



# MATHS

# **BOOKS - KC SINHA MATHS (HINGLISH)**

# **3D - COMPETITION**

**Solved Examples** 

**1.** Show that the three lines drawn from the origin with direction cosines

proportional to 1,-1,1,2,-3,0 and 1,0,3 are coplanar

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2. Prove that the two lines whose direction cosines are given by the relations pl+qm+rn=0 and  $al^2+bm^2+cn^2=0$  are

perpendicular if  $p^2(b+c)+q^2(c+a)+r^2(a+b)=0$  and parallel if

$$rac{p^2}{a}+rac{q^2}{b}+rac{r^2}{c}=0$$

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3. Prove that the lines whose directioncosines are given by the equtions

l + m + n = 0 and 3lm - 5mn + 2nl = 0 are mutually perpendicular.

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4. If the direction cosines of two lines given by the equations pm + qn + rl = 0 and lm + mn + nl = 0, prove that the lines are parallel if  $p^2 + q^2 + r^2 = 2(pq + qr + rp)$  and perpendicular if pq + qr + rp = 0

5. Show that the angle between the straight lines whose direction cosines are given by the equation l + m + n = 0 and amn + bnl + clm = 0 is  $\frac{\pi}{3}$  if  $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 0$ 

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**6.** Prove that in a tetrahedron if two pairs of opposite edges are perpendicular, then the third pair is also perpendicular.

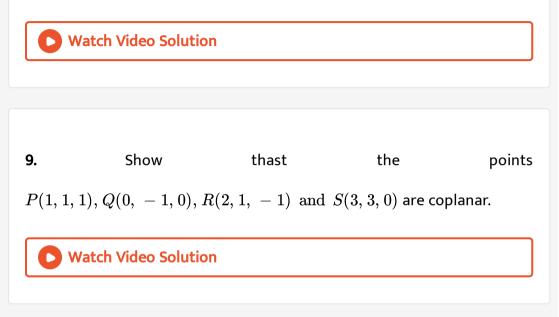
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7. If coordinates of P,Q,R,S and (3, 6, 4), (2, 5, 2), (6, 4, 4), (0, 2, 1)

respectively, find the projection of PQ on RS.



**8.** Find the length and direction cosines of a line segment whose projection on the coordinate axes are 6,-3,2.



10. find the equation f the plane passing through the point  $(\alpha,\beta,\gamma)$  and

perpendicular to the planes

 $a_1x + b_1y + c_1z + d_1 = 0 \, ext{ and } \, a_2x + b_2 + yc_2z + d_2 = 0$ 



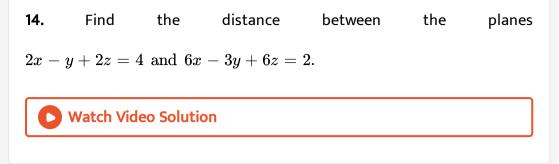
**11.** Find the equation of the plane passing through the line of intersection of the planes 4x - 5y - 4z = 1 and 2x = y + 2z = 8 and the point (2,1,3).

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12. The plane ax + by = 0 is rotated about its line of intersection with the plane z = 0 through an angle  $\alpha$ . Prove that the equation of the plane in its new position is  $ax + by \pm (\sqrt{a^2 + b^2} \tan \alpha)z = 0$ Watch Video Solution

13. Find the reflection of the plane ax + by + cz + d = 0 in the plane

$$a'x + b'y + c'z + d' = 0$$



15. Find the plane which bisects the obtuse angle between the planes

4x - 3y + 12z + 13 = 0 and x + 2y + 2z = 9

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16. Find the equation of the planes bisecting the angles between planes

2x + y + 2z = 9 and 3x - 4y + 12z + 13 = 0



17. 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 .



18. If P be a point on the lane lx + my + nz = p and Q be a point on the OP such that  $OP. OQ = p^2$  show that the locus of the point Q is  $p(lx + my + nz) = x^2 + y^2 + z^2.$ 

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**19.** A variable plane passes through a fixed point  $(\alpha, \beta, \gamma)$  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  $\alpha x^{-1} + \beta y^{-1} + \gamma z^{-1} = 1.$ 

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**20.** A variable plane at constant distance p form the origin meets the coordinate axes at P,Q, and R. Find the locus of the point of intersection of planes drawn through P,Q, r and parallel to the coordinate planes.

**21.** A variable plane is at a constant distance p from the origin and meets the coordinate axes in A, B, C. Show that the locus of the centroid of the tehrahedron  $OABCisx^{-2} + y^{-2} + z^{-2} = 16p^{-2}$ .

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**22.** 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 = 0 and z = 0, respectively, intersect at *Q*, find the locus of *Q*.

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23. 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 **24.**  $A_{xy,yz}$  ,  $A_{zx}$  be the area of projections oif asn area a o the xy,yz and zx and planes resepctively, then  $A^2=A^2_-(xy)+A^2_-(yz)+a^2_-(zx)$ 

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25. Through a point P(h, k, l) a plane is drawn at right angle to OP to meet the coordinate axes in A,B and C. If OP =p show that the area of  $\triangle ABCisp^5/(2hkl)$ `

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**26.** Find the distance of the point (1,0,-3) from plane x-y-z=9 measured parallel to the line  $\frac{x-2}{2} = \frac{y+2}{2} = \frac{z-6}{-6}$ 

**27.** Find the equation of the plane passing through (1, 2, 0) which x + 3 = u - 1 = z - 2

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

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**28.** Find the equation of the plane through the line  

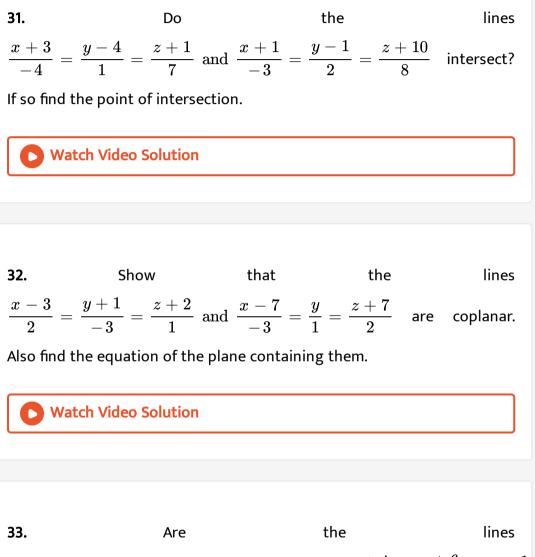
$$\frac{x - x_1}{l_1} = \frac{y - y_1}{m_1} = \frac{z - z_1}{n_1}$$
 and parallel to the line  

$$\frac{x - \alpha}{l_2} = \frac{y - \beta}{m_2} = \frac{z - \gamma}{n_2}$$
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**29.** 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. **Vatch Video Solution** 

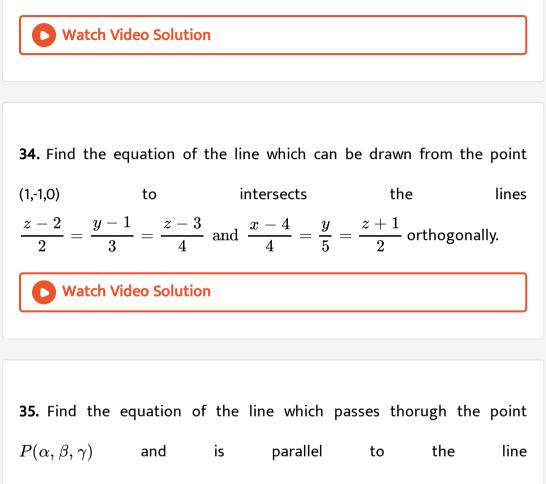
**30.** Find the the image of the point  $(\alpha, \beta, \gamma)$  with respect to the plane

2x + y + z = 6.



3x - 2y + z + 5 = 0 = 2x + 3y + 4z - 4 and  $\frac{x + 4}{3} = \frac{y + 6}{5} = \frac{z - 1}{-2}$ 

coplanar. If yes find their point of intersection and equation of the plane which they lie.



 $a_1x+b_1y+c_1z+d_1=0, a_2x+b_2y+c_2z+d_2=0$ 

**36.** Equation of line of projection of the line 3x - y + 2z - 1 = 0 = x + 2y - z - 2 on the plane 3x + 2y + z = 0 is:

**37.** Find the equation of the plane which passes through the line  $a_1x + b_1y + c_1y + c_1z + d_1 = 0a_2x + b_2y + c_2z + d_2 = 0$  and which is parallel to the line  $\frac{x - \alpha}{l} = \frac{y - \beta}{m} = \frac{z - \gamma}{n}$ 

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 $x-cy-bz=0, cx-y+az=0 \hspace{0.1 cm} ext{and} \hspace{0.1 cm} bx+ay-z=0 \hspace{0.1 cm} ext{pass through}$ 

a line, then the value of  $a^2+b^2+c^2+2abc$  is....

39. Find the length of the shortest distance between the lines  $\frac{x-1}{2}\frac{y-4}{3} = \frac{z+1}{-3}$  and  $\frac{x-4}{1} = \frac{y-3}{3} = \frac{z-2}{2}$ Watch Video Solution 40. Prove that the shortest distance between any two opposite edges of a tetrahedron formed the planes by  $y+z=0,x+z=0,x+y=0,x+y+z=\sqrt{3}ais\sqrt{2}a$ Watch Video Solution

**41.** Find the equation of the sphere touching the four planes x = 0, y = 0, z = 0 and x + y + z = 1 and lying in the octant bounded by positive coordinate planes.

**42.** The plane  $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$  meets the coordinate axes at A,B and C respectively. Find the equation of the sphere OABC.



**43.** Find the equation of the sphere which passes through the point (1,0,0),(0,1,0) and (0,0,1)` and has its radius as small as possible.

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**44.** find the equation of the plane passing through points (2,1,0),(5,0,1) and (4,1,1).



**45.** If P is the point (2,1,6) find the point Q such that PQ is perpendicular to

the plane x + y - 2z = 3 and the mid point of PQ lies on it.



**46.** 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, CandD. The volume of parallelepiped T is 90 percent of the volume of parallelepiped S. Prove that the locus of A is a plane.

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**47.** A plane is parallel to two lines whose direction ratios are (1,0,-1) and (-1,1,0) and it contains the point (1,1,1).If it cuts coordinate axes at A,B,C then find the volume of the tetrahedron OABC.



**48.** Two planes  $P_1$  and  $P_2$  pass through origin. Two lines  $L_1$  and  $L_2$  also passing through origin are such that  $L_1$  lies on  $P_1$  but not on  $P_2$ ,  $L_2$  lies

on  $P_2$  but not on  $P_1A, B, C$  are there points other than origin, then prove that the permutation [A', B', C'] of [A, B, C] exists. Such that:

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**49.** Find the equation of the plane containing the line 2x + y + z - 1 = 0, x + 2y - z = 4 and at a distance of  $\frac{1}{\sqrt{6}}$  from the

point (2,1,-1).

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**50.** The line 
$$\frac{x-4}{1} = \frac{y-2}{1} = \frac{z-k}{2}$$
 lies exactly on the plane  $2x - 4y + z = 7$  then the value of k is (A) 7 (B) -7 (C) 1 (D) none of these

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51. Two system of rectangular axes have the same origin. IF a plane cuts

them at distances a,b,c and a\',b\',c\' $omthe ext{ or } ig \in then$ (A)

$$\frac{1}{a^2} + \frac{1}{b^2} - \frac{1}{c^2} + \frac{1}{a^{\prime 2}} + \frac{1}{b^{\prime 2}} - \frac{1}{c^{\prime 2}} = 0$$
(B)

$$\frac{1}{a^2} - \frac{1}{b^2} - \frac{1}{c^2} + \frac{1}{a^{\prime 2}} - \frac{1}{b^{\prime 2}} - \frac{1}{c^{\prime 2}} = 0$$
(C)

$$\frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2} - \frac{1}{a^{\prime 2}} - \frac{1}{b^{\prime 2}} - \frac{1}{c^{\prime 2}} = 0$$
(D)

$$rac{1}{a^2} + rac{1}{b^2} + rac{1}{c^2} + rac{1}{a^{\,'2}} + rac{1}{b^{\,'2}} + rac{1}{c^{\,'2}} = 0$$

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52. The shortest distance from the plane 12x + y + 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

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**53.** 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 the value of k is (A)  $\frac{3}{2}$  (B)  $\frac{9}{2}$  (C)  $-\frac{2}{9}$  (D)  $-\frac{3}{2}$ 

54. A line with direction cosines proportional to 2,1,2 meet each of the lines x = y + a = z and x + a = 2y = 2z. The coordinastes of each of the points of intersection are given by (A) (3a, 2a, 3a), (a, a, 2a) (B) (3a, 2a, 3a), (a, a, a0 (C) (3a, 3a, 3a), (a, a, a) (D) 92a, 3a, 3a), (2a, a, a0

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**55.** A variable plane at distance of 1 unit from the origin cuts the coordinte axes at A,B and C. If the centroid D(x, y, z) of triangle ABC satisfies the relation  $\frac{1}{x^2} + \frac{1}{y^2} + \frac{1}{z^2} = k$  then the value of k is (A) 3 (B) 1 (C)  $\frac{1}{3}$  (D) 9

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56. Let the line  $\frac{x-2}{3} = \frac{y-1}{-5} = \frac{z+2}{2}$  lie in the plane  $x + 3y - \alpha z + \beta = 0$ . Then $(\alpha, \beta)$  equals(A)(6,-17)(B)(-6,7)(C)(5,15)(D) (-5,5)'

**57.** A line with positive direction cosines passes through the ont P(2, -1, 2) and makes equal angles with the coordinate axes. The line meets the plane 2x + y + z = 9 at Q. The length of the line segment PQ equals (A) 1 (B)  $\sqrt{2}$  (C)  $\sqrt{3}$  (D) 2

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**58.** The value of k for which the planes kx + 4y + z = 0, 4x + ky + 2z = 0 and 2x + 2y + z = 0 intersect in a straight line is (A) 1 (B) 2 (C) 3 (D) 4

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**59.** Consider the planes  $\overrightarrow{r}$ .  $\overrightarrow{n}_1 = d_1$  and  $\overrightarrow{r}$ .  $\overrightarrow{n}_2 = d_2$  then (A) they are perpendiculat if  $\overrightarrow{n}_1$ .  $\overrightarrow{n}_2 = 0$  (B) intersect in a line parallel to

 $\overrightarrow{n}_1 \times \overrightarrow{n}_2$  if  $\overrightarrow{n}_1$  is not parallel to  $\overrightarrow{n}_2$  (C) angle between them is  $\cos^{-1}\left(\frac{\overrightarrow{n}_1.n_2.}{|\overrightarrow{n}_1||\overrightarrow{n}_2|}\right)$  (D) none of these Watch Video Solution

60. Consider three planes 
$$P_1: x - y + z = 1, P_2: x + y - z = -1, P_3, x - 3y + 3z = 2$$
 Let  $L_1, L_2, L_3$  be the lines of intersection of the planes  $P_2$  and  $P_3$  and  $P - 1, P_1$  and  $P_2$ , respectively.

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**61.** A paragraph has been given. Based upon this paragraph, 3 multiple choice question have to be answered. Each question has 4 choices a,b,c and d out of which ONLYONE is correct. Consider the  $L_1: \frac{x+1}{3} = \frac{y+2}{1} = \frac{z+1}{2}$  and  $L_2: \frac{x-2}{1} = \frac{y+2}{2} = \frac{z-3}{3}$  The

unit vector perpendicular to both 
$$L_1$$
 and  $L_2$  is (A)  $\frac{-\hat{i}+7\hat{k}+7\hat{k}}{\sqrt{99}}$  (B)  
 $\frac{-\hat{i}-7\hat{k}+5\hat{k}}{5\sqrt{3}}$  (C)  $\frac{-\hat{i}+7\hat{k}+7\hat{k}}{5\sqrt{3}}$  (D)  $\frac{7\hat{i}-7\hat{k}-7k}{\sqrt{99}}$ 

**62.** A paragraph has been given. Based upon this paragraph, 3 multiple choice question have to be answered. Each question has 4 choices a,b,c and d out of which ONLYONE is correct. Consider the  $L_1: \frac{x+1}{3} = \frac{y+2}{1} = \frac{z+1}{2}$  and  $L_2: \frac{x-2}{1} = \frac{y+2}{2} = \frac{z-3}{3}$  The shortest distance betwen  $L_1$  and  $L_2$  is (A) O (B)  $\frac{17}{\sqrt{3}}$  (C)  $\frac{41}{5(3)}$  (D)  $\frac{17}{\sqrt{75}}$ 

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**63.** A paragraph has been given. Based upon this paragraph, 3 multiple choice question have to be answered. Each question has 4 choices a,b,c and d out of which ONLYONE is correct. Consider the  $L_1: \frac{x+1}{3} = \frac{y+2}{1} = \frac{z+1}{2}$  and  $L_2: \frac{x-2}{1} = \frac{y+2}{2} = \frac{z-3}{3}$  The distance of the point (1,1,) from the plane passing through the point

(-1,-2,-1) and whose normal is perpendicular to both the lines  $L_1 \,\, {
m and} \,\, L_2$ 

is (A) 
$$\frac{2}{\sqrt{75}}$$
 (B)  $\frac{7}{\sqrt{75}}$  (C)  $\frac{13}{\sqrt{75}}$  (D)  $\frac{23}{\sqrt{75}}$ 

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#### Exercise

1. Show that the plane ax + by + cz + d = 0 divides the line joining  $(x_1, y_1, z_1)$  and  $(x_2, y_2, z_2)$  in the ratio of  $\left(-\frac{ax_1 + ay_1 + cz_1 + d}{ax_2 + by_2 + cz_2 + d}\right)$ 

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2. If origin is the centroid of  $\triangle ABC$  with the vertices  $A(\alpha, 1, 3), B(-2, \beta, -5)$  and  $C(4, 7, \gamma)$  find the value of  $\alpha, \beta, \gamma$ 

**3.** Show that  $\left(-\frac{1}{2}, 2, 0\right)$  is the circumacentre of the triangle whose vertices are A(1, 1, 0), B(1, 2, 1) and C(-2, 2, -1) and hence find its orthocentre.

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4. A(3,2,0), B(5,3,2), (-9,6,-3) are the vertices of riangle ABC and

AD is the bisector of  $\angle BAC$  which meets at D. Find the coordinates of D,

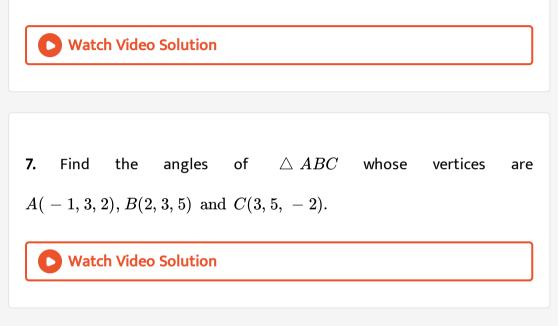
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**5.** Find the coordinate of the foot of the perpendicular from P(2, 1, 3) on

the line join int the points A(1, 2, 4) and B(3, 4, 5)



**6.** IF O be the origin and OP makes angles  $45^0$  and  $60^0$  with the positive direction f x and y-axes respectively and OP=12 units find the coordinates of P.



8. Find the projection of the line segment joining (2,-1,3) and (4,2,5)` on a

line which makes equal to acute angle with coordinate axes.



9. The projection of a directed line segment on the coordinate axes are

12,4,3. Find its length and direction cosines.



**10.** Find the direction cosines of as perpendicular from origin to the plane

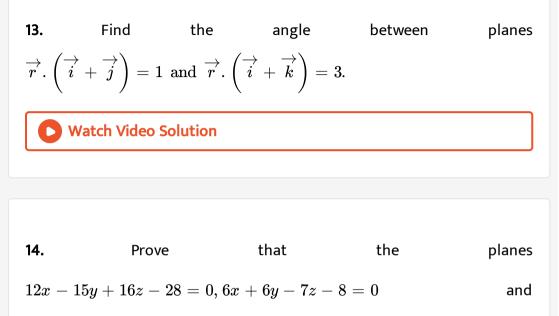
$$\overrightarrow{r}.\left(2\hat{i}-2\hat{j}+\hat{j}
ight)+2=0$$

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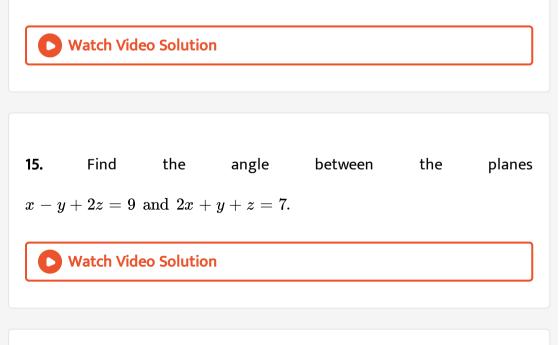
11. Find the Cartesian equation of the plane  $\overrightarrow{r}.\left(2\hat{i}-3\hat{j}+5\hat{k}
ight)=1.$ 

**12.** If the vector equation of a plane is  
$$\overrightarrow{r}$$
.  $(1 + s - t)\overrightarrow{i} + (2 - s)\overrightarrow{j} + (3 - 2 + 2t)\overrightarrow{k}$ , find its equation in Cartesian form.





2x + 35y - 39z + 12 = 0 have a common line of intersection.



**16.** Show that the origin lies in the interior of the acute angle between planes x + 2y + 2z = 9 and 4x - 3y + 12z + 13 = 0. Find the equation of bisector of the acute angle.



**17.** The plane  $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$  meets the coordinaste axces in points A,B,C respectively. Find the area of  $\triangle ABC$ .

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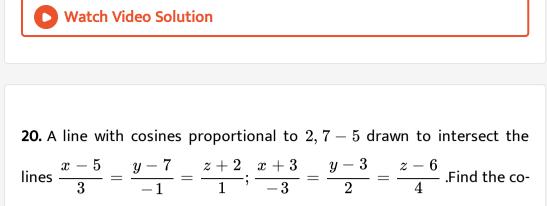
**18.** A(1, 0, 4), B(0, -11, 3), C(2, -3, 1) are three points and D is the

foot of perpendicular from A to BC. Find the coordinates of D.



19. Find the perpendicular distance of an angular point of a cube from a

diagona which does not pass through that angular point.



ordinates of the points of intersection and the length intercepted on it.

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**21.** Find the image of the point (2,-3,4) with respect to the plane 4x + 2y - 4z + 3 = 0

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22. Projection of line 
$$\frac{x+1}{2} + \frac{y+1}{-1} = \frac{z+3}{4}$$
 on the plane  $x + 2y + z = 6$ ; has equation  $x + 2y + z - 6 = 0 = 9x - 2y - 5z - 8$   
b.  $x + 2y + z + 6 = 0$ ,  $9x - 2y + 5z = 4$  c.  $\frac{x-1}{4} = \frac{y-3}{-7} = \frac{z+1}{10}$   
d.  $\frac{x+3}{4} = \frac{y-2}{7} = \frac{z-7}{-10}$ 

**23.** Prove that the straight lines 
$$\frac{x}{\alpha} = \frac{y}{\beta} = \frac{z}{\gamma}, \frac{x}{l} = \frac{y}{m} = \frac{z}{n}$$
 and  $\frac{x}{a\alpha} = \frac{y}{b\beta} = \frac{z}{c\gamma}$  will be co planar if  $\frac{l}{\alpha}(b-c) + \frac{m}{\beta}(c-a) + \frac{n}{\gamma}(a-b) = 0$ 

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24. Find the equation of the line through point (1, 2, 3) and parallel to

line x - y + 2z = 5, 3x + y + z = 6

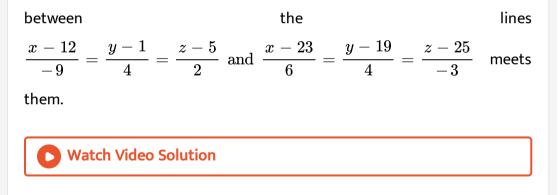


**25.** The shortest distance between the straighat lines through the point  $A_1 = (6, 2, 2)$  and  $A_2 = (-4, 0, -1)$  in the directions 1,-2,2 and 3,-2,-2 is (A) 6 (B) 8 (C) 12 (D) 9



26. Find the points on the lines  $\frac{x-6}{3} = \frac{y-7}{-1} = \frac{z-4}{1}$  and  $\frac{x}{-3} = \frac{y-9}{2} = \frac{z-2}{4}$ . Which are nearest to each other.

27. Find the coordinates of the points where the shortest distance



**28.** A variable plane moves in such a way that the sum of the reciprocals of its intercepts on the three coordinate axes is constant. Show that the plane passes through a fixed point.

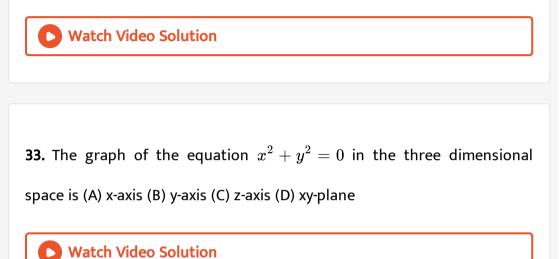
**29.** The position of a mving point in space is x = 2t, y4t, z = 4t where t is measured in seconds and coordinates of moving point are in kilometers: The distance of thepoint from the starting point `O(0,0,0) in 15 sec is (A) 3 km (B) 60km (C) 90km (D) 120km



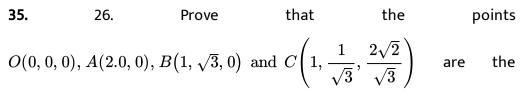
30. If the system of equations x=cy+bz y=az+cx z=bz+ay has a non-trivial solution, show that  $a^2+b^2+c^2+2abc=1$ 

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**31.** Let PQ be the perpendicular form P(1, 2, 3) to xy-plane. If OP makes an angle theta with the positive direction of z-axis and OQ makes an angle  $\phi$  with the positive direction of x-axis where O is the origin show that  $\tan \theta = \frac{\sqrt{5}}{3}$  and  $\tan \phi = 2$ . **32.** 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:



**34.** If a point moves so that the sum of the squars of its distances from the six faces of a cube having length of each edge 2 units is 104 units then the distance of the point from point (1,1,1) is (A) a variable (B) a constant equal to 7 units (C) a constant equal to 4 uinits (D) a constant equal to 49 units



vertices of a regular tetrahedron.,

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**36.** Prove that the acute angle between two diagonals of a cube is  $\cos^{-1}\left(\frac{1}{3}\right)$ 

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37. The equation  $\overrightarrow{r}=\lambda\hat{i}+\mu\hat{j}$  represents the plane (A) x=0 (B) z=0 (C)

y=0 (D) none of these

**38.** The vector  $\overrightarrow{c}$ , directed along the internal bisector of the angle

between the vectors  

$$\overrightarrow{c} = 7\hat{i} - 4\hat{j} - 4\hat{k}$$
 and  $\overrightarrow{b} = -2\hat{i} - \hat{j} + 2\hat{k}$  with  $\left|\overrightarrow{c}\right| = 5\sqrt{6}$ , is

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**39.** The equation of the plane containing the line 2x + z - 4 = 0nd2y + z = 0 and passing through the point (2,1,-1)is(A)x+y-z=4(B)x-y-z=2(C)x+y+z+2=0(D)x+y+z=2`



**40.** The locus of xy + yz = 0 is (A) a pair of straighat lines (B) a pair of

parallel lines (C) a pair of parallel planes (D) none of these

**41.** The acute angle between the planes 5x - 4y + 7z = 13 and the y-axis

is given by (A) 
$$\sin^{-1}\left(\frac{5}{\sqrt{90}}\right)$$
 (B)  $\sin^{-1}\left(\frac{-4}{\sqrt{90}}\right)$  (C)  $\sin^{-1}\left(\frac{7}{\sqrt{90}}\right)$  (D)  $\sin^{-1}\left(\frac{4}{\sqrt{90}}\right)$ 

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**42.** The points A(1, 1, 0), B(0, 1, 1), C(1, 0, 1) and  $D\left(\frac{2}{3}, \frac{2}{3}, \frac{2}{3}\right)$  are

(A) coplanar (B) non coplanar (C) vertices of a paralleloram (D) none of these

**43.** The equation of the parallel plane lying midway between the parallel planes 2x - 3y + 6z - 7 = 0 and 2x - 3y + 6z + 7 = 0 is (A) 2x - 3y + 6z + 1 = 0 (B) 2x - 3y + 6z - 1 = 0 (C) 2x - 3y + 6z = 0 (D) none of these

44. The equation of the righat bisector plane of the segment joining (2,3,4) and (6,7,8) is (A) x + y + z + 15 = 0 (B) x + y + z - 15 = 0 (C) x - y + z - 15 = 0 (D) none of these



**45.** The angle between the plane 3x + 4y = 0 and z-axis is (A)  $0^0$  (B)  $30^0$ 

(C)  $60^0$  (D)  $90^0$ 

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**46.** If the points (-0, -1, -2), (-3, -4, -5), (-6, -7, -8) and (x, x, x)

are non coplanar then x is (A) -2 (B) 0 (C) 3 (D) any real number

47. The equation of the plane through the point (1,2,-3) which is parallel to the plane 3x - 5y + 2z = 11 is given by (A) 3x - 5y + 2z - 13 = 0(B) 5x - 3y + 2z + 13 = 0 (C) 3x - 2y + 5z + 13 = 0 (D) 3x - 5y + 2z + 13 = 0



48. The equation of any plane parallel to x-axis (A)  
$$ay + cz + b = 0, a^2 + b^2 + c^2 = 0$$
 (B)  $x = a$  (C)  
 $ay + cz - bx = 0, a^2 + c \neq 0$  (D) none of these

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**49.** 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.  $\langle 1, \sqrt{2}, \rangle$  b.  $\langle 1, 1, \sqrt{2} \rangle$  c.  $\langle 1, 1, 2 \rangle$  d. `<>`

50. The equation of the plane through the intersection of plane x + 2y + 3z = 4 and 2x + y - z - 5 and perpendicular to the plane 5x + 3y + 6z + 8 = 0 is (A) 7x - 2y + 3z + 81 = 0 (B) 23x + 14y - 9z + 48 = 0 (C) 51x + 15y + 50z + 173 = 0 (D) none of these

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**51.** The distance of the point (2,1,-1) from the plane x-2y+4z=9 is (A)

$$rac{\sqrt{13}}{21}$$
 (B)  $rac{13}{21}$  (C)  $rac{13}{\sqrt{21}}$  (D)  $\sqrt{rac{13}{21}}$ 

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52.

The

points

 $A(5, -1, 1), B(7, -4, 7), C(1, -6, 10) \,\, {
m and} \,\, D(\, -1, \, -3, 4)$  are the

vertices of a (A) rhombus (B) square (C) rectangle (D) none of these

53. The angle  $\theta$  the line  $\overrightarrow{r} = \overrightarrow{r} + \lambda \overrightarrow{b}$  and the plane  $\overrightarrow{r}$ .  $\widehat{n} = d$  is given

by (A) 
$$\sin^{-1}\left(\frac{\overrightarrow{b} \cdot \widehat{n}}{\left|\overrightarrow{b}\right|}\right)$$
 (B)  $\cos^{-1}\left(\frac{\overrightarrow{b} \cdot \widehat{n}}{\left|\overrightarrow{b}\right|}\right)$  (C)  $\sin^{-1}\left(\frac{\overrightarrow{a} \cdot \widehat{n}}{\left|\overrightarrow{a}\right|}\right)$  (D)  $\cos^{-1}\left(\frac{\overrightarrow{a} \cdot \widehat{n}}{\left|\overrightarrow{a}\right|}\right)$ 

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54. A straighat line  $\overrightarrow{r} = \overrightarrow{a} + \lambda \overrightarrow{b}$  meets the plane  $\overrightarrow{r} \cdot \overrightarrow{n} = p$  in the point whose position vector is (A)  $\overrightarrow{a} + \left(\frac{\overrightarrow{a} \cdot \widehat{n}}{\overrightarrow{b} \cdot \widehat{n}}\right) \overrightarrow{b}$  (B)  $\overrightarrow{a} + \left(\frac{p - \overrightarrow{a} \cdot \widehat{n}}{\overrightarrow{b} \cdot \widehat{n}}\right) \overrightarrow{b}$  (C)  $\overrightarrow{a} - \left(\frac{\overrightarrow{a} \cdot \widehat{n}}{\overrightarrow{b} \cdot \widehat{n}}\right) \overrightarrow{b}$  (D) none of these

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**55.** The equation of the line through (1, 1, 1) and perpendicular to the plane 2x + 3y - z = 5 is (A)  $\frac{x-1}{2} = \frac{y-1}{3} = z - 1$  (B)

$$\frac{x-1}{2} = \frac{y-1}{3} = \frac{z-1}{-1} \qquad (C) \qquad \frac{x-1}{2} = \frac{y-1}{3} = \frac{z-1}{5} \qquad (D)$$
$$\frac{x-1}{2} = \frac{y-1}{-3} = z-1$$

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**56.** For the  $l: \frac{x-1}{3} = \frac{y+1}{2} = \frac{z-3}{-1}$  and the plane P: x - 2y - z = 0 of the following assertions the ony one which is true is (A) I lies in P (B) I is parallel to P (C) I is perpendiculr to P (D) none of these

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**57.** The reflection of the point (2, -1, 3) in the plane 3x - 2y - z = 9 is (A)  $\left(\frac{28}{7}, \frac{15}{7}, \frac{17}{7}\right)$  (B)  $\left(\frac{26}{7}, -\frac{15}{7}, \frac{17}{7}\right)$  (C)  $\left(\frac{15}{7}, \frac{26}{7}, -\frac{17}{7}\right)$  (D)  $\left(\frac{26}{7}, \frac{17}{7}, -\frac{15}{70}\right)$ 

**58.** the cooerdinastes of the foot of perpendicular from the point A(1, 1, 10 on theine joining the points B(1, 4, 6 and C(5, 4, 4) are (A)(3, 4, 5) (B) (4, 5, 3) (C) (3, -4, 5) (D) (-3, -4, 5)

**59.** The equation of the plane thorugh the point (-1, 2, 0) and parallel to the lines  $\frac{x}{3} = \frac{y+1}{0} = \frac{z-2}{-1}$  and  $\frac{x-1}{1} = \frac{2y+1}{2} = \frac{z+1}{-1}$  is (A) 2x + 3y + 6z - 4 = 0 (B) x - 2y + 3z + 5 = 0 (C) x + y - 3z + 1 = 0 (D) x + y + 3z - 1 = 0Watch Video Solution

60. Find the shortest distance between the lines 
$$\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4} and \frac{x-2}{3} = \frac{y-4}{4} = \frac{z-5}{5}.$$

**61.** The plane x-2y+z-6=0 and the line x/1=y/2=z/3 are related as the line (A) meets the plane obliquely (B) lies in the plane (C) meets at righat angle to the plane (D) parallel to the plane

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62. If  $\overrightarrow{r} \cdot \left(2\hat{i}+3\hat{j}-2\hat{k}\right)+\frac{3}{2}=0$  is the equation of a plane and  $\hat{i}-2\hat{j}+3\hat{k}$  is a point then a point equidistasnt from the plane on the opposite side is (A)  $\hat{i}+2\hat{j}+3\hat{k}$  (B)  $3\hat{i}+\hat{j}+\hat{k}$  (C)  $3\hat{i}+2\hat{j}+3\hat{k}$  (D)  $3\left(\hat{i}+\hat{j}+\hat{k}\right)$ 

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**63.** The line of intersection of the planes  $\overrightarrow{r} \cdot (3\hat{i} - \hat{j} + \hat{k}) = 1$  and  $\overrightarrow{r} \cdot (\hat{i} + 4\hat{j} - 2\hat{k}) = 2$  is parallel to the vector (A)  $2\hat{i} + 7\hat{j} + 13\hat{k}$  (B)  $-2\hat{i} + 7\hat{j} + 13\hat{k}$  (C)  $-2\hat{i} - 7\hat{j} + 13\hat{k}$  (D)  $2\hat{i} - 7\hat{j} - 13\hat{k}$ 

64. The line  $\frac{x-1}{1} = \frac{y-2}{2} = \frac{z-3}{3}$  (A) lies in the plane x - 2y + z = 0 (B) is asme as line  $\frac{x}{1} = \frac{y}{2} = \frac{z}{3}$  (C) passes through (2,3,5) (D) is parallel to the plane x - 2y = z - 5 = 0

65. If  

$$l_1: \frac{x-5}{3} = \frac{y-7}{-16} = \frac{z-3}{7}$$
 and  $l_2: \frac{x-9}{3} = \frac{y-13}{8} = \frac{z-15}{-5}$  the  
(A)  $l_1$  and  $l_2$  intersect (B)  $l_1$  and  $l_2$  are skew (C) distance between  
 $l_1$  and  $l_2$  is 14 (D) none of these  
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**66.** If 
$$\overrightarrow{r} = \hat{i} + \hat{j} + \lambda \left(2\hat{i} + \hat{j} + 4\hat{k}\right)$$
 and  $\overrightarrow{r} \cdot \left(\hat{i} + 2\hat{j} - \hat{k}\right) = 3$  ar the equation of a line and a plane respectively then which of the following is true? (A) line is perp[endiculat to the plane (B) line lies in the plane (C) line is paralle to tehplane but does not lies in the plane (D) line cuts the plane obliquely

67. The distance of the point (1,2,3) form the coordinate axes are A,B and C respectively.  $A^2 = B^2 + C^2$ ,  $B^2 = 2C^2$ ,  $2A^2C^2 = 13B^2$  which of these hold (s) true? (A) 1 only (B) 1 and 3 (C) 1 and 2 (D) 2 and 3

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**68.** The direction ratio o the lien OP are euqla and the length  $OP = \sqrt{3}$ . Then the cooredinates of the point P are (A) (-1, -1, -1) (B)  $(\sqrt{3}, \sqrt{3}, \sqrt{3})$  (C)  $(\sqrt{2}, \sqrt{2}, \sqrt{2})$  (D) (2, 2, 2)

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**69.** If a line makes angle  $35^0$  and  $55^0$  with x-axis and y-axis respectively, then the angle with this line makes with z-axis is (A)  $35^0$  (B)  $45^0$  (C)  $55^0$  (D)  $90^0$  **70.** A unit vector  $\hat{a}$  makes an angle  $\frac{\pi}{4}$  with z-axis, if  $\hat{a} + \hat{i} + \hat{j}$  is a unit vector then  $\hat{a}$  is equal to (A)  $\hat{i} + \hat{j} + \frac{\hat{k}}{2}$  (B)  $\frac{\hat{i}}{2} + \frac{\hat{j}}{2} - \frac{\hat{k}}{\sqrt{2}}$  (C)  $-\frac{\hat{i}}{2} - \frac{\hat{j}}{2} + \frac{\hat{k}}{\sqrt{2}}$  (D)  $\frac{\hat{i}}{2} - \frac{\hat{j}}{2} - \frac{\hat{k}}{\sqrt{2}}$  Watch Video Solution

71. If the direction ratio of two lines are given by  $3lm - 4\ln + mn = 0$  and l + 2m + 3n = 0, then the angle between the lines, is

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72. If  $\alpha$ ,  $\beta$ ,  $\gamma$  be angles which a straighat line makes with the positive direction of the axes, then  $\sin^2 \alpha + \sin^2 \beta + \sin^2 \gamma$  is equal to (A) 4 (B) 1 (C) 2 (D) 3

73. The condition of rthe ines  

$$x = az + b, y = cz + d$$
 and  $x = a_1z + b_1, y = c_1z + d_1$  to be  
perpendicular is (A)  $ac_1 + a_1c + 1 = 0$  (B)  $aa_1 + -1 + 1 = 0$  (C)  
 $ac_1 + i + i = 0$  (D)  $(aa_1 + -1 - 1 = 0$ 

74. the two lines  

$$x = ay + b, z = cy + d$$
 and  $x = a'y + b, z = c'y + d'$  will be  
perpendicular, if and only if: (A)  $aa' + i' = 1 = 0$  (B)  
 $aa' + i' + i' = 1 = 0$  (C)  $aa' + i' + i' = 0$  (D)  
 $(a + a') + (b + b') + (c + c') = 0$ 

**75.** 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 = 3 or -3 (B) k = 0 or -1 (C) k = 1 or -1 (D) k = 0 or -3

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76. The diection cosines of two lines are proportional to (2, 3, -6) and (3, -4, 5), then the acute angle between them is (A)  $\cos^{-1}\left\{\frac{49}{36}\right\}$  (B)  $\cos^{-1}\left\{\frac{18\sqrt{2}}{35}\right\}$  (C)  $96^0$  (D)  $\cos^{-1}\left(\frac{18}{35}\right)$ Watch Video Solution

77. The equation to the striaghat line passing through the points (4,-5,-2)

and (-1,5,3) is (A) 
$$\frac{x-4}{1} = \frac{y+5}{-2} = \frac{z+2}{-1}$$
 (B)  
 $\frac{x+1}{1} = \frac{y-5}{2} = \frac{z-3}{-1}$  (C)  $\frac{x}{-1} = \frac{y}{5} = \frac{z}{3}$  (D)  $\frac{x}{4} = \frac{y}{-5} = \frac{z}{-2}$ 

**78.** The distance between the parallel planes 4x - 2y + 4z + 9 = 0 and 8x - 4y + 8z + 21 = 0 is (A)  $\frac{1}{4}$  (B)  $\frac{1}{2}$  (C)  $\frac{3}{2}$ (D)  $\frac{7}{4}$ 

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79. The locus of point such that the sum of the squares of its distances from the planes x + y + z = 0, x - z = 0 and x - 2y + z = 0 is 9 is (A)  $x^2 + y^2 + z^2 = 3$  (B)  $x^2 + y^2 + z^2 = 6$  (C)  $x^2 + y^2 + z^2 = 9$  (D)  $x^2 + y^2 + z^2 = 12$ 

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**80.** Which of the folloiwng conditions such that the line  $\frac{x-p}{l} = \frac{y-q}{m} = \frac{z-r}{n}$  lies on the plane  $Ax + By + Cz + D = 0i\frac{s}{a}rec$  or rect? 1. lp+mq+nr+D=0 2. Ap + Bq + Cr + D = 0 3. Al+Bm+Cn=0` Select the correct answer using the codes given (A) 1 only (B) 1 and 2 (C) 1 and 3 (D) 2 and 3 **81.** If  $\overrightarrow{a}$ ,  $\overrightarrow{b}$ ,  $\overrightarrow{c}$  are three non coplanar vectors then the vector equation  $\overrightarrow{r} = (1 - p - q)\overrightarrow{a} + p\overrightarrow{b} + q\overrightarrow{c}$  are represents a: (A) straighat line (B)

plane (C) plane passing through the origin (D) sphere

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82. A plane pi makes intercepts 3 and 4 respectively on z-axis and x-axis. If pi is parallel to y-axis, then its equation is (A) 3x - 4z = 12 (B) 3z + 4z = 12 (C) 3y + 4z = 12 (D) 3z + 4y = 12

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**83.** The equation of the plane passing through (1,1,1) and (1,-1,-1) and perpendicular to 2x - y + z + 5 = 0 is (A) 2x + 5y + z - 8 = 0 (B) x + y - z - 1 = 0 (C) 2x + 5y + z + 4 = 0 (D) x - y + z - 1 = 0 **84.** The angle between the plane 2x - y + z = 6n and x + y + 2z = 3

is (A) 
$$\frac{\pi}{3}$$
 (B)  $\frac{\cos^{-1}1}{6}$  (C)  $\frac{\pi}{4}$  (D)  $\frac{\pi}{6}$ 

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**85.**  $\frac{\alpha}{2}, \frac{\beta}{2}, \frac{\gamma}{2}$  are the angle which a line makes with positive x,y,z axes respectively. What is the value of  $\cos \alpha + \cos \beta + \cos \gamma$ ? (A) 1 (B) -1 (C) 2 (D) 3

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**86.** ABC is a triangle and AD is the median. If the coordinates of A are (4,7,-8) and the coordinates of centroid of triangle ABC are (1,1,1) what are the coordinates of D? (A)  $\left(\frac{-1}{2}, 2, 11\right)$  (B)  $\left(\frac{-1}{2}, -2, \frac{11}{2}\right)$  (C) (-1, 2, 11) (D) (-5,-11,19)`

**87.** If the points (5, -1, 1), (-1, -3, 4) and (1, -6, 10) are three vertices of a rhombus taken in order then which one of the following ils the fourth vertex? (A) (7, -4, 11) (B)  $\left(3, \frac{-7}{2}, \frac{11}{2}\right)$  (C) (7, -4, 7) (D) (7, 4, 11)

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**88.** which of the following points is on the line of intersection of planes x = 3z - 4, y = 2z - 3? (A) (4, 3, 0) (B) (-3, -4, 0) (C) (3, 2, 1) (D) (-4, -3, 0)

**89.** The point of intersection of the lines  

$$\frac{x-5}{3} = \frac{y-7}{-1} = \frac{z+2}{1} \text{ and } \frac{x+3}{-36} = \frac{y-3}{2} = \frac{z-6}{4} \text{ is } (A)$$

$$\left(21, \frac{5}{3}, \frac{10}{3}\right) (B) (2, 10, 4) (C) (-3, 3, 6) (D) (5, 7, -2)$$

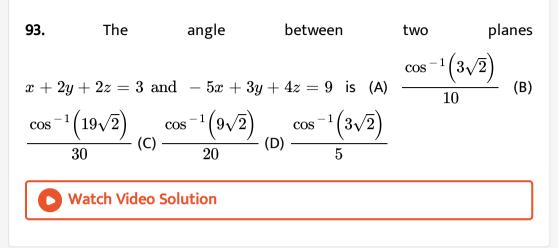
**90.** The equation of the line intersection of the planes 4x + 4y - 5z = 12 and 8x + 12y - 13z = 32 can be written as: (A)  $\frac{x}{2} = \frac{y-1}{3} = \frac{z-2}{4}$  (B)  $\frac{x}{2} = \frac{y}{3} = \frac{z-2}{4}$  (C)  $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z}{4}$ (D)  $\frac{x-1}{2} = \frac{y-2}{-3} = \frac{z}{4}$ 

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**91.** If line makes angle  $\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\delta$  with four diagonals of a cube, then the value of  $\sin^2 \alpha + \sin^2 \beta + \sin^2 \gamma + \sin^2 \delta$  is (A)  $\frac{4}{-}$  (B) 1 (C)  $\frac{8}{3}$  (D)  $\frac{7}{3}$ 

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**92.** The equation of the plane which makes with coordinate axes a triangle with its centroid  $(\alpha, \beta, \gamma)$  is (A)  $\alpha x + \beta y + \gamma z = 3$  (B)  $\frac{x}{\alpha} + \frac{y}{\gamma} + \frac{z}{\gamma} = 1$  (C)  $\alpha x + \beta y + \gamma z = 1$  (D)  $\frac{x}{\alpha} + \frac{y}{\beta} + \frac{z}{\gamma} = 3$ 



**94.** A line line makes the same angle  $\theta$  with each of the x and z-axes. If the angle  $\beta$ , which it makes with y-axis, is such that  $\sin^2\beta = 3\sin^2\theta$  then  $\cos^2\theta$  equals

**95.** Distancebetweentwoparallelplanes
$$2x + y + 2z = 8$$
 and  $4x + 2y + 4z + 5 = 0$  is (A)  $\frac{7}{2}$  (B)  $\frac{5}{2}$  (C)  $\frac{3}{2}$  (D)  $\frac{9}{2}$ **Watch Video Solution**

96. If the straighat lines  $x = 1 + s, y = -3 - \lambda s, z = 1 + \lambda s$  and  $x = \frac{t}{2}, y = 1 + t, z = 2 - t$  with parameters s and t respectively, are coplanar, then  $\lambda$  equals (A)  $-\frac{1}{2}$  (B) -1 (C) -2 (D) 0



97. 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.  $2x - y - z = 1$   
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**98.** If the angle  $\theta$  between the line  $\frac{x+1}{1} = \frac{y-1}{2} = \frac{z-2}{2}$  and the plane  $2x - y + \sqrt{pz} + 4 = 0$  is such that  $\sin \theta = \frac{1}{3}$ , then the values of p is (A) 0 (B)  $\frac{1}{3}$  (C)  $\frac{2}{3}$  (D)  $\frac{5}{3}$ 

**99.** The angle between the lines 2x = 3y = -z and 6x = -y = -4z

is (A)  $0^0$  (B)  $90^0$  (C)  $45^0$  (D)  $30^0$ 

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100. If the plane 2ax - 3ay + 4az + 6 = 0 passes through the midpoint

of the line joining centres of the spheres $x^2+y^2+z^2+6x-8y-2z=13 ext{ and } x^2+y^2+z^2-10x+4y-2z=8$ 

then a equals (A) -1 (B) 1 (C) -2 (D) 2

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101. The plane x+2y-z=4 cuts the sphere  $x^2+y^2+z^2-x+z-2=0$  in a circle of radius (A) 3 (B) 1 (C) 2 (D)  $\sqrt{2}$ 

**102.** Let  $\overrightarrow{a} = 3\hat{i} + \hat{j} + 2\hat{k}$  and  $\overrightarrow{b} = \hat{i} - 2\hat{j} - 4\hat{k}$  be the positon vectors of the points A and B respectively. If  $\overrightarrow{r}$  is the position vector of any point P(x, y, z) on the plane passing through the point A and perpendiculr to the line AB, then consider the following statements: The locus of  $\overrightarrow{r} = x\hat{i} + y\hat{j} + z\hat{k}$  is given by 1.  $(\overrightarrow{r} \cdot \overrightarrow{a}) \cdot (\overrightarrow{b} - \overrightarrow{a}) = 0$  2.  $(\overrightarrow{r} - \overrightarrow{a}) \cdot (\overrightarrow{a} - \overrightarrow{b}) = 0$  3. 2x + 3y + 6z - 21 = 0 Which of the statements given above are correct? (A) 1,2,and 3 (B) 1 and 2 (C) 1 and 3 (D) 2 and 3



**103.** IF for a plane the intercepts on the coordinate axes are 8,4,4 then the length of the perpendicular from the origin on to the plane is (A)  $\frac{8}{3}$  (B)  $\frac{3}{8}$  (C) 3 (D)  $\frac{4}{3}$ 

104. The equation of the sphere concentric with the sphere  $2x^2 + 2y^2 + 2z^2 - 6x + 2y - 4z = 1$  and double its radius is (A)  $x^2 + y^2 + z^2 - x + y - z = 1$  (B)  $x^2 + y^2 + z^2 - 6x + 2y - 4z = 1$  (C)  $2x^2 + 2y^2 + 2z^2 - 6x + 2y - 4z - 15 = 0$  (D)  $2x^2 + 2y^2 + 2y^2 + 2y^2 + 2z^2 - 6x + 2y - 4z - 15 = 0$  (D)  $2x^2 + 2y^2 + 2y^2 + 2z^2 + 2y^2 + 2y^$ 

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**105.** 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.

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**106.** The position vector of the pont where the line  

$$\vec{r} = \hat{i} - h * j + \hat{k} + t(\hat{i} + \hat{j} - \hat{k})$$
 meets plane  $\vec{r} \cdot (\hat{i} + \hat{j} + \hat{k}) = 5$  is  
(A)  $5\hat{i} + \hat{j} - \hat{k}$  (B)  $5\hat{i} + 3\hat{j} - 3\hat{k}$  (C)  $5\hat{i} + \hat{j} + \hat{k}$  (D)  $4\hat{i} + 2\hat{j} - 2\hat{k}$ 

107. If (2, 3, 5) is one end of a diameter of the sphere  $x^2 + y^2 + z^2 - 6x - 12y - 2z + 20 = 0$ , then the coordinates of the other end of the diameter are (1) (4, 9, -3) (2) (4, -3, 3) (3) (4, 3, 5) (4) (4, 3, -3)

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**108.** The line segment joining the points A,B makes projection 1, 4, 3onx, y, z axes respectively then the direction cosiners of AB are (A) 1,4,3 (B)  $\frac{1}{\sqrt{26}}$ ,  $\frac{4}{\sqrt{26}}$ ,  $\frac{3}{\sqrt{26}}$  (C)  $\frac{-1}{\sqrt{26}, \frac{4}{\sqrt{26}}, \frac{3}{\sqrt{26}}}$  (D)  $\frac{1}{\sqrt{26}}$ ,  $\frac{-4}{\sqrt{26}}$ ,  $\frac{3}{\sqrt{26}}$ 

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**109.** The length of projection of the line segment joinint (3, -1, 0) and  $(-3, 5, \sqrt{2})$  on a line with direction cosiens  $\frac{1}{2}, \frac{1}{2}, \frac{1}{\sqrt{2}}$  is (A) 1 (B) 2 (C) 3 (D) 4

110. The line perpendicular to the plane 2x - y + 5z = 4 passing through the point (-1,0,1) is (A)  $(x + 1) = -y = \frac{z - 1}{-5}$  (B)  $\frac{x + 1}{-2} = y = \frac{z - 1}{5}$  (C)  $\frac{x = 1}{2} = -y = \frac{z - 1}{5}$  (D)  $\frac{x + 1}{2} = y = \frac{z - 1}{5}$ 

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**111.** The shortest distance between the lines  

$$\frac{x-2}{3} = \frac{y-3}{4} = \frac{z-6}{5}$$
 and  $\frac{x-5}{1} = \frac{y-2}{1} = \frac{z-1}{2}$  is (A) 3 (B) 2  
(C) 1 (D) 0

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112. Angle between the line  $\frac{x+1}{1} = \frac{y}{2} = \frac{z-1}{1}$  and a normal to plane x-y+z=0 is (A) 0^0(B)30^0(C)45^0(D)90^0`

113. Foot of the perpendicular form (-2,1,4) to a plane  $\pi$  is (3,1,2). Then the equation of theplane  $\pi$  is (A) 4x - 2y = 11 (B) 5x - 2y = 10 (C) 5x - 2z = 11 (D) 5x + 2z = 11



114. If  $\theta$  is the angel between the planes 2x - y + z - 1 = 0 and x - 2y + z + 2 = 0 then  $\cos \theta = (A)2/3(B)$ 3/4(C)4/5(D)5/6`

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**115.** If (2, 3, 5) is one end of a diameter of the sphere  $x^2 + y^2 + z^2 - 6x - 12y - 2z + 20 = 0$ , then the coordinates of the other end of the diameter are (1) (4, 9, -3) (2) (4, -3, 3) (3) (4, 3, 5) (4) (4, 3, -3)

**116.** Let L be the line of intersection of the planes 2x + 3y + z = 1 and x + 3y + 2z = 2. If L makes an angle  $\alpha$  with the positive x-axis, then  $\cos \alpha$  equals a.  $\frac{1}{2}$  b. 1 c.  $\frac{1}{\sqrt{2}}$  d.  $\frac{1}{\sqrt{3}}$ 

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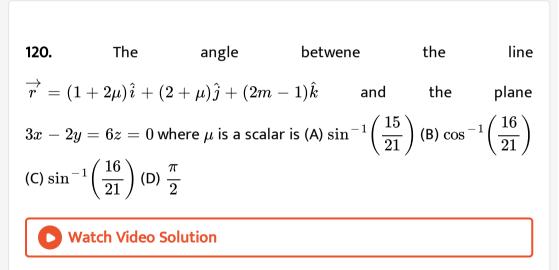
117. The shortest distance form the point (1,2,-1) to the surface of the sphere  $(x+1)^2+(y+2)^2+(z-1)^2=6$  (A)  $3\sqrt{6}$  (B)  $2\sqrt{6}$  (C)  $\sqrt{6}$  (D) 2

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**118.** If from a point P(a, b, c) perpendiculars PAandPB are drawn to

YZandZX-planes find the vectors equation of the plane OAB

**119.** 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  $\overrightarrow{O}P$  on te axes are 13/5, 19/5 and 26/5, respectively, then find the ratio in which P divides QR.



121. The length of the shortest distance between the two lines  $\vec{r} = \left(-3\hat{i}+6\hat{j}\right) + s\left(-4\hat{i}+3\hat{j}+2\hat{k}\right) \text{ and } \vec{r} = \left(-2\hat{i}+7\hat{k}\right) = t\left(-3\hat{i}+6\hat{j}\right) + s\left(-4\hat{i}+3\hat{j}+2\hat{k}\right) + s\left(-2\hat{i}+6\hat{j}\right) + s\left(-4\hat{i}+3\hat{j}+2\hat{k}\right) + s\left(-2\hat{i}+6\hat{j}\right) + s\left($ 

122. The equation of the plane passing through the origin and containing

the line  $\frac{x-1}{5} = \frac{y-2}{4} = \frac{z-3}{5}$  is (A) x + 5y - 3z = 0 (B) x - 5y + 3z = 0 (C) x - 5y - 3z = 0 (D) 3x - 10y + 5z = 0

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**123.** The line passing through the points (5, 1, a) and (3, b, 1) crosses the yzplane at the point  $\left(0, \frac{17}{2}, \frac{-13}{2}\right)$  .Then (1) a = 2, b = 8 (2)

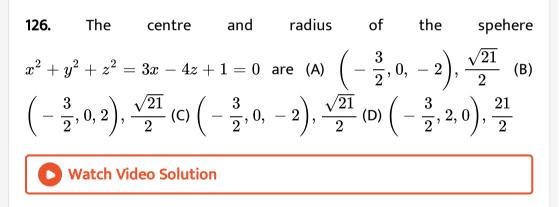
a = 4, b = 6 (3) a = 6, b = 4 (4) a = 8, b = 2

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124. If the straight lines  $\frac{x-1}{k} = \frac{y-2}{2} = \frac{z-3}{3}$  and  $\frac{x-2}{3} = \frac{y-3}{k} = \frac{z-1}{2}$  intersect at a point, then the integer k is equal to (1) -5 (2) 5 (3) 2 (4) -2

125. The shortest distance between the straighat lines through the point  $A_1 = (6, 2, 2)$  and  $A_2 = (-4, 0, -1)$  in the directions 1,-2,2 and 3,-2,-2 is (A) 6 (B) 8 (C) 12 (D) 9



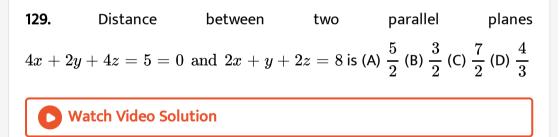


127. The plane through the point (-1,-1,-1) nd contasining the line of intersection of the planes  $\overrightarrow{r}$ .  $(\hat{i} + 3\hat{j} - \hat{k}) = 0$ ,  $\overrightarrow{r}$ .  $(\hat{i} + 2\hat{k}) = 0$  is (A)  $\overrightarrow{r}$ .  $(\hat{i} + 2\hat{j} - 3\hat{k}) = 0$  (B)  $\overrightarrow{r}$ .  $(\hat{i} + 4\hat{j} + \hat{k}) = 0$  (C)  $\overrightarrow{r}$ .  $(\hat{i} + 5\hat{j} - 5\hat{k}) = 0$  (D)  $\overrightarrow{r}$ .  $(\hat{i} + \hat{j} + 3\hat{k}) = 0$ 



**128.** If projections of as line on x,y and z axes are 6,2 and 3 respectively, then directions cosines of the lines are (A)  $\left(\frac{6}{2}, \frac{2}{7}, \frac{3}{7}\right)$  (B)  $\left(\frac{3}{5}, \frac{5}{7}, \frac{6}{7}\right)$ (C)  $\left(\frac{1}{7}, \frac{2}{7}, \frac{3}{7}\right)$  (D) none of these

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**130.** The coordinates of the point of intersection of the lines  $\frac{x-1}{1} = \frac{y+2}{3} = \frac{z-2}{-2}$  with the plane 3x + 4y + 5z - 25 = 0 is (A) (5, 6, -10) (B) (5, 10, -6) (C) (-6, 5, 10) (D) (-6, 10, 5)

**131.** Let PM be the perpendicular from the point P(1, 2, 3) to XY-plane. If OP makes an angle  $\theta$  with the positive direction of the Z-axies and OM makes an angle  $\Phi$  with the positive direction of X-axis, where O is the origin,  $\theta$  and  $\Phi$  are acute angles, then

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**132.** The values (s) of k for whichate trianle with vertice (6, 10, 10), (1, 0, -5) and (6, -10, k) will be righat angled triangle is /are (A) 0 (B) 35 (C)  $\frac{70}{3}$  (D) 0

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**133.** The diection ratios of lines intersecting the line  $\frac{x-3}{2} = \frac{y-3}{2} = \frac{z}{1}$  at an angle 60<sup>0</sup> are (A) 1,2,-1 (B) 1,1,2 (C) 1,-2,1 (D) 1,-1,2

**134.** If OABC is a tetrahedron such that  $OA^2 + BC^2 = OB^2 + CA^2 = OC^2 + AB^2$  then

**135.** The direction ratios of the bisector of the angle between the lines whose direction cosines are  $l_1, m_1, n_1$  and  $l_2, m_2, n_2$  are (A)  $l_1 + l_2, m_1 + m_2 + n_1 + n_2$  (B)  $l_1 - l_2, m_1 - m_2 - n_1 - n_2$  (C)  $l_1m_2 - l_2m_1, m_1n_2 - m_2n_1, n_1l_2 - n_2l_1$  (D)  $l_1m_2 + l_2m_1, m_1n_2 + m_2n_1, n_1l_2 + n_2l_1$ 

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**136.** If straighat lin emakes and angle of  $60^0$  with each of the x and y-axes the angle which it makes with the z-axis is (A)  $\frac{\pi}{4}$  (B)  $\frac{\pi}{3}$  (C)  $\frac{3\pi}{4}$  (D)  $\frac{\pi}{2}$ 

137. The lines  $\left(x - \frac{20}{1} = \frac{y - 3}{1} = \frac{z - 4}{-k_{\text{and}} \left(x - \frac{10}{k} = \frac{y - 4}{2} = \frac{z - 5}{1}\right)}$ are coplanar if (A) k = 3 or -3 (B) k = 0 or -1 (C) k = 1 or -1 (D) k = 0 or -3

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**138.** The plane x - 2y + 7z + 21 = 0 (A) contains the line  $\frac{x+1}{-3} = \frac{y-3}{2} = \frac{z+2}{1}$  (B) contains the point (0,7,-1) (C) is perpendicular to the line  $\frac{x}{1} = \frac{y}{-2} = \frac{z}{7}$  (D) is parallel to the plane x - 2y + 7z = 0

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139. If  $d_1, d_2, d_3$  denote the distances of the plane 2x - 3y + 4z = 0from the planes 2x - 3y + 4z + 6 = 0

4x-6y+7z+3=0 and 2x-3y+4z-6=0 respectively, then

**140.** In three dimensional geometry ax + by + c = 0 represents (A) a plane perpendicular to z-axis (B) a plane perpendicular to xy plane (C) a straighat line on xy plane (D) a plane parallel to z-axis

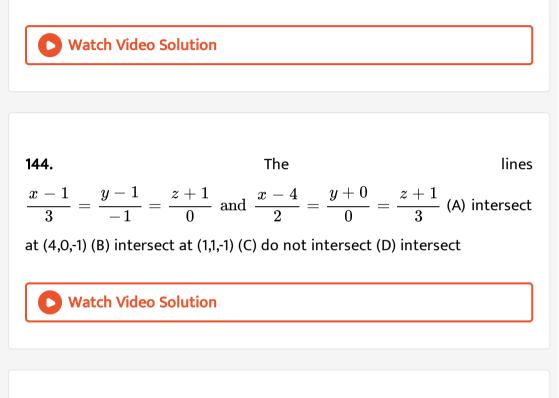
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**141.** A(0, 5, 6), B(1, 4, 7), C(2, 3, 7) and D(3, 4, 6) are four points in space. The point nearest to the origin O(0, 0, 0) is (A) A (B) B (C) C (D) D

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**142.** If P(2, 3, 1) is a point  $L \equiv x - y - z - 2 = 0$  is a plane then (A) origin and P lie on the same side of the plane (B) distance of P from the plane is  $\frac{4}{\sqrt{3}}$  (C) foot of perpendicular from point P to plane is  $\left(\frac{10}{3}, \frac{5}{3}, -\frac{1}{3}\right)$  (D) image of point P i the planee is  $\left(\frac{10}{3}, \frac{5}{3}, -\frac{1}{3}\right)$ 

**143.** P(1, 1, 1) and  $Q(\lambda, \lambda, \lambda)$  are two points in space such that  $PQ = \sqrt{27}$  the value of  $\lambda$  can be (A) -2 (B) -4 (C) 4 (D) 2



145. If  $\alpha$ ,  $\beta$ ,  $\gamma$  are the angles which a line makes with the coordinate axes ,then (A)  $\sin^2 \alpha = \cos^2 \beta + \cos^2 \gamma$  (B)  $\cos^2 \alpha + \cos^2 \beta + \cos^2 \gamma = 2$  (C)  $\cos^2 \alpha + \cos^2 \beta + \cos^2 \gamma = 1$  (D)  $\sin^2 \alpha + \sin^2 \beta = 1 + \cos^2 \gamma$ 

**146.** The equation of a line 4x - 4y - z + 11 = 0 = x + 2y - z - 1 can be put as  $\frac{x}{2} = \frac{y-2}{1} = \frac{z-3}{4}$  (b)  $\frac{x-2}{2} = \frac{y-2}{1} = \frac{z}{4}$  $\frac{x-2}{2} = \frac{y}{1} = \frac{z-3}{4}$  (d) None of these Watch Video Solution

**147.** A point Q at a distance 3 from the point P(1, 1, 1) lying on the line joining the points

 $A(0,\ -1,3)$  and P has the coordinates

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**148.** If  $A \equiv (2, -3, 7), B \equiv (-1, 4, -5)$  and P is a point on the line AB such that AP:BP =3:2, then P has coordinastes (A)  $\left(\frac{7}{5}, \frac{-18}{5}, \frac{29}{5}\right)$  (B)  $\frac{1}{5}, \frac{6}{5}, \frac{-1}{5}\right)$  (C)  $\frac{4}{5}, \frac{-1}{5}, \frac{11}{5}\right)$  (D) (-7, 18, -29)

**149.** If the direction ratios of a line are  $1 + \lambda$ ,  $1 - \lambda$ , 2 and the line the makes an angle  $60^0$  with the y-axis, then  $\lambda$  is (A)  $1 + \sqrt{3}$  (B)  $2 + \sqrt{5}$  (C)  $1 - \sqrt{3}$  (D)  $2 - \sqrt{5}$ 

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**150.** A point on the line 
$$\frac{x-1}{1} = \frac{y-2}{2} = \frac{z+1}{3}$$
 at a distance  $\sqrt{6}$  from the origin is (A)  $\left(\frac{-5}{7}, \frac{-10}{7}, \frac{13}{7}\right)$  (B)  $\left(\frac{5}{7}, \frac{10}{7}, \frac{-13}{7}\right)$  (C)  $(1, 2, -1)$  (D)  $(-1, -2, 1)$ 

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151. A plane through the line  $\frac{x-1}{1} = \frac{y+1}{-2} = \frac{z}{1}$  has the equation (A) x+y+z=0 (B) 3x+2y-z=1 (C) 4x+y-2z=3 (D) 3x+2y+z=0

**152.** the equation of a plane is 2x - y - 3z = 5 and A(1, 1, 1), B(2, 1, -3), C(1, -2, -2) and D(-3)are four points. Which of the following line segments are intersects by the plane? (A) AD (B) AB (C) AC (D) BC

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**153.** Assertion: The equation 3y + 4z = 0 in te dimensional space represents a plane containing x-axis., Reason: An equation of the form ax + by + cz + d = 0 always represents a plane. (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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154. Assertion: x + y + z - 15 = 0 is the equation of a plane which

passes through the midpoint of the ine segment joining te points (2,3,4)

and (6,7,8). Reason: The mid point (4,5,6) satisfies the equation of the plane. (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.



**155.** Assertion: Straighat lines  $l_1$  and  $l_2$  are perpendicular to each other. Reason:  $aa' + \prime + ' = \sin\theta$  (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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**156.** Assertion : Line L is perpendicular to the plane 2x - 3y + 6z = 7, Reason: Direction cosines of L are  $\frac{2}{7}$ ,  $\frac{-3}{7}$ ,  $\frac{6}{7}$ . (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true. **157.** Assertion: equation of the straighat ine passing through the ont (2,3,-5) and equally inclined to the axes is x - 2 = y - 3 = z + 5, Reason: Direction ratios of the line which is equally inclined to the axes are < 1, 1, 1 > (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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**158.** Assertion: The lines  $\frac{x}{1} = \frac{y}{2} = \frac{z}{3}$  and  $\frac{x-1}{-2} = \frac{y-2}{-4} = \frac{z-3}{-6}$ are parallel., Reason: two lines having direction ratios  $l_1, m_1, n_1$  and  $l_2, m_2, n_2$  are parallel if  $\frac{l_1}{l_2} = \frac{m_1}{m_2} = \frac{n_1}{n_2}$ . (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true. **159.** Assertion : The line I is parallel to the plane P. Reason: The normal of the plane P is perpendicular to the line I. (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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**160.** Assertion: centroid of the triangle ABC is  $\left(\frac{1}{3a}, \frac{1}{3b}, \frac{1}{3c}\right)$ , Reason: Centroid of a triangle is the point of intersection of medians. (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.



**161.** Assertion: The distance between two parallel planes ax + by + cz + d = 0 and ax + by + cz + d' = 0 is  $\frac{|d - d'|}{\sqrt{a^2 + b^2 + c^2}}$ , Reason: The normal of two parallel planes are perpendicular to each other. (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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162. Assertion: If the lines  $\frac{x-1}{-3} = \frac{y-2}{2k} = \frac{z-3}{2}$  and  $\frac{x-1}{3k} = \frac{y-1}{1} = \frac{z-6}{-5}$  are perpendicular to each other, then  $k = \frac{10}{7}$ , Reason: Two lines having diection ratios  $l_1, m_1, n_1$  and  $l_2, m_2, n_2$  are perpendiculr to each other if and only if  $l_1l_2 + m_1m_2 + n_1n_2 = 0$  (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

**163.** Assertion: The straighat line  $\frac{x}{1} = \frac{y}{2} = \frac{z}{3}$  is parallel to the plane x - 2y + z - 6 = 0 Reason: The normal of the plane is perpendicular to the line. (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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**164.** The equation of a straighat line through the point (a, b, c) and parallel to x-axis is  $\frac{x-a}{1} \frac{y-b}{0} = \frac{z-c}{0}$ , Reason: The direction ratiof of the y-axis are , 0, 1, 0 > (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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165. Assertion: The equation of the plane thorugh the orign and parallel

to the plane 3x-4y+5z-6=0is3x-4y=5z=0 Reason: The

normals of two parallel planes are always parallel. (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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**166.** Assertion: The centre of the sphere which passes through the point (a, 0, 0), (0, b, 0), (0, 0, c) and  $(0, 0, 0)si(\frac{a}{2}, 0, 0)$  Reason: Points on a sphere are equidistant from its centre. (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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**167.** Assertion: The shortest distance between the skew lines  $\overrightarrow{r} = \overrightarrow{a} + \alpha \overrightarrow{b}$  and  $\overrightarrow{r} = \overrightarrow{c} + \beta \overrightarrow{d} is \frac{\left| \left[ \overrightarrow{a} - \overrightarrow{c} \overrightarrow{b} \overrightarrow{d} \right] \right|}{\left| \overrightarrow{b} \times \overrightarrow{d} \right|}$ , Reason: Two lines are skew lines if they are not coplanar. (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.



**168.** Assertion: ABCD is a rhombus. Reason: AB=BC=CD=DA and  $AC \neq BD$ . (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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**169.** Assertion: The direction ratios of the line joining orign and point (x, y, z) are x,y,z., Reason: If O be the origin and P(x, y, z) is a point in space and OP =r then direction cosines of OP are  $\frac{x}{r}$ ,  $\frac{y}{r}$ ,  $\frac{z}{r}$ . (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are

true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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**170.** Assertion: The equation of the plane through the intesection of the planes x + y + z = 6 and 2x + 3y + 4z + 5 = 0 and the point (4, 4, 40is29x + 23y + 17z = 276. Reason: Equation of the plane through the line of intersection of the planes  $P_1 = 0$  and  $P_2 = 0isP_1 + \lambda P_2 = 0$ ,  $\lambda \neq 0$ . (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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171. Assertion: The equation  $2x^2 - 6y^2 + 4z^2 + 18yz + 2z + xy = 0$ represents a pair of perpendicular planes, Reason: A pair of planes represented by  $ax^2 + by^2 + cz^3 + 2fyz + 2gzx + 2hxy = 0$  are perpendicular if a + b + c = 0 (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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**172.** Assertion: The points (2,1,5) and (3,4,5) lie on opposite side of the plane 2x + 2y - 2z - 1 = 0, Reason: Values of 2x + 2y - 2z - 1 for points (2,1,5) and (3,4,3)` have opposite signs. (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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**173.** Assertion: If coordinates of the centroid and circumcentre oif a triangle are known, coordinates of its orthocentre can be found., Reason: Centroid, orthocentre and circumcentre of a triangle are collinear. (A) Both A and R are true and R is the correct explanation of A (B) Both A and

R are true R is not te correct explanation of A (C) A is true but R is false.

(D) A is false but R is true.

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**174.** Assertion: The shortest distance between the skew lines  $\frac{x+3}{-4} = \frac{y-6}{3} = \frac{z}{2}$  and  $\frac{x+2}{-4} = \frac{y}{1} = \frac{z-7}{1}$  is 9., Reason: Two lines are skew lines if there exists no plane passing through them. (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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**175.** Assertion :  $A^{-1}$  exists, Reason: |A| = 0 (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.



176. A tetahedron is a three dimensional figure bounded by forunon coplanar trianglular plane.So a tetrahedron has four no coplnar points as its vertices. Suppose a tetrahedron has points A,B,C,D as its vertices which have coordinates  $(x_1, y_1, z_1)(x_2, y_2, zs_2), (x_3, y_3, z_3)$  and  $(-4, y_4, z_4)$ respectivley in a rectngular three dimensionl space. Then the coordinates of tis centroid are  $\Big(x_1+x_2+x_3+x_3+4rac{.}{4}\,,y_1+y_2+y_3+y_3+4rac{.}{4}\,,z_1+z_2+z_3+z_3+$ . the circumcentre of the tetrahedron is th centre of a sphere pssing thorugh its vetices. So, this is a point equidistasnt from each ofhate vertices fo the tetrahedron. Let a tetrahedron hve three of its vertices reresented by the points (0,0,0), (6,-5,-1) and (-4,1,3) and its centrod lies at the point (1,2,5). THe coordinate of the fourth vertex of the tetrahedron is

177. A tetrahedron is a three dimensional figure bounded by four non coplanar triangular plane.So a tetrahedron has four no coplnar points as its vertices. Suppose a tetrahedron has points A,B,C,D as its vertices which coordinates  $(x_1, y_1, z_1)(x_2, y_2, z_2), (x_3, y_3, z_3)$  and  $(x_4, y_4, z_4)$ have respectively in a rectangular three dimensional space. Then the coordinates of its centroid are  $\Big(rac{x_1+x_2+x_3+x_3+x_4}{4}, rac{y_1+y_2+y_3+y_3+y_4}{4}, rac{z_1+z_2+z_3+z_3+z_4}{4}\Big)$ . the circumcentre of the tetrahedron is the center of a sphere passing through its vertices. So, this is a point equidistant from each of the vertices of the tetrahedron. Let a tetrahedron have three of its vertices represented by the points (0,0,0) ,(6,-5,-1) and (-4,1,3) and its centroid lies at the point (1,2,5). The coordinate of the fourth vertex of the tetrahedron is

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**178.** A tetahedron is a three dimensional figure bounded by forunon coplanar trianglular plane.So a tetrahedron has four no coplanar points as

its vertices. Suppose a tetrahedron has points A,B,C,D as its vertices which have coordinates  $(x_1, y_1, z_1)(x_2, y_2, zs_2)$ ,  $(x_3, y_3, z_3)$  and  $(-4, y_4, z_4)$ respectivley in a rectngular three dimensionl space. Then the coordinates of tis centroid are  $(x_1 + x_2 + x_3 + x_3 + 4\frac{1}{4}, y_1 + y_2 + y_3 + y_3 + 4\frac{1}{4}, z_1 + z_2 + z_3 + z_3 +$ . the circumcentre of the tetrahedron is th centre of a sphere pssing thorugh its vetices. So, this is a point equidistasnt from each ofhate vertices fo the tetrahedron. Let a tetrahedron hve three of its vertices reresented by the points (0,0,0), (6,-5,-1) and (-4,1,3) and its centrod lies at the point (1,2,5). THe coordinate of the fourth vertex of the tetrahedron is

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**179.** A tetahedron is a three dimensional figure bounded by forunon coplanar trianglular plane. So a tetrahedron has four no coplanar points as its vertices. Suppose a tetrahedron has points A,B,C,D as its vertices which have coordinates  $(x_1, y_1, z_1)(x_2, y_2, zs_2), (x_3, y_3, z_3)$  and  $(-4, y_4, z_4)$  respectivley in a rectngular three dimensionl space. Then the coordinates

 $(x_1 + x_2 + x_3 + x_3 + 4\frac{1}{4}, y_1 + y_2 + y_3 + y_3 + 4\frac{1}{4}, z_1 + z_2 + z_3 + z_3 + .$  the circumcentre of the tetrahedron is th centre of a sphere pssing thorugh its vetices. So, this is a point equidistasnt from each ofhate vertices fo the tetrahedron. Let a tetrahedron hve three of its vertices reresented by the points (0,0,0) ,(6,-5,-1) and (-4,1,3) and its centrod lies at the point (1,2,5). THe coordinate of the fourth vertex of the tetrahedron is

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**180.** Suppose direction direction of two lines are given by ul + vm + wn = 0 and  $al^2 + bm^2 + cn^2 = 0$  where u,v,w,a,b,c are arbitrary constnts and l,m,n are direction of the lines. For u = v = w = 1 direction isines of both lines satisfy the relation. (A)  $(b+c)\left(\frac{n}{l}\right)^2 + 2b\left(\frac{n}{l}\right) + (a+b) = 0$  (B)  $(c+a)\left(\frac{l}{m}\right)^2 + 2c\left(\frac{l}{m}\right) + (b+c) = 0$  (C)

$$(a+b) \Big(rac{m}{n}\Big)^2 + 2a \Big(rac{m}{n}\Big) + (c+a) = 0$$
 (D) all of the above

**181.** Suppose direction direction of two lines are given by ul + vm + wn = 0 and  $al^2 + bm^2 + cn^2 = 0$  where u,v,w,a,b,c are arbitrary constnts and l,m,n are direction of the lines. For u = v = w = 1 if  $\frac{n_1n_2}{l_1l_2} = \left(\frac{a+b}{b+c}\right)$  then (A)  $\frac{m_1m_2}{l_1l_2} = \frac{(b+c)}{(c+a)}$  (B)  $\frac{m_1m_2}{l_1l_2} = \frac{(c+a)}{(b+c)}$  (C)  $\frac{m_1m_2}{l_1l_2} = \frac{(a+b)}{(c+a)}$  (D)  $\frac{m_1m_2}{l_1l_2} = \frac{(c+a)}{(a+b)}$ 

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**182.** Suppose direction of two lines are given by ul + vm + wn = 0 and  $al^2 + bm^2 + cn^2 = 0$  where u,v,w,a,b,c are arbitrary constnts and l,m,n are direction of the lines. For u = v = w = 1 if lines are perpendicular then. (A) a + b + c = 0 (B) ab + bc + ca = 0 (C) ab + bc + ca = 3abc (D) ab + bc + ca = abc

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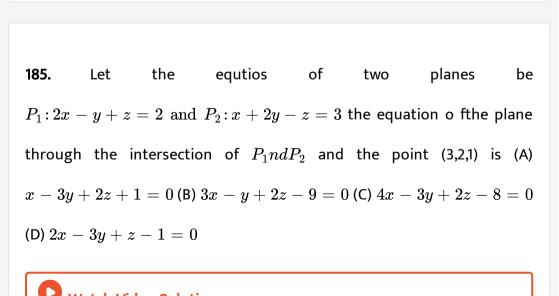
**183.** The equations of motion of a rocket are x = 2t, y = -4tandz = 4t, where time t is given in seconds, and the

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?



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**184.** The position of a mving point in space is x = 2t, y = 4t, z = 4t where t is measured in seconds and coordinates of moving point are in kilometers: The distance of thepoint from the starting point `O(0,0,0) in 15 sec is (A) 3 km (B) 60km (C) 90km (D) 120km



186. Let the equations of two planes be  $P_1: 2x - y + z = 2$  and  $P_2: x + 2y - z = 3$  Equation of the plane which passes through the point (-1,3,2) and is perpendicular to each of plane  $P_1$  and  $P_2$  is (A) x - 3y - 5z + 20 = 0the (B) x + 3y + 5z - 18 = 0 (C) x - 3y - 5z = 0 (D) x + 3y - 5z = 0

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The equation of the acute angle bisector of planes 187. 2x - y + z - 2 = 0 and x + 2y - z - 3 = 0 is x - 3y + 2z + 1 = 0 (b) 3

$$3x + 3y - 2z + 1 = 0 \ x + 3y - 2z + 1 = 0$$
 (d)  $3x + y = 5$ 

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The equation of the acute angle bisector of planes 188. 2x - y + z - 2 = 0 and x + 2y - z - 3 = 0 is x - 3y + 2z + 1 = 0 (b)  $3x + 3y - 2z + 1 = 0 \ x + 3y - 2z + 1 = 0$  (d) 3x + y = 5



**189.** The image of plane 2x - y + z = 2 in the plane mirror x + 2y - z = 3 is x + 7y - 4x + 5 = 0 (b) 3x + 4y - 5z + 9 = 07x - y + 2z - 9 = 0 (d) None of these