MATHS

BOOKS - CHHAYA PUBLICATION MATHS (BENGALI ENGLISH)

STRAIGHT LINE IN THREE DIMENSINAL SPACE

Illustrative Example

1. Find the vector equation of a line which passes through the point with position vector $\hat{i} - 2\hat{j} + 4\hat{k}$ and is in the direction of $\hat{i} + 2\hat{j} - \hat{k}$. Also, reduce it to cartesian from.

Watch Video Solution

2. Find the equation of the line passing through the point (3,7,-4) and (1,6,-1) in both cartesian and vector from

Watch Video Solution

3. The cartesian equation of a line is given by : $6x - 1 = 3y + 2 = 2x - 2$. Find its direction ratios and reduce it to vector form.

Watch Video Solution

4. Find the equation of a line in cartesian and vector from passing through the points (1,-2,2) and which is parellel to the line joining the points (-1,2,1) and (1,2,2).

Watch Video Solution

5. The cartesian equation of a line are

$$\frac{x-5}{3} = \frac{y+4}{7} = \frac{z-6}{2}$$

Find a vector equation for the line.

Watch Video Solution

6. The points P (3,5,9), Q(1,3,3) and R (0,2,-2) are three vertices of a parallelogram PQRS. Find the coordinates and the position vector of S, the fourth vertex.

Watch Video Solution

7. If the points P (0,3,2), Q(1,2,-2) and R (4,-1,t) are collinear, find the value of t.

Watch Video Solution

8. Find the points on the line $\frac{x+2}{3} = \frac{y+1}{2} = \frac{z-3}{2}$ at a distance $3\sqrt{2}$ units from the points (1,2,3).

Watch Video Solution

9. Find the angle between the lines

$\vec{r} = \left(3\hat{i} + \hat{j} - 4\hat{k}\right) + t\left(\hat{i} + \hat{j} + \hat{k}\right)$ and

$\vec{r} = \left(5\hat{i} - \hat{j}\right) + t'\left(3\hat{i} + 2\hat{j} + 4\hat{k}\right)$

Watch Video Solution

10. Find the angle between the lines whose direction ratios are givan by 3,4,5 and 1,1,-2.

Watch Video Solution

11. Find the cartesian equation of the line which is perpendicular to lines $\frac{x}{2}=\frac{y}{1}=\frac{z}{3}$ and $\frac{x-3}{-1}=\frac{y-2}{3}=\frac{z+5}{5}$ and which passes through the points (1,2,3) and hence convert it to vector form.

Watch Video Solution

12. A line passes through (2,-1,3) and perpendicular to the lines $\vec{r}=\left(\hat{i}+\hat{j}+\hat{k}\right)+\lambda\left(2\hat{i}-2\hat{j}+\hat{k}\right)$ and $\vec{r}=\left(2\hat{i}-\hat{j}-3\hat{k}\right)+\mu\left(\hat{i}+2\hat{j}+2\hat{k}\right)$. Obtain its vector equation.

Watch Video Solution

13. Show that the pair of lines whose direction cosines are given by $3lm-4\ln+mn=0$ and $l+2m+3n=0$ are perpendicular to each other.

Watch Video Solution

14. Find the value of λ so that the lines $\frac{1-x}{3}=\frac{7y-14}{2\lambda}=\frac{z-3}{2}$ and $\frac{7-7x}{3\lambda}=\frac{y-5}{1}=\frac{6-z}{5}$ are at right angles.

Watch Video Solution

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

$\vec{r}=\left(\hat{i}-2\hat{j}+\hat{k}\right)+\lambda\left(2\hat{i}+3\hat{j}-5\hat{k}\right)$

Watch Video Solution

16. Show that the lines $\frac{x-1}{3}=\frac{y+1}{2}=\frac{z-1}{5}$ and $\frac{x+2}{4}=\frac{y-1}{3}=\frac{z+1}{-2}$ do not intersect.

Watch Video Solution

17. Show that the lines $\frac{x-1}{2}=\frac{y-2}{3}=\frac{z-3}{4}$ and $\frac{x-4}{5}=\frac{y-1}{2}=z$ intersect. Find the point of intersection.

Watch Video Solution

18. Show that the lines $\vec{r} = \left(\hat{i} + \hat{j} + \hat{k}\right) + t\left(\hat{i} - \hat{j} + \hat{k}\right)$ and $\vec{r} = \left(3\hat{i} - \hat{k}\right) + s\left(4\hat{j} - 16\hat{k}\right)$ intersect and find the position vector of their point of intersection.

Watch Video Solution

19. Find the distance of the point (1,2,3) from the line $\frac{x-6}{2} = \frac{y-7}{2} = \frac{z-7}{-3}$.

Watch Video Solution

20. Find the foot of the perpendicular drawn from the point $\left(2\hat{i} - \hat{j} + 5\hat{k}\right)$ to the line $\vec{r} = \left(11\hat{i} - 2\hat{j} - 8\hat{k}\right) + t\left(10\hat{i} - 4\hat{j} - 11\hat{k}\right)$. Find also the length of the perpendicular.

Watch Video Solution

21. Find the image of the point (1,6,3) in the line $\frac{x}{1} = \frac{y-1}{2} = \frac{z-2}{3}$. Also, write the equation of the line joining the given point and its image and find the length of the segment joining the given point and its image.

Watch Video Solution

22. Show that the distance of the point P from the line l with equation $\vec{r} = \vec{a} + \vec{tb}$ is given by $\frac{\left|\vec{b} \times \overrightarrow{PQ}\right|}{\left|\vec{b}\right|}$, where Q is any point on line l.

Watch Video Solution

23. The base of a triangle is 5 units long and has equation $\frac{x+2}{2} = \frac{y-1}{1} = \frac{z}{4}$. Find the area of the triangle if its remaining vertex is at (1,-1,2).

Watch Video Solution

24. Find the distance between the lines

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

Watch Video Solution

25. Determine the shortest distance between the following lines and conclude whether they intersect or not

(i) $\vec{r}=\left(\hat{i}-\hat{j}\right)+t\left(2\hat{i}+\hat{k}\right), \vec{r}=\left(2\hat{i}-\hat{j}\right)+s\left(\hat{i}-\hat{j}-\hat{k}\right)$

(ii) $\frac{x-1}{2}=\frac{y+1}{3}=\frac{z-0}{1}, \frac{x+1}{5}=\frac{y-2}{1}, z=2$

View Text Solution

26. Find the distance between the lines l_1 and l_2 given by

$\vec{r}=\left(\hat{i}+2\hat{j}-4\hat{k}\right)+\lambda\left(2\hat{i}+3\hat{j}+6\hat{k}\right)$ and

$\vec{r}=\left(3\hat{i}+3\hat{j}-5\hat{k}\right)+\mu\left(2\hat{i}+3\hat{j}+6\hat{k}\right)$

Watch Video Solution

Exercise 4 A

1. The cartisian equation parallel to x-axis is -

A. $\frac{x-x_1}{0}=\frac{y-y_1}{a}=\frac{z-z_1}{a}, a \neq 0$

B. $\frac{x-x_1}{a}=\frac{y-y_1}{0}=\frac{z-z_1}{0}, a \neq 0$

C. $\frac{x-x_1}{0}=\frac{y-y_1}{a}=\frac{z-z_1}{0}, a \neq 0$

D. $\frac{x-x_1}{0}=\frac{y-y_1}{0}=\frac{z-z_1}{a}, a \neq 0$

Answer: B

Watch Video Solution

2. If a line passing through the point with position vector $\vec{\alpha}$ and parallel to vector $\vec{\beta}$ then the vector equation of the line is-

A. $\vec{r}=\vec{\alpha}+\vec{\beta}$

B. $\vec{r}=\vec{\alpha}-t\vec{\beta}$

C. $\vec{r} = \vec{\alpha} + t\vec{\beta}$

D. none of these

Answer: C

Watch Video Solution

3. The direction ratios of the line parallel to the line $\frac{x-1}{3} = \frac{y-5}{1} = \frac{z-3}{0}$ are proportional to -

A. 3,1,0

B. 3,-1,0

C. 1,5,3

D. $-3, 1, 0$

Answer: A

Watch Video Solution

4. The direction ratios of the line $3x - 2 = 2y + 1 = 2z - 4$ are proportional to -

A. $\frac{1}{3}, -\frac{1}{2}, \frac{1}{2}$

B. $-\frac{1}{3}, \frac{1}{2}, \frac{1}{2}$

C. $\frac{1}{3}, \frac{1}{2}, \frac{1}{2}$

D. $\frac{1}{3}, \frac{1}{2} - \frac{1}{2}$

Answer: C

Watch Video Solution

5. The equation of a line passing through the points (1,2,3) and (4,0,6) is -

A. $\frac{x-1}{4} = \frac{y-2}{0} = \frac{z-3}{6}$

B. $\frac{x-4}{1} = \frac{y-0}{2} = \frac{z-6}{3}$

C. $\frac{x-1}{-3} = \frac{y-2}{2} = \frac{z-3}{-3}$

D. $\frac{x-4}{3} = \frac{y-0}{-2} = \frac{z-6}{3}$

Answer: D

Watch Video Solution

6. The equation of a line passing through the points (5,2,7) and paraleel to y - axis is -

A. $\frac{x-5}{b}=\frac{y-2}{0}=\frac{z-7}{b}, b \neq 0$

B. $\frac{x+5}{b}=\frac{y+2}{0}=\frac{z+7}{b}, b \neq 0$

C. $\frac{x-5}{0}=\frac{y-2}{b}=\frac{z-7}{0}, b \neq 0$

D. $\frac{x+5}{0}=\frac{y+2}{b}=\frac{z+7}{b}, b \neq 0$

Answer: C

Watch Video Solution

7. State which of the following statement is true ?

A. The line $\frac{x-x_1}{a}=\frac{y-y_1}{b}=\frac{z-z_1}{c}$ is parellel to x-axis, is $a \neq 0$ and $b=c=0$ is satisfied.

B. The line $\frac{x-x_1}{a}=\frac{y-y_1}{b}=\frac{z-z_1}{c}$ is passing through the origin, if $\frac{x_1}{a}=\frac{y_1}{b}=-\frac{z_1}{c}$ is satisfied.

C. The vector equation of a line passing through the points (1,0,0) and (0,5,0) is given by $\vec{r}=\hat{i}+t\left(-\hat{i}-5\hat{j}+3\hat{k}\right)$

D. The line $x=3+2t, y=5, z=3$ is parallel to y-axis.

Answer: A

Watch Video Solution

8. If the points P (1,2,3), Q(4,5,6) and R(7,8,9) are collinear then Q divides PR in the ratios of -

A. $2:1$

B. $1:2$

C. $1:1$

D. $1:3$

Answer: C

Watch Video Solution

9. If the line $\frac{x-x_1}{a}=\frac{y-y_1}{b}=\frac{z-z_1}{c}$ is parallel to z-axis then-

A. $a=c=0 \text{ and } b\neq 0$

B. $a=b=0 \text{ and } c\neq 0$

C. $b=c=0 \text{ and } a\neq 0$

D. $a=b=c=0$

Answer: B

Watch Video Solution

10. The equation of a line passing through the points (1,2,3) and (4,5,6) is given by -

A. $\frac{x-1}{1-4}=\frac{y-2}{2-5}=\frac{z-3}{3-6}$

B. $\frac{x-1}{4-1}=\frac{y-2}{5-2}=\frac{z-3}{4-2}$

C. $\frac{x-4}{4-1}=\frac{y-5}{5-2}=\frac{z-6}{5-3}$

D. $\frac{x-4}{4-1}=\frac{y-5}{2-5}=\frac{z-6}{3-6}$

Answer: A

Watch Video Solution

11. Write the cartesian and vector equation of x- axis.

Watch Video Solution

12. The cartesian equation of a line is $\frac{2x-5}{3}=\frac{6-3y}{2}=\frac{z+1}{6}$. Find the direction ratios of the given line.

Watch Video Solution

13. Write the direction cosines of the line $6x - 2 = 3y + 1 = 2z - 4$.

Watch Video Solution

14. Write the coordinate axis to which the line $\frac{x-5}{2} = \frac{y+6}{0} = \frac{z-3}{2}$ is perpendicular.

Watch Video Solution

15. Write the vector equation of the line $\frac{x-5}{3} = \frac{y+4}{7} = \frac{z-6}{2}$.

Watch Video Solution

16. Find the equation in vector form of a line which is parallel to the vector $\hat{i} - 2\hat{j} + 3\hat{k}$ and which passes through the point (1,-2,5). Reduce it

to cartesian form.

Watch Video Solution

17. Find the vector and cartesian equations of the line through the point (5,2,-4) and which is parallel to the vector $3\hat{i} + 2\hat{j} - 8\hat{k}$.

Watch Video Solution

18. The cartesian equation of a line is $\frac{x+3}{2} = \frac{y-5}{4} = \frac{z+6}{2}$. the vector equation for the line.

Watch Video Solution

19. The cartesian equation of a line is $3x + 2 = 5y - 4 = 3 - z$.

Find a point on the line and its direction ratios, hence rewrite this equation in symmetric from and then reduce it to vector form.

Watch Video Solution

20. The cartesian equations of a line are $3x + 1 = 6y - 2 = 1 - z$. Find the fxed point through which it passes, its direction ratios and also its vector equation.

Watch Video Solution

21. Find the equation of the line which passes through (1,2,-4) and (4,-5,2) both in cartesian and vector form.

Watch Video Solution

22. The equation of a line is given by $x = by + c, z = ay + d$, write it in cartesian form and vector form.

Watch Video Solution

23. Let the position vectors of the points P, Q and R are respectively given by $2\hat{i}+5\hat{j}-8\hat{k}, \quad -3\hat{j}+6\hat{k}$ and $-3\hat{i}+2\hat{j}+3\hat{k}$. IF PQRS is a parallelogram, find the equation of QS in certesian and vector form.

Watch Video Solution

24. Show that the poins whose position vectors are $4\hat{i}+5\hat{k}, \hat{i}+\hat{j}+3\hat{k}$ and $-5\hat{i}+3\hat{j}-\hat{k}$ are collinear.

Watch Video Solution

25. Find the points on the line $\frac{x+2}{3}=\frac{y+1}{2}=\frac{z-3}{2}$ at a distance of 5 units from the point P(1,3,3).

Watch Video Solution

26. Show that the line joining the points P and Q with position vectors $\vec{p} = p_1\hat{i} + p_2\hat{j} + p_3\hat{k}$ and $\vec{q}\,\hat{i} + q_2\hat{j} + q_3\hat{k}$ passes through the origin if $\vec{p} \cdot \vec{q} = \left|\vec{p}\right|\left|\vec{q}\right|$.

Watch Video Solution

27. (i) Find the vector equation of a line passing through a point with position vector $2\hat{i} - \hat{j} + \hat{k}$, and parallel to the line joining the points $-\hat{i} + 4\hat{j} + \hat{k}$ and $\hat{i} + 2\hat{j} + 2\hat{k}$. Also find the cartesian equivalent of this equation.

(ii) The cartesian equations of a line are $6x - 2 = 3y + 1 = 2z - 2$. Find its direction ratios and also find vector equation of the line.

Watch Video Solution

28. The angle between the straight lines $\frac{x-4}{2} = \frac{y-5}{0} = \frac{z-6}{0}$ and $\frac{3-x}{3} = \frac{y-7}{0} = \frac{z-3}{0}$ is -

A. π

B. $\frac{\pi}{2}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{6}$

Answer: A

Watch Video Solution

29. The angle between the straight lines $x = 5, y = 4t + 5, z = 4t + 3$ and $\frac{x-5}{5} = \frac{y-6}{0} = \frac{z-\frac{1}{2}}{0}$ is-

A. $\frac{\pi}{2}$

B. $\frac{\pi}{3}$

C. $\frac{\pi}{4}$

D. 0

Answer: D

Watch Video Solution

30. The straight lines $\frac{x-x_1}{l_1}=\frac{y-y_1}{m_1}=\frac{z-z_1}{n_1}$ and $\frac{x}{l_2}=\frac{y}{m_2}=\frac{z}{n_2}$ will be perpendicular, if -

A. $l_1l_2+m_1m_2+n_1n_2=1$

B. $l_1l_2+m_1m_2+n_1n_2=0$

C. $\frac{l_1}{l_2}=\frac{m_1}{m_2}=\frac{n_1}{n_2}$

D. $\frac{l_1}{l_2}=\frac{m_1}{m_2}=-\frac{n_1}{m_2}$

Answer: B

Watch Video Solution

31. The straight lines $\frac{x}{a_1}=\frac{y}{b_1}=\frac{z}{c_1}$ and $\frac{x-2}{a_2}=\frac{y-3}{b_2}=\frac{z}{c_2}$ will be parallel if -

A. $a_1a_2 + b_1b_2 + c_1c_2 = 0$

B. $a_1a_2 + b_1b_2 + c_1c_2 = 1$

C. $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

D. $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

Answer: C

Watch Video Solution

32. State which of the following statement is true ?

A. The line joining the points (1,2,3) and (1,5,3) makes angle $\frac{\pi}{2}$ with the positive y-axis.

B. The line joining the points (1,-1,0) and (2,-1,0) is parallel with the positive x-axis.

C. The angle between the lines $\frac{x-5}{7} = \frac{y+2}{-5} = \frac{z-2}{1}$ and $\frac{x-1}{1} = \frac{y}{2} = \frac{z-1}{3}$ is $\frac{\pi}{3}$

D. The anlge between the lines $2x = 3y = -z$ and $6x = -y = -4z$ is $\frac{\pi}{4}$.

Answer: B

Watch Video Solution

33. The angles between the lines $\frac{x-5}{2} = \frac{y-3}{2} = \frac{z}{0}$ and $x = 5, y = 8, z = 6t$ is -

A. 0

B. $\frac{\pi}{6}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{2}$

Answer: D

Watch Video Solution

34. The angle between the lines $\frac{x-5}{1}=\frac{y-1}{0}=\frac{z-9}{0}$ and $2x-1=5-2y=\sqrt{2}z$ is -

A. 0

B. $\frac{\pi}{6}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{2}$

Answer: C

Watch Video Solution

35. The lines $\frac{x}{1}=\frac{y}{2}=\frac{z}{3}$ and $\frac{x-1}{-2}=\frac{y-2}{-4}=\frac{3-z}{6}$ are

A. coincident

B. skew

C. intersecting

D. parallel

Answer: D

Watch Video Solution

36. Find the angle between the lines $\frac{x-5}{7}=\frac{y+2}{-5}=\frac{z-9}{1}$ and $\frac{x-5}{2}=\frac{y-10}{2}=\frac{z-9}{-4}$.

Watch Video Solution

37. Find the angle between the lines $\frac{x-7}{2}=\frac{y-6}{3}=\frac{z+2}{-4}$ and $\frac{2-x}{-1}=\frac{y-9}{5}=\frac{z-12}{4}$.

Watch Video Solution

38. The cartesian equation of a line AB is $\frac{3-x}{1}=\frac{y+2}{-2}=\frac{z-5}{4}$. Find the direction ratios of a line parallel to AB.

Watch Video Solution

39. Find the equation of a line passing through the point (1,2,3) and parallel to the line $\frac{x-1}{2} = \frac{7-y}{3} = -z.$

Watch Video Solution

40. Find the angle between the following pair of lines

$\vec{r} = \left(3\hat{i} + 2\hat{j} - 4\hat{k}\right) + t\left(\hat{i} + 2\hat{j} + 2\hat{k}\right)$ and $\vec{r} = \left(\hat{i} - 2\hat{j}\right) + t'\left(3\hat{i} + 2\right.$

Watch Video Solution

41. Find the angle between the following pair of lines

$\vec{r} = \left(2\hat{i} + 3\hat{j} - 5\hat{k}\right) + t\left(\hat{i} + 2\hat{j} - 2\hat{k}\right)$ and $\vec{r} = \left(2\hat{i} - 6\hat{k}\right) + t'\left(\hat{i} + 2\hat{j}\right.$

Watch Video Solution

42. Find the angle between the following pair of lines

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

Watch Video Solution

43. Find the angle between the following pair of lines

$$\frac{x-7}{2}=\frac{y+5}{7}=\frac{z+2}{-3} \text{ and } \frac{x+2}{-1}=\frac{y-3}{2}=\frac{z-5}{4}$$

Watch Video Solution

44. Find the angle between the pair of lines with direction ratios given by

$12, -5, 13$ and $3, 4, -5$

Watch Video Solution

45. Find the angle between the pair of lines with direction ratios given by

$1, 2, -2$ and $2, -2, 1$

Watch Video Solution

46. Find the angle between the pair of lines with direction ratios given by

$4, -1, 8$ and $1, -2, 2$

Watch Video Solution

47. Find the angle between the pair of lines with direction ratios given by

$b-c, c-a, a-b$ and a, b, c

Watch Video Solution

48. Find the equation of the line passing through the point (1,2,3), which is parallel to lines $\frac{2x-3}{4} = \frac{6-y}{3} = \frac{7z-3}{14}$

Watch Video Solution

49. Find the equation of the line which passes through the point with position vector $-\hat{i} + 2\hat{j} + \hat{k}$ and which is at right angles to each of the

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

Watch Video Solution

50. If the lines $\frac{x-1}{-3}=\frac{y-2}{2\lambda}=\frac{z-3}{2}$ and $\frac{x-1}{3\lambda}=\frac{y-1}{1}=\frac{z-6}{-5}$ are perpendicular to each other, then find λ

Watch Video Solution

51. Slow that the lines $\frac{x-5}{7}=\frac{y+2}{-5}=\frac{z}{1}$ and $\frac{x}{1}=\frac{y}{2}=\frac{z}{3}$ are perpendicular to each other.

Watch Video Solution

52. If the coordinates of the points A,B,C,D be (1,2,3), (4,5,7), (-4,3,-6) and (2,9,2) respectively, then find the angle between the lines AB and CD.

Watch Video Solution

53. Show that the lines $\frac{x+1}{3}=\frac{y+3}{5}=\frac{z+5}{7}$ and $x-2=\frac{y-4}{3}=\frac{z-6}{5}$ intersect and find their point of intersection.

Watch Video Solution

54. Show that the lines $\frac{x-1}{3}=\frac{y+1}{2}=\frac{z-1}{5}$ and $\frac{x+2}{4}=\frac{y-1}{3}=\frac{z+1}{-2}$ do not intersect.

Watch Video Solution

55. Show that the line through P(3,9,4) and Q(-4,4,4)) intersect the line through R(0,-1,-1) and S(4,5,1) and find the point of intersection.

Watch Video Solution

56. Find whether the lines $\vec{r} = \left(2\hat{i} + 3\hat{j} + \hat{k}\right) + t\left(5\hat{j} - 4\hat{k}\right)$ and $\vec{r} = \left(6\hat{j} - \hat{k}\right) + s\left(\hat{i} - 3\hat{j} + \hat{k}\right)$

intersect or not and if they inersect, find the position vector of their poin

of intersection.

Watch Video Solution

57. Determine whether the following pair of lines intersect or not :

(i) $\vec{r} = \left(\hat{i} - \hat{j} + \hat{k}\right) + t\left(2\hat{i} + \hat{k}\right), \vec{r} = \left(2\hat{i} - \hat{j} - \hat{k}\right) + s\left(2\hat{i} + 3\hat{k}\right)$

(ii) $\frac{x-1}{3} = \frac{1-y}{1} = \frac{z+2}{0}$ and $\frac{x-4}{2} = \frac{y-0}{0} = \frac{z+1}{3}$

(iii) $\frac{x-5}{4} = \frac{y-7}{4} = \frac{z+3}{-5}$ and $\frac{x-3}{7} = \frac{y-4}{1} = \frac{z-5}{3}$

Watch Video Solution

58. The perpendicular distance of the points (1,0,0) from the y-axis is -

A. 7 units

B. $\sqrt{5}$ units

C. 1 units

D. $\sqrt{2}$ units

Answer: C

Watch Video Solution

59. The perpendicular distance of the point (1,1,0) from the z-axis is -

A. $\sqrt{2}$ units

B. 4.18 units

C. 9 units

D. $\sqrt{13}$ units

Answer: A

Watch Video Solution

60. The perpendicula distance of the points (1,1,1) from the x-axis is -

A. 1 units

B. $\sqrt{2}$ units

C. 2.14 units

D. $\sqrt{7}$ units

Answer: B

Watch Video Solution

61. The perpendicular distance of the point (1,2,3) from the x-axis is -

A. $\sqrt{5}$ units

B. $\sqrt{13}$ units

C. 9 units

D. 13 units

Answer: B

Watch Video Solution

62. Find the distance of the point (1,0,0) from the line $\frac{x-1}{2}=\frac{y+1}{-3}=\frac{z+10}{8}$, Also find the coordinates of the foot of the perpendicular and the equation of the perpendicular.

Watch Video Solution

63. A(1,0,4), B(0,-11,3), C(2,-3,1) are three points and D is the foot of the perpendicular from A on BC. Find the coordinates of D.

Watch Video Solution

64. Find the length of the perpendicular drawn from the point (5,4,-1) to the line $\vec{r}=\hat{i}+t\left(2\hat{i}+9\hat{j}+5\hat{k}\right)$

Watch Video Solution

Watch Video Solution

65. Let $l_1, m_1, n_1, l_2, m_2, n_2$ and l_3, m_3, n_3 be the durection cosines of three mutually perpendicular lines. Show that the direction ratios of the line which makes equal angles with each of them are $(l_1 + l_2 + l_3), (m_1 + m_2 + m_3), (n_1 + n_2 + n_3)$.

Watch Video Solution

66. Find the equation of the perpendicular drawn from the point P(-1,3,2) to the line $\vec{r} = \left(2\hat{i} + 3\hat{k}\right) + t\left(2\hat{i} + \hat{j} + 3\hat{k}\right)$. Also find the coordinates of the foot of the perpendicular from P.

Watch Video Solution

67. Find the equation of the line passing through the points A(0,6,-9) and B(-3,-6,3). If D is the foot of the perpendicular drawn a point C(7,4,-1) on

the line AB, then find the coordinates of the point D and the equation of line CD.

Watch Video Solution

68. The shortest distance between the lines $\vec{r} = \vec{a} + t\vec{b}$ and $\vec{r} = \vec{a}' + s\vec{b}$ is

A. $\frac{\left|\left(\vec{a} + \vec{a}'\right) \times \vec{b}\right|}{\left|\vec{b}\right|}$

B. $\frac{\left|\left(\vec{a} - \vec{a}'\right) \times \vec{b}\right|}{\left|\vec{b}\right|}$

C. $\frac{\left|\left(\vec{a} - \vec{a}'\right) \times \vec{b}\right|}{\left|\vec{b}\right|^2}$

D. $\frac{\left|\left(\vec{a} + \vec{a}'\right) \times \vec{b}\right|}{\left|\vec{b}\right|^2}$

Answer: B

Watch Video Solution

69. The shortest distance between the lines $\vec{r} = \vec{a}_1 + t\vec{b}_1$ and $\vec{r} = \vec{a}_2 + s\vec{b}_2$ is -

A. $\dfrac{\left|\left(\vec{a}_2 - \vec{a}_1\right) \cdot \left(\vec{b}_1 \times \vec{b}_2\right)\right|}{\left|\vec{b}_1 \times \vec{b}_2\right|}$

B. $\dfrac{\left|\left(\vec{a}_2 + \vec{a}_1\right) \cdot \left(\vec{b}_1 \times \vec{b}_2\right)\right|}{\left|\vec{b}_1 \times \vec{b}_2\right|}$

C. $\dfrac{\left|\left(\vec{a}_2 - \vec{a}_1\right) \cdot \left(\vec{b}_1 \times \vec{b}_2\right)\right|}{\left|\vec{b}_1 \times \vec{b}_2\right|^2}$

D. $\dfrac{\left|\left(\vec{a}_2 + \vec{a}_1\right) \cdot \left(\vec{b}_1 \times \vec{b}_2\right)\right|}{\left|\vec{b}_1 \times \vec{b}_2\right|^2}$

Answer: A

Watch Video Solution

70. The condition for intersecting the lines $\vec{r} = \vec{a}_1 + t\vec{b}_1$ and $\vec{r} = \vec{a}_2 + s\vec{b}_2$ is

A. $\left(\vec{a}_2 + \vec{a}_1\right) \cdot \left(\vec{b}_1 \times \vec{b}_2\right) = 0$

B. $\left(\vec{a}_2 - \vec{a}_1\right) \cdot \left(\vec{b}_1 \times \vec{b}_2\right) = 0$

C. $\left(\vec{a}_1 \times \vec{a}_2\right) \cdot \left(\vec{b}_1 + \vec{b}_2\right) = 0$

D. $\left(\vec{a}_1 \times \vec{a}_2\right) \cdot \left(\vec{b}_1 - \vec{b}_2\right) = 0$

Answer: B

Watch Video Solution

71. The condition for collinearity for the two parallel lines $\vec{r} = \vec{a} + t\vec{b}$ and $\vec{r} = \vec{a}_1 + s\vec{b}$ is

A. $\left|\left(\vec{a} - \vec{a}_1\right) \cdot \vec{b}\right| = 0$

B. $\left|\left(\vec{a} + \vec{a}_1\right) \cdot \vec{b}\right| = 0$

C. $\left|\left(\vec{a} + \vec{a}_1\right) \times \vec{b}\right| = 0$

D. $\left|\left(\vec{a}-\vec{a}_1\right)\times\vec{b}\right|=0$

Answer: D

Watch Video Solution

72. The lines $\vec{r}=\hat{i}+t\left(5\hat{i}+2\hat{j}+\hat{k}\right)$ and $\vec{r}=\hat{i}+s\left(-10\hat{i}-4\hat{j}-2\hat{k}\right)$ are -

A. parallel

B. skew

C. coincident

D. none of these

Answer: C

Watch Video Solution

73. The shortest distance (in units) between the lines $\vec{r} = \left(\hat{i} + 2\hat{j} + 4\hat{k}\right) + t\left(5\hat{j}\right)$ and $\vec{r} = \left(\hat{i} + 2\hat{j} + 5\hat{k}\right) + s\left(\hat{j}\right)$ is

A. 0

B. 2

C. $\frac{1}{\sqrt{2}}$

D. $\sqrt{2}$

Answer: A

Watch Video Solution

74. Find the shortest distance between the two lines whose vector equations are :

$\vec{r} = \left(\hat{i} + \hat{j}\right) + t\left(2\hat{i} - \hat{j} + \hat{k}\right),$

$\vec{r} = \left(2\hat{i} + \hat{j} - \hat{k}\right) + s\left(3\hat{i} - 5\hat{k} + 2\hat{k}\right)$

Watch Video Solution

75. Find the shortest distance between the two lines whose vector equations are :

$\vec{r} = \left(\hat{i} + 2\hat{j} + 3\hat{k}\right) + t\left(2\hat{i} + 3\hat{j} + 4\hat{k}\right),$

$\vec{r} = \left(2\hat{i} + 4\hat{j} + 5\hat{k}\right) + s\left(3\hat{i} + 4\hat{j} + 5\hat{k}\right)$

Watch Video Solution

76. Find the shortest distance between the two lines whose vector equations are :

$\vec{r} = (1-t)\hat{i} + (t-2)\hat{j} + (3-t)\hat{k},$

$\vec{r} = (s+1)\hat{i} + (2s-1)\hat{j} - (2s+1)\hat{k}$

Watch Video Solution

77. Find the shortest distance distance between the following lines :

$\frac{x-1}{-1} = \frac{y+2}{1} = \frac{z-3}{-2}, \frac{x-1}{1} = \frac{y+1}{2} = \frac{z+1}{-2}$

Watch Video Solution

78. Find the shortest distance distance between the following lines :

$$\frac{x-1}{1}=\frac{y-5}{-2}=\frac{z-7}{1}, \frac{x+1}{7}=\frac{y+1}{-6}=\frac{z+1}{1}$$

Watch Video Solution

79. Write the vector equation of the following lines and hence determine the distance between them :

$$\frac{x-1}{2}=\frac{y-2}{3}=\frac{z+4}{6}, \frac{x-3}{6}=\frac{z+5}{12}$$

Watch Video Solution

80. Find the shortest distance between the following pairs of parallel lines whose equations are :

$$\vec{r}=\left(\hat{i}+2\hat{j}+3\hat{k}\right)+t\left(\hat{i}-\hat{j}+\hat{k}\right) \quad \text{and}$$

$$\vec{r}=\left(2\hat{i}-\hat{j}-\hat{k}\right)+s\left(-\hat{i}+\hat{j}-\hat{k}\right)$$

Watch Video Solution

81. Find the shortest distance between the following pairs of parallel lines whose equations are :

$\vec{r} = \left(\hat{i} + \hat{j}\right) + t'\left(2\hat{i} - \hat{j} + \hat{k}\right)$ and

$\vec{r} = \left(2\hat{i} + \hat{j} - \hat{k}\right) + s'\left(4\hat{i} - 2\hat{j} + 2\hat{k}\right)$

Watch Video Solution

Sample Questions For Competitive Examination

1. The symmetrical from of the lines $x + y + z - 1 = 0$ and $4x + y - 2z + 2 = 0$ are -

A. $\frac{x-1}{2} = \frac{y+2}{-1} = \frac{z-2}{2}$

B. $\frac{x+\frac{1}{2}}{1} = \frac{y-1}{-2} = \frac{z-\frac{1}{2}}{1}$

C. $\frac{x}{1} = \frac{y}{-2} = \frac{z-1}{1}$

D. $\frac{x+1}{1} = \frac{y-2}{-2} = \frac{z-0}{1}$

Answer: B::C::D

Watch Video Solution

2. The equation of line passing through the point $\vec{a}$ parallel to the plane $\vec{r} \cdot \vec{n} = q$ and perpendicular to the line $\vec{r} = \vec{b} + t\vec{c}$ is -

A. $\vec{r} = \vec{a} + \lambda\left(\vec{n} \times \vec{c}\right)$

B. $\left(\vec{r} - \vec{a}\right) \times \left(\vec{n} \times \vec{c}\right) = 0$

C. $\vec{r} = \vec{b} + \lambda\left(\vec{n} \times \vec{c}\right)$

D. none of these

Answer: A::B

Watch Video Solution

3. The lines $\vec{r} = \hat{i} + \hat{j} - \hat{k} + \lambda\left(3\hat{i} - \hat{j}\right)$ and $\vec{r} = \left(4\hat{i} - \hat{k}\right) + \mu\left(2\hat{i} + 3\hat{k}\right)$ -

A. meet in a unique points

B. are skew lines

C. are coplanar

D. are coincident

Answer: A::C

Watch Video Solution

4. Consider the lines $\frac{x-5}{3}=\frac{y-7}{-16}=\frac{z-3}{7}$ and $\frac{x-9}{3}=\frac{y-13}{8}=\frac{z-15}{-5}$, then-

A. the two lines intersect

B. the two lines are skew

C. the shortest distance between the lines is 14

D. direction numbers of the line of shortest distance are 2,3,6

Answer: B::C::D

Watch Video Solution

5. The distance of the point $A\left(\vec{a}\right)$ from the line $\vec{r} = \vec{b} + t\vec{c}$ is equal to -

A. $\dfrac{\left|\left(\vec{b} - \vec{a}\right) \times \vec{c}\right|}{\left|\vec{c}\right|}$

B. $\dfrac{\left|\left(\vec{b} - \vec{a}\right) \cdot \vec{c}\right|}{\left|\vec{c}\right|}$

C. $\left|\vec{b} - \vec{a} + \left\{\dfrac{\left(\vec{a} - \vec{b}\right) \cdot \vec{c}}{\left|\vec{c}\right|^2}\right\}\vec{c}\right|$

D. none of these

Answer: C

Watch Video Solution

6. If the length of the perpendicular drawn from (1,2,3) to the line $\dfrac{x-6}{3} = \dfrac{y-7}{2} = \dfrac{z-7}{-2}$ is K units, then the value of K is -

Watch Video Solution

7. If the shortest distance between the lines $\frac{x-1}{1}=\frac{y-1}{1}=\frac{z-1}{1}$ and $\frac{x-2}{1}=\frac{y-3}{1}=\frac{z-4}{1}$ is equal to $\sqrt{K}$ unit, then the value of K is -

Watch Video Solution

8. The line $\frac{x-2}{3}=\frac{y+1}{2}=\frac{z-1}{-1}$ intersects the curve xy $xy=c^2, z=0$, then the value of c^2 is equal to -

Watch Video Solution

9. A line passing through the point (1,1,1) from a tiangle of area $\sqrt{6}$ sq. unit with the lines $x=y=z$ and $x=\frac{y}{2}=\frac{z}{3}$. If the point of intersection of the line with the second line be $(\lambda, 2\lambda, 3\lambda)$, then the value of λ is -

Watch Video Solution

10. The direction cosines of two lines satisfy the relations $\lambda(l+m)=n$ and $mn+nl+lm=0$. The value of λ, for which the two lines are perpendicular to each other, is -

Watch Video Solution

11. Each question in this section contains statements given in two columns which have to be matched. Statements in Column I are labetted as A,B, C, and D where as statements in Column II are labelled (p), (q), (r) and (s).

2.	Column I		Column II
A	$\frac{x-2}{3}=\frac{y-7}{4}=\frac{z+5}{2}$	(p)	perpendicular to the plane $3x+4y+2z=1$
B	$\frac{x+1}{3}=\frac{y-3}{4}=\frac{z+7}{2}$	(q)	passes through $(2, 7, -5)$
C	$\frac{x-5}{1}=\frac{y+2}{3}=\frac{z-2}{4}$	(r)	direction cosines are $\frac{2}{\sqrt{30}}, \frac{5}{\sqrt{30}}, \frac{1}{\sqrt{30}}$
D	$\frac{x}{2}=\frac{y-2}{5}=\frac{z+6}{1}$	(s)	lies in the plane $7x-y-z=35$

Watch Video Solution

12. $\vec{a} = 6\hat{i} + 7\hat{j} + 7\hat{k}, \vec{b} = 3\hat{i} + 2\hat{j} - 2\hat{k}, P(1, 2, 3)$

The position vector of L, the foot of the perpendicular from P on the line $\vec{r} = \vec{a} + \lambda \vec{b}$ is -

A. $6\hat{i} + 7\hat{j} + 7\hat{k}$

B. $3\hat{i} + 2\hat{j} - 2\hat{k}$

C. $3\hat{i} + 5\hat{j} + 9\hat{k}$

D. $9\hat{i} + 9\hat{j} + 5\hat{k}$

Answer: C

Watch Video Solution

13. $\vec{a} = 6\hat{i} + 7\hat{j} + 7\hat{k}, \vec{b} = 3\hat{i} + 2\hat{j} - 2\hat{k}, P(1, 2, 3)$

The image of the points P in the line $\vec{r} = \vec{a} + \lambda \vec{b}$ is -

A. (11,12,11)

B. (5,2,-7)

C. (5,8,15)

D. (17,16,7)

Answer: C

Watch Video Solution

14. $\vec{a} = 6\hat{i} + 7\hat{j} + 7\hat{k}$, $\vec{b} = 3\hat{i} + 2\hat{j} - 2\hat{k}$, $P(1, 2, 3)$

If A is the point with position vector $\vec{a}$ then area of the ΔPLA in square units is equal to -

A. $3\sqrt{6}$

B. $7\sqrt{\frac{17}{2}}$

C. $\sqrt{17}$

D. $\frac{7}{2}$

Answer: B

View Text Solution

15. $L_1 : \frac{x+1}{-3} = \frac{y-3}{2} = \frac{z+2}{1}, L_2 : \frac{x}{1} = \frac{y-7}{-3} = \frac{z+7}{2}$

The lines L_1 and L_2 are -

A. Perpendicular

B. parallel

C. coplanar

D. none of these

Answer: C

Watch Video Solution

16. $L_1 : \frac{x+1}{-3} = \frac{y-3}{2} = \frac{z+2}{1}, L_2 : \frac{x}{1} = \frac{y-7}{-3} = \frac{z+7}{2}$

The lines L_1 and L_2 intersect at the point

A. (-3,2,1)

B. (2,1,-3)

C. (1,-3,2)

D. none of these

Answer: B

Watch Video Solution

17. $L_1 : \frac{x+1}{-3} = \frac{y-3}{2} = \frac{z+2}{1}, L_2 : \frac{x}{1} = \frac{y-7}{-3} = \frac{z+7}{2}$

Equation of plane containinng L_1 and L_2 is -

A. $x + y + z = 0$

B. $3x - 2y - z = 0$

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

D. $x + y + z = 42$

Answer: A

Watch Video Solution

18. Statement - I: The point A (1,0,7) is the mirror image of the point B(1,6,3) in the line $\frac{x}{1} = \frac{y-1}{2} = \frac{z-2}{3}$.

Statement - II : The line $\frac{x}{1} = \frac{y-1}{2} = \frac{z-2}{3}$ bsects the line segment joining A(1,0,7) and B (1,6,3).

A. Statement - I True, Statement - II is True , Statement - II is a correct explanation for Statement - I

B. Statement -I is True, Statement - II is True , Statement - II is not a correct explanation for Statement -I

C. Statement-I is True, Statement -II is False.

D. Statement-I False, Statement -II is True.

Answer: B

Watch Video Solution

19. Statement - I : The lines $\vec{r} = \hat{i} + \hat{j} - \hat{k} + S\left(3\hat{i} - \hat{j}\right)$ and $\vec{r} = 4\hat{i}$ -

A. Statement - I True, Statement - II is True , Statement - II is a correct explanation for Statement - I

B. Statement -I is True, Statement - II is True , Statement - II is not a correct explanation for Statement -I

C. Statement-I is True, Statement -II is False.

D. Statement-I False, Statement -II is True.

Answer: B

View Text Solution