

MATHS

BOOKS - NCERT MATHS (HINGLISH)

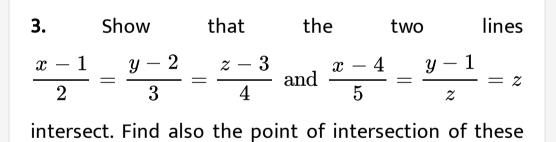
THREE DIMENSIONAL GEOMETRY

Three Dimensional Geometry

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).





lines.

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

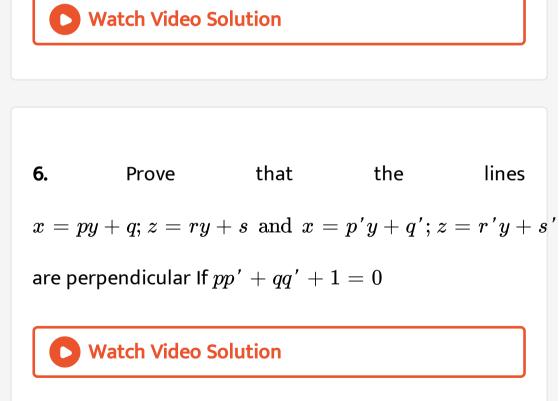
A.
$$\theta = \cos^{-1}\left(\frac{21}{19}\right)$$

B. $\theta = \cos^{-1}\left(\frac{19}{21}\right)$
C. $\theta = \cos^{-1}\left(\frac{6}{21}\right)$
D. $\theta = \cos^{-1}\left(\frac{1}{19}\right)$

Answer: B



5. Prove that the lines through A(0, -1, -1)andB(4, 5, 1) intersects the line through C(3, 9, 2)andD(-4, 4, 4). Also, find their point of intersection.



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.

A.
$$x+y+2z=19$$

B.
$$x + y - 2z = 19$$

C.
$$x + y - 2z = 38$$

D.
$$x + y + 2z = 38$$

Answer: A



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.

- A. x + y + z = 9
- B. x + y z = 9
- C. x y z = 9
- D. x y + z = 9

Answer: A



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.

A.
$$3x + 2y + 6z - 18 = 0$$

B. 3x + 2y + 6z - 24 = 0

C.
$$3x-2y+6z-24=0$$

D.
$$3x - 2y + 6z - 27 = 0$$

Answer: D

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.



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

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

Watch Video Solution

13. 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

Watch Video Solution

14. 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.

15. 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

16. 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.

17. Find the equation of the perpendicular drawn from

$$(2,\,4,\,-1)$$
 to the line $rac{x+5}{1}=rac{y+3}{4}=rac{z-6}{3}$

Watch Video Solution

18. Find the length and the foot of perpendicular from

the point
$$\left(1, \frac{3}{2}, 2
ight)$$
 to the plane

2x - 2y + 4z + 5 = 0.

A. $\sqrt{7}units$

B. $\sqrt{2}units$

C. $\sqrt{6}units$

D. $\sqrt{3}units$

Answer: C



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

Watch Video Solution

20. Find the shortest distance between the lines gives

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

Watch Video Solution

21. 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

A. 51x + 18y - 50z + 173 = 0

B. 51x + 18y - 50z = 173

C. 51x + 18y + 50z + 173 = 0

D. 51x - 18y + 50z - 173 = 0

Answer: A



22. 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 $ax + by \pm (\sqrt{a^2 + b^2} \tan \alpha) z = 0$

Watch Video Solution

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



24. 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.

Watch Video Solution

25. 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).

26. Show that the line $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ and $\frac{x-4}{5} = \frac{y-1}{2}$

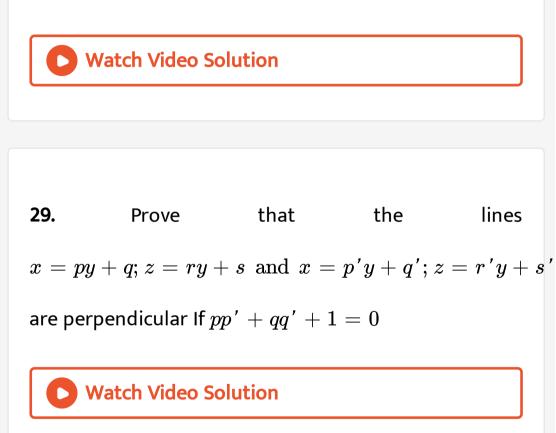
intersect. Find their point of intersection.

Watch Video Solution

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

28. 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).



30. 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.

Watch Video Solution

31. 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.



32. 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	

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

Watch Video Solution

34. 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.
Watch Video Solution

35. Find the acute angle between the two straight lines whose direction cosines are given by l+m+n=0 and $l^2+m^2-n^2=0$

Watch Video Solution

36. If the direction cosines of a variable line in two adjacent points be $l, M, n \text{ and } l + \delta l, m + \delta m + n + \delta n$ the small angle

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

A.
$$\delta heta^2 = \delta l^2 + \delta m^2 + \delta n^2$$

B. $\delta heta^2 = \delta l^2 - \delta m^2 + \delta n^2$
C. $\delta heta^2 = \delta l^2 + \delta m^2 - \delta n^2$
D. $\delta heta^2 = \delta l^2 - \delta m^2 - \delta n^2$

Answer: A



37. 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.



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

39. 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.



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

line

$$\frac{x+5}{1} = \frac{y+3}{4} = \frac{z-6}{-9}$$

Watch Video Solution

41. 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

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

$$3y-z=0.$$



43. Find the shortest distance between the lines gives by $\vec{r} = (8+3\lambda)\hat{i} - (9+16\lambda)\hat{j} + (10+7\lambda)\hat{k}$ and $\vec{r} = 15\hat{i} + 29\hat{j} + 5\hat{k} + \mu(3\hat{i} + 8\hat{j} - 5\hat{k}).$

A. 11 units

B. 12 units

C. 13 units

D. 14 units

Answer: D



44. 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 = 0A. 51x - 18y - 50z + 173 = 0B. 51x + 18y - 50z + 173 = 0C. 51x + 17y - 50z + 173 = 0D. 51x + 18y - 50z - 173 = 0

Answer: B



45. 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 $ax + by \pm (\sqrt{a^2 + b^2} \tan \alpha) z = 0$

Watch Video Solution

46. 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.

A. 18x + 17y + 4z = -49

B.
$$18x + 17y - 4z = 49$$

C. 18x + 17y + 4z = 49

D. 18x - 17y + 4z = 49

Answer: C