



# MATHS

# **BOOKS - RD SHARMA MATHS (HINGLISH)**

# THE PLANE

Solved Examples And Exercises

1. Find the distance of the point  $2\hat{i}+\hat{j}-\hat{k}$  from the plane  $\overrightarrow{r}\hat{i}-2\dot{\hat{j}}+4\hat{k}=9$  .

**Watch Video Solution** 

2. Find the distance of the point (21,0) from the plane 2x + y + 2z + 5 = 0.

**3.** Show that the points  $\hat{i} - \hat{j} + 3\hat{k}and3(\hat{i} + \hat{j} + \hat{k})$  are equidistant from the plane  $\overrightarrow{r}5\hat{i} + 2\hat{j} + \hat{k} + 9 = 0$ 



**4.** Find the equations of the planes parallel to the plane x - 2y + 2z - 3 = 0 which is at a unit distance from the point (1, 2, 3).

Watch Video Solution

5. Find the equation of the plane which contains the line of intersection of the planes x + 2y + 3z - 4 = 0 and 2x + y - z + 5 = 0 and which is

perpendicular to the plane 5x + 3y - 6z + 8 = 0.

6. Find the equation of the plane passing through the intersection of the planes 2x + 3y - z + 1 = 0 and x + y - 2z + 3 = 0 and perpendicular to the plane 3x - y - 2z - 4 = 0.

#### Watch Video Solution

7. Find the equation of the plane passing through the intersection of the planes  $\overrightarrow{r} \cdot \left(2\hat{i} + \hat{j} - 3\hat{k}\right) = 7, \ \overrightarrow{r} \cdot \left(2\hat{i} + 5\hat{j} + 3\hat{k}\right) = 9$  the point (2, 1, 3).

Watch Video Solution

**8.** Find the equation of the plane passing through (a, b, c) and parallel to

the plane 
$$\overrightarrow{r}\left(\hat{i}+\hat{j}+\hat{k}
ight)=2.$$

**9.** Two systems of rectangular axes have the same origin. If a plane cuts them at distances a, b, canda', b', c' respectively, prove that  $\frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2} = \frac{1}{a'^2} + \frac{1}{b'^2} + \frac{1}{c'^2}$ 

Watch Video Solution

**10.** 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  $OABCisx^{-2} + y^{-2} + z^{-2} = 16p^{-2}$ .

Watch Video Solution

11. Find the equation of the plane passing through the intersection of the planes 2x - 3y + z - 4 = 0 and x - y + z + 1 = 0 and perpendicular to the plane x + 2y - 3z + 6 = 0.

12. Find the equation of the plane through the line of intersection of  $\vec{r} \cdot 2\hat{i} - 3\hat{j} + 4\hat{k} = 1$  and  $\vec{r} \cdot \hat{i} - \hat{j} + 4 = 0$  and passing through (2, -1, 1)

#### Watch Video Solution

**13.** Find the equation of the plane which is perpendicular to the plane 5x + 3y + 6z + 8 = 0 add which contains the line of intersection of the planes x + 2y + 3z - 4 = 0 and 2x + y - z + 5 = 0.

Watch Video Solution

**14.** Find the equation of a plane through the intersection of the planes  $\vec{r} \cdot \hat{i} + 3\hat{j} - \hat{k} = 5$  and  $\vec{r} \cdot 2\hat{i} - \hat{j} + \hat{k} = 3$  and passing through the point (1, 1, 1).

**15.** Find the vector equation of the following planes in non-parametric  
form: (i) 
$$\overrightarrow{r} = (2\hat{i} + 2\hat{j} - \hat{k}) + \lambda(\hat{i} + 2\hat{j} + 3\hat{k}) + \mu(5\hat{i} - 2\hat{j} + 7\hat{k})$$
.  
Watch Video Solution

16. Find the vector equation of the plane 
$$\overrightarrow{r} = (1+s-t)\hat{i} + (2-s)\hat{j} + (3-2s+2t)\hat{k}$$
 in non-parametric form.

Watch Video Solution

17. Find the Cartesian form the equation of the plane $\overrightarrow{r}=(s+t)\hat{i}+(2+t)\hat{j}+(3s+2t)\hat{k}$ =15

#### Watch Video Solution

**18.** Find the vector equation of the following plane in scalar product form:  $\vec{r} = (\hat{i} - \hat{j}) + \lambda (\hat{i} + \hat{j} + \hat{k}) + \mu (-4\hat{i} - 2\hat{j} + 3\hat{k}).$  **19.** The plane x - 2y + 3z = 0 is rotated through a right angle about the line of intersection with the plane 2x + 3y - 4z = 0, find the equation of the plane in its new position.

Watch Video Solution

**20.** The plane lx + my = 0 is rotated through an angle  $\alpha$  about its line of intersection with the planez = 0. Prove that the equation of the in its new position if  $lx + my \pm \left(\sqrt{l^2 + m^2} \tan \alpha\right) z = 0$ .

Watch Video Solution

**21.** Find the vector equation of the line passing through the point (1, -1, 2) and perpendicular to the plane 2x - y + 3z - 5 = 0.

**22.** Find the vector equation of the plane passing through the intersection of the planes x - 2y + z = 1 and 2x + y + z = 8 and parallel to the line with direction ratios proportional to 1, 2, 1. Find also the perpendicular distance of (1, 1, 1) from this plane.

Watch Video Solution

**23.** If 30 oxen can plough  $\frac{1}{7}$  th of the field in 4 hrs , in how many hour will 18 oxen take to do the remaining work?

Watch Video Solution

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

25. Find the angle between line  $\frac{x+1}{3} = \frac{y-1}{2} = \frac{z-2}{4}$  and the plane 2x + y - 3z + 4 = 0.

Watch Video Solution

**26.** Show that the line whose vector equation is  $\vec{r} = (2\hat{i} - 2\hat{j} + 3) + \lambda(\hat{i} - \hat{j} + 4\hat{k})$  is parallel to the plane whose vector equation  $\vec{r}\hat{i} + 5\hat{j} + \hat{k} = 5$ . Also, find the distance between them.

Watch Video Solution

27. Show that the line whose vector equation is  $\vec{r} = 2\hat{i} + 5\hat{j} - 7\hat{k} + \lambda(\hat{i} + 3\hat{j} + 4\hat{k})$  is parallel to the plane whose vector equation is  $\vec{r}\hat{i} + \hat{j} - \hat{k} = 7$ . Also find the distance between them.

**28.** Find the vector equation of the line passing through the point (1, -1, 2) and perpendicular to the plane 2x - y - 3z - 5 = 0.

#### Watch Video Solution

**29.** State when the line  $\overrightarrow{r} \stackrel{\cdot}{a} + \lambda \stackrel{\rightarrow}{b}$  is parallel to the plane  $\overrightarrow{r} \stackrel{\cdot}{n} = \cdots$ Show that the line  $\overrightarrow{r} = \hat{i} + \hat{j} + \lambda \left(2\hat{i} + \hat{j} + 4\hat{k}\right)$  is parallel to the plane  $\overrightarrow{r} - 2\hat{i} + \hat{k} = 5$ . Also, find the distance between the line and the plane.

Watch Video Solution

**30.** Find the plane passing through (4, -1, 2) and parallel to the lines

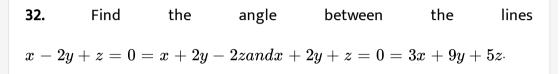
$$rac{x+2}{3} = rac{y-2}{-1} = rac{z+1}{2} and rac{x-2}{1} = rac{y-3}{2} = rac{z-4}{3}$$

Watch Video Solution

**31.** Find the angle between the lines  $\overrightarrow{r} \doteq \left(\hat{i} + 2\hat{j} + \hat{k}\right) + \lambda \left(\hat{i} + \hat{j} + \hat{k}\right)$  and the plane

$$\overrightarrow{r}\left(2\hat{i}-\hat{j}+\hat{k}
ight)=5.$$

#### Watch Video Solution

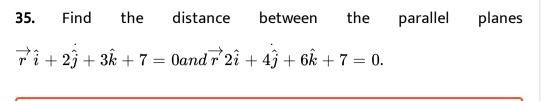


Watch Video Solution

**33.** Find the distance between the parallel planes,  $\vec{r} \left(2\hat{i} - 3\hat{j} + 6\hat{k}\right) = 5$ and  $\vec{r} \left(6\hat{i} - 9\hat{j} + 18\hat{k}\right) + 20 = 0.$ 

Watch Video Solution

**34.** Find the distance between the parallel planes 2x - y + 2z + 3 = 0 and 4x - 2y + 4z + 5 = 0.



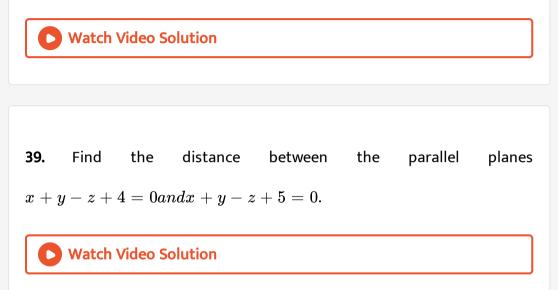
### Watch Video Solution

**36.** Find the equation of the plane which passes through the point (3, 4, -1) and is parallel to the plane 2x - 3y + 5z + 7 = 0. Also, find the distance between the two planes.

Watch Video Solution

**37.** Find the distance of the point (33,3) from the plane  $\vec{r}5\hat{i}+2\hat{j}-7\hat{k}+9=0$ 

**38.** Find the equations of the planes parallel to the plane x + 2y - 2z + 8 = 0 which are at distance of 2 units from the point (2, 1, 1).



**40.** Find the equation of the plane through the intersection of the planes

$$3x - 4y + 5z = 10$$
 and  $2x + 2y - 3z = 4$  and parallel to the line  $x = 2y = 3z$ .

**41.** If the line drawn from (4, -1, 2) meets a plane at right angles at the point (-10, 5, 4), find the equation of the plane.



**42.** If O is the origin and the coordinates of A are (a, b, c). Find the direction cosines of OA and the equation of the plane through A at right angles to OA.

Watch Video Solution

**43.** Find the vector equation of a lane passing through a point having position vector 2i + 3j - 4k and perpendicular to the vector 2i - j + 2k. Also, reduce it to Cartesian form.

**44.** The foot of perpendicular drawn from the origin to the plane is (4, -2, -5). Find the equation of the plane.



**45.** If he line drawn from the point (-2, -1, -3) meets a plane at right angle at the point (1, -3, 3), find the equation of the plane.

Watch Video Solution

46. Find the equation of the plane which bisects the line segment joining

the points A(2, 3, 4) and B(4, 5, 8) at right angles.



**47.** Find the equation of the plane passing through the point (1, -1, 2)

having 2, 3, 2 as direction ratios of normal to the plane.



**48.** Let  $\overrightarrow{n}$  be a vector of magnitude  $2\sqrt{3}$  such that it makes equal acute angles with the coordinate axes. Find the vector and Cartesian forms of the equation of a plane passing through (1, -1, 2) and normal to  $\overrightarrow{n}$ .

Watch Video Solution

**49.** A vector  $\overrightarrow{n}$  of magnitude 8 units is inclined to x-axis at  $45^0$ , y-axis at  $60^0$  and an acute angle with z-axis. If a plane passes through a point  $(\sqrt{2}, -1, 1)$  and is normal to  $\overrightarrow{n}$ , find its equation in vector form.

#### Watch Video Solution

**50.** A plane passes through the point (1, -2, 5) and is perpendicular to the line joining the origin to the point  $3\hat{i} + \hat{j} - \hat{k}$ . Find the vector and Cartesian forms of the equation of the plane.

51. Find the vector and Cartesian equations of the plane containing the

two lines  

$$\overrightarrow{r} = 2\hat{i} + \hat{j} - 3\hat{k} + \lambda(\hat{i} + 2\hat{j} + 5\hat{k})and, \overrightarrow{r} = 3\hat{i} + 3\hat{j} + 2\hat{k} + \mu(3\hat{i} - 2\hat{j})$$
  
Watch Video Solution  
52. If the lines  $\frac{x+4}{3} = \frac{y+6}{5} = \frac{z-1}{-2}$  and  $3x - 2y + z + 5 = 0 = 2x + 3y + 4z - k$  are coplanar, then  $k = (a) - 4$   
(2)3 (3)2 (4) 4 (5)1  
Watch Video Solution

53. Equation of plane which passes through the intersection point of the

lines  $L_1: \frac{x-1}{3} = \frac{y-2}{1} = \frac{z-3}{2}$  and  $L_2: \frac{x-2}{2} = \frac{y-1}{2} = \frac{z-6}{-1}$ 

and has the largest distance from origin

**54.** Find the coordinates of the point where the line  $\frac{x-2}{3} = \frac{y+1}{4} = \frac{z-2}{2}$  intersect the plane x - y + z - 5 = 0. Also, find the angel between the line and the plane.

# **Watch Video Solution**

**55.** Find the shortest distance between the skew-line4s  

$$l_1: \frac{x-1}{2} = \frac{y+1}{1} = \frac{z-2}{4}$$
 and  $l_2: \frac{x+2}{4} = \frac{y-0}{-3} = \frac{z+1}{1}$   
Watch Video Solution

56. Find the distance between the line  $\overrightarrow{r} = \left(-\hat{i}+3\hat{k}\right) + \lambda\left(\hat{i}-2\hat{j}\right)$ and the line passing through  $(0,\ -1,2)$  and  $(1,\ -2,3)$ .

**57.** Find the image of the point having position vector  $\hat{i} + 3\hat{j} + 4\hat{k}$  in the

planer. 
$$\overrightarrow{r}.\left(2\hat{i}-\hat{j}+\hat{k}
ight)+3=0$$

#### Watch Video Solution

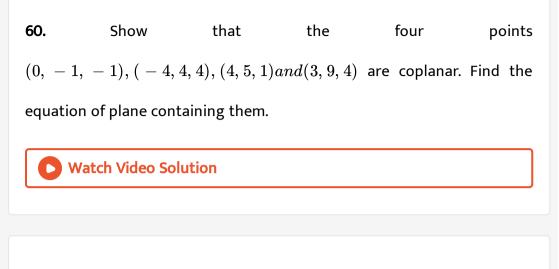
**58.** A plane meets the coordinate axes at A, BandC respectively such that the centroid of triangle ABC is (1, -2, 3). Find the equation of the plane.

Watch Video Solution

**59.** Find the equation of a plane which meets the axes in A, BandC,

given that the centroid of the triangle ABC is the point  $(\alpha, \beta, \gamma)$ 





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

yzandzx - planes, find the eqution of th plane OAB.

Watch Video Solution

**62.** Find the equation of the plane through the points A(2, 2, -1), B(3, 4, 2) and C(7, 0, 6.)



**63.** 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.

**64.** A plane meets the coordinate axes in A, B, C such that eh centroid of triangle ABC is the point (p, q, r). Show that the equation of the plane is  $\frac{x}{p} + \frac{y}{q} + \frac{z}{r} = 3$ .

#### Watch Video Solution

65. Write the equation of the plane whose intercepts on the coordinate

axes are -4, 2and3 respectively.



four Show point 66. that the  $(0, \ -1, \ -1), (4, 5, 1), (3, 9, 4) and (-4, 4, 4)$  are coplanar and find the equation of the common plane. Watch Video Solution Find the image of the point (1, 3, 4) in the plane 67. 2x - y + z + 3 = 0.Watch Video Solution

**68.** Find the image of the point with position vector  $3\hat{i} + \hat{j} + 2\hat{k}$  in the plane  $\overrightarrow{r}2\hat{i} - \hat{j} + \hat{k} = 4$ . Also, find the position vectors of the foot of the perpendicular and the equation of the perpendicular line through  $3\hat{i} + \hat{j} + 2\hat{k}$ .

**69.** Find the length and the foot of perpendicular from the point (1, 3/2, 2) to the plane 2x - 2y + 4z + 5 = 0.

Watch Video Solution

**70.** Find the distance between the point with position vector  $\hat{i} - 5\hat{j} - 10\hat{k}$  and the point of intersection of the line  $\frac{x-2}{3} = \frac{y+1}{4} = \frac{z-2}{12}$  with the plane x - y + z = 5.

Watch Video Solution

**71.** Find the equation of the plane through the intersection of the planes

3x-4y+5z=10and2x+2y-3z=4 and parallel to the line x=2y=3z.

**72.** Show that the plane whose vector equation is  $\overrightarrow{r}\,\hat{i}+2\hat{j}-\hat{k}=1.$  and

the line whose vector equation is 
$$\overrightarrow{r}=\Big(-\hat{i}+\hat{j}+\hat{k}\Big)+\lambda\Big(2\hat{i}+\hat{j}+4\hat{k}\Big)$$
 are parallel. Also, find the

distance between them.



**73.** Prove that the lines 
$$\frac{x+1}{3} = \frac{y+3}{5} = \frac{z+5}{7}$$
 and  $\frac{x-2}{1} = \frac{y-4}{4} = \frac{z-6}{7}$  are coplanar.

Also, find the plane containing these two lines.

74. Show that the lines 
$$\overrightarrow{r} = \left(\hat{i} + \hat{j} - \hat{k}
ight) + \lambda \left(3\hat{i} - \hat{j}
ight) and \overrightarrow{r} = \left(4\hat{i} - \hat{k}
ight) + \mu \left(2\hat{i} + 3\hat{k}
ight)$$
 are

coplanar. Also, find the plane containing these two lines.

**75.** Find the distance of the point P(-1, -5, -10) from the point of intersection of the line joining the points A(2, -1, 2) and B(5, 3, 4) with the plane x - y + z = 5.

## Watch Video Solution

**76.** Find the distance of the point (1, -2, 3) from the plane x - y + z = 5 measured parallel to the line whose direction cosines are proportional to 2, 3, -6.

Watch Video Solution

77. Show that the plane whose vector equation is  $\overrightarrow{r}\cdot\left(\hat{i}+2\hat{j}=\hat{k}
ight)=3$ 

contains the line whose vector equation is $ec{r}\cdot\left(\hat{i}+\hat{j}
ight)+\lambda\Big(2\hat{i}+\hat{j}+4\hat{k}\Big).$ 

**78.** Find the equation of the plane passing through the point (0, 7, -7)and containing the line  $\frac{x+1}{-3} = \frac{y-3}{2} = \frac{z+2}{1}$ .

Watch Video Solution

**79.** Find the equation of the plane passing through the points (1, -1, 2) and (2, -2, 2) and which is perpendicular to the plane x - 2y + 2z = 9

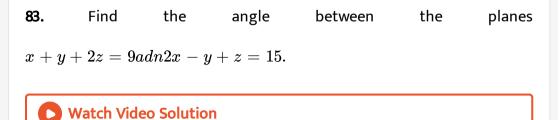
Watch Video Solution

**80.** Find the equation of the plane passing through the point whose coordinates are (-1, 1, 1) and (1, -1, 1) and perpendicular to the plane x + 2y + 3z = 5.

**81.** Find the equation of the plane passing through the point (1, 1, -1) and perpendicular to the planes x + 2y + 3z - 7 = 0 and 2x - 3y + 4z = 0.

**82.** Find the equation of the plane passing through the point (-1, -1, 2) and perpendicular to the planes

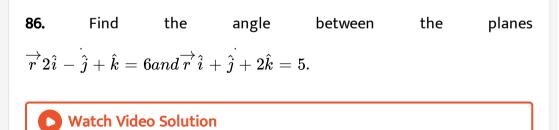
$$3x + 2y - 3z = 1$$
 and  $5x - 4y + z = 5$ .



84. If the planes Find the angle between the planes  $\vec{r} 2\hat{i} - \dot{\hat{j}} + \lambda \hat{k} = 5$  and  $\vec{r} 3\hat{i} + 2\hat{j} + 2\hat{k} = 4$ . are perpendicular. Find the value of  $\lambda$ .

Watch Video Solution

**85.** Find the vector equation of the plane passing through the points  $3\hat{i} + 4\hat{j} + 2\hat{k}, 2\hat{i} - 2\hat{j} - \hat{k}and7\hat{i} + 6\hat{k}$ 



**87.** Find the vector equation of the plane passing through the points (1, 1, 0), (1, 2, 1) and (-2, 2, -1).



**88.** Find the vector equation of the plane passing through the points A(a, 0, 0), B(0, b, 0) and C(0, 0, c). Reduce it to normal form. If plane ABC is at a distance p from the origin, prove that  $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2}$ .

Watch Video Solution

**89.** Reduce the equation  $\overrightarrow{r}3\hat{i}-4\hat{j}+12\hat{k}=5$  to normal form and hence

find the length of perpendicular from the origin to the plane.

**90.** Find the vector equation of a plane which is at a distance of 8 units from the origin and which is normal to the vector  $2\hat{i} + \hat{j} + 2\hat{k}$ .



**91.** Find the direction cosines of perpendicular from the origin to the plane  $\vec{r} 2\hat{i} - 3\hat{j} - 6\hat{k} + 5 = 0$ .

Watch Video Solution

92. Find the coordinates of the foot of the perpendicular drawn from the

origin to the plane 2x - 3y + 4z - 6 = 0.



**93.** Find the equation of a plane which is at a distance of  $3\sqrt{3}$  units from the origin and the normal to which is equally inclined with the coordinate

## Watch Video Solution

**94.** Find the equation of the plane passing through the point (-1, 2, 1)and perpendicular to the line joining the points (-3, 1, 2) and (2, 3, 4). Find also the perpendicular distance of the origin from this plane.

Watch Video Solution

**95.** Find the vector equation of the plane passing through the points A(2, 2, -1), B(3, 4, 1) and C(7, 0, 6). Also, find the Cartesian equation of the plane.



**96.** Find the equation of the plane passing through the point (1, 2, 1)and perpendicular to the line joining the points (1, 4, 2)and(2, 3, 5). find also the perpendicular distance of the origin from this plane.



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

YZandZX - planes find the vectors equation of the plane OAB.

Watch Video Solution

**98.** Find the vector equation of the plane passing through the points having position vectors  $\hat{i} + \hat{j} - 2\hat{k}$ ,  $2i - \hat{j} + \hat{k}$ and  $\hat{i} + 2\hat{j} + \hat{k}$ .

Watch Video Solution

**99.** Find the equation of the plane through the points P(1, 1, 0), Q(1, 2, 1) and R(-2, 2, -1).

100. Find the equation of the plane passing through the following points:

 $(2,\ 1,\ 0),\ (3,\ -2,\ -2) and\ (3,\ 1,\ 7)$ .

Watch Video Solution

101. Find the equation of the plane passing through the following points:

 $(\,-5,\ 0,\ -6),\ (\,-3,\ 10,\ -9) and\ (\,-2,\ 6,\ -6).$ 

Watch Video Solution

102. Find the equation of the plane passing through the following points:

```
(1,\ 1,\ 1),\ (1,\ -1,\ 2) and\ (-2,\ -2,\ 2).
```

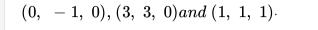


103. Find the equation of the plane passing through the following points:

$$(2, \ 3, \ 4), \ (-3, \ 5, \ 1) and \ (4, \ -1, \ 2)$$

Watch Video Solution

104. Find the equation of the plane passing through the following points:



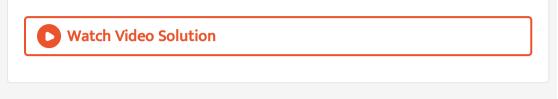
**105.** Show that the following points are coplanar: (0, -1, 0), (2, 1, -1), (1, 1, 1) and (3, 30).

Watch Video Solution

**106.** Show that the following points are coplanar: (0, 4, 3), (-1, -5, -3), (-2, -2, 1) and (1, 1, -1).

**107.** Show that the point (0, -1, -1), (4 5, 1), (3, 9, 4) and (-4, 4, 4) are

coplanar and find the equation of the common plane.



**108.** Reduce the equation of the plane 2x + 3y - z = 6 to intercept form

and find its intercepts on the coordinate axes.

Watch Video Solution

109. Write the equation of the plane whose intercepts on the coordinate

axes are 2, -3 and 4.



110. Reduce the equations of the following planes in intercept form and

find its intercepts on the coordinate axes: 4x + 3y - 6z - 12 = 0



**111.** Reduce the equation of the plane 2x + 3y - 4 = 12 to intercept form and find its intercepts on the coordinate axes.

Watch Video Solution

112. Reduce the equations of the following planes in intercept form and

find its intercepts on the coordinate axes: 2x - y + z = 5

Watch Video Solution

**113.** Find the equation of the plane passing through the point (2, 4, 6) and

making equal intercepts on the coordinate axes.

**114.** Find the equation in Cartesian form of the plane passing through the point (3, -3, 1) and normal to the line joining the points (3, 4, -1) and (2, -1, 5).

Watch Video Solution	
----------------------	--

115. Find the vector equation of the plane whose Cartesian form of equals

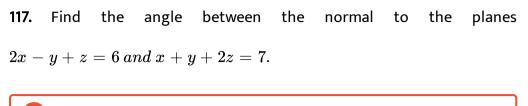
3x - 4y + 2z = 5.

Watch Video Solution

**116.** Find a normal vector to the plane 2x - y + 2z = 5. Also, find a unit

vector normal to the plane.





Watch Video Solution

**118.** Find the angles at which the normal vector to the plane 4x + 8y + z = 5 is inclined to the coordinate axes.

Watch Video Solution

**119.** Find the vector equation of a plane passing through a point having position vector  $2\hat{i} - \hat{j} + \hat{k}$  and perpendicular to the vector  $4\hat{i} + 2\hat{j} - 3\hat{k}$ .

## Watch Video Solution

120. Find the Cartesian form of equation of a plane whose vector equation is :  $\vec{r}(12\hat{i}-3\hat{j}+4\hat{k})+5=0$ 

121. Find the Cartesian form of equation of a plane whose vector equation

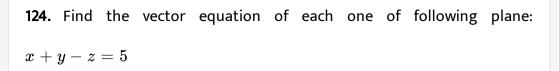
$$\mathsf{is}: \overrightarrow{r} \Big( - \hat{i} + \hat{j} + 2 \hat{k} \Big) = 9$$

Watch Video Solution

**122.** Find the vector equations of the coordinates planes.



123. Find the vector equation of each one of following plane: 2x - y + 2z = 8





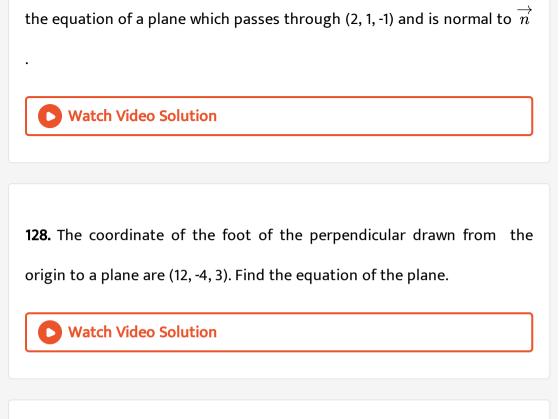
125. Find the vector equation of each one of following plane: x+y=3



126. Find the vector and Cartesian equations of a plane passing through the point (1, -1, 1) and normal to theline joining the point (1, 2, 5) and (-1, 3, 1).

### Watch Video Solution

**127.** If  $\overrightarrow{n}$  is a vector of magnitude  $\sqrt{3}$  and is equally inclined with an acute angle with the coordinate axes. Find the vector and Cartesian forms of



129. Find the equation of the plane passing through the point  $\left(2,3,1
ight)$ 

having (5, 3, 2) as the direction ratio is of the normal to the plane.

Watch Video Solution

**130.** If the axes are rectangular and P is the point (2, 3, -1), find the equation of the plane through P at right angle to OP.

131. Find the intercepts made on the coordinate axes by the plane 2x + y - 2z = 3 and find also the direction cosines of the normal to the plane.

Watch Video Solution

**132.** Find the equation of the plane that bisects the line segment joining points (1, 2, 3) and (3, 4, 5) and is at right angle to it.



133. Show that the normal to the following planes are perpendicular to

each other. 
$$x - y + z - 2 = 0$$
 and  $3x + 2y - z + 4 = 0$ 

134. Show that the normal to the following planes are perpendicular to

each other. 
$$\overrightarrow{r}\left(2\hat{i}-\hat{j}+3\hat{k}
ight)=5$$
 &  $\overrightarrow{r}\left(2\hat{i}-2\hat{j}-2\hat{k}
ight)=5$ 

#### Watch Video Solution

135. Show that the equation of the planes are perpendicular to each other.  $ightarrow r2\hat{i}-\dot{\hat{j}}+3\hat{k}=5$ 

Watch Video Solution

**136.** Show that the normal vector to the plane 2x + 2y + 2z = 3 is equally inclined with the coordinate axes.



**137.** Find a vector of magnitude 26 units normal to the plane 12x - 3y + 4z = 1.

**138.** Find the equation of the plane which bisects the line segment joining

the points (-1, 2, 3) and (3, -5, 6) at right angles.

Watch Video Solution

**139.** Find the vector and the Cartesian equation of the plane which pases through the point (5,2,-4) and perpendicular to the line with direction ratios (2,3,-1).

Watch Video Solution

140. If O be the origin and the coordinates of P be(1, 2, 3), then find the equation of the plane passing through P and perpendicular to OP. **141.** Find the vector equation of a plane at a distance of 5 units from the origin and has  $\hat{i}$  as the unit vector normal to it.



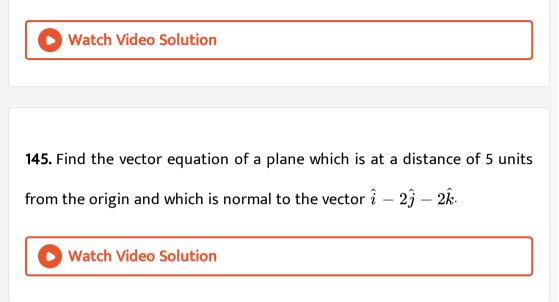
**142.** Reduce the equation of the plane x - 2y - 2z = 12 to normal form and hence find the length of the perpendicular for the origin to the plane. Also, find the direction cosines of the normal to the plane.

Watch Video Solution

**143.** Find the vector equation of a plane which is at a distance of 6 units from the origin and has 2, -1, 2 as the direction ratios of a normal to it. Also, find the coordinates of the foot of the normal drawn from the origin.

144. Find the vector equation of a plane which is at a distance of 3 units

from the origin and has  $\hat{k}$  as the unit vector normal to it.



**146.** Reduce the equation 2x - 3y - 6z = 14 to the normal form and hence fine the length of perpendicular from the origin to the plane. Also, find the direction cosines of the normal to the plane.



147. Write the normal form of the equation of the plane 2x - 3y + 6z + 14 = 0.

**148.** The direction ratios of the perpendicular from the origin to a plane are 12,-3,4 and the length of the perpendicular is 5. Find the equation of the plane.

Watch Video Solution

**149.** Find a normal vector to the plane x + 2y + 3z - 6 = 0



**150.** Find the vector equation of the plane which is at a distance of  $\frac{6}{\sqrt{29}}$  from the origin and its normal vector from the origin is  $2\hat{i} - 3\hat{j} + 4\hat{k}$ . Also find its cartesian form.



151. Find the distance of the plane 2x - 3y + 4z - 6 = 0 from the origin.



**152.** Find the vector equation of the plane passing thrugh the points (2,5,-3),(-2,-3,5),(5,3,-3).

Watch Video Solution

153. Find the vector equation of the plane passing through the points (1,

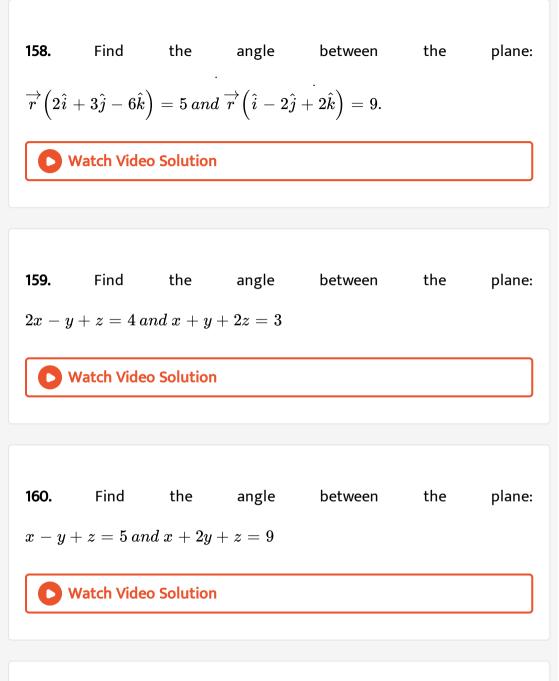
1, -1), (6, 4, -5) and (-4, -2, 3).

Watch Video Solution

154. Show that the planes 2x + 6y - 6z = 7 and 3x + 4y + 5z = 8 are

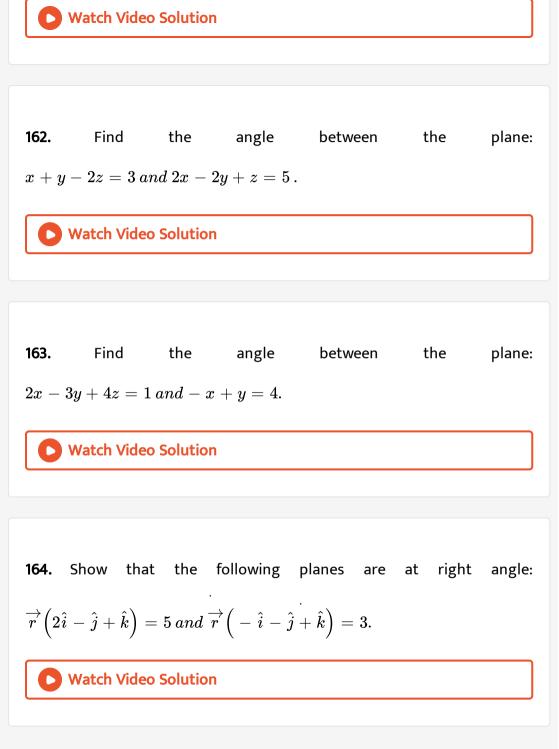
at right angles.

155. Find the equation of the plane through the points (2, 1, -1) and (-1, 3, 4) and perpendicular to the plane x - 2y + 4z = 1. Also show that the plain thus obtained contains the line  $\overrightarrow{r} = - \hat{i} + 3\hat{j} + 4\hat{k} + \lambdaig(3\hat{i} - 2\hat{j} - 5\hat{k}ig)ig)$ Watch Video Solution 156. Find the angle between the plane:  $\overrightarrow{r}\left(2\hat{i}-3\hat{j}+4\hat{k}
ight)=1\,and\,\overrightarrow{r}\left(\,-\,\hat{i}+\hat{j}
ight)=4\,.$ Watch Video Solution the angle between 157. Find plane: the  $\overrightarrow{r}\left(2\hat{i}-\hat{j}+2\hat{k}
ight)=6~and~\overrightarrow{r}\left(3\hat{i}+6\hat{j}-2\hat{k}
ight)=9.$ Watch Video Solution



161. Find the angle between the two planes 2x + y2z = 5 and 3x6y2z = 7

using vector method.



165. Show that the following planes are at right angle: x - 2y + 4z = 10 and 18x + 17y + 4z = 49.

**166.** Determine the value of  $\lambda$  for which the following plane are perpendicular to each other.  $\overrightarrow{r}(\hat{i}+2\hat{j}+3\hat{k}) = 7$  and  $\overrightarrow{r}(\lambda\hat{i}+2\hat{j}-7\hat{k}) = 26$ . Watch Video Solution

167. Determine the value of  $\lambda$  for which the following plane are perpendicular to each other. 2x - 4y + 3z = 5 and  $x + 2y + \lambda z = 5$ 

**168.** Determine the value of  $\lambda$  for which the following plane are perpendicular to each other. 3x - 6y - 2z = 7 and  $2x + y - \lambda z = 5$ 



**169.** Obtain the equation of the plane passing through the point (1, -3, -2)

and perpendicular to the planes

x + 2y + 2z = 5 and 3x + 3y + 2z = 8.

Watch Video Solution

170. Find the equation of the plane through the points (2,2,1) and (9,3,6)

and perpendicular to the plane 2x + 6y + 6z = 1

**171.** Find the equation of the plane with intercept 3 on the y-axis and parallel to ZOX plane.



**172.** Find the equation of the plane that contains the point (1, 1, 2) and is perpendicular to each of the planes 2x + 3y2z = 5 and x + 2y3z = 8.

Watch Video Solution

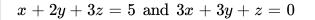
**173.** Find the equation of the plane passing through (a, b, c) and parallel

to the plane  $\overrightarrow{r}\hat{i}+\dot{\hat{j}}+\hat{k}=2.$ 

# Watch Video Solution

**174.** Find the equation of the plane passing through the point (-1,3,2) and

perpendicular to each of the planes





175. Find the vector equation of the plane through the points (2, 1, -1) and

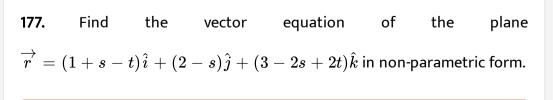
(-1, 3, 4) and perpendicular to the plane x - y + 4z = 10.

Watch Video Solution

176. Find the vector equation of the following planes in scalar product

$$\operatorname{form}\left(\overrightarrow{r}\overset{\cdot}{\overrightarrow{n}}=d
ight)\colon\overrightarrow{r}=\left(2\hat{i}-\hat{k}
ight)+\lambda\hat{i}+\mu\Big(\hat{i}-2\hat{j}-\hat{k}\Big).$$

Watch Video Solution



178. Find the vector equation of the following planes in scalar product

form

$$\left(\overrightarrow{r}\stackrel{\cdot}{\overrightarrow{n}}=d
ight):\overrightarrow{r}=\left(\hat{i}+\hat{j}
ight)+\lambda\Big(\hat{i}+2\hat{j}-\hat{k}\Big)+\mu\Big(-\hat{i}+\hat{j}-2\hat{k}\Big)$$

Watch Video Solution

179. Find the vector equation of the following planes in scalar product

form

$$\Big( o r \stackrel{\cdot}{\longrightarrow} n = d \Big) \colon o r = \hat{i} - \hat{j} + \lambda \Big( \hat{i} + \hat{j} + \hat{k} \Big) + \mu \Big( 4 \hat{i} - 2 \hat{j} + 3 \hat{k} \Big) \cdot$$

Watch Video Solution

**180.** Find the Cartesian form of the equation of the following plane:  $\vec{r} = (\hat{i} - \hat{j}) + s(-\hat{i} + \hat{j} + 2\hat{k}) + t(\hat{i} + 2\hat{j} + \hat{k}).$ 

181. Find the vector equation of the following planes in non parametric

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

# Watch Video Solution

182. Find the vector equation of the following planes in non parametric

form: 
$$ightarrow r = \left(2\hat{i}+2\hat{j}-\hat{k}
ight)+\lambda\Big(\hat{i}+2\hat{j}+3\hat{k}\Big)+\mu\Big(5\hat{i}-2\hat{j}+7\hat{k}\Big).$$

Watch Video Solution

**183.** Find the equation of lane passing through the point  $\hat{i} + \hat{j} + \hat{k}$  and parallel to the point  $\rightarrow r2\hat{i} - \hat{j} + 2\hat{k} = 5$ .

#### Watch Video Solution

**184.** 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).
```



**185.** Direction ratios of the normal to the plane passing through the points (2, 1, 3) and the line of intersection of the planes x + 2y + z = 3 and 2x - y - z = 5 are (A) 13, 6, 1 (B) 4, 3, 2 (C) 4, 3, 2 (D) none

(D) none

Watch Video Solution

186. Find the Cartesian as well as vector equations of the planes through

the intersection of the planes  $ec{r}\left(2\hat{i}+6\hat{j}
ight)+12=0 \ and \ ec{r}\left(3\hat{i}-\hat{j}-4\hat{k}
ight)=0$  which are at a unit

distance from the origin.

**187.** Find the equation of the plane which is parallel to 2x - 3y + z = 0

and which passes through (1, -1, 2).



**188.** Find the equation of the plane through (3, 4, -1) which is parallel to the plane  $ightarrow r\Big(2\hat{i}-3\hat{j}+5\hat{k}\Big)+2=0.$ 

Watch Video Solution

**189.** Find the equation of the plane passing through the line of intersection of the planes 2x - 7y + 4z - 3 = 0, 3x - 5y + 4z + 11 = 0 and the point (-2, 1, 3).

**190.** Find the equation of the plane through the point  $2\hat{i} + \hat{j} - \hat{k}$  and passing through the line of intersection of the plane  $\overrightarrow{r}(\hat{i}+3\hat{j}-\hat{k}) = 0$  and  $\overrightarrow{r}(\hat{j}+2\hat{k}) = 0$ . **Watch Video Solution** 

**191.** Find the equation of the plane passing through the line intersection of the plane:  $\overrightarrow{2}x - y = 0$  and 3z - y = 0 and perpendicular to the plane 4x + 5y - 3z = 8

### Watch Video Solution

192. Find the equation of the plane through the line of intersection of the

planes x + 2y + 3z + 4 = 0 and x - y + z + 3 = 0 and passing

through the origin.

**193.** Find the vector equation (in scalar product form) of the plane containing the line of intersection of the planes x - 3y + 2z - 5 = 0 and 2x - y + 3z - 1 = 0 and passing through (1, -2, 3).

Watch Video Solution

**194.** Find the equation of the plane which is perpendicular to the plane

5x + 3y + 6z + 8 = 0 adn which contailns the line of intersedtion of the

planes x + 2y + 3z - 4 = 0 and 2x + y - z + 5 = 0.

## Watch Video Solution

195. Find the equation of the plane through the line of intersection of the

planes 
$$\overrightarrow{r}\left(\hat{i}+3\hat{j}
ight)-6=0$$
  $and$   $\overrightarrow{r}\left(3\hat{i}-\hat{j}-4\hat{k}
ight)=0,$  which is at a

unit distance from the origin.

196. Find the equation of the plane through the intersection of the planes

3x - y + 2z - 4 = 0 and x + y + z - 2 = 0 and the point (2,2,1).

**197.** Find the equation of the plane through the line of intersection of the planes x + y + z = 1 and 2x + 3y + 4z = 5 which is perpendicular to the plane x - y + z = 0

Watch Video Solution

198. Prove that if a plane has the intercepts a, b, c and is at a distance of p

units from the origin, then 
$$rac{1}{a^2}+rac{1}{b^2}+rac{1}{c^2}=rac{1}{p^2}.$$

**199.** If the points  $(1, 1, \lambda)$  and (-3, 0, 1) be equidistant from the plant  $\vec{r} \left(3\hat{i}+4\hat{j}-12\hat{k}\right)+13=0$  find the value of  $\lambda$ .

Watch Video Solution

**200.** Find the distance between the point P(6, 5, 9) and the plane determined by the points A(3, -1, 2), B(5, 2, 4) and C(-1, -1, 6).

Watch Video Solution

**201.** Find the equation of a plane passing through the pint P(6, 5, 9) and parallel to the plane determined by the points A(3, -1, 2)B(5, 2, 4) and C(-1, -1, 6). Also find the distance of this plane from the point A.



**202.** 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  $OABCisx^{-2} + y^{-2} + z^{-2} = 16p^{-2}$ .

**203.** A variable plane at a constant distance p from the origin meets the coordinate axes in points A,B and C respectively. Through these points , planes are drawn parallel to the coordinate planes, show that locus of the point of intersection is  $\frac{1}{x^2} + \frac{1}{y^2} + \frac{1}{z^2} = \frac{1}{p^2}$ 

Watch Video Solution

204. Find the distance of the point  $2\hat{i} - \hat{j} - 4\hat{k}$  from the plane  $\overrightarrow{r}\left(3\hat{i} - 4\hat{j} + 12\hat{k}\right) - 9 = 0.$ 

**205.** Find the distance of the point (2, 3, -5) from the plane x + 2y - 2z - 9 = 0.



**206.** Show that the points (1, 1, 1) and (-3, 0, 1) are equidistant from the

plane 3x + 4y - 12z + 13 = 0.

Watch Video Solution

**207.** Find the equations of the plane parallel to the plane x - 2y + 2z - 3 = 0 and which are at a unit distance from the point (1, 1, 1).

# Watch Video Solution

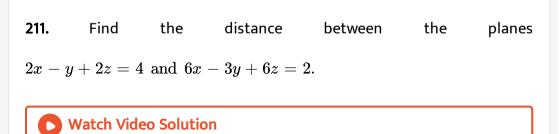
**208.** Find the distance of the point (2, 3, 5) from the xy-plane.

**209.** If the product of distances of the point (1, 1, 1) from the origin and

plane  $x-y+z+\lambda=0$  be 5 then  $\lambda=$ 



**210.** Find the distance between the point (7, 2, 4) and the plane determined by the points a(2, 5, -3), B(-2, -3, 5) and C(5, 3, -3).



**212.** Prove that the four points having position vectors are non-coplanar:

$$\hat{i} + 2\hat{j} + 3\hat{k}, 2\; \hat{i} + \hat{j} + 3\hat{k} ~and ~\hat{i} + \hat{j} + \hat{k}$$



**213.** Find the equation of the plane mid parallel to the planes 2x - 2y + z + 3 = 0 and 2x - 2y + z + 9 = 0.

Watch Video Solution

**214.** Reduce the equation of line x - y + 2z = 5adn3x + y + z = 6 in symmetrical form. Or Find the line of intersection of planes x - y + 2z = 5and3x + y + z = 6.

**215.** Find the equation of the plane passing through the line of intersection of the planes 2x + y - Z = 3,5x - 3y + 4z + 9 = 0 and parallel to the line  $\frac{x-1}{2} = \frac{y-3}{4} = \frac{z-5}{5}$ 

# Watch Video Solution

**216.** Find the equation of the plane passing through the intersection of

the planes 
$$\overrightarrow{r}\left(\hat{i}+\hat{j}+\hat{k}
ight)=1$$
 and  $\overrightarrow{r}\left(2\hat{i}+3\hat{j}-\hat{k}
ight)+4=0$  and

parallel to x-axis.

## Watch Video Solution

**217.** Find the equation of the plane passing through the intersection of the planes 4x - y + z = 0 and x + y - z = 4 and parallel to the line with direction ratios proportional to 2, 1, 1.

**218.** Find the equation of the plane passing through the point A(1, 2, 1)and perpendicular to the in joining the points P(1, 4, 2) and Q(2, 3, 5).

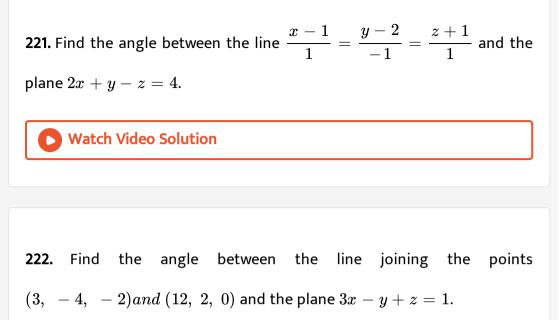


**219.** Find an equation or the line that passes through the point P(2, 3, 1) and is parallel to the line of intersection o the planes x + 2y - 3z = 4 and x - 2y + z = 0.

Watch Video Solution

**220.** Find the angle between the line  

$$\rightarrow r = \left(2\hat{i} + 3\hat{j} + 9\hat{k}\right) + \lambda\left(2\hat{i} + 3\hat{j} + 4\hat{k}\right)$$
 and the plane  
 $\rightarrow r\left(\hat{i} + \dot{\hat{j}} + \hat{k}\right) = 5.$ 



Watch Video Solution

223. The line 
$$\overrightarrow{r}=\hat{i}+\lambda\Big(2\hat{i}-m\hat{j}-3\hat{k}\Big)$$
 is parallel to the plane  $\overrightarrow{r}\Big(m\hat{i}+3\hat{j}+\hat{k}\Big)=4$  . Find  $m$ 

### Watch Video Solution

224. Find the vector equation of the line through the origin which is perpendicular to the plane  $\overrightarrow{r}(\hat{i}+2\hat{j}+3\hat{k})=3.$ 

**225.** Find the equation of the plane passes through the point (2, 3, -4)

and (1, -1, 3) and parallel to x-axis.



226. Find the Cartesian equation of the plane passing through the points

 $A\ (0,0,0)$  and  $b(3,\ -1,2)$  and parallel to the line  $rac{x-4}{1}=rac{y+3}{-4}=rac{z+1}{7}$ 

Watch Video Solution

227. Find the vector and Cartesian equations of the line passing through

(1, 2, 3) and parallel to the planes  

$$\overrightarrow{r}(\hat{i}-\hat{j}+2\hat{k}) = 5 \text{ and } \overrightarrow{r}(3\hat{i}+\hat{j}+\hat{k}) = 6.$$

**228.** Prove that the line of section of the planes 5x + 2y - 4z + 2 = 0 and 2x + 8y + 2z - 1 = 0 is parallel to the plane 4x - 2y - 5z - 2 = 0.

Watch Video Solution

**229.** Find the equation of the plane passing through the points (2, 2, -1) and (3, 4, 2) and parallel to the line whose direction ratios are (7, 0, 6)

# Watch Video Solution

**230.** Find the coordinates of the point, where the line  $\frac{x-2}{3} = \frac{y+1}{4} = \frac{z-2}{2}$  intersects the plane x - y + z - 5 = 0. Also find the angle between the line and the plane.

**231.** Find the vector and Cartesian forms of the equation of the plane passing through the point (1, 2, -4) and parallel to the lines  $\vec{r} = (\hat{i} + 2\hat{j} - 4\hat{k}) + \lambda(2\hat{i} + 3\hat{j} + 6\hat{k})$  and  $\vec{r} = (\hat{i} - 3\hat{j} + 5\hat{k}) + \mu(\hat{i} + A)$  Also find the distance of the point (9, -8, -10) from the plane thus obtained.

Watch Video Solution

**232.** Find the equation of the plane passing through the point (3,4,1) and

(0,1,0) and parallel to the line  $rac{x+3}{2}=rac{y-3}{7}=rac{z-2}{5}$ 

Watch Video Solution

**233.** Find the coordinates of the point, where the line  $\frac{x-2}{3} = \frac{y+1}{4} = \frac{z-2}{2}$  intersects the plane x - y + z - 5 = 0. Also find the angle between the line and the plane.

234. Find the vector equation of the line passing through (1, 2, 3) and

perpendicular to the plane 
$$\ 
ightarrow rigg( {\hat i}+2{\dot {\hat j}}-5{\hat k} igg) = 9.$$

#### Watch Video Solution

235. Find the vector equation of the line passing through (1, 2, 3 ) and

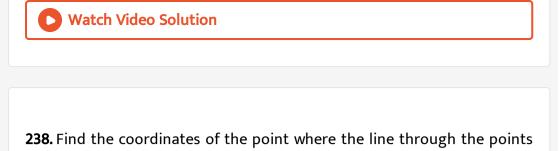
parallel to the planes 
$$\overrightarrow{r}\left(\hat{i}-\hat{j}+2\hat{k}
ight)=5$$
 and  $\overrightarrow{r}\left(3\hat{i}+\hat{j}+\hat{k}
ight)=6.$ 

Watch Video Solution

**236.** Find the value of  $\lambda$  such that the lines  $\frac{x-2}{6} = \frac{y-1}{\lambda} = \frac{z+5}{-4}$  is perpendicular to the plane 3x - y - 2z = 7.

#### Watch Video Solution

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



A (3, 4, 1) and B(5, 1, 6) crosses the XY-plane.

Watch Video Solution

239. Find the coordinate of the point where the line through (5, 1, 6) and

(3, 4, 1) crosses the i. yz-plane ii. zx-plane.

Watch Video Solution

**240.** Find the coordinates of the point where the line through (3, 4, 5)

and (2, 3, 1) crosses the plane 2x + y + z = 7.

**241.** Find the distance of the point P(3, 4, 4) from the point where the line joining the points A(3, -4, -5) and B(2, -3, 1) intersects the plane 2x + y + z = 7.

### Watch Video Solution

**242.** 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.

**243.** If  $4x + 4y - \lambda z = 0$  is the equations of the plane through the origin

that contains the line  $rac{x-1}{2}=rac{y+1}{3}=rac{z}{4}, ext{ find the value of } \lambda \cdot$ 

244. 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 Video Solution  
245. Show that the lines  
 $\vec{r} = (2\hat{j} - 3\hat{k}) + \lambda(\hat{i} + 2\hat{j} + 3\hat{k})$  and  $\vec{r} = (2\hat{i} + 6\hat{j} + 3\hat{k}) + \mu(2\hat{i} + 3\hat{j})$   
are coplanar. Also, find the equation of the plane containing them.  
Watch Video Solution

**246.** Show that the lines 
$$\frac{x+1}{-3} = \frac{y-3}{2} = \frac{z+2}{1}$$
 and  $\frac{x}{1} = \frac{y-7}{-3} = \frac{z+7}{2}$  are coplanar.

Also, find the equation of the plane containing them.

247. Find the equation of the plane which contains two parallel to lines

$$rac{x-4}{1} = rac{y-3}{-4} = rac{z-2}{5} \ and \ rac{x-3}{1} = rac{y+2}{-4} = rac{z}{5}.$$

Watch Video Solution

**248.** Show that the plane whose vector equation is  $\vec{r} \,\hat{i} + 2\hat{j} = \hat{k} = 3$  contains the line whose vector equation is  $\vec{r} \,\hat{i} + \hat{j} + \lambda \Big( 2\hat{i} + \hat{j} + 4\hat{k} \Big)$ .

Watch Video Solution

**249.** Find the vector equation of the plane passing through the points (3, 4, 2) and (7, 0, 6) and perpendicular to the plane 2x - 5y - 15 = 0. Also, show that the plane thus obtained contains the line  $\vec{r} = \hat{i} + 3\hat{j} - 2\hat{k} + \lambda (\hat{i} - \hat{j} + \hat{k})$ .

250. If the lines  $\frac{x-1}{-3} = \frac{y-2}{-2y} = \frac{z-3}{2}$  and  $\frac{x-1}{k} = \frac{y-2}{1} - \frac{z-3}{5}$  are perpendicular, find the value of k and hence find the equation of plane containing these lines

hence find the equation of plane containing these lines.

## Watch Video Solution

**251.** Find the vector equation of the plane passing through three points with position vectors  $\hat{i} + \hat{j} - 2\hat{k}$ ,  $\hat{i} - \hat{j} + \hat{k}$  and  $\hat{i} + 2\hat{j} + \hat{k}$ . Also find the coordinates of the point of intersection of this plane and the line  $\vec{r} = 3\hat{i} - \hat{j} - \hat{k} + \lambda (2\hat{i} - 2\hat{j} + \hat{k})$ .

Watch Video Solution

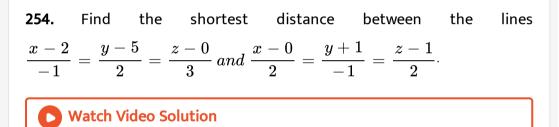
252. Show that the lines 
$$\frac{x5}{4}, \frac{y-7}{4} = \frac{z+3}{-5}$$
 and  $x-8\frac{1}{7} = \frac{y-4}{1} = \frac{z-5}{3}$  intersect each

other

253. Find the equation of a plane which passes through the point (3, 2, 0)

and contains the line 
$$rac{x-3}{1}=rac{y-6}{5}=rac{z-4}{4}\cdot$$

#### Watch Video Solution



255. Find the shortest distance between the lines , 
$$\frac{x-1}{2} = \frac{y-3}{4} = \frac{x+2}{1}$$
 and  $3x - y - 2z + 4 = 0 = 2x + y + z + 1$ 

**256.** Find the length and the foot of the perpendicular from the point (7, 14, 5) to the plane 2x + 4y - z = 2. Also, the find image of the point *P* in the plane.

**Watch Video Solution** 

**257.** Find the image of point (0, 0, 0) in the plnae 3x + 4 - 6z + 1 = 0.

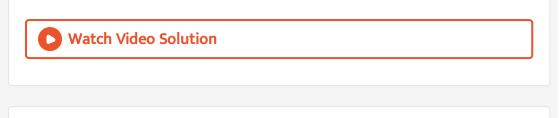
Watch Video Solution

258. Find the reflection of the point (1, 2, -1) in the plane 3x - 5y + 4z = 5.

### Watch Video Solution

**259.** Find the coordinates of the foot of the perpendicular drawn from the point (5, 4, 2) to the line  $\frac{x+1}{2} = \frac{y-3}{3} = \frac{z-1}{-1}$ . Hence or

otherwise deduce the length of the perpendicular.



260. Find the coordinates of the foot of the perpendicular from the point

(1, 1, 2) to the plane 2x - 2y + 4z + 5 = 0. Also the find the length of

the perpendicular.

Watch Video Solution

**261.** The distance of the point (1, -2, 3) from the plane x - y + z = 5measured parallel to the line  $\frac{x}{2} = \frac{y}{3} = \frac{z}{-6}$ , is

Watch Video Solution

**262.** Find a vector in the direction of  $\overrightarrow{a} = 2\hat{i} - \hat{j} + 2\hat{k}$ , which has magnitude of 6 units.

**263.** Find the co-ordinates of the foot of perpendicular and the length of perpendicular drawn from the point (2, 3, 7) to the plane 3x - y - z = 7.

Watch Video Solution

**264.** Find the distance of the point with position vector  $-\hat{i}-5\hat{j}-10\hat{k}$ 

from the point of intersection of the line  $\overrightarrow{r}=\left(2\hat{i}-\hat{j}+2\hat{k}
ight)+\lambda\left(3\hat{i}+4\hat{j}+12\hat{k}
ight)$  with the plane  $\overrightarrow{r}\left(\hat{i}-\hat{j}+\hat{k}
ight)=5.$ 

Watch Video Solution

265. Find the length and the foot of the perpendicular from the point (1, 1,

2) to the plane 
$$\overrightarrow{r}\left(\hat{i}-2\hat{j}+4\hat{k}
ight)+5=0.$$

**266.** Find the coordinates of the foot of the perpendicular and the perpendicular distance from the point P(3, 2, 1) to the plane 2x - y + z + 1 = 0 Find also the image of the point P in the plane.



**267.** Find the direction cosines of the unit vector perpendicular to the

plane 
$$\overrightarrow{r}\left(6\hat{i}-3\hat{j}-2\hat{k}
ight)+1=0$$
 passing through the origin.

#### Watch Video Solution

268. Find the coordinates of the foot of perpendicular drawn from origin

to the planes: 2x - 3y + 4z - 6 = 0

269. Write the equation of the plane parallel to XOY-plane and passing

through the point (2, -3, 5).

Watch Video Solution

**270.** Write the equation of the plane parallel to YOZ-plane and passing through (-4, 1, 0).

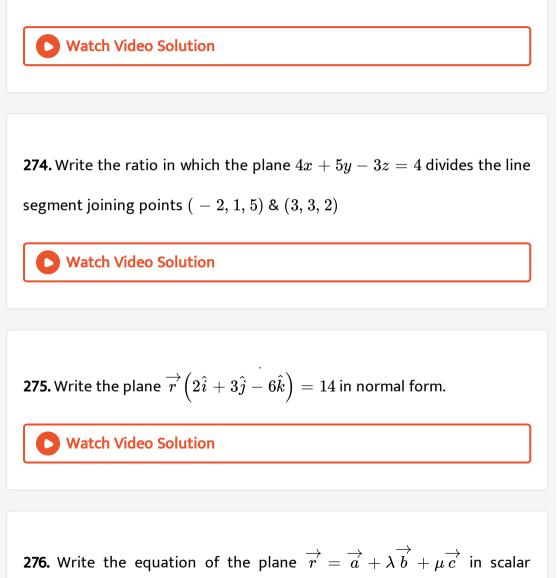
Watch Video Solution

**271.** Write the equation of the plane passing through points (a, 0, 0), (0, b, 0) and (0, 0, c).

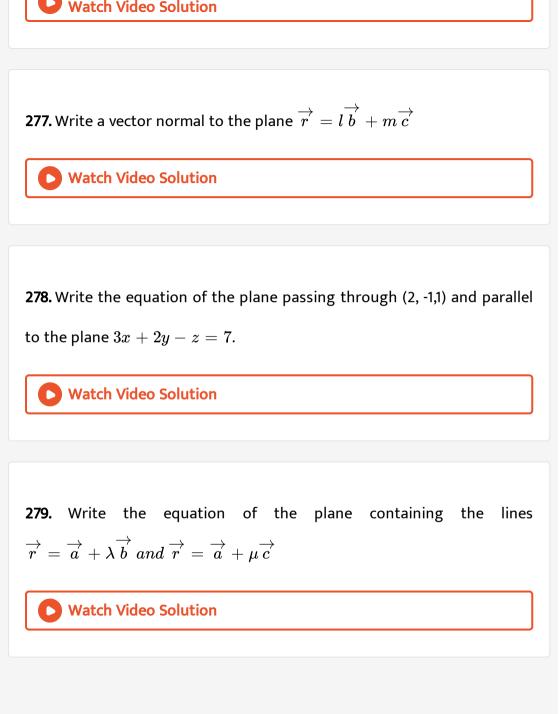


**272.** Write the general equation of a plane parallel to X-axis.

273. Write the intercepts made by the plane 2x - 3y + 4z = 12 on the coordinate axes.



product form.



**280.** Write the position vector of the point where the line  $\overrightarrow{r} = \overrightarrow{a} + \lambda \overrightarrow{b}$ 

meets the plane  $\overrightarrow{r}\overset{\cdot}{\overrightarrow{n}}=0.$ 

#### Watch Video Solution

**281.** Write the value of k for which the line  $\frac{x-1}{2} = \frac{y-1}{3} = \frac{z-1}{k}$  is perpendicular to the normal to the plane  $\overrightarrow{r}\left(2\hat{i}+3\hat{j}+4\hat{k}\right) = 4$ .

Watch Video Solution

**282.** Write the intercept cut off by the plane 2x + y - z = 5 on x-axis.

283. Find the length of the perpendicular drawn from the origin to the

plane 2x 3y + 6z + 21 = 0.

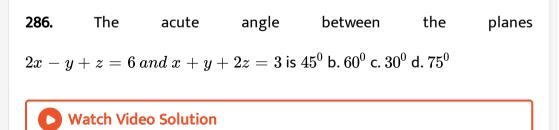
284. Write the vector equation of the line passing through the point (1, -2,

-3) and normal to the plane 
$$\overrightarrow{r}\left(2\hat{i}+\hat{j}+2\hat{k}
ight)=5.$$

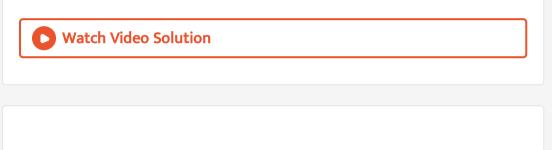
Watch Video Solution

285. Write the vector equation of the plane passing through the point

$$(a,b,c)$$
 and parallel to the plane  $\overrightarrow{r}.\left(\hat{i}+\hat{j}+\hat{k}
ight)=2.$ 



**287.** The equation of the plane thrugh the ointersection of lane x + 2y + 3z = 4 and 2x+y-z-5 and  $perpendic\underline{a}r \rightarrow thepla \neq$ 5x+3y+6z+8=0is(A)7x-2y+3z+81=0(B)23x+14y-9z+48=0(C)51x+15y+50z+173=0 (D) none of these



**288.** The distance between the planes 2x + 2y - z + 2 = 0 and 4x + 4y - 2z + 5 = 0 is  $a \cdot \frac{1}{2}$  b.  $\frac{1}{4}$ ' c.  $\frac{1}{6}$  d.

none of these

Watch Video Solution

**289.** The image of the point (1, 3, 4) in the plane 2x - y + z + 3 = 0 is (3, 5, 2) b. (-3, 5, 2) c.(3, 5, -2) d. (3, -5, 2)

290. Find the vector equation of the following plane in scalar product

form: 
$$\overrightarrow{r} = \left(\hat{i} - \hat{j}
ight) + \lambda \Big(\hat{i} + \hat{j} + \hat{k}\Big) + \mu \Big(\hat{i} - 2\hat{j} + 3\hat{k}\Big)$$
.

Watch Video Solution

**291.** The distance of the line  $\overrightarrow{r} = 2\hat{i} - 2\hat{j} + 3\hat{k} + \lambda(\hat{i} - \hat{j} + 4\hat{k})$  from the plane  $\overrightarrow{r}(\hat{i} + 5\hat{j} + \hat{k}) = 5$ , is  $\frac{5}{3\sqrt{3}}$  b.  $\frac{10}{3\sqrt{3}}$  c.  $\frac{25}{3\sqrt{3}}$  d. none of

these

Watch Video Solution

**292.** The equation of the plane through the line x + y + z + 3 = 0 = 2x - y + 3z + 1 and parallel to the line  $\frac{x}{1} = \frac{y}{2} = \frac{z}{3}$  is a. x - 5y + 3 = 7 b. x - 5y + 3z = 7 c. x + 5y = 3z = 7 d. x + 5y + 3z = -7

**293.** The vector equation of the plane containing the line  $\vec{r} = \left(-2\hat{i} - 3\hat{j} + 4\hat{k}\right) + \lambda\left(3\hat{i} - 2\hat{j} - \hat{k}\right)$  and the point  $\hat{i} + 2\hat{j} + 3\hat{k}$  is  $a. \vec{r}\left(\hat{i} + 3\hat{k}\right) = 10$  b.  $\vec{r}\left(\hat{i} - 3\hat{k}\right) = 10$  c.  $\vec{r}\left(3\hat{i} + \hat{k}\right) = 10$  d. none of these

Watch Video Solution

**294.** A plane meets the coordinate axes at A, B, C such that the centroid of  $\Delta ABC$  is the point (a, b, c). If the equation of the plane is  $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = k$ , then k = 1 b. 2 c. 3 d. none of these

Watch Video Solution

295. The distance between the point (3,4, 5) and the point where the line

$$rac{x-3}{1}=rac{y-4}{2}=rac{z-5}{2}$$
 meets the plane  $x+y+z=17,\ is\ 1$  b.  $2$  c.

 $3\,\mathrm{d.}\,\mathrm{none}\,\mathrm{of}\,\mathrm{these}$ 

**296.** A vector parallel to the line of intersection of the planes  $\vec{r} = 3\hat{i} - \hat{j} + \hat{k} = 1 \text{ and } \vec{r} \left(\hat{i} + 4\hat{j} - 2\hat{k}\right) = 2 \text{ is } a. - 2\hat{i} + 7\hat{j} + 13\hat{k}$ b.  $2\hat{i} + 7\hat{j} - 13\hat{k}$  c. -2i - 7j + 13k d. 2i + 7j + 13k

Watch Video Solution

**297.** If plane passes through the point (1, 1,1) and is perpendicular to the line,  $\frac{x-1}{3} = \frac{y-1}{0} = \frac{z-1}{4}$ , then its perpendicular distance from the origin is

### Watch Video Solution

**298.** The equation of the plane parallel to the lines x - 1 = 2y - 5 = 2z and 3x = 4y - 11 = 3z - 4 and passing through the point (2, 3, 3) is

**299.** The distance of the point (-1, -5, -10) from the point of intersection of the line  $\overrightarrow{r} = 2\hat{i} - \hat{j} + 2\hat{k} + \lambda\left(3\hat{i} + 4\hat{j} + 12\hat{k}\right)$  and the plane  $\overrightarrow{r}\left(\hat{i} - \hat{j} + \hat{k}\right) = 5$  is a. 9 b. 17 c. 13 d. none of these

#### Watch Video Solution

**300.** The equation of the plane through the intersection of the plane ax + by + cz + d = 0 and lx + my + n + p = 0 and parallel to the line y = 0, z = 0. (A)(bl - am)y + (cl - an)z + dl - ap = 0(B)(am - bl)x + (mc - bn)z + md - bp = 0(c)(na - cl)d + (bn - cm)y + nd - cp = 0 (D) None of these

Watch Video Solution

**301.** The equation of the plane which cuts equal intersects of unit length on the coordinate axes is x+y+z=1 b. x+y+z=0 c. x+y-z=1 d. x+y+z=2

### Others

1. Reduce in symmetrical form the equations of et line  $x=ay+b, \ zs=cy+d$ .

View Text Solution

2. If the line 
$$\rightarrow r = (\hat{i} - 2\hat{j} + \hat{k}) + \lambda (2\hat{i} + \hat{j} + 2\hat{k})$$
 is parallel to the plane  $\rightarrow r3\hat{i} - 2\hat{j} + m\hat{k} = 14$ , find the value of  $m$ .

# View Text Solution