

MATHS

BOOKS - NCERT MATHS (ENGLISH)

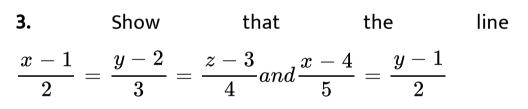
THREE DIMENSIONAL GEOMETRY

Short Answer Type Questions

1. Find the position vector of a point A in space such that $\overrightarrow{O}A$ is inclined at $60^0 \rightarrow OX$ and at $45^0 \rightarrow OY$ and $\left|\overrightarrow{O}A\right| = 10$ units.

2. Find the vector equation of the line which is parallel to the vector $3\hat{i} - 2\hat{j} + 6\hat{k}$ and which passes through the point (1, -2, 3).





intersect. Find their point of intersection.

4. Find the angle between the lines

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

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5. Prove that the lines through A(0, -1, -1) and B(4, 5, 1) intersects the line through C(3, 9, 4) and D(-4, 4, 4). Also, find their point of intersection.

6. Find the condition that the lines x = py + q, z = ry + s and x = p'y + q', z = r'y + s' may be perpendicular to each other. Watch Video Solution

7. 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.



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



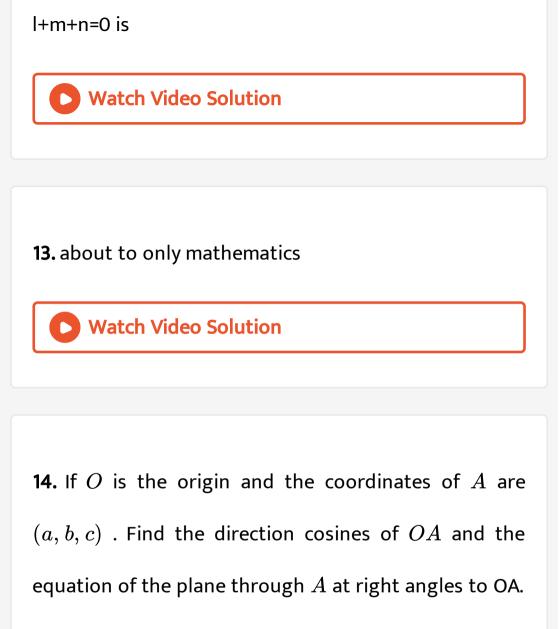
9. If the line drawn from the point (-2, -1, -3) meets a plane at right angle at the point (1, -3, 3), find the equation of the plane.

10. Find the equation of the plane through points (2,1,0),(3,-2,-2), and (3,1,7).

11. Find the equations of the two lines through the origin which intersect the line $\frac{x-3}{2} = \frac{y-3}{1} = \frac{z}{1}$ at angle of $\frac{\pi}{3}$ each.

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12. The angle between the line whose d.c.'s are connected by the relations $l^2+m^2-n^2=0$ and





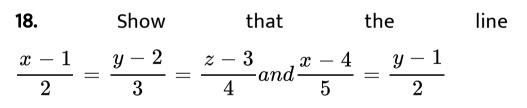
15. Two systems of rectangular axes have the same origin. If a plane cuts them at distances a, b, c and a', b', c' respectively, prove that $\frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2} = \frac{1}{a'^2} + \frac{1}{b'^2} + \frac{1}{c'^2}$

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16. Find the position vector of a point A in space such that $\overrightarrow{O}A$ is inclined at $60^0 \rightarrow OX$ and at $45^0 \rightarrow OY$ and $\left|\overrightarrow{O}A\right| = 10$ units.

17. Find the vector equation of the line which is parallel to the vector $3\hat{i} - 2\hat{j} + 6\hat{k}$ and which passes through the point (1, -2, 3).





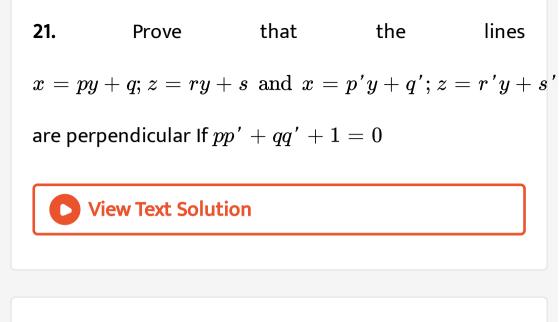
intersect. Find their point of intersection.

19. Find the angle between the lines

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

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20. Prove that the line through A(0, -1, -1) and B(4, 5, 1) intersects the line through C(3, 9, 4) and D(-4, 4, 4) .



22. 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.



23. Write the equation of a plane which is at a distance of $5\sqrt{3}$ units from origin and the normal to which is equally inclined to coordinate axes.



24. 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.

25. Find the equation of the plane through points (2,1,0),(3,-2,-2), and (3,1,7).



26. Find the equations of the two lines through the origin which intersect the line $\frac{x-3}{2} = \frac{y-3}{1} = \frac{z}{1}$ at angle of $\frac{\pi}{3}$ each.

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27. Find the acute angle between the two straight lines whose direction cosines are given by l+m+n=0

and
$$l^2 + m^2 - n^2 = 0$$

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28. If the direction cosines of a variable line in twoadjacentpointsbe

 $l,\,M,\,n\,\,\,{
m and}\,\,\,l+\delta l,\,m+\delta m+n+\delta n$ the small angle

 $\delta\theta$ as between the two positions is given by

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29. 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.

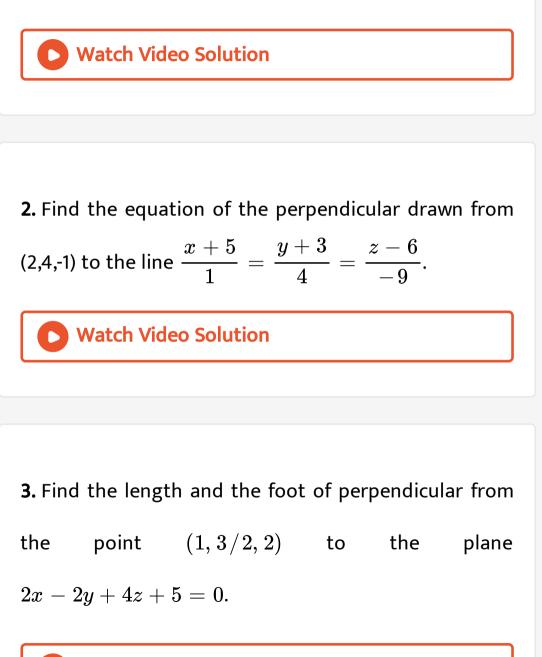
30. Two systems of rectangular axes have the same origin. If a plane cuts them at distances a, b, canda', b', c' respectively, prove that $\frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2} = \frac{1}{a'^2} + \frac{1}{b'^2} + \frac{1}{c'^2}$ Watch Video Solution

Long Answer Type Questions

1. Find the foot of the perpendicular from the point (2,3,-8) to the line $\frac{4-x}{2} = \frac{y}{6} = \frac{1-z}{3}$. Find the

perpendicular distance from the given point to the

line.



4. Find the equations of the line passing through the point (3, 0, 1) parallel to the planes x + 2y = 0 and 3y - z = 0.



5. Find the shortest distance between the lines gives

$$\overrightarrow{r}=(8+3\lambda)\hat{i}-(9+16\lambda)\hat{j}+(10+7\lambda)\hat{k}$$

and
$$\overrightarrow{r}=15\hat{i}+29\hat{j}+5\hat{k}+\mu\Bigl(3\hat{i}+8\hat{j}-5\hat{k}\Bigr).$$

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

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

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



9. Find the foot of perpendicular from the point (2, 3, -8) to the line. $\frac{4-x}{2} = \frac{y}{6} = \frac{1-z}{3}$. Also find the perpendicular distance from the given point to the line.

10. Find the distance of a point (2, 4, -1) from the

line

$$\frac{x+5}{1} = \frac{y+3}{4} = \frac{z-6}{-9}.$$
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11. Find the length and the foot of perpendicular from the point (1, 3/2, 2) to the plane 2x - 2y + 4z + 5 = 0.

12. Find the equations of the line passing through the point (3, 0, 1) parallel to the planes x + 2y = 0 and 3y - z = 0.

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13. Find the shortest distance between the lines gives by

$$\overrightarrow{r}=(8+3\lambda)\hat{i}-(9+16\lambda)\hat{j}+(10+7\lambda)\hat{k}$$
 and $\overrightarrow{r}=15\hat{i}+29\hat{j}+5\hat{k}+\muigl(3\hat{i}+8\hat{j}-5\hat{k}igr).$

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

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