



MATHS

BOOKS - SHARAM PUBLICATION

THREE DIMENSIONAL GEOMETRY

Example

1. Write the vector equation of the plane whose cartesian

equation is x + y + 2z = 1.

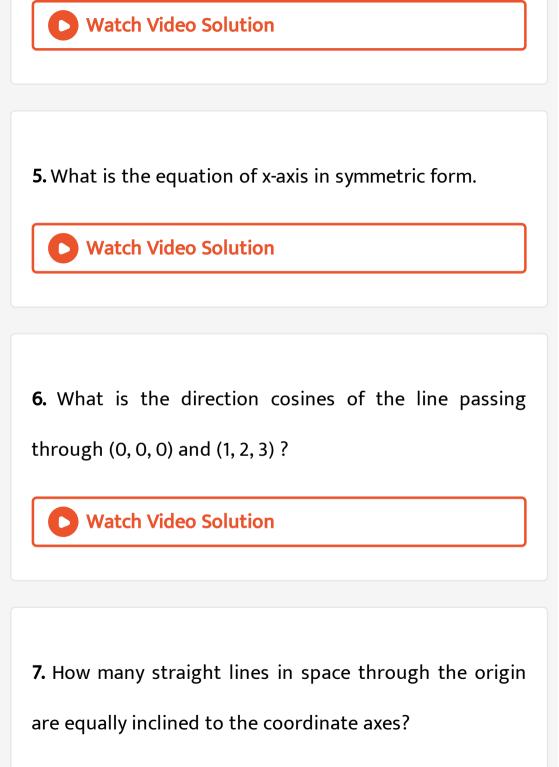
2. Write the vector equation of the plane passing through the point (a, b, c) and parallel to the plane $r.\left(\hat{i}+\hat{j}+\hat{k}
ight)=2.$

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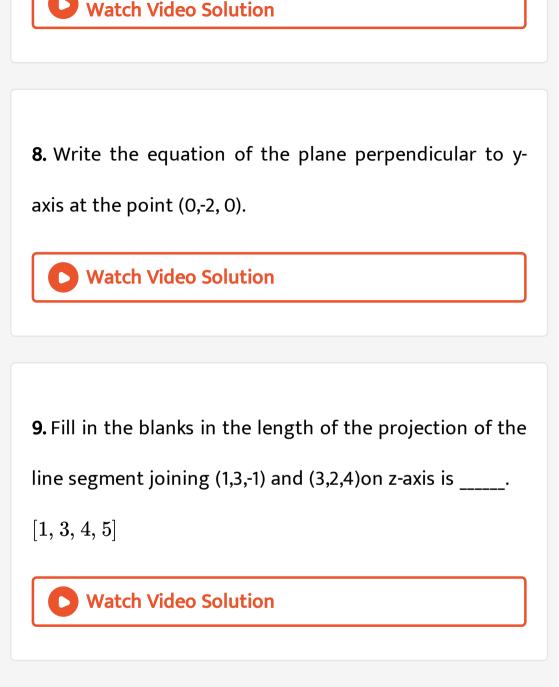
3. Find the vector equation of a plane which is at a distance of 7 units from the origin and normal to the vector $3\hat{i} + 5\hat{j} - 6\hat{k}$.

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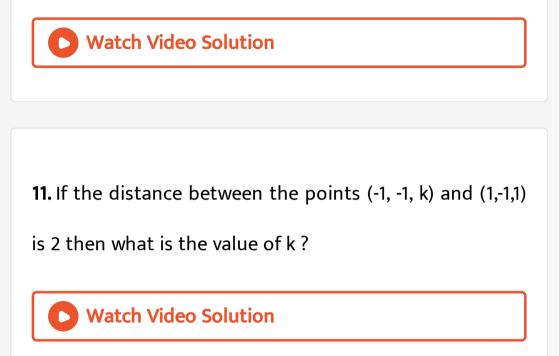
4. Write the distance between parallel planes 2x - y + 3z = 4 and 2x - y + 3z = 18.

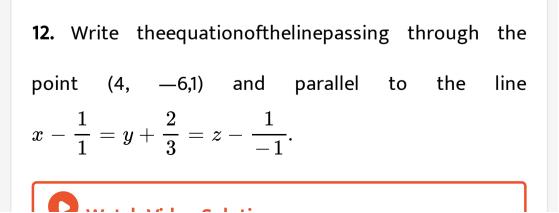






10. If α , β , γ be direction angles of a line, what is the value of $\sin^2 \alpha + \sin^2 \beta + \sin^2 \gamma$.







13. What is the image of the point (-2, 3, -5) respect to

the zx-plane ?

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14. What is the distance of the point (x, y, z) from x-axis?

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15. What is the distance of the point (1, 2, -3) from xy-

plane ?

16. What is the angle between the lines $\frac{x}{1} = \frac{y}{-2} = \frac{z}{1}$

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

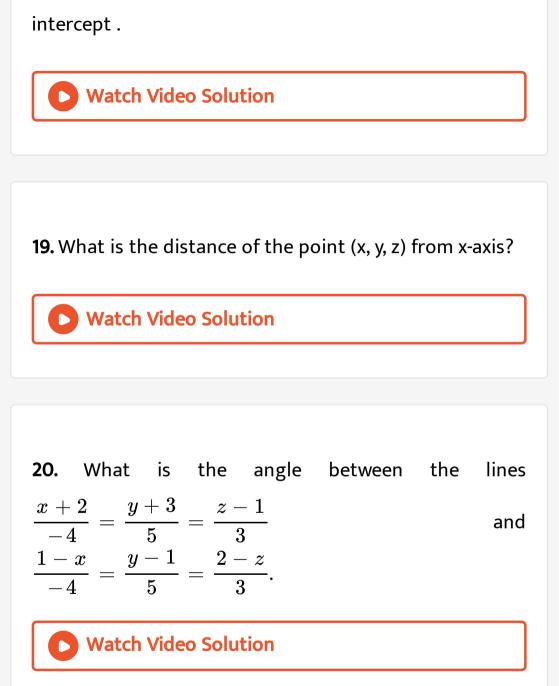
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17. What is the number of independent constants that

occur in the general equation of a plane.

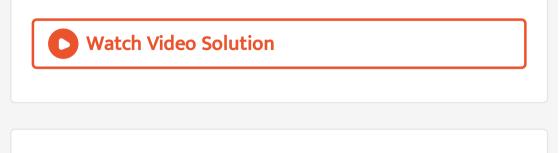
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18. A plane has x-intercept and y-intercept 2 and 3 respectively and passes through (1, 1, 1). Find the z-



21. Write the equation of the plane passing through the

point(1,-2,3)and perpendicular to the y-axis.



22. To which coordinate axis is, the plane 2x + 3y = 0

parallel and why?

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23. What is the image of the point (6, 3, -4) with respect

to yz-plane?'



24. Find the value of k for which the line $\frac{x-2}{3} = \frac{1-y}{k} = \frac{z-1}{4}$ is parallel to the plane 2x + 6y + 3z - 4 = 0.

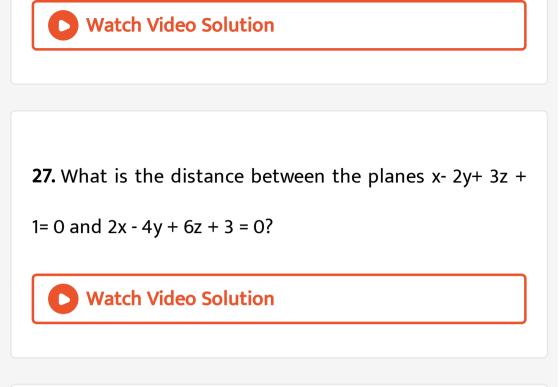
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25. If the d.cs of a straight line be $\left\langle \frac{2}{7}, \frac{3}{7}, \frac{k}{7} \right\rangle$, then

what is the value of k?



26. If a line makes an angle 90° with x-axis, 60° with y-axis and what angle it makes with z-axis?



28. Write the equation of the plane with intercepts on

axes 1, -1, 3. .



29. What are the direction consines of the normal to the

plane 3x - 2y - 2z + 1 = 0?



30. Write the ratio in which the line joining the points

(2,3,4) and (-3, 5, -4) is divided by yz-plane.



31. Write the angle between the planes 3x - 5y + 2z - 8 = 0

and 2x + 4y + 7z + 16 = 0.



32. Write the equation of the line passing through (-3, 1,

2) and perpendicular to the plane 2y - z=3.

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33. Write the direction cosines of Z-axis.

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34. What is the distance of the point (4, 5, -3) from y-axis

?

35. Write the equation of the plane passes through y-axis and z-axis.



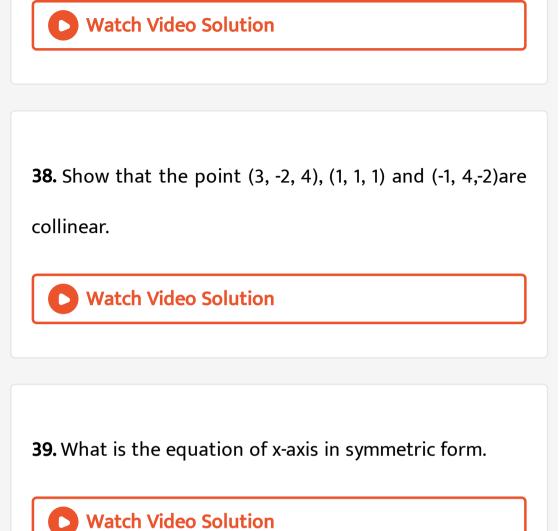
36. Fill in the blanks in the length of the projection of the line segment joining (1,3,-1) and (3,2,4)on z-axis is

 $\left[1,\,3,\,4,\,5
ight]$



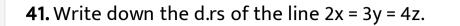
37. What are the d.cs of the line through (1,-1, 1)and (2,

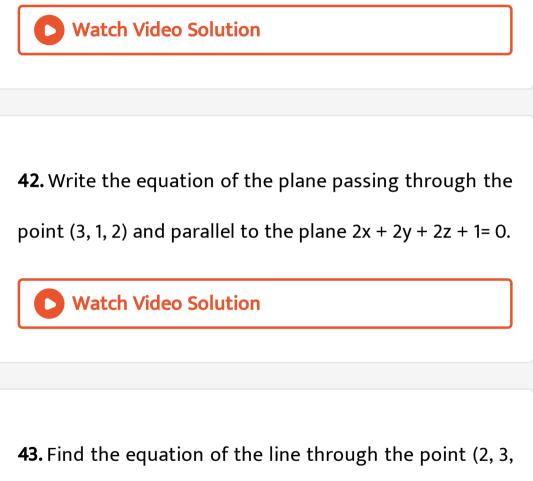
-5,-3)?



40. What are the d.cs of the line x = y = z.







5) and parallel to the line $rac{x-3}{2}=rac{y+1}{1}=rac{z+7}{4}.$

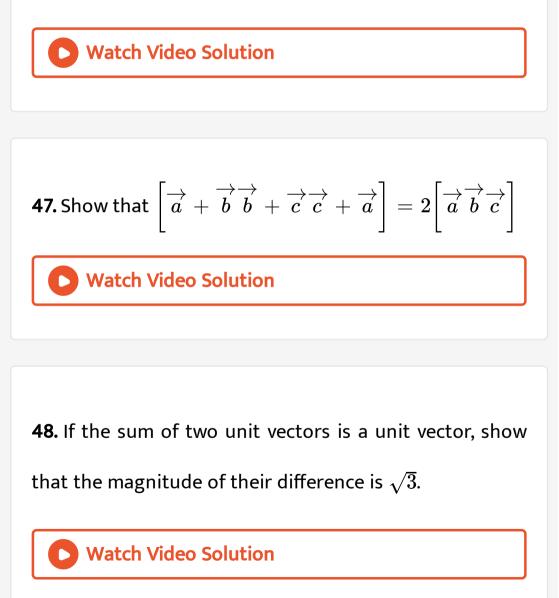
44. Show that lines $\overrightarrow{r} = (\hat{i} + \hat{j} - \hat{k}) + \lambda (3\hat{i} - \hat{j})$ and $\overrightarrow{r} = (4\hat{i} - \hat{k}) + \mu (2\hat{i} + 3\hat{k})$ intersect each other.

Find their point of intersection.

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45. The position vectors of two points A and B are $3\hat{i} + \hat{j} + 2\hat{k}$ and $\hat{i} - 2\hat{j} - 4\hat{k}$, respectively. Find the equation of the plane passing through B and prependicular to AB.

46. Find the area of the triangle ABC with vertices A(1,2,4), B(3,1,-2) and C(4,3,1) by vector method.



49. Find the shortest distance between the following

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

$$\overrightarrow{r}=7\hat{i}-6\hat{k}+\mu\Bigl(\hat{i}+2\hat{j}+2\hat{k}\Bigr)$$

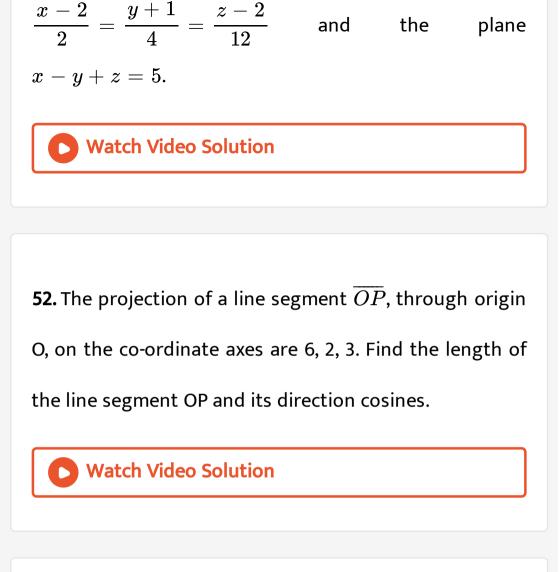
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50. Find the shortest distance between the lines

$$\frac{x-8}{3} = \frac{y+9}{-16} = \frac{z-10}{7}$$
 and
$$\frac{x-15}{3} = \frac{y-29}{8} = \frac{z-5}{-5}.$$



51. Find the distance of the point (-1, -5, -10) from the point of intersection of the line



53. passing through the point (-1, 3, 2) perpendicular

to the planes x + 2y + 2z = 5 and 3x + 3y + 2z = 8.

54. Prove that the lines $\frac{x+4}{3} = \frac{y+6}{5} = \frac{z-1}{-2}$ and 3x - 2y + z + 5 = 0 = 2x + 3y + 4z - 4 are co-

planar.



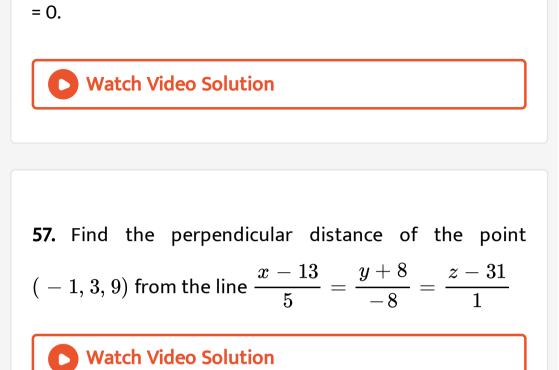
55. Find the locus of points which are equidistant from

the points (1,2,3) and (3,2,-1).



56. Find the equation of the plane through the points (1,

2, -3), (2,3, -4) and perpendicular to the plane x + y + z + 1



58. Prove that the measure of the angle between two main diagonals of a cube is $\cos^{-1} \frac{1}{3}$.

59. If P (1, y, z) lies on the line through (3, 2, -1) and (-4, 6, 3) find y & z. Watch Video Solution

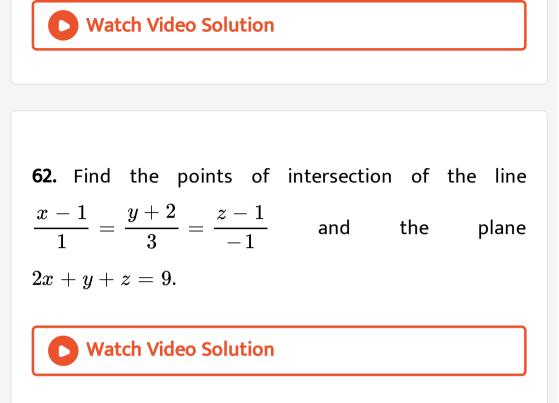
60. Find the equation of the plane passing through the

foot of the perpendiculars drawn from P(a,b,c) on the co-

ordinate planes.

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61. Find the equation of the plane passing through the points (2, 1, -1) and (-1, 3, 4) and perpendicular to the plane x - 2y + 4z = 10.



63. Find the ratio in which the line segment through

(1,3,-1) and (2,6,-2) is divided by zx-plane.



64. Find the co-ordinates of the point where the perpendicular from the origin meets the line joining the points (-9, 4, 5) and (11, 0, -1).

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65. Find the image of the point (2, -1, 3) in the plane

3x - 2y + z - 9 = 0

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66. Find the image of the point (-2,0,3) with respect to

the plane y = 3.

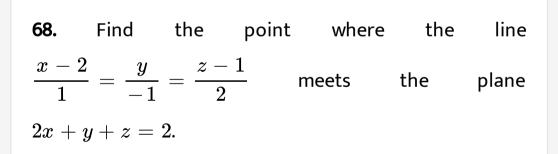


67. If A (1,0,-1), B (-2,4,-2) and C(1,5,10) be the vertices of a

triangle and the bisector of the angle BAC, meets BC at

D, then find the coordinates of the point D.





69. The angle between the plane 3x + 3z - 5 = 0 and the line $\frac{x-1}{1} = \frac{y-2}{-1} = \frac{z-3}{0}$ is. Watch Video Solution

70. Find the equation of the plane passing through the

line x = y = z and the point (3,2,1).



71. Find the equation of the plane which passes through

(1, 1, 2) and parallel to the plane x + 2y - z = 5.

72. Bisecting the line segment joining (-1, 4, 3) and

(5, -2, -1) at right angles.

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73. Find the distance between the parallel planes 3x - 2y

+ 6z - 7 = 0 and 3x - 2y + 6z + 14 = 0.

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74. Find the number of points (x, y, z) in space other than

the point (1,-2, 3), such that |x| = 1, |y| = 2 and |z|= 3.

75. Write the equation of the plane passing through (3,-6,-9) and parallel to xy-plane.

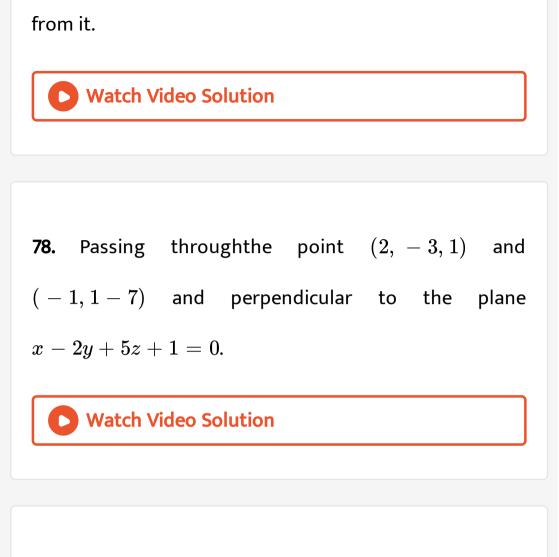
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76. Find the equation of the plane passing through the

points (-2, 3, 5), (7,-7,-5) and (-2, 5, -3).

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77. Find the equation of the plane Paralel to the plane 2x - y + 3z + 1 = 0 and at a distance 3 units away



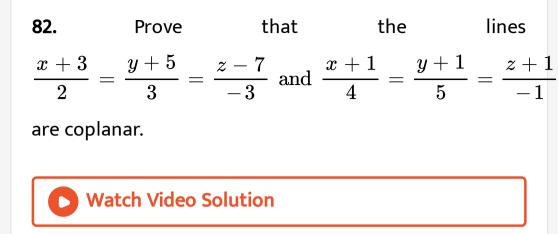
79. Write the axis to which the plane by+cz+d=0 is parallal.



80. Find the shortest distance between the lines

$$\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4} \text{ and } \frac{x-2}{3} = \frac{y-3}{4} = \frac{z-5}{5}$$
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81. Find the equation of the plane which contains the line of intersection of the planes
$$\vec{r} \cdot (\hat{i} + 2\hat{j} + 3\hat{k}) - 4 = 0, \vec{r} \cdot (2\hat{i} + \hat{j} - \hat{k}) + 5 = 0$$
 and which is perpendicular to the planer $\vec{r} \cdot (5\hat{i} - 6\hat{k}) + 8 = 0$



83. Prove that the four points (0, 4, 3), (-1, -5, -3), (-2, -2, 1) and (1, 1, -1) lie in one plane. Find the equation of the plane.



84. Find the distance from the line $\frac{x}{2} = \frac{y}{3} = \frac{z}{1}$ to the point (4, 5, 2).

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85. A variable plane is at a constant distance 3r from the origin and meets the axes in A, B and C. Show that the locus of the centroid of the ΔABC is $x^{-2} + y^{-2} + z^{-2} = r^{-2}$.

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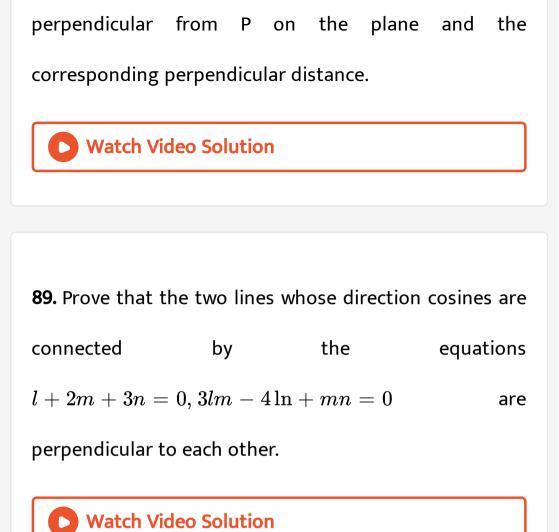
86. If the edges of a rectangular parallelopiped are of lengths a, b, c, then the angle between four diagonals

are
$$\cos^{-1}\left(\frac{\pm a^2 \pm b^2 \pm c^2}{a^2 + b^2 + c^2}\right)$$
.
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87. If l_1 , m_1 , n_1 and l_2 , m_2 , n_2 are the direction cosines of two mutually perpendicular lines show that the d.cs. Of the line perpendicular to both of them are $m_1n_2 - n_1m_2$, $n_1l_2 - l_1n_2$, $l_1m_2 - m_1l_2$

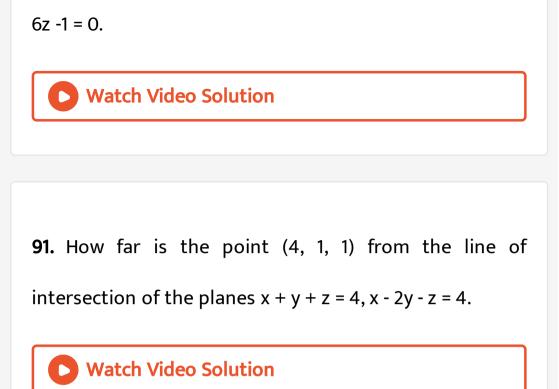
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88. Find the image of the point (2, 3, 4) with respect to the plane x - y + 2z = 4. Obtain the foot of the



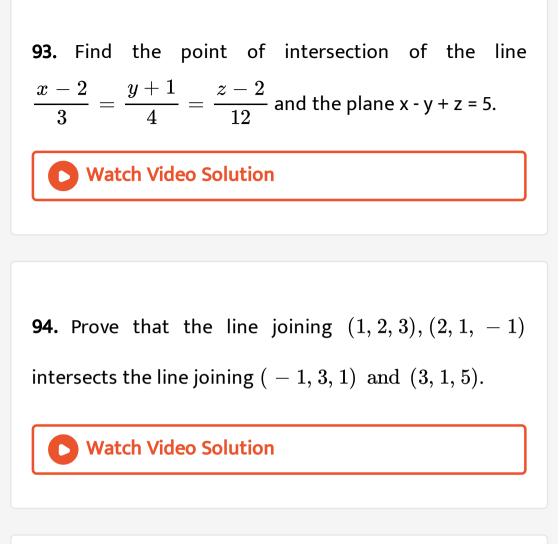
90. Find the equation of the plane through the points (2,

2,1) and (9, 3, 6) and perpendicular to the plane 2x + 6y +



92. passing through the point (-1, 3, 2) perpendicular

to the planes x + 2y + 2z = 5 and 3x + 3y + 2z = 8.



95. Find the equation of the line through the point (1, -2,

1) and parallel to the line $rac{x}{2}=rac{y-1}{-1}=rac{z+2}{3}.$

96. Find the shortest distance between the lines $\frac{x-3}{3} = \frac{y-8}{-1} = \frac{z-3}{1}$ and $\frac{x+3}{-3} = \frac{y-7}{2} = \frac{z-6}{4}$ Find also the equation of

the line of shortest distance.

