Career Makers

Assignment **It's all about believing**

+2 class sub **Topic: - 3.Dimension**

1. **Find the Cartesian equation of the plane passing through the points A(0, 0, 0) and B(3, -1, 2) and parallel to the** $\frac{x-4}{1}=\frac{y+3}{-4}=\frac{z+1}{7}$
2. **Find the equation of plane passing through the point (1, 2, 1) and perpendicular to the line joining the points (1, 4, 2) and (2, 3, 5) Also, find the perpendicular distance of the plane from the origin.**
3. **Find the equation of the plane passing through the point (1, 1, 1) and containing the line** $\vec{r}=(-3\hat{i}+j+5k)+\lambda(3\hat{i}-j-5k)$ **Also show that the plane contains the lines** $\vec{r}=(-\hat{i}+2j+5k)+\lambda(\hat{i}-2j-5k)$
4. **By Computing the shortest distance whether the following pairs of lines intersect or not.** $\frac{x-1}{2}=\frac{y+1}{3}=z;\frac{x+1}{5}=\frac{y-2}{1},z=2$ **.**
5. **Find the distance of the point (3, 4, 5) from the plane x + y + z = 2 measured parallel to the line 2x = y = z.**
6. **Find the vector equation of a line passing through the point with position vector** $(2\hat{i}-3j-5k)$ **and perpendicular to the plane** $\hat{r}.(6\hat{i}-3j-5k)+2=0$ **.**
7. **Find the image of point (1, 6, 3) in the line** $\frac{x}{1}=\frac{y-1}{2}=\frac{z-2}{3}$ **.**
8. **Find the coordinates of the point where the line** $\frac{x+1}{2}=\frac{y+2}{3}=\frac{z+3}{4}$ **meets the plane x + y + 4z = 6.**
9. **Find the equation of the line passing through the point (-1, 3, -2) and perpendicular to the lines.** $\frac{x}{1}=\frac{y}{2}=\frac{z}{3}$ **and** $\frac{x+2}{-3}=\frac{y-1}{2}=\frac{z+1}{5}$ **.**
10. **A vector** $\vec{n}$ **of magnitude 8 units is inclined to x-axis at 45°, y –axis at 60°and an acute angle with z-axis . If a plane passes through a point (** $\sqrt{2}$ **,-1, 1) and is normal to** $\vec{n}$ **find the equation in vector form.**
11. **Determine whether or not the following pair of lines intersect. If these intersect, then find the point of intersection, otherwise obtain the shortest distance between them.** $\vec{r}=\hat{i}+j-k+\lambda(3\hat{i}-j)$, $\vec{r}=4\hat{i}-k+\mu(2\hat{i}+3k)$ **.**
12. **Find the equation of the plane which contain the line of intersection of the planes** $\vec{r}.(\hat{i}+2j+3k)-4=0,\vec{r}.(2\hat{i}+j-k)+5=0$ **and which is perpendicular to the plane** $\vec{r}.(5\hat{i}+3j-6k)+8=0$ **.**
13. **Find the length and the equation of the line of shortest distance between the lines:** $\frac{x-3}{3}=\frac{y-8}{-1}=\frac{z-3}{1}$ **and** $\frac{x+3}{-3}=\frac{y+7}{2}=\frac{z-6}{4}$
14. **Show that the lines** $\vec{r}=(\hat{i}+j-k)+\lambda(3\hat{i}-j)$ **and** $\vec{r}=(4\hat{i}-k)+\mu(2\hat{i}+3k)$ **are coplanar. Also find the equation of the plane containing both these lines.**
15. **Find the image of the point having position vector** $\hat{i}+3j+4k$ **in the plane** $\vec{r}.(2\hat{i}-j+k)+3=0$ **.**
16. **Find the equation of the line passing through the point (-1, 3, -2) and perpendicular to the lines** $\frac{x}{1}=\frac{y}{2}=\frac{z}{3}$ **and** $\frac{x+2}{-3}=\frac{y-1}{2}=\frac{z+1}{5}$ **.**
17. **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.**
18. **Find the vector and Cartesian from of the equation of the plane containing two lines:** $\vec{r}=(\hat{i}+2j-4k)+\lambda(2\hat{i}+3j+6k)$ **and** $\vec{r}=3\hat{i}+3j-5k+\mu(-2\hat{i}+3j+8k)$ **.**

19. Find the shortest distance between the lines l_1 and l_2 whose vector equations are $\vec{r}=\hat{i}+j+\lambda(2\hat{i}-3j+k)$ and $\vec{r}=2\hat{i}+j-k+\mu(3\hat{i}-5j+2k)$

20. Prove that the lines $\frac{x-4}{1}=\frac{y+3}{-4}=\frac{z+1}{7}$ and $\frac{x-1}{2}=\frac{y+1}{-3}=\frac{z+10}{8}$. Intersect each other and find the point of intersection.

21. Find the equation of the plane which contains the line of intersection of the planes $\vec{r}.(\hat{i}+2j+3k)-4=0, \vec{r}.(2\hat{i}+j-k)+5=0$ and which is perpendicular to the plane. $\vec{r}.(5\hat{i}+3j-6k)+8=0$

22. Find the coordinates of the point where the line $\frac{x+1}{2}=\frac{y+2}{3}=\frac{z+3}{4}$ meets the plane x + y +4z = 6.

23. Find the vector equation of a line through the point with position vector $(2\hat{i}-3j-5k)$ and perpendicular the plane $\vec{r}.(6\hat{i}-3j-5k)+2=0$. Also find the point of intersection of this line and the plane.

24. Find the equation of the plane through the line $\frac{x+1}{-3}=\frac{y-3}{2}=\frac{z+2}{1}$ and the point (0, 7, -7) Show that the line x = $\frac{7-y}{3}=\frac{z+7}{2}$ lies in the plane.

25. 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 their point of intersection.

26. Find the equation of the plane through the intersection of the planes 3x – 4y + 5z = 10, 2x + 2y – 3z = 4 and parallel to the line x = 2y = 3z.

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

28. Find the coordinates of the point where the line through (3, -4, -5) and (2, -3, 1) crosses the plane, passing through the point (2, 2, 1), (3, 0, 1) and (4,-1, 0).

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

30. Find the coordinates of point where the line $\frac{x+1}{2}=\frac{y+2}{3}=\frac{z+3}{4}$ meets the plane x + y + 4z = 6.

31. Find the equation of the plane passing through the points (0, -1, -1), (4, 5, 1) and (3, 9, 4).

32. Find the equation of the perpendicular drawn the point (1, -2, 3) to the plane 2x – 3y + 4z + 9 = 0. Also find the coordinates of the foot of the perpendicular.

33. Find the equation of the plane passing through the line of intersection of the planes $\vec{r}.(\hat{i}+j+k)=1$ and $\vec{r}.(2\hat{i}+3j-k)+4=0$ and parallel to x –axis.

34. If the lines $\frac{x-1}{-3}=\frac{y-2}{-2k}=\frac{z-3}{2}$ 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.

35. Find the length and the foot of the perpendicular from the point P(7, 14, 5) to the plane 2x + 4y – z = 0. Also find the image of point P in the plane.

36. Find the vector and Cartesian equations of the line passing through the point P(1, 2, 3) and parallel to the planes $\vec{r}.(\hat{i}-j+2k)=5$ and $\vec{r}.(3\hat{i}+j+k)=6$.

37. Find the vector equation of the plane passing through the points (2, 1, -1) and (-1, 3, 4) and perpendicular to the plane x – 2y + 4z = 10. Also show that the plane thus obtained contains the line $\vec{r}=-\hat{i}+3j+4k+\lambda(3\hat{i}-2j-5k)$.

38. 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).

39. If a line makes angles α,β,γ with x, y and z-axis respectively, prove that (i) $\sin^2\alpha+\sin^2\beta+\sin^2\gamma=2$ (ii) $\cos 2\alpha+\cos 2\beta+\cos 2\gamma=-1$.

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40. Find the equations of the planes through the intersection of the planes x + 3y + 6 = 0 and 3x – y – 4z = 0 whose perpendicular distance from the origin is equal to 1.

41. Find the angle between the lines whose direction cosines are given by equations $l+m+n=0; l^2+m^2-n^2=0$.

42. Show that the equation of a plane, which meets the axes in A, B, and C and the given centroid of triangle ABC is the point (α,β,γ), is $\frac{x}{\alpha}+\frac{y}{\beta}+\frac{z}{\gamma}=3$.

43. Show that the lines x = ay + b, z = cy + d and x = a'y + b', z = c'y + d' are perpendicular to each other, if aa' + cc' + 1 = 0.

44. Find the Cartesian and vector equations of a line which passes through the point (1, 2, 3) and is parallel to the line $\frac{-x-2}{1}=\frac{y+3}{7}=\frac{2z-6}{3}$.

45. Find the distance between the line l_1 and l_2 given by $\vec{r}=\hat{i}+2\hat{j}-4\hat{k}+\lambda(2\hat{i}+3\hat{j}+6\hat{k})$ and $\vec{r}=3\hat{i}+3\hat{j}-5\hat{k}+\mu(2\hat{i}+3\hat{j}+6\hat{k})$.

46. 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.

47. Find the image of the point having position vector $\hat{i}+3\hat{j}+4\hat{k}$ in the plane $\vec{r}.(2\hat{i}-\hat{j}+\hat{k})+3=0$.

48. A line passing through (2, -1, 3) and is 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 equation in vector and Cartesian form.

49. 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. Also, find the distance of the plane obtained above, from the origin.

50. Find the distance of the point (2, 12, 5) from the point of intersection of the line $\vec{r}=2\hat{i}-4\hat{j}+2\hat{k}+\lambda\left(3\hat{i}+4\hat{j}+2\hat{k}\right)$ and the plane $\vec{r}=\left(\hat{i}-2\hat{j}+\hat{k}\right)=0$.

51. Find the vector and Cartesian equations of the line passing through the point (2, 1, 3) and perpendicular to the lines $\frac{x-1}{1}=\frac{y-2}{2}=\frac{z-3}{3}$ and $\frac{x-1}{1}=\frac{y-2}{2}=\frac{z-3}{3}$.

52. Find the value of p, so that the line: $l_1:\frac{1-x}{3}=\frac{7y-14}{p}=\frac{z-3}{2}$ and $l_2:\frac{7-7x}{3p}=\frac{y-5}{1}=\frac{6-z}{5}$ and perpendicular to each other. Also, find the equation of a line passing through a point (3, 2, -4) and parallel to line l_1.

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

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

55. 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).

56. Find the distance of the point (-1, -5, -10) from the point of intersection of the line $\vec{r}=2\hat{i}-\hat{j}+2\hat{k}+\lambda\left(3\hat{i}+4\hat{j}+2\hat{k}\right)$ and the plane $\vec{r}=\left(\hat{i}-\hat{j}+\hat{k}\right)=5$.

57. Show that the lines $\frac{5-x}{-4}=\frac{y-7}{4}=\frac{z+3}{-5}$ & $\frac{x-8}{7}=\frac{2y-8}{2}=\frac{z-5}{3}$ are coplanar.

58. Show that the lines $\vec{r}=\left(\hat{i}+\hat{j}-\hat{k}\right)+\lambda\left(3\hat{i}-\hat{j}\right)$ & $\vec{r}=\left(4\hat{i}-\hat{k}\right)+\mu\left(2\hat{i}+3\hat{k}\right)$ intersect. Also, find their point of intersection.

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59. **Find the distance of point (-1, -5, -10) from the point of intersection of the line** $\vec{r} = 2\hat{i} - \hat{j} + 2\hat{k} + \lambda\left(3\hat{i} + 4\hat{j} + 2\hat{k}\right) \& \vec{r}.\left(\hat{i} - \hat{j} + \hat{k}\right) = 5$**.**

60. **Find the equation of the plane passing through the line of intersection of the planes** $\vec{r} = \left(\hat{i} + \hat{j} + \hat{k}\right) = 1 \& \vec{r}.\left(2\hat{i} + 3\hat{j} - \hat{k}\right) + 4 = 0$ **and parallel to x-axis.**

61. **Find the equation of a line passing through the point (1, 2, -4) and perpendicular to two lines** $\vec{r} = \left(8\hat{i} - 19\hat{j} + 10\hat{k}\right) + \lambda\left(3\hat{i} - 16\hat{j} + 7\hat{k}\right) \& \vec{r} = \left(15\hat{i} + 29\hat{j} + 5\hat{k}\right) + \mu\left(3\hat{i} + 8\hat{j} - 5\hat{k}\right)$**.**

62. **If lines** $\frac{x-1}{2} = \frac{y+1}{3} = \frac{z-1}{4} \& \frac{x-3}{1} = \frac{y-k}{2} = \frac{z}{1}$ **intersect, then find the value of k and hence find the equation of the plane containing these lines.**

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

Answer

1. x – 19y – 11z = 0 **2. x – y+ 3z – 2 = 0** **4. Do not intersect.** **5. 6 units** **6.** $\left(\frac{76}{35}, \frac{-108}{35}, \frac{-34}{7}\right)$ **7. P(1, 0, 7)**

8. (1, 1, 1) **9.** $\frac{x+1}{2} = \frac{y-3}{-7} = \frac{z+2}{4}$ **10.** $\vec{r}.(\sqrt{2}\hat{i} + j + k) = 2$ **11. (4, 0, -1)** **12.** $\vec{r}.(33\hat{i} + 45j + 50k) - 41 = 0$

13. 3 **14.** $\vec{r}.(3\hat{i} + 9j - 2k) + 14 = 0$ **15.** $(-3\hat{i} + 5j + 2k)$ **16.** $\frac{x+1}{2} = \frac{y-3}{-7} = \frac{z+2}{4}$ **17. X – y + 3z – 2 = 0**

18. $\vec{r}.(3\hat{i} - 14j + 6k) + 49 = 0; 3x - 14y + 6z + 49 = 0$ **19.** $\frac{10}{\sqrt{59}}$ **20.(5, -7, 6)** **21. 33x + 45y + 50z – 41 = 0** **22. (1, 1, 1)**

23. $\vec{r} = (2\hat{i} - 3j - 5k) + \lambda(6\hat{i} - 3j + 5k)$ **; Point of intersection is** $\left(\frac{76}{35}, \frac{-108}{35}, \frac{-34}{7}\right)$ **24. X + y + z = 0** **25.(-1, -1, -1)**

26. X – 20y + 27z = 14 **27. x + y + z = 0.** **28.** $r = (\hat{i} + 2j + 3k) + \lambda(-3\hat{i} + 5j + 4k)$ **29.(1, -2, 7)** **30.** $r = \hat{i} + j - 2k$ **31.5x – 7y + 11z + 4 = 0** **32.** $\frac{x-1}{2} = \frac{y+2}{-3} = \frac{z-3}{4}; (-1, 1, -1)$ **33.** $\vec{r}.(-j + 3k) - 6 = 0$ **34. K = 2, 22x – 19y – 5z + 31 = 0** **35. (1, 2, 8);** $\sqrt{189}$ **units; image: (-5, 10, 11)** **36.** $\vec{r}.(\hat{i} + 2j + 3k) + \lambda(-3\hat{i} + 5j + 4k), \frac{x-1}{-3} = \frac{y-2}{5} = \frac{z-3}{4}$ **37.** $\vec{r}.(18\hat{i} + 17j + 4k) - 49 = 0$

38. $\frac{6}{\sqrt{34}}$ **units** **40.x – 2y – 2z – 3 = 0; 2x + y – 2z + 3 = 0** **41. 60º** **44.** $\frac{x-1}{-2} = \frac{y-2}{14} = \frac{z-3}{3}; \vec{r} = (\hat{i} + 2j + 3k) + \lambda(-2\hat{i} + 14j + 3k)$

45. $\frac{\sqrt{293}}{7}$ **units** **47.** $-3\hat{i} + 5j + 2k$ **48. Equation of line** $\frac{x-2}{-2} = \frac{y+1}{-1} = \frac{z-3}{2}$ **Vector equation** $\vec{r} = \left(2\hat{i} - \hat{j} + 3\hat{k}\right) + \lambda\left(-2\hat{i} - \hat{j} + 2\hat{k}\right)$

49. $\sqrt{2}$ **units** **50. 13 unit** **51. Cartesian equation:** $\frac{x-2}{2} = \frac{y-1}{-7} = \frac{z-3}{4}$ **Vector equation:** $\vec{r} = \left(2\hat{i} + \hat{j} + 3\hat{k}\right) + \lambda\left(2\hat{i} - 7\hat{j} + 4\hat{k}\right)$ **52. p =7** **53.** $\vec{r}.\left(\hat{i} + \hat{j} + \hat{k}\right) = a + b + c$ **54.** $\left(\frac{1}{2}, \frac{-1}{2}, \frac{-3}{2}\right)$ **55.** $\sqrt{29}$ **units** **56. 13 units** **57. 0**

58. P =(4, 0, -1) **59. 13 units** **60.** $\vec{r}.\left(\hat{j} - 3\hat{k}\right) + 6 = 0$ **61.** $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z+4}{6}$ **62.** $k = \frac{9}{2}$ **63. 7 units**

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