $(1/7, 21/9)$ c. $(1, 3, -4)$ d. $(1/2, 1, 1/3)$

Watch Free Video Solution on Doubtnut

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL

236	**GEOMETRY_Direction Cosines And Direction Ratios** The equation of the line $x+y+z-1=0,\ 4x+y-2z+2$ written in the symmetrical form is Watch Free Video Solution on Doubtnut
237	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of A Plane Bisecting The Angle Between Two Planes** Consider the planes $3x-6y+2z+5=0 and 4x$ $-12+3z=3.$ The plane $67x-162y+47z+44=0$ bisects the angel between the given planes which a. contains origin b. is acute c. is obtuse d. none of these Watch Free Video Solution on Doubtnut
238	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** The equations of the plane which passes through $(0,0,0)$ and which is equally inclined to the planes $x-y+z-3=0 and x+y$ $=z+4=0$ is/are a. $y=0$ b. $x=0$ c. $x+y=0$ d. $x+z=0$ Watch Free Video Solution on Doubtnut
239	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** The x-y plane is rotated about its line of intersection with the y-z plane by 45^0 , then the equation of the new plane is/are a. $z+x=0$ b. $z-y=0$ c. $x+y+z=0$ d. $z-x=0$ Watch Free Video Solution on Doubtnut
	
	CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL

240	**GEOMETRY_Plane** The equation of the plane which is equally inclined to the lines $\frac{x-1}{2}=\frac{y}{-2}=\frac{z+2}{-1} and$ $=\frac{x+3}{8}=\frac{y-4}{1}=\frac{z}{-4}$ and passing through the origin is/are a. $14x-5y-7z=0$ b. $2x+7y-z=0$ c. $3x-4y-z=0$ d. $x+2y-5z=0$ Watch Free Video Solution on Doubtnut
241	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** Which of the following lines lie on the plane $x+2y-z+4=0?$ a. $\frac{x-1}{1}=\frac{y}{-1}=\frac{z-5}{1}$ b. $x-y+z=2x+y-z=0$ c. $\hat{r}=2\hat{i}-\hat{j}+4\hat{k}$ $+\lambda\left(3\hat{i}+\hat{j}+5\hat{k}\right)$ d. none of these Watch Free Video Solution on Doubtnut
242	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Regular Tetrahedron** If the volume of tetrahedron $ABCD$ is 1 cubic units, where $A(0,1,2)$, $B(-1,2,1) and C(1,2,1)$, then the locus of point D is a. $x+y-z=3$ b. $y+z=6$ c. $y+z=0$ d. $y+z=-3$ Watch Free Video Solution on Doubtnut
243	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of Straight Line Passing Through A Given Point And Parallel To A Given Vector** The equation of a line passing through the point $\vec{a}$ parallel to the plane $\vec{r}\dot{\vec{n}}=q$ and perpendicular to the line $\vec{r}=\vec{b}+t\vec{c}$ is a. $\vec{r}=\vec{a}+\lambda\left(\vec{n}\times\vec{c}\right)$ b. $\left(\vec{r}-\vec{a}\right)\times\left(\vec{n}\times\vec{c}\right)$ c. $\vec{r}=\vec{b}+\lambda\left(\vec{n}\times\vec{c}\right)$ d. none of these Watch Free Video Solution on Doubtnut
244	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of Line Passing Through Two Given Point** The equation of the line $x+y+z-1=0,\ 4x+y-2z+2$ written in the symmetrical form is Watch Free Video Solution on Doubtnut

245

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Shortest Distance Between Two Lines

Each question has four choices a, b, c, and d, out of which only one is correct. Each question contains STATEMENT 1 and STATEMENT 2. Both the statements are TRUE and statement 2 is the correct explanation for Statement 1. Both the statements are TRUE but Statement 2 is NOT the correct explanation for Statement 1. Statement 1 is TRUE and Statement 2 is FALSE. Statement 1 is FALSE and Statement 2 is TRUE. Statement 1: Vector $\overrightarrow{c} = 5\hat{i} + 7\hat{j} + 2\hat{k}$ is along the bisector of angel between

$\overrightarrow{a} = \hat{i} + 2\hat{j} + 2\hat{k} and \overrightarrow{b} =$

$-8\hat{i} + \hat{j} - 4\hat{k}.$

Statement 2: $\overrightarrow{c}$ is equally inclined to $\overrightarrow{a} and \overrightarrow{b}$.

Watch Free Video Solution on Doubtnut

246

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Shortest Distance Between Two Lines

Statement 1: Lines

$\overrightarrow{r} = \hat{i} + \hat{j} - \hat{k}$

$+ \lambda\left(3\hat{i} - \hat{j}\right) and \overrightarrow{r} = 4\hat{i}$

$-\hat{k} + \mu\left(2\hat{i} + \ + 3\hat{k}\right)$

intersect. Statement 2: $\overrightarrow{b} \times \overrightarrow{d} = 0$, then lines

$\overrightarrow{r} = \overrightarrow{a} + \lambda\overrightarrow{b} and \overrightarrow{r} = \overrightarrow{c}$

$+ \lambda\overrightarrow{d}$

do not intersect.

Watch Free Video Solution on Doubtnut

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios

247	The equation of two straight lines are $\frac{x-1}{2} = \frac{y+3}{1} = \frac{z-2}{-3} and \frac{x-2}{1} = \frac{y-1}{-3} = \frac{z+3}{2}$. Statement 1: the given lines are coplanar. Statement 2: The equations $2x_1 - y_1 = 1, x_1 + 3y_1 = 4 and 3x - 1 + 2y_1 = 5$ are consistent. Watch Free Video Solution on Doubtnut
248	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Distance Of A Point From A Plane** Statement 1: A plane passes through the point $A(2, 1, -3)$. If distance of this plane from origin is maximum, then its equation is $2x + y - 3z = 14$. Statement 2: If the plane passing through the point $A\left(\vec{a}\right)$ is at maximum distance from origin, then normal to the plane is vector $\vec{a}$. Watch Free Video Solution on Doubtnut
249	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** Statement 1: Line $\frac{x-1}{1} = \frac{y-0}{2} = \frac{z2}{-1}$ lies in the plane $2x - 3y - 4z - 10 = 0$. Statement 2: if line $\vec{r} = \vec{a} + \lambda \vec{b}$ lies in the plane $\vec{r} \dot{\vec{c}} = n(where n$ is scalar$), then \vec{b} \dot{\vec{c}} = 0$. Watch Free Video Solution on Doubtnut
250	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Angle Between A Line And A Plane** Statement 1: Let θ be the angle between the line $\frac{x-2}{2} = \frac{y-1}{-3} = \frac{z+2}{-2}$ and the plane $x + y - z = 5$. Then $\theta = \sin^{-1}\left(1/\sqrt{51}\right)$. Statement 2: The angle between a straight line and a plane is the complement of the angle between the line and the normal to the plane. Watch Free Video Solution on Doubtnut
	CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres Statement 1: let

251	$A\left(\vec{i}+\vec{j}+\vec{k}\right) andB\left(\vec{i}-\vec{j}+\vec{k}\right)$ be two points. Then point $P\left(2\vec{i}+3\vec{j}+\vec{k}\right)$ lies exterior to the sphere with AB as its diameter. Statement 2: If $AandB$ are any two points and P is a point in space such that $\overrightarrow{PA}\cdot\overrightarrow{PB}>0$, then point P lies exterior to the sphere with AB as its diameter. Watch Free Video Solution on Doubtnut
	
252	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Statement 1: there exists a unique sphere which passes through the three non-collinear points and which has the least radius. Statement 2: The centre of such a sphere lies on the plane determined by the given three points. Watch Free Video Solution on Doubtnut
253	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Perpendicular Distance Of A Point From A Line** Statement 1: There exist two points on the $\frac{x-1}{1}=\frac{y}{-1}=\frac{z+2}{2}$ which are at a distance of 2 units from point $(1,2,-4)$. Statement 2: Perpendicular distance of point $(1,2,-4)$ form the line $\frac{x-1}{1}=\frac{y}{-1}=\frac{z+2}{2}$ is 1 unit. Watch Free Video Solution on Doubtnut
	CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Shortest Distance Between Two Lines Statement 1: The shortest distance between the lines

254	$\frac{x}{-3}=\frac{y-1}{1}=\frac{z+1}{-1} and \frac{x-2}{1}=\frac{y-3}{2}=\left(\frac{z+(13/7)}{-1}\right)$ is zero. Statement 2: The given lines are perpendicular. Watch Free Video Solution on Doubtnut
255	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Spheres** Find the number of sphere of radius r touching the coordinate axes. Watch Free Video Solution on Doubtnut
256	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Distance Of A Point From A Plane** Find the distance of the z-axis from the image of the point $M(2-3,3)$ in the plane $x-2y-z+1=0.$ Watch Free Video Solution on Doubtnut
257	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios** The length of projection of the line segment joining the points $(1,0,-1) and (-1,2,2)$ on the plane $x+3y-5z=6$ is equal to a. 2 b. $\sqrt{\frac{271}{53}}$ c. $\sqrt{\frac{472}{31}}$ d. $\sqrt{\frac{474}{35}}$ Watch Free Video Solution on Doubtnut

258	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Angle Between A Line And A Plane** If the angle between the plane $x-3y+2z=1$ and the line $\frac{x-1}{2}=\frac{y-1}{1}$ $=\frac{z-1}{-3} is \theta,$ then the find the value of $\cos ec\theta$. Watch Free Video Solution on Doubtnut
259	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Regular Tetrahedron** Let $a_1, a_2, a_3.........$ be in $A.P.$ and $h_1, h_2, h_3.....$,in $H.P.$ If $a=2=h_1,$ and $a_{30}=25$ $=h_{30}$ then $a_7 h_{24}+a_{14}+a_{17}=$ Watch Free Video Solution on Doubtnut
260	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** Let the equation of the plane containing the line $x-y-z-4=0=x+y$ $+2z-4$ and is parallel to the line of intersection of the planes $2x+3y+z=1$ and $x+3y+2z=2$ be $x+Ay+Bz+C=0$ Compute the value of $\lvert A+B+C \rvert$. Watch Free Video Solution on Doubtnut
261	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios** If (a,b,c) is a point on the plane $3x+2y+z=7,$ then find the least value ofvector method. $a^2+b^2+c^2,$ using vector method. Watch Free Video Solution on Doubtnut
262	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of A Plane Passing Through The Line Of Intersection Of Two Planes** The plane $4x+7y+4z+81=0$ is rotated through a right angle about its line of intersection with the plane $5x+3y+10z=25.$ The equation of the plane in its new position is a. $x-4y+6z=106$ b. $x-8y+13z=103$ c. $x-4y+6z=110$ d. $x-8y+13z=105$

Watch Free Video Solution on Doubtnut

263

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Perpendicular Distance Of A Point From A Line

Find the distance of the point $(-2, 3, \ -4)$ from the line $\frac{x+2}{3} = \frac{2y+3}{4} = \frac{3z+4}{5}$ measured parallel to the plane $4x + 12y - 3z + 1 = 0.$

Watch Free Video Solution on Doubtnut

264

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Regular Tetrahedron

The position vectors of the four angular points of a tetrahedron OABC are $(0, 0, 0); (0, 0, 2), (0, 4, 0)$ and $(6, 0, 0)$ respectively. A point P inside the tetrahedron is at the same distance r from the four plane faces of the tetrahedron. Find the value of r

Watch Free Video Solution on Doubtnut

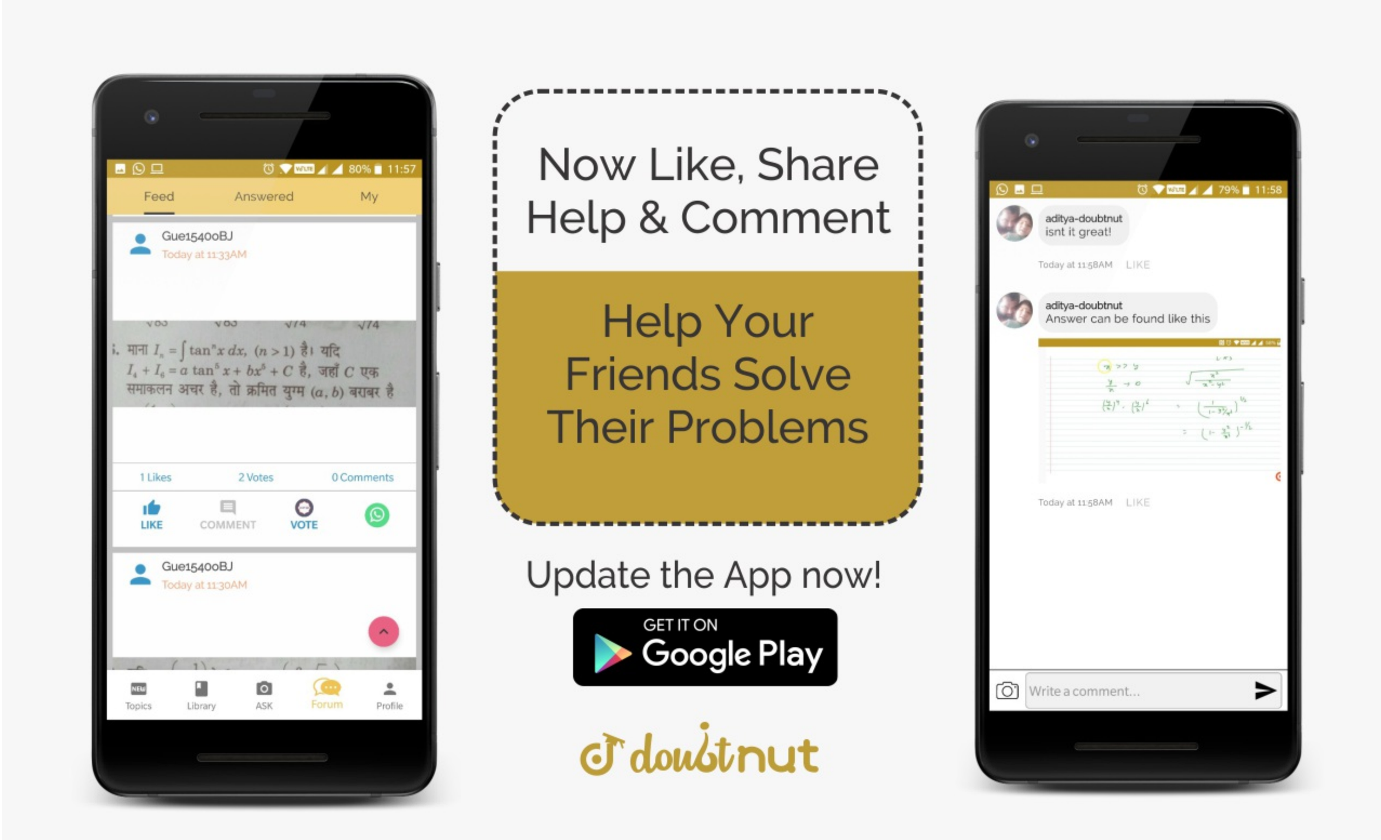
265

CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane

Find the equation of the plane passing through the points$(2, 1, 0), (5, 0, 1)$ and $(4, 1, 1)$ If P is the point $(2, 1, 6)$ then find point Q such that PQ is perpendicular to the above plane and the mid point of PQ lies on it.

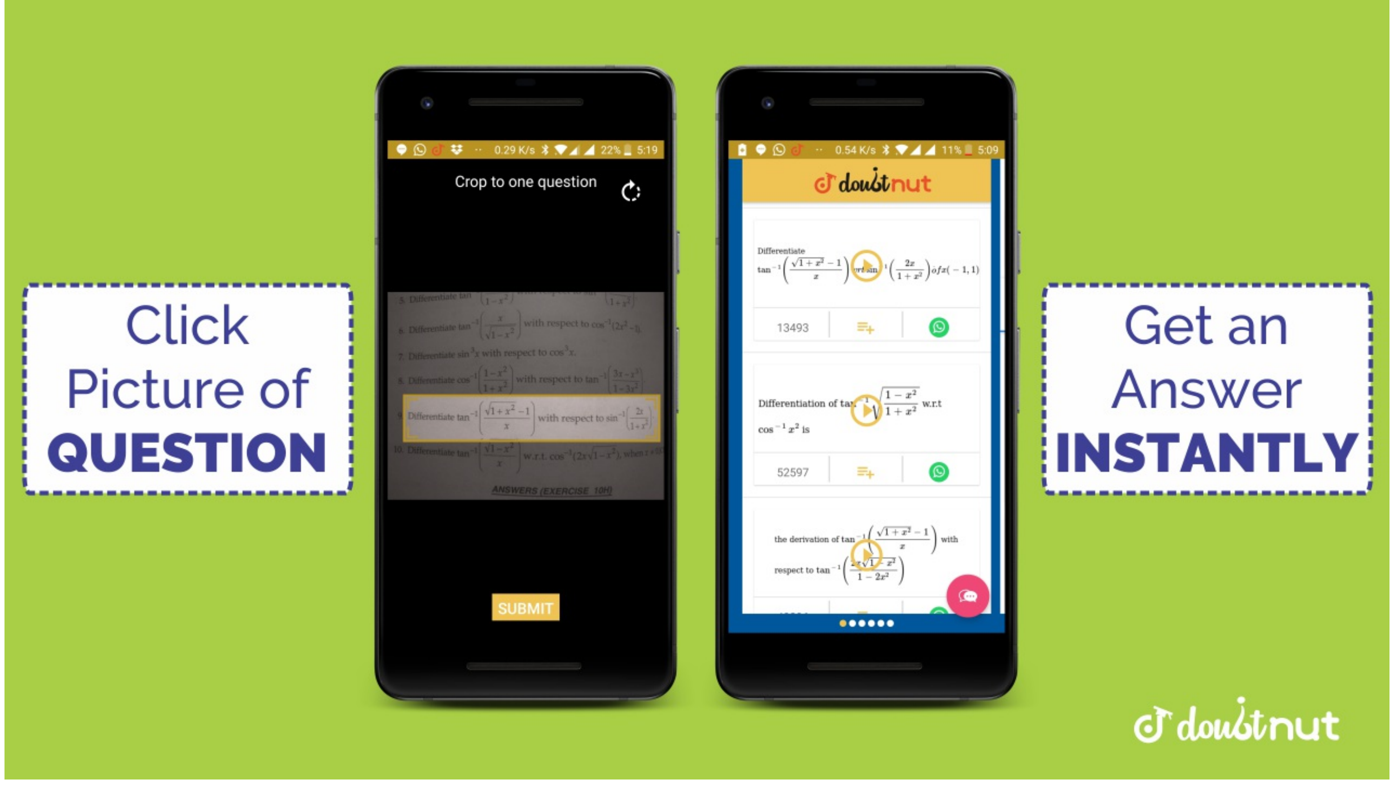
Watch Free Video Solution on Doubtnut

266	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Regular Tetrahedron** Find the equation of a plane passing through (1, 1, 1) and parallel to the lines L_1 and L_2 direction ratios (1, 0,-1) and (1,-1, 0) respectively. Find the volume of the tetrahedron formed by origin and the points where this plane intersects the coordinate axes. Watch Free Video Solution on Doubtnut
267	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Miscellaneous** A parallelepiped S has base points $A, B, CandD$ and upper face points $A', B', C', andD'$. The parallelepiped is compressed by upper face $A'B'C'D'$ to form a new parallepiped T having upper face points A,B, $C\mathrm{a\ n\ dD}$. The volume of parallelepiped T is 90 percent of the volume of parallelepiped $S_.$ Prove that the locus of A is a plane. Watch Free Video Solution on Doubtnut
268	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** Find the equation of the plane containing the lines 2x-y+z-3=0,3x+y+z=5 and a t a distance of $\frac{1}{\sqrt{6}}$ from the point (2,1,-1). Watch Free Video Solution on Doubtnut
269	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Direction Cosines And Direction Ratios** A line with positive direction cosines passes through the point P(2, – 1, 2) and makes equal angles with the coordinate axes. The line meets the plane 2x + y + z = 9 at point Q. The length of the line segment PQ equals Watch Free Video Solution on Doubtnut
doubtnut पढ़ना हुआ आसान	

	
270	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** The value of k such that $\frac{x-4}{1}=\frac{y-2}{1}=\frac{z-k}{2}$ lies in the plane $2x-4y+z=7$ is a. 7 b. -7 c. no real value d. 4 Watch Free Video Solution on Doubtnut
271	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Shortest Distance Between Two Lines** If the lines $\frac{x-1}{2}=\frac{y+1}{3}=\frac{z-1}{4}$ and $\frac{x-3}{1}=\frac{y-k}{2}=\frac{z}{1}$ intersect, then k is equal to (1) -1 (2) $\frac{2}{9}$ (3) $\frac{9}{2}$ (4) 0 Watch Free Video Solution on Doubtnut
272	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** 3. A variable plane $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=1$at a unit distance from origin cuts the coordinate axes at A, B and C. Centroid (x, y, z)satisfies the equation $\frac{1}{x^2}+\frac{1}{y^2}+\frac{1}{z^2}=K$. The value of Kis Watch Free Video Solution on Doubtnut
273	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Distance Of A Point From A Plane** A plane which prependicular totwo planes $2x-2y+z=0$and $x-y+2z=4$ passes through the point $(1,\ -2,\ 1)$ is: Watch Free Video Solution on Doubtnut

274	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** Let $P(3, 2, 6)$ be a point in space and Q be a point on line $\vec{r} = (\hat{i} - \hat{j} + 2\hat{k}) + \mu(-3\hat{i} + \hat{j} + 5\hat{k})$. Then the value of μ for which the vector $\vec{PQ}$ is parallel to the plane $x - 4y + 3z = 1$ is a. 1/4 b. -1/4 c. 1/8 d. -1/8 Watch Free Video Solution on Doubtnut
275	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** Equation of the plane containing the straight line $\frac{x}{2} = \frac{y}{3} = \frac{z}{4}$ and perpendicular to the plane containing the straight lines $\frac{x}{2} = \frac{y}{4} = \frac{z}{2}$ and $\frac{x}{4} = \frac{y}{2} = \frac{z}{3}$ is Watch Free Video Solution on Doubtnut
276	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Distance Of A Point From A Plane** If the distance of the point $P(1, -2, 1)$ from the plane $x + 2y - 2z = \alpha, where\alpha > 0, is5,$ then the foot of the perpendicular from P to the place is a. $\left(\frac{8}{3}, \frac{4}{3}, -\frac{7}{3}\right)$ b. $\left(\frac{4}{3}, -\frac{4}{3}, \frac{1}{3}\right)$ c. $\left(\frac{1}{3}, \frac{2}{3}, \frac{10}{3}\right)$ d. $\left(\frac{2}{3}, -\frac{1}{3}, -\frac{5}{3}\right)$ Watch Free Video Solution on Doubtnut
	CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL

277	**GEOMETRY_Perpendicular Distance Of A Point From A Line** The point P is the intersection of the straight line joining the points Q(2,3,5) and R(1,-1,4) with the plane 5x - 4y -z = 1. If S is the foot of the perpendicular drawn from the point T(2,1,4) to QR, Watch Free Video Solution on Doubtnut
278	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** Perpendiculars are drawn from points on the line $\frac{x+2}{2}=\frac{y+1}{-1}=\frac{z}{3}$ to the plane x + y + z=3 The feet of perpendiculars lie on the line Watch Free Video Solution on Doubtnut
279	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Plane** Two lines $L_1: x=5, \frac{y}{3-\alpha}=\frac{z}{-2}$ and $L_2: x=\alpha, \frac{y}{-1}=\frac{z}{2-\alpha}$ are coplanar. Then α can take value (s) a. 1 b. 2 c. 3 d. 4 Watch Free Video Solution on Doubtnut
280	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Perpendicular Distance Of A Point From A Line** A line l passing through the origin is perpendicular to the lines $l_1: (3+t)\hat{i}+(-1+2t)\hat{j}$ $+(4+2t)\hat{k}, \infty < t < \infty, l_2$ $: (3+s)\hat{i}+(3+2s)\hat{j}$ $+(2+s)\hat{k}, \infty < t < \infty$ then the coordinates of the point on l_2 at a distance of $\sqrt{17}$ from the point of intersection of $l \& l_1$ is/are: Watch Free Video Solution on Doubtnut
281	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of A Plane Passing Through The Line Of Intersection Of Two Planes** Consider the planes $3x-6y-2z-15=0$ and $2x+y-2z-5=0$ Statement 1:The parametric equations of the line intersection of the given planes are $x=3+14t, y=2t, z=15t$. Statement 2: The vector $14\hat{i}+2\hat{j}+15\hat{k}$ is parallel to the line of intersection of the given planes. Watch Free Video Solution on Doubtnut

	
282	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Equation Of A Plane Passing Through The Line Of Intersection Of Two Planes** Consider three planes $P_1 : x - y + z = 1$, $P_2 : x + y - z = -1$ and $P_3 : x - 3y + 3z = 2$ Let L_1, L_2 and L_3 be the lines of intersection of the planes P_2 and P_3, P_3 and P_1 and P_1 and P_2 respectively.Statement 1: At least two of the lines L_1, L_2 and L_3 are non-parallel The three planes do not have a common point Watch Free Video Solution on Doubtnut
283	**CENGAGE_MATHS_VECTORS AND 3D GEOMETRY_THREE DIMENSIONAL GEOMETRY_Distance Between Parallel Planes** If the distance between the plane Ax 2y + z = d and the plane containing the lines 2 1x = 3 2y = 4 3z and 3 2x = 4 3y = 5 4z is 6 , then |d| is Watch Free Video Solution on Doubtnut