MATHS

BOOKS - CENGAGE PUBLICATION

THREE-DIMENSIONAL GEOMETRY

ILLUSTRATION

1. If $\alpha, \beta, and \gamma$ are the an gles which a directed line makes with the positive directions of the co-ordinates axes, then find the value of $\sin^2\alpha + \sin^2\beta + \sin^2\gamma$.

Watch Video Solution

2. A line OP through origin O is inclined at $30^0 and 45^0 \rightarrow OX and OY$, respectivley. Then find the angle at which it is inclined to OZ.

Watch Video Solution

3. ABC is a triangle and $A = (235)\dot{B} = (-1, 3, 2) and C = (\lambda, 5, \mu)$. If the median through A is equally inclined to the axes, then find the value of $\lambda and \mu$.

Watch Video Solution

4. A line passes through the points $(6, -7, -1) and (2, -3, 1)$. Find te direction cosines off the line if the line makes an acute angle with the positive direction of the x-axis.

Watch Video Solution

5. Find the ratio in which the $y-z$ plane divides the join of the points $(-2, 4, 7) and (3, -5, 8)$.

Watch Video Solution

6. If $A(3, 2, -4), B(5, 4, -6) and C(9, 8, -10)$ are three collinear points, then find the ratio in which point C divides AB.

Watch Video Solution

7. If the sum of the squares of the distance of a point from the three coordinate axes is 36, then find its distance from the origin.

Watch Video Solution

8. A line makes angles $\alpha, \beta, \gamma and \delta$ with the diagonals of a cube. Show that $\cos^2\alpha + \cos^2\beta + \cos^2\gamma + \cos^2\delta = 4/3$.

Watch Video Solution

9. Find the angle between the line whose direction cosines are given by $l + m + n = 0 and 2l^2 + 2m^2 - n^2 = 0.$

Watch Video Solution

10. A mirror and a source of light are situated at the origin O and at a point on OX, respectively. A ray of light from the source strikes the mirror and is reflected. If the direction ratios of the normal to the plane are $1, -1, 1$, then find the DCs of the reflected ray.

Watch Video Solution

11. The Cartesian equation of a line is $\frac{x-3}{2}=\frac{y+1}{-2}=\frac{z-3}{5}$. Find the vector equation of the line.

Watch Video Solution

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

Watch Video Solution

13. A line passes through the point with position vector $2\hat{i} - 3\hat{j} + 4\hat{k}$ and is in the direction of $3\hat{i} + 4\hat{j} - 5\hat{k}$. Find the equations of the line in vector and Cartesian forms.

Watch Video Solution

14. Find the vector equation of line passing through $A(3, 4 - 7) and B(1, -1, 6)$. Also find its Cartesian equations.

Watch Video Solution

15. Find Cartesian and vector equation of the line which passes through the point $(-2, 4, -5)$ and parallel to the line given by $\frac{x+3}{3} = \frac{y-4}{5} = \frac{z+8}{6}$.

Watch Video Solution

16. Find the equation of a line which passes through the point $(2, 3, 4)$ and which has equal intercepts on the axes.

Watch Video Solution

17. Find the points where line $\frac{x-1}{2} = \frac{y+2}{-1} = \frac{z}{1}$ intersects $xy, yzandzx$ planes.

Watch Video Solution

18. Find the equation of line $x + y - z - 3 = 0 = 2x + 3y + z + 4$ in symmetric form. Find the direction ratio of the line.

Watch Video Solution

19. Find the vector equation of line passing through the point $(1, 2, -4)$ and perpendicular to the two lines:

$\frac{x-8}{3} = \frac{y+19}{-16} = \frac{z-10}{7} and \frac{x-15}{3} = \frac{y-29}{8} = \frac{z-5}{-5}$

Watch Video Solution

20. If

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

are two lines, then find the equation of acute angle bisector of two lines.

Watch Video Solution

21. Find the equation of the line drawn through point (1, 0, 2) to meet the line $\frac{x+1}{3} = \frac{y-2}{-2} = \frac{z1}{-1}$ at right angles.

Watch Video Solution

22. Line L_1 is parallel to vector $\overrightarrow{\alpha} = -3\hat{i} + 2\hat{j} + 4\hat{k}$ and passes through a point $A(7, 6, 2)$ and line L_2 is parallel vector $\overrightarrow{\beta} = 2\hat{i} + \hat{j} + 3\hat{k}$ and point $B(5, 3, 4)\cdot$ Now a line L_3 parallel to a vector

$\vec{r} = 2\hat{i} - 2\hat{j} - \hat{k}$ intersects the lines $L_1 and L_2$ at points $C and D$, respectively, then find $\left|\vec{C}D\right|$.

Watch Video Solution

23. Find the coordinates of a point on the $\frac{x-1}{2} = \frac{y+1}{-3} = z$ atg a distance $4\sqrt{14}$ from the point $(1, -1, 0)$.

Watch Video Solution

24. Find the angel between the following pair of lines: $\vec{r} = 2\hat{i} - 5\hat{j} + \hat{k} + \lambda\left(3\hat{i} + 2\hat{j} + 6\hat{k}\right) and \vec{r} = 7\hat{i} - 6\hat{k} + \mu\left(\hat{i} + 2\hat{j} + 2\hat{k}\right)$ $\frac{x}{2} = \frac{y}{2} = \frac{z}{1} and \frac{x-5}{4} = \frac{y-2}{1} = \frac{z-3}{8}$

Watch Video Solution

25. Find the values p so that line $\frac{1-x}{3} = \frac{7y-14}{2p} = \frac{z-3}{2} and \frac{7-7x}{3p} = \frac{y-5}{1} = \frac{6-z}{5}$ are at right angles.

Watch Video Solution

26. Find the acute angle between the lines $\frac{x-1}{l} = \frac{y+1}{m} = \frac{1}{n} and = \frac{x+1}{m} = \frac{y-3}{n} = \frac{z-1}{l} where l > m > n,$ are the roots of the cubic equation $x^3 + x^2 - 4x = 4.$

Watch Video Solution

27. Find the condition if lines $x = ay + b, z = cy + d and x = a'y + b', z = c'y + d'$ are perpendicular.

Watch Video Solution

28. Find the coordinates of the foot of the perpendicular drawn from point $A(1, 0, 3)$ to the join of points $B(4, 7, 1) and C(3, 5, 3)\cdot$

Watch Video Solution

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

Watch Video Solution

30. Find the shortest distance between the lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4} and \frac{x-2}{3} = \frac{y-4}{4} = \frac{z-5}{5}$.

Watch Video Solution

31. Determine whether the following pair of lines intersect or not. i. $\vec{r} = \hat{i} - \hat{j} + \lambda\left(2\hat{i} + \hat{k}\right), \vec{r} = 2\hat{i} - \hat{j} + \mu\left(\hat{i} + \hat{j} - \hat{k}\right)$

Watch Video Solution

32. Find the shortest distance between lines $\vec{r} = \left(\hat{i} + 2\hat{j} + \hat{k}\right) + \lambda\left(\hat{i} - \hat{j} + \hat{k}\right) and \vec{r} = 2\hat{i} - \hat{j} - \hat{k} + \mu\left(2\hat{i} + \hat{j} + 2\hat{k}\right.$

Watch Video Solution

33. If the straight lines $x = 1 + s, y = -3 - \lambda s, z = 1 + \lambda s and x = \frac{t}{2}, y = 1 + t, z = 2 - t,$ with paramerters $s and t,$ respectivley, are coplanar, then find λ.

Watch Video Solution

34. Find the equation of a line which passes through the point $(1, 1, 1)$ and intersects the lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4} and \frac{x+2}{1} = \frac{y-3}{2} = \frac{z+1}{4}$.

Watch Video Solution

35. Find the equation of plane which is at a distance $\frac{4}{\sqrt{14}}$ from the origin and is normal to vector $2\hat{i} + \hat{j} - 3\hat{k}$.

Watch Video Solution

36. Find the unit vector perpendicular to the plane $\overrightarrow{r}\dot{} 2\hat{i} + \hat{j} + 2\hat{k} = 5$.

Watch Video Solution

37. Find the distance of the plane $2x - y + 2z + 1 = 0$ from the origin.

Watch Video Solution

38. Find the vector equation of a line passing through $3\hat{i} - 5\hat{j} + 7\hat{k}$ and perpendicular to the plane $3x - 4y + 5z = 8$.

Watch Video Solution

39. Find the equation of the plane passing through the point $(2, 3, 1)$ having $(5, 3, 2)$ as the direction ratio is of the normal to the plane.

Watch Video Solution

40. If O be the origin and the coordinates of P be$(1, \quad 2, \quad 3)$, then find the equation of the plane passing through P and perpendicular to OP.

Watch Video Solution

41. Find the equation of the plane such that image of point $(1, 2, 3)$ in it is$(-1, 0, 1)$.

Watch Video Solution

42. Find the equation of the plane passing through $A(2, 2, -1), B(3, 4, 2) and C(7, 0, 6)$.

Watch Video Solution

43. Show that the line of intersection of the planes $\vec{r}.\left(\hat{i}+2\hat{j}+3\hat{k}\right)=0$ and $\vec{r}.\left(3\hat{i}+2\hat{j}+\hat{k}\right)=0$ is equally inclined to $i and k$. Also find the angle it makes with j.

Watch Video Solution

44. Find the vector equation of the following planes in Cartesian form: $\vec{r}=\hat{i}-\hat{j}+\lambda\left(\hat{i}+\hat{j}+\hat{k}\right)+\mu\left(\hat{i}-2\hat{j}+3\hat{k}\right)$.

Watch Video Solution

45. Show that the plane whose vector equation is $\vec{r}.\left(\hat{i}+2\hat{j}-\hat{k}\right)=3$ contains the line $\vec{r}=\left(\hat{i}+\hat{j}\right)+\lambda\left(2\hat{i}+\hat{j}+4\hat{k}\right)$.

Watch Video Solution

46. Find the equation of the plane which is parallel to the lines $\vec{r}=\hat{i}+\hat{j}+\lambda\left(2\hat{i}+\hat{j}+4\hat{k}\right)and\frac{x+1}{-3}=\frac{y-3}{2}=\frac{z+2}{1}$ and is passing through the point $(0, 1, -1)$.

Watch Video Solution

47. If a plane meets the equations axes at $A, BandC$ such that the centroid of the triangle is $(1, 2, 4)$, then find the equation of the plane.

Watch Video Solution

48. Find the equation of the plane passing through $(3, 4, \ -1)$, which is parallel to the plane $\vec{r} \dot{2\hat{i} - 3\hat{j}} + 5\hat{k} + 7 = 0.$

Watch Video Solution

49. Find the angle between the planes `2x+y-2z+3=0a n d 6x−2y+3z=5

Watch Video Solution

50. Show that $ax + by + r = 0, by + cz + p = 0andcz + ax + q = 0$ are perpendicular to $x - y, y - zandz - x$ planes, respectively.

Watch Video Solution

51. Reduce the equation of line $x - y + 2z = 5 \text{ and } 3x + y + z = 6$ in symmetrical form.

Watch Video Solution

52. Find the angle between the lines $x-3y-4=0, 4y-z+5=0 and x+3y-11=0, 2y=z+6=0.$

Watch Video Solution

53. If the line $x=y=z$ intersect the line $\sin A\dot{x}+\sin B\dot{y}+\sin C\dot{z}=2d^2, \sin 2A\dot{x}+\sin 2B\dot{y}+\sin 2C\dot{z}=d^2,$ then find the value of $\frac{\sin A}{2}\dot{\frac{\sin B}{2}}\dot{\frac{\sin C}{2}} where A, B, C$ are the angles of a triangle.

Watch Video Solution

54. Find the point of intersection of line passing through $(0,0,1)$ and the intersection lines $x+2u+z=1, -x+y-2z and x+y=2, x+z=2$ with the xy plane.

Watch Video Solution

Watch Video Solution

55. A horizontal plane $4x - 3y + 7z = 0$ is given. Find a line of greatest slope passes through the point $(2, 1, 1)$ in the plane $2x + y - 5z = 0$.

Watch Video Solution

56. Find the equation of the plane passing through the points $(-1, 1, 1)$ and $(1, -1, 1)$ and perpendicular to the plane $x + 2y + 2z = 5$.

Watch Video Solution

57. Find the equation of the plane containing line $\frac{x+1}{-3} = \frac{y-3}{2} = \frac{z+2}{1}$ and point $(0, 7, -7)$.

Watch Video Solution

58. Find the distance of the point $P(3, 8, 2)$ from the line $\frac{1}{2}(x-1) = \frac{1}{4}(y-3) = \frac{1}{3}(z-2)$ measured parallel to the plane $3x + 2y - 2z + 15 = 0$.

Watch Video Solution

59. Find the distance of the point $(1, 0, -3)$ from the plane $x - y - z = 9$ measured parallel to the line $\frac{x-2}{2} = \frac{y+2}{2} = \frac{z-6}{-6}$.

Watch Video Solution

60. Find the equation of the projection of the line $\frac{x-1}{2} = \frac{y+1}{-1} = \frac{z-3}{4}$ on the plane $x + 2y + z = 9$.

Watch Video Solution

61. Find the angle between the lines $\vec{r} = \hat{i} + 2\hat{j} - \hat{k} + \lambda\left(\hat{i} - \hat{j} + \hat{k}\right)$ and the plane $\vec{r} \,.\, 3\hat{i} - \hat{j} + \hat{k} = 4.$

Watch Video Solution

62. Find the vector equation of the line passing through $(1, 2, 3)$ and parallel to the planes $\vec{r} \,.\, \left(\hat{i} - \hat{j} + 2\hat{k}\right) = 5 and \vec{r} \,.\, \left(3\hat{i} + \hat{j} + \hat{k}\right) = 6.$

Watch Video Solution

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

Watch Video Solution

64. Find the equation of a plane containing the line of intersection of the planes $x + y + z - 6 = 0 and 2x + 3y + 4z + 5 = 0$ passing through $(1, 1, 1)$.

Watch Video Solution

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

Watch Video Solution

66. Find the length and the foot of the perpendicular from the point $(7, 14, 5)$ to the plane $2x + 4y - z = 2.$

Watch Video Solution

67. Find the locus of a point, the sum of squares of whose distance from the planes $x - z = 0, x - 2y + z = 0 and x + y + z = 0 is 36$.

Watch Video Solution

68. A ray of light passing through the point $A(1, 2, 3)$, strikews the plane $xy + z = 12 at B$ and on reflection passes through point $C(3, 5, 9)$. Find the coordinate so point B.

Watch Video Solution

69. Find the distance between the parallel planes $x + 2y - 2z + 1 = 0 and 2x + 4y - 4z + 5 = 0.$

Watch Video Solution

70. Find the image of the line $\frac{x-1}{2} = \frac{y+1}{-1} = \frac{z-3}{4}$ in the plane $3x - 3y + 10z - 26 = 0.$

Watch Video Solution

71. Find the equations of the bisectors of the angles between the planes $2x - y + 2z + 3 = 0 and 3x - 2y + 6z + 8 = 0$ and specify the plane which bisects the acute angle and the plane which bisects the obtuse angle.

Watch Video Solution

72. Find the equation of a sphere whose centre is $(3, 1, 2)$ radius is 5.

Watch Video Solution

73. Find the equation of the sphere passing through $(0, 0, 0), (1, 0, 0), (0, 1, 0)$ and $(0, 0, 1)$.

Watch Video Solution

74. Find the equation of the sphere which has centre at the origin and touches the line $2(x+1) = 2 - y = z + 3.$

Watch Video Solution

75. Find the equation of the sphere which passes through $(1, 0, 0), (0, 1, 0) and (0, 0, 1)$ and whose center lies on the plane $3x - y + z = 2.$

Watch Video Solution

76. Find the equation of a sphere which passes through $(1, 0, 0)(0, 1, 0) and (0, 0, 1)$, and has radius as small as possible.

Watch Video Solution

77. Find the locus of appoint which moves such that the sum of the squares of its distance from the points $A(1, 2, 3), B(2, -3, 5) and C(0, 7, 4) is 120.$

Watch Video Solution

78. Find the equation of the sphere described on the joint of points $A and B$ having position vectors $2\hat{i} + 6\hat{j} - 7\hat{k} and -2\hat{i} + 4\hat{j} - 3\hat{k}$, respectively, as the diameter. Find the center and the radius of the sphere.

Watch Video Solution

79. Find the radius of the circular section in which the sphere $\left|\vec{r}\right| = 5$ is cut by the plane $\vec{r} \cdot \left(\hat{i} + \hat{j} + \hat{k}\right) = 3\sqrt{3.}$

Watch Video Solution

80. Show that the plane $2x - 2y + z + 12 = 0$ touches the sphere $x^2 + y^2 + z^2 - 2x - 4 + 2z - 3 = 0.$

Watch Video Solution

81. A variable plane passes through a fixed point (a, b, c) and cuts the coordinate axes at points $A, B, andC$. Show that locus of the centre of the sphere $OABCis\frac{a}{x} + \frac{b}{y} + \frac{c}{z} = 2.$

Watch Video Solution

82. A sphere of constant radius k, passes through the origin and meets the axes at $A, BandC$. Prove that the centroid of triangle ABC lies on the sphere $9(x^2+y^2+z^2)=4k^2$.

Watch Video Solution

CONCEPT APPLICATION EXERCISE 3.1

1. If the x-coordinate of a point on the join of $P(2, 2, 1) and Q(5, 1, -2) is 4,$ then find its $z-$ coordinate.

Watch Video Solution

2. Find the distance of the point $P(a, b, c)$ from the x-axis.

Watch Video Solution

3. If $\vec{r}$ is a vector of magnitude 21 and has direction ratios $2, -3 and 6,$ then find $\vec{r}$.

Watch Video Solution

4. If $P(x, y, z)$ is a point on the line segment joining $Q(2, 2, 4) and R(3, 5, 6)$ such that the projections of $\vec{O}P$ on te axes are 13/5, 19/5 and 26/5, respectively, then find the ratio in which P divides QR.

Watch Video Solution

5. If O is the origin, $OP = 3$ with direction ratios $-1, 2, and -2,$ then find the coordinates of P.

Watch Video Solution

6. A line makes angles $\alpha, \beta and \gamma$ with the coordinate axes. If $\alpha + \beta = 90^0,$ then find γ.

Watch Video Solution

7. The line joining the points $-2, 1, -8)and(a, b, c)$ is parallel to the line whose direction ratios are $6, 2, and3$. Find the values of $a, band \cdot$

Watch Video Solution

8. If a line makes angles $\alpha, \beta and \gamma$ with three-dimensional coordinate axes, respectively, then find the value of $\cos 2\alpha + \cos 2\beta + \cos 2\gamma$.

Watch Video Solution

9. A parallelepiped is formed by planes drawn through the points $P(6, 8, 10)and(3, 4, 8)$ parallel to the coordinate planes. Find the length of edges and diagonal of the parallelepiped.

Watch Video Solution

10. Find the angel between any two diagonals of a cube.

Watch Video Solution

Watch Video Solution

11. Direction ratios of two lines are $a, b, cand1/bc, 1/ca, 1/ab\cdot$ Then the lines are ______.

Watch Video Solution

12. Find the angle between the lines whose direction cosines are connected by the relations $l+m+n=0and2/m+2nl-mn=0.$

Watch Video Solution

CONCEPT APPLICATION EXERCISE 3.2

1. Find the point where line which passes through point $(1, 2, 3)$ and is paralle to line $\overrightarrow{r}=\hat{i}+\hat{j}+2\hat{k}+\lambda\left(\hat{i}-2\hat{j}+3\hat{k}\right)$ meets the xy-plane.

Watch Video Solution

2. Find the equation of the line passing through the points $(1, 2, 3) and (-1, 0, 4)$.

Watch Video Solution

3. Find the vector equation of the line passing through the point $(2, -1, -1)$ which is parallel to the line $6x - 2 = 3y + 1 = 2z - 2$.

Watch Video Solution

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

Watch Video Solution

5. Find the equation of the line passing through the intersection $(-1, 3, -2)$ and perpendicular to the lines $\frac{x}{1} = \frac{y}{2} = \frac{z}{3} and \frac{x+2}{-3} = \frac{y-1}{2} = \frac{z+1}{5}$.

Watch Video Solution

6. The straight line $\frac{x-3}{3} = \frac{y-2}{1} = \frac{z-1}{0}$ is Parallel to x-axis Parallel to the y-axis Parallel to the z-axis Perpendicular to the z-axis

A. (A) Parallel to x-axis

B. (B) Parallel to the y-axis

C. (C) Parallel to the z-axis

D. (D) Perpendicular to the z-axis

Answer: (D) Perpendicular to the z-axis

Watch Video Solution

7. Find the angle between the lines $2x = 3y = -z$ and $6x = -y = -4z$

Watch Video Solution

8. If the lines $\frac{x-1}{-3} = \frac{y-2}{2k} = \frac{z-3}{-2}$ and $\frac{x-1}{3k} = \frac{y-5}{1} = \frac{z-6}{-5}$ are at right angle, then find the value of k.

Watch Video Solution

9. The equations of motion of a rocket are $x = 2t, y = -4tandz = 4t$, where time$t$ is given in seconds, and the coordinates of a moving points in kilometers. What is the path of the rocket? At what distance will be the rocket from the starting point $O(0, 0, 0)$ in $10s$?

Watch Video Solution

10. Find the length of the perpendicular drawn from the point $(5, 4, -1)$ to the line $\vec{r} = \hat{i} + \lambda\left(2\hat{i} + 9\hat{j} + 5\hat{k}\right)$, wher λ is a parameter.

Watch Video Solution

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

Watch Video Solution

12. Find the shortest distance between the lines $\vec{r} = (1-\lambda)\hat{i} + (\lambda-2)\hat{j} + (3-2\lambda)\hat{k}$ and $\vec{r} = (\mu+1)\hat{i} + (2\mu+1)\hat{k}$.

Watch Video Solution

13. Find the shortest distance between the z-axis and the line, $x+y+2z-3=0, 2x+3y+4z-4=0.$

Watch Video Solution

14. If the lines $\frac{x-1}{2}=\frac{y+1}{3}=\frac{z-1}{4} and \frac{x-3}{1}=\frac{y-k}{2}=\frac{z}{1}$ intersect, then find the value of $k\cdot$

Watch Video Solution

15. Let $l_1 and l_2$ be the two skew lines. If P, Q are two distinct points on $l_1 nd R, S$ are two distinct points on $l_2,$ then prove that PR cannot be parallel to $QS\cdot$

Watch Video Solution

CONCEPT APPLICATION EXERCISE 3.3

1. Find the angle between the line $\frac{x-1}{3}=\frac{y-1}{2}=\frac{z-1}{4}$ and the plane $2x+y-3z+4=0$.

Watch Video Solution

2. Find the distance between the line $\frac{x+1}{-3}=\frac{y-3}{2}=\frac{z-2}{1}$ and the plane $x+y+z+3=0$.

Watch Video Solution

3. Find the distance of the point $(-1,-5,-10)$ from the point of intersection of the line $\frac{x-2}{3}=\frac{y+1}{4}=\frac{z-2}{12}$ and plane $x-y+z=5$.

Watch Video Solution

4. Find the equation of the plane passing through the point $(1, 3, 2)$and perpendicular to each of the planes $x+2y+3z=5$and

$3x + 3y + z = 0.$

Watch Video Solution

5. Find the equation of the plane passing through the points $(1, 0, -1) and (3, 2, 2)$ and parallel to the line $x - 1 = \frac{1 - y}{2} = \frac{z - 2}{3}$.

Watch Video Solution

6. Find the equation of the plane containing the lines $\frac{x - 5}{4} = \frac{y - 7}{4} = \frac{z + 3}{-5} and \frac{x - 8}{7} = \frac{y - 4}{1} = \frac{z - 5}{3}$.

Watch Video Solution

7. Find the equation of the plane passing through the straight line $\frac{x - 1}{2} = \frac{y + 2}{-3} = \frac{z}{5}$ and perpendicular to the plane $x - y + z + 2 = 0$.

Watch Video Solution

8. Find the equation of the plane perpendicular to the line $\frac{x-1}{2} = \frac{y-3}{-1} = \frac{z-4}{2}$ and passing through the origin.

Watch Video Solution

9. Find the equation of the plane passing through the line $\frac{x-1}{5} = \frac{y+2}{6} = \frac{z-3}{4}$ and point $(4, 3, 7)$.

Watch Video Solution

10. Find the angle between the lines $\vec{r} = \hat{i} + 2\hat{j} - \hat{k} + \lambda\left(\hat{i} - \hat{j} + \hat{k}\right)$ and the plane $\vec{r} . 3\hat{i} - \hat{j} + \hat{k} = 4.$

Watch Video Solution

11. Find the equation of the plane which passes through the point $(12, 3)$ and which is at the maxixum distance from the point $(-1, 0, 2)$.

Watch Video Solution

12. Find the direction ratios of orthogonal projection of line $\frac{x-1}{1} = \frac{y+1}{-2} = \frac{z-2}{3}$ in the plane $x - y + 2z - 3 = 0$. also find the direction ratios of the image of the line in the plane.

Watch Video Solution

13. Find the equation of a plane which is parallel to the plane $x - 2y + 2z = 5$ and whose distance from thepoint $(1, 2, 3)$ is 1.

Watch Video Solution

14. Find the equation of a plane which passes through the point $(1, 2, 3)$ and which is equally inclined to the planes $x - 2y + 2z - 3 = 0 and 8x - 4y + z - 7 = 0.$

Watch Video Solution

15. Find the equation of the image of the plane $x - 2y + 2z - 3 = 0$ in plane $x + y + z - 1 = 0.$

Watch Video Solution

16. Find the equation of the plane through the points $(23, 1) and (4, -5, 3)$ and parallel to the x-axis.

Watch Video Solution

17. Find the distance of the point $\overrightarrow{a}$ from the plane $\overrightarrow{r} \cdot \widehat{n} = d$ measured parallel to the line $\overrightarrow{r} = \overrightarrow{b} + t\overrightarrow{c}$.

Watch Video Solution

18. The value of m for which the straight line 3x-2y+z+3 = 0=4x-3y+4z+1. is parallel to the plane 2x-y+mz-2 = 0 is

Watch Video Solution

19. 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.

Watch Video Solution

CONCEPT APPLICATION EXERCISE 3.4

1. Find the plane of the intersection of $x^2 + y^2 + z^2 + 2x + 2y + 2 = 0$ and $4x^2 + 4y^2 + 4z^2 + 4x + 4y + 4z - 1 = 0$.

Watch Video Solution

2. Find the radius of the circular section in which the sphere $\left|\vec{r}\right| = 5$ is cut by the plane $\vec{r} \cdot \left(\hat{i} + \hat{j} + \hat{k}\right) = 3\sqrt{3.}$

Watch Video Solution

3. A point $P(x, y, z)$ is such that $3PA = 2PB,$ where $AandB$ are the point $(1, 3, 4)and(1, \ -2, \ -1),$ erespectivley. Find the equation to the locus of the point P and verify that the locus is a sphere.

Watch Video Solution

4. The extremities of a diameter of a sphere lie on the positive y- and positive z-axes at distance 2 and 4, respectively. Show that the sphere passes through the origin and find the radius of the sphere.

Watch Video Solution

5. A plane passes through a fixed point (a, b, c). Show that the locus of the foot of the perpendicular to it from the origin is the sphere $x^2 + y^2 + z^2 - ax - by - cz = 0$.

Watch Video Solution

SUBJECTIVE TYPE

1. If the direction cosines of a variable line in two adjacent points be l, m, n 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

Watch Video Solution

2. Find the equation of the plane containing the line $\frac{y}{b}+\frac{z}{c}=1, x=0,$ and parallel to the line $\frac{x}{a}-\frac{z}{c}=1, y=0.$

Watch Video Solution

3. A variable plane passes through a fixed point (a, b, c) and meets the axes at $A, B, andC$. The locus of the point commom to the planes through $A, BandC$ parallel to the coordinate planes is

Watch Video Solution

4. Show that the straight lines whose direction cosines are given by the equations $al+bm+cn=0$ and $ul^2+vm^2+wn^2=0$ are parallel or perpendicular as $\frac{a^2}{u}+\frac{b^2}{v}+\frac{c^2}{w}=0$ or $a^2(v+w)+b^2(w+u)+c^2(u+v)=0$

Watch Video Solution

5. The perpendicular distance of a corner of unit cube from a diagonal not passing through it is

Watch Video Solution

6. A point P moves on a plane $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1.$ A plane through P and perpendicular to OP meets the coordinate axes at $A, BandC\cdot$ If the planes through $A, BandC$ parallel to the planes $x = 0, y = 0andz = 0,$ respectively, intersect at $Q,$ find the locus of $Q\cdot$

Watch Video Solution

7. If $x = cy + bz, y = az + cx, z = bx + ay, where. x, y, z$ are not all zeros, then find the value of $a^2 + b^2 + c^2 + 2abc\cdot$

Watch Video Solution

8. If a line makes angles $\alpha, \beta and \gamma$ with three-dimensional coordinate axes, respectively, then find the value of $\cos 2\alpha + \cos 2\beta + \cos 2\gamma\cdot$

Watch Video Solution

9. A variable plane $lx + my + nz = p(where l, m, n$ are direction cosines of normal) intersects the coordinate axes at points$A, B and C$, respectively. Show that the foot of the normal on the plane from the origin is the orthocenter of triangle ABC and hence find the coordinate of the circumcentre of triangle $ABC\cdot$

Watch Video Solution

10. Let $x - y \sin\alpha - z \sin\beta = 0$,$x \sin\alpha + z \sin\gamma - y = 0$ and $x \sin\beta + y \sin\gamma - z = 0$ be the equations of the planes such that $\alpha + \beta + \gamma = \pi/2$ (where α, β and $\gamma \neq 0)\cdot$ Then show that there is a common line of intersection of the three given planes.

Watch Video Solution

11. find the angle between the pair of lines $\frac{x+3}{3} = \frac{y-1}{5} = \frac{z+3}{4}$ and $\frac{x+1}{1} = \frac{y-4}{1} = \frac{z-5}{2}$

Watch Video Solution

12. find the angle between the line $\frac{x+1}{2} = \frac{y}{3} = \frac{z-3}{6}$ and the plane is $10x + 2y - 11z = 3$

Watch Video Solution

13. $OA, OBandOC, withO$ as the origin, are three mutually perpendicular lines whose direction cosines are $l_r m_r andn_r (r = 1, 2and3)$. If the projection of $OAandOB$ on the plane $z = 0$ make angles $\varphi_1 and \varphi_2$, respectively, with the x-axis, prove that $\tan(\varphi_1 - \varphi_2) = \pm n_3 / n_1 n_2$.

Watch Video Solution

14. O is the origin and lines OA, OB and OC have direction cosines l_r, m_r and $n_r (r = 1, 2 \text{ and } 3)$. If lines OA', OB' and OC' bisect angles BOC, COA and AOB, respectively, prove that planes AOA', BOB' and COC' pass through the line $\frac{x}{l_1 + l_2 + l_3} = \frac{y}{m_1 + m_2 + m_3} = \frac{z}{n_1 + n_2 + n_3}$.

Watch Video Solution

15. If P is any point on the plane $lx + my + nz = pandQ$ is a point on the line OP such that $OP. OQ = p^2$, then find the locus of the point Q.

Watch Video Solution

16. If a variable plane forms a tetrahedron of constant volume $64k^3$ with the co-ordinate planes, then the locus of the centroid of the tetrahedron is:

Watch Video Solution

17. Prove that the volume of tetrahedron bounded by the planes $\vec{r}\dot{} m\hat{j}+n\hat{k}=0, \vec{r}\dot{} n\hat{k}+l\hat{i}=0, \vec{r}\dot{} l\hat{i}+m\hat{j}=0, \vec{r}\dot{} l\hat{i}+m\hat{j}+n\hat{k}=\pi s\frac{2p}{3ln}$

Watch Video Solution

SINGLE CORRECT ANSWER TYPE

1. In a three-dimensional xyz space , the equation $x^2-5x+6=0$ represents a. Points b. planes c. curves d. pair of straight lines

A. points

B. planes

C. curves

D. pair of straight lines

Answer: b

Watch Video Solution

2. The line $\frac{x-2}{3}=\frac{y+1}{2}=\frac{z-1}{1}$ intersects the curve $xy=c^2, z=0$ then c is equal to a. ± 1 b. $\pm 1/3$ c. $\pm\sqrt{5}$ d. none of these

A. $\neq 1$

B. $\pm 1/3$

C. $\pm\sqrt{5}$

D. none of these

Answer: c

Watch Video Solution

3. Let the equations of a line and plane be $\frac{x+3}{2}=\frac{y-4}{3}=\frac{z+5}{2} and 4x-2y-z=1,$ respectively, then a. the line is parallel to the plane b. the line is perpendicular to the plane c. the line lies in the plane d. none of these

A. the line is parallel to the plane

B. the line is parpendicular to the plane

C. the line lies in the plane

D. none of these

Answer: a

Watch Video Solution

4. The length of the perpendicular from the origin to the plane passing through the points $\vec{a}$ and containing the line $\vec{r} = \vec{b} + \lambda \vec{c}$ is

A. $\dfrac{\left[\vec{a}\,\vec{b}\,\vec{c}\right]}{\left|\vec{a} \times \vec{b} + \vec{b} \times \vec{c} + \vec{c} \times \vec{a}\right|}$

B. $\dfrac{\left[\vec{a}\,\vec{b}\,\vec{c}\right]}{\left|\vec{a} \times \vec{b} + \vec{b} \times \vec{c}\right|}$

C. $\dfrac{\left[\vec{a}\,\vec{b}\,\vec{c}\right]}{\left|\vec{b} \times \vec{c} + \vec{c} \times \vec{a}\right|}$

D. $\dfrac{\left[\vec{a}\ \vec{b}\ \vec{c}\right]}{\left|\vec{c}\times\vec{a}+\vec{a}\times\vec{b}\right|}$

Answer: c

Watch Video Solution

5. The distance of point $A(-2, 3, 1)$ from the line PQ through $P(-3, 5, 2)$, which makes equal angles with the axes is a. $2/\sqrt{3}$ b. $\sqrt{14/3}$ c. $16/\sqrt{3}$ d. $5/\sqrt{3}$

A. $2/\sqrt{3}$

B. $\sqrt{14/3}$

C. $16/\sqrt{3}$

D. $5/\sqrt{3}$

Answer: B

Watch Video Solution

6. The Cartesian equation of the plane $\overrightarrow{r} = (1 + \lambda - \mu)\hat{i} + (2 - \lambda)\hat{j} + (3 - 2\lambda + 2\mu)\hat{k}$ is a. $2x + y = 5$ b. $2x - y = 5$ c. $2x + z = 5$ d. $2x - z = 5$

A. $2x + y = 5$

B. $2x - y = 5$

C. $2x + z = 5$

D. $2x - z = 5$

Answer: c

Watch Video Solution

7. A unit vector parallel to the intersection of the planes $\overrightarrow{r}.\left(\hat{i} - \hat{j} + \hat{k}\right) = 5\, and\, \overrightarrow{r}.\left(2\hat{i} + \hat{j} - 3\hat{k}\right) = 4$ a. $\frac{2\hat{i} + 5\hat{j} - 3\hat{k}}{\sqrt{38}}$ b. $\frac{-2\hat{i} + 5\hat{j} - 3\hat{k}}{\sqrt{38}}$ c. $\frac{2\hat{i} + 5\hat{j} - 3\hat{k}}{\sqrt{38}}$ d. $\frac{-2\hat{i} - 5\hat{j} - 3\hat{k}}{\sqrt{38}}$

A. $\frac{2\hat{i} + 5\hat{j} - 3\hat{k}}{\sqrt{38}}$

B. $\dfrac{2\hat{i}-5\hat{j}+3\hat{k}}{\sqrt{38}}$

C. $\dfrac{-2\hat{i}-5\hat{j}-3\hat{k}}{\sqrt{38}}$

D. $\dfrac{-2\hat{i}+5\hat{j}-3\hat{k}}{\sqrt{38}}$

Answer: C

Watch Video Solution

8. Let L_1 be the line $\overrightarrow{r}_1 = 2\hat{i}+\hat{j}-\hat{k}+\lambda\left(\hat{i}+2\hat{k}\right)$ and let L_2 be the line $\overrightarrow{r}_2 = 3\hat{i}+\hat{j}+\mu\left(\hat{i}+\hat{j}-\hat{k}\right)$. Let π be the plane which contains the line L_1 and is parallel to L_2. The distance of the plane π from the origin is a. $\sqrt{6}$ b. $1/7$ c. $\sqrt{2/7}$ d. none of these

A. $\sqrt{2/7}$

B. $1/7$

C. $\sqrt{6}$

D. none

Answer: a

Watch Video Solution

9. For the line $\frac{x-1}{1}=\frac{y-2}{2}=\frac{z-3}{3}$, which one of the following is correct? a. it lies in the plane $x-2y+z=0$ b. it is same as line $\frac{x}{1}=\frac{y}{2}=\frac{z}{3}$ c. it passes through $(2, 3, 5)$ d. it is parallel t the plane $x-2y+z-6=0$

A. It lies in the plane $x-2y+z=0$

B. It is same as line $\frac{x}{1}=\frac{y}{2}=\frac{z}{3}$

C. It passes through (2,3,5)

D. It is parallel to the plane $x-2y+z-6=0$

Answer: c

Watch Video Solution

10. The value of m for which the straight line 3x-2y+z+3 = 0=4x-3y+4z+1. is parallel to the plane 2x-y+mz-2 = 0 is

A. -2

B. 8

C. -18

D. 11

Answer: A

Watch Video Solution

11. The intercept made by the plane $\vec{r}\,.\,\vec{n} = q$ on the x-axis is a. $\frac{q}{\hat{i}\dot{\vec{n}}}$ b. $\frac{\hat{i}\dot{\vec{n}}}{q}$ c. $\frac{\hat{i}\dot{\vec{n}}}{q}$ d. $\frac{q}{\left|\vec{n}\right|}$

A. $\frac{q}{\hat{i}\,.\,\vec{n}}$

B. $\frac{\hat{i}\,.\,\vec{n}}{q}$

C. $\dfrac{\hat{i}.\overrightarrow{n}}{q}$

D. $\dfrac{q}{\left|\overrightarrow{n}\right|}$

Answer: a

Watch Video Solution

12. Equation of a line in the plane $\pi \equiv 2x - y + z - 4 = 0$ which is perpendicular to the line l whse equation is $\dfrac{x-2}{1} = \dfrac{y-2}{-1} = \dfrac{z-3}{-2}$ and which passes through the point of intersection of $land\pi$ is a. $\dfrac{x-2}{1} = \dfrac{y-1}{5} = \dfrac{z-1}{-1}$ b. $\dfrac{x-1}{3} = \dfrac{y-3}{5} = \dfrac{z-5}{-1}$ c. $\dfrac{x+2}{2} = \dfrac{y+1}{-1} = \dfrac{z+1}{1}$ d. $\dfrac{x-2}{2} = \dfrac{y-1}{-1} = \dfrac{z-1}{1}$

A. $\dfrac{x-2}{1} = \dfrac{y-1}{5} = \dfrac{z-1}{-1}$

B. $\dfrac{x-1}{3} = \dfrac{y-3}{5} = \dfrac{z-1}{-5}$

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

D. $\dfrac{x-2}{2} = \dfrac{y-1}{-1} = \dfrac{z-1}{1}$

Answer: B

Watch Video Solution

13. If the foot of the perpendicular from the origin to plane is $P(a, b, c)$, the equation of the plane is a. $\frac{x}{a} = \frac{y}{b} = \frac{z}{c} = 3$ b. $ax + by + cz = 3$ c. $ax + by + cz = a^{I2} + b^2 + c^2$ d. $ax + by + cz = a + b + c$

A. $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 3$

B. $ax + by + cz = 3$

C. $ax + by + cz = a^2 + b^2 + c^2$

D. $ax + by + cz = a + b + c$

Answer: c

Watch Video Solution

14. The equation of the plane which passes through the point of intersection of lines $\frac{x-1}{3}=\frac{y-2}{1}=\frac{z-3}{2}$, and $\frac{x-3}{1}=\frac{y-1}{2}=\frac{z-2}{3}$ and at greatest distance from point $(0, 0, 0)$ is a. $4x+3y+5z=25$ b. $4x+3y=5z=50$ c. $3x+4y+5z=49$ d. $x+7y-5z=2$

A. $4x+3y+5z=25$

B. $4x+3y+5z=50$

C. $3x+4y+5z=49$

D. $x+7y+5z=2$

Answer: b

Watch Video Solution

15. Let $A\left(\vec{a}\right) and B\left(\vec{b}\right)$ be points on two skew lines $\vec{r}=\vec{a}+\lambda\vec{p} and \vec{r}=\vec{b}+u\vec{q}$ and the shortest distance between the skew lines is $1, where \vec{p} and \vec{q}$ are unit vectors forming adjacent sides of a parallelogram enclosing an area of 1/2 units. If angle between AB and the line of shortest distance is 60^0, then $AB =$ a. $\frac{1}{2}$ b. 2 c. 1 d. $\lambda R = \{10\}$

A. $\frac{1}{2}$

B. 2

C. 1

D. $\lambda \varepsilon R - \{0\}$

Answer: b

Watch Video Solution

16. Let $A(1, 1, 1), B(2, 3, 5) and C(-1, 0, 2)$ be three points, then equation of a plane parallel to the plane ABC which is at distance 2units is

Watch Video Solution

17. The point on the line $\frac{x-2}{1}=\frac{y+3}{-2}=\frac{z+5}{-2}$ at a distance of 6 from the point $(2,\ -3,\ -5)$ is a. $(3,\ -5,\ -3)$ b. $(4,\ -7,\ -9)$ c. $(0,2,\ -1)$ d. none of these

A. (3,-5,-3)

B. (4,-7,-9)

C. (0,2,-1)

D. (-3,5,3)

Answer: b

Watch Video Solution

18. The coordinates of the foot of the perpendicular drawn from the origin to the line joining the point $(-9,4,5) and (10,0,-1)$ will be a. $(-3,2,1)$ b. $(1,2,2)$ c. $(4,5,3)$ d. none of these

A. (-3,2,1)

B. (1,2,2,)

C. (4,5,3)

D. none of these

Answer: D

Watch Video Solution

19. If $P_1 : \vec{r} \cdot \vec{n}_1 - d_1 = 0$ $P_2 : \vec{r} \cdot \vec{n}_2 - d_2 = 0$ and $P_3 : \vec{r} \cdot \vec{n}_3 - d_3 = 0$ are three planes and $\vec{n}_1, \vec{n}_2$ and $\vec{n}_3$ are three non-coplanar vectors, then three lines $P_1 = P_2 = 0$; $P_2 = P_3 = 0$; $P_3 = P_1 = 0$ are

a. parallel lines

b. coplanar lines

c. coincident lines

d. concurrent lines

A. parallel lines

B. coplanar lines

C. coincident lines

D. concurrent lines

Answer: d

Watch Video Solution

20. The length of projection of the line segment joining the points $(1, 0, -1)$ and $(-1, 2, 2)$ on the plane $x + 3y - 5z = 6$ is equal to a. 2 b. $\sqrt{\frac{271}{53}}$ c. $\sqrt{\frac{472}{31}}$ d. $\sqrt{\frac{474}{35}}$

A. 2

B. $\sqrt{\frac{271}{53}}$

C. $\sqrt{\frac{472}{31}}$

D. $\sqrt{\frac{474}{35}}$

Answer: d

Watch Video Solution

21. The number of planes that are equidistant from four non-coplanar points is a. 3 b. 4 c. 7 d. 9

A. 3

B. 4

C. 7

D. 9

Answer: c

Watch Video Solution

22. In a three-dimensional coordinate system, $P, Q, andR$ are images of a point $A(a, b, c)$ in the $x - y, y - zandz - x$ planes, respectively. If G is the centroid of triangle $PQR,$ then area of triangle AOG is (O is the origin) a. 0 b. $a^2 + b^2 + c^2$ c. $\frac{2}{3}(a^2 + b^2 + c^2)$ d. none of these

A. 0

B. $a^2 + b^2 + c^2$

C. $\frac{2}{3}\left(a^2+b^2+c^2\right)$

D. none of these

Answer: a

Watch Video Solution

23. A plane passing through $(1, 1, 1)$ cuts positive direction of coordinates axes at $A, BandC,$ then the volume of tetrahedron $OABC$ satisfies a. $V \leq \frac{9}{2}$ b. $V \geq \frac{9}{2}$ c. $V = \frac{9}{2}$ d. none of these

A. $V \leq \frac{9}{2}$

B. $V \geq \frac{9}{2}$

C. $V = \frac{9}{2}$

D. none of these

Answer: b

Watch Video Solution

24. If lines $x = y = zandx = \frac{y}{2} = \frac{z}{3}$ and third line passing through $(1, 1, 1)$ form a triangle of area $\sqrt{6}$ units, then the point of intersection of third line with the second line will be a. $(1, 2, 3)$ b. $2, 4, 6$ c. $\frac{4}{3}, \frac{6}{3}, \frac{12}{3}$ d. none of these

A. (1,2,3)

B. (2,4,6)

C. $\left(\frac{4}{3}, \frac{8}{3}, \frac{12}{3}\right)$

D. none of these

Answer: b

Watch Video Solution

25. Find the point of intersection of line passing through $(0, 0, 1)$ and the intersection lines

$x + 2u + z = 1, \; - x + y - 2z and x + y = 2, x + z = 2$ with the xy plane.

A. $\left(\frac{5}{3}, \; - \frac{1}{3}, 0\right)$

B. (1,1,0)

C. $\left(\frac{2}{3}, \; - \frac{1}{3}, 0\right)$

D. $\left(- \frac{5}{3}, \frac{1}{3}, 0\right)$

Answer: a

Watch Video Solution

26. 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 a. $\sqrt{14}$ b. $\sqrt{7}$ c. $\sqrt{2}$ d. none of these

A. $\sqrt{14}$

B. $\sqrt{7}$

C. $\sqrt{2}$

D. none of these

Answer: c

Watch Video Solution

27. Distance of point $P\left(\overrightarrow{p}\right)$ from the plane $\overrightarrow{r}\dot{\overrightarrow{n}}=0$ is a. $\left|\overrightarrow{p}\dot{\overrightarrow{n}}\right|$ b. $\dfrac{\left|\overrightarrow{p}\times\overrightarrow{n}\right|}{\left|\overrightarrow{n}\right|}$ c. $\dfrac{\left|\overrightarrow{p}\dot{\overrightarrow{n}}\right|}{\left|\overrightarrow{n}\right|}$ d. none of these

A. $\left|\overrightarrow{p}.\overrightarrow{n}\right|$

B. $\dfrac{\left|\overrightarrow{p}\times\overrightarrow{n}\right|}{\left|\overrightarrow{n}\right|}$

C. $\dfrac{\left|\overrightarrow{p}.\overrightarrow{n}\right|}{\left|\overrightarrow{n}\right|}$

D. none of these

Answer: c

Watch Video Solution

28. The reflection of the point $\overrightarrow{a}$ in the plane $\overrightarrow{r}\dot{\overrightarrow{n}}=q$ is a. $\overrightarrow{a}+\dfrac{\left(\overrightarrow{q}-\overrightarrow{a}\dot{\overrightarrow{n}}\right)}{\left|\overrightarrow{n}\right|}$ b. $\overrightarrow{a}+2\left(\dfrac{\left(\overrightarrow{q}-\overrightarrow{a}\dot{\overrightarrow{n}}\right)}{\left|\overrightarrow{n}\right|^2}\right)\overrightarrow{n}$ c. $\overrightarrow{a}+\dfrac{2\left(\overrightarrow{q}+\overrightarrow{a}\dot{\overrightarrow{n}}\right)}{\left|\overrightarrow{n}\right|^2}\overrightarrow{n}$ d. none of these

A. $\overrightarrow{a}+\dfrac{\left(\overrightarrow{q}-\overrightarrow{a}.\overrightarrow{n}\right)}{\left|\overrightarrow{n}\right|}$

B. $\overrightarrow{a}+2\left(\dfrac{\left(\overrightarrow{q}-\overrightarrow{a}.\overrightarrow{n}\right)}{\left|\overrightarrow{n}\right|^2}\right)\overrightarrow{n}$

C. $\overrightarrow{a}+\dfrac{2\left(\overrightarrow{q}-\overrightarrow{a}.\overrightarrow{n}\right)}{\left|\overrightarrow{n}\right|}\overrightarrow{n}$

D. none of these

Answer: b

Watch Video Solution

29. Line $\vec{r} = \vec{a} + \lambda \vec{b}$ will not meet the plane $\vec{r} \dot{\vec{n}} = q$, if a. $\vec{b} \dot{\vec{n}} = 0, \vec{a} \dot{\vec{n}} = q$ b. $\vec{b} \dot{\vec{n}} \neq 0, \vec{a} \dot{\vec{n}} \neq q$ c. $\vec{b} \dot{\vec{n}} = 0, \vec{a} \dot{\vec{n}} \neq q$ d. $\vec{b} \dot{\vec{n}} \neq 0, \vec{a} \dot{\vec{n}} = q$

A. $\vec{b} \, . \, \vec{n} = 0, \vec{a} \, . \, \vec{n} = q$

B. $\vec{b} \, . \, \vec{n} \neq 0, \vec{a} \, . \, \vec{n} \neq q$

C. $\vec{b} \, . \, \vec{n} = 0, \vec{a} \, . \, \vec{n} \neq q$

D. $\vec{b} \, . \, \vec{n} \neq 0, \vec{a} \, . \, \vec{n} \neq q$

Answer: c

Watch Video Solution

30. If a line makes an angel of $\frac{\pi}{4}$ with the positive direction of each of x-axis and y-axis, then the angel that the line makes with the positive direction of the z-axis is a. $\frac{\pi}{3}$ b. $\frac{\pi}{4}$ c. $\frac{\pi}{2}$ d. $\frac{\pi}{6}$

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

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

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

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

Answer: c

Watch Video Solution

31. The ratio in which the plane $\vec{r}\cdot\left(\vec{i}-2\vec{j}+3\vec{k}\right)$=17 divides the line joining the points $-2\vec{i}+4\vec{j}+7\vec{k}$ and $3\vec{i}-5\vec{j}+8\vec{k}$ is a. $1:5$ b. $1:10$ c. $3:5$ d. $3:10$

A. $1:5$

B. $1:10$

C. $3:5$

D. $3:10$

Answer: d

Watch Video Solution

32. the image of the point $(-1, 3, 4)$ in the plane $x - 2y = 0$ a. $\left(-\frac{17}{3}, \frac{19}{3}, 4\right)$ b.$(15, 11, 4)$ c.$\left(-\frac{17}{3}, \frac{19}{3}, 1\right)$ d.$\left(\frac{9}{5}, -\frac{13}{5}, 4\right)$

A. $\left(-\frac{17}{3}, \frac{19}{3}, 4\right)$

B. (15,11,4)

C. $\left(-\frac{17}{3}, \frac{19}{3}, 1\right)$

D. $\left(\frac{9}{5}, -\frac{13}{5}, 4\right)$

Answer: d

Watch Video Solution

33. The distance between the line $\vec{r} = \left(2\hat{i} - 2\hat{j} + 3\hat{k}\right) + \lambda\left(\hat{i} - \hat{j} + 4\hat{k}\right)$ and plane $\vec{r} \cdot \left(\hat{i} + 5\hat{j} + \hat{k}\right) = 5.$

A. $\frac{10}{3\sqrt{3}}$

B. $\frac{10}{9}$

C. $\frac{10}{3}$

D. $\frac{3}{10}$

Answer: a

Watch Video Solution

34. Column I, Column II $At x = 1, f(x) = \{\log x, x < 12x - x^2, x \geq 1$, p. is increasing At $x = 2, f(x) = \{x - 1, x < 20, x = 2 \sin x, x > 2$, q. is decreasing At $x = 0, f(x) = \{2x + 3, x < 05, x = 0x^2 + 7, x > 0$, r. has point of maxima At $x = 0, f(x) = \{e^{-x} x < 00, x = 0 - \cos x, x > 0$, s. has point of minima

A. $\frac{1}{2}$

B. 1

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

D. $\frac{1}{\sqrt{3}}$

Answer: d

Watch Video Solution

35. The length of the perpendicular drawn from $(1, 2, 3)$ to the line $\frac{x-6}{3} = \frac{y-7}{2} = \frac{z-7}{-2}$ is a. 4 b. 5 c. 6 d. 7

A. 4

B. 5

C. 6

D. 7

Answer: d

Watch Video Solution

36. If the angle θ between the line $\frac{x+1}{1} = \frac{y-1}{2} = \frac{z-2}{2}$ and the plane $2x - y + \sqrt{pz} + 4 = 0$ is such that $\sin\theta = \frac{1}{3}$, then the values of p is (A) 0 (B) $\frac{1}{3}$ (C) $\frac{2}{3}$ (D) $\frac{5}{3}$

A. $\frac{-3}{5}$

B. $\frac{5}{3}$

C. $\frac{-4}{3}$

D. $\frac{3}{4}$

Answer: b

Watch Video Solution

37. The intersection of the spheres $x^2 + y^2 + z^2 + 7x - 2y - z = 13 and x^2 + y^2 + z^2 - 3x + 3y + 4z = 8$ is the same as the intersection of one of the spheres and the plane is

a. $x - y - z = 1$ b. $x - 2y - z = 1$ c. $x - y - 2z = 1$ d. $2x - y - z = 1$

A. $x - y - z = 1$

B. $x - 2y - z = 1$

C. $x - y - 2z = 1$

D. $2x - y - z = 1$

Answer: d

Watch Video Solution

38. If a plane cuts off intercepts $OA = a, OB = b, OC = c$ from the coordinate axes 9where $'O'$ is the origin). then the area of the triangle ABC is equal to

A. $\frac{1}{2}(ab + bc + ac)$

B. $\frac{1}{2}abc$

C. $\frac{1}{2}\left(a^2b^2 + b^2c^2 + c^2a^2\right)^{1/2}$

D. $\frac{1}{2}(a + b + c)^2$

Answer: c

Watch Video Solution

39. A line makes an angel θ with each of the x-and z-axes. If the angel β, which it makes with the y-axis, is such that $\sin^2\beta = 3\sin^2\theta, then \cos^2\theta$ equals a. $\frac{2}{3}$ b. $\frac{1}{5}$ c. $\frac{3}{5}$ d. $\frac{2}{5}$

A. $\frac{2}{3}$

B. $\frac{1}{5}$

C. $\frac{3}{5}$

D. $\frac{2}{5}$

Answer: c

Watch Video Solution

40. The shortest distance from the plane $12x + y + 3z = 327$ to the sphere $x^2 + y^2 + z^2 + 4x - 2y - 6z = 155$ is a. 39 b. 26 c. $41 - \frac{4}{13}$ d. 13

A. 39

B. 26

C. $41\frac{4}{13}$

D. 13

Answer: d

Watch Video Solution

41. A tetrahedron has vertices $O(0, 0, 0), A(1, 2, 1), B(2, 1, 3), and C(-1, 1, 2),$ then angle between face $OAB and ABC$ will be a. $\cos^{-1}\left(\frac{17}{31}\right)$ b. 30^0 c. 90^0 d. $\cos^{-1}\left(\frac{19}{35}\right)$

A. $\cos^{-1}\left(\frac{17}{31}\right)$

B. 30°

C. 90°

D. $\cos^{-1}\left(\frac{19}{35}\right)$

Answer: d

Watch Video Solution

42. The radius of the circle in which the sphere $x^2 + y^2 + z^2 + 2x - 2y - 4z - 19 = 0$ is cut by the plane $x + 2y + 2z + 7 = 0$ is

A. 2

B. 3

C. 4

D. 1

Answer: b

Watch Video Solution

43. The lines $\frac{x-2}{1}=\frac{y-3}{1}=\frac{z-4}{-k}$ and $\frac{x-1}{k}=\frac{y-4}{2}=\frac{z-5}{1}$ are coplanar if a. $k=1$ or -1 b. $k=0$ or -3 c. $k=3$ or -3 d. $k=0$ or -1

A. k=1 or -1

B. k=0 or -3

C. k=3 or -3

D. k=0 or -1

Answer: b

Watch Video Solution

44. The point of intersection of the lines $\frac{x-5}{3}=\frac{y-7}{-1}=\frac{z+2}{1} and =\frac{x+3}{-36}=\frac{y-3}{2}=\frac{z-6}{4}$ is a. $\left(21, \frac{5}{3}, \frac{10}{3}\right)$ b. $(2, 10, 4)$ c. $(-3, 3, 6)$ d. $(5, 7, -2)$

A. $\left(21, \frac{5}{3}, \frac{10}{3}\right)$

B. (2,10,4)

C. (-3,3,6)

D. (5,7,-2)

Answer: a

Watch Video Solution

45. Two systems of rectangular axes have the same origin. If a plane cuts them at distance $a, b, c and d, b', c'$ from the origin, then a. $\frac{1}{a^2}+\frac{1}{b^2}+\frac{1}{c^2}+\frac{1}{a'^2}+\frac{1}{b'^2}+\frac{1}{c'^2}=0$ b. $\frac{1}{a^2}-\frac{1}{b^2}-\frac{1}{c^2}+\frac{1}{a'^2}-\frac{1}{b'^2}-\frac{1}{c'^2}=0$ c. $\frac{1}{a^2}+\frac{1}{b^2}+\frac{1}{c^2}-\frac{1}{a'^2}-\frac{1}{b'^2}-\frac{1}{c'^2}=0$ d. $\frac{1}{a^2}+\frac{1}{b^2}+\frac{1}{c^2}+\frac{1}{a'^2}+\frac{1}{b'^2}+\frac{1}{c'^2}=0$

A. $\frac{1}{a^2}+\frac{1}{b^2}+\frac{1}{c^2}+\frac{1}{a'^2}+\frac{1}{b'^2}+\frac{1}{c'^2}=0$

B. $\frac{1}{a^2}-\frac{1}{b^2}-\frac{1}{c^2}-\frac{1}{a'^2}-\frac{1}{b'^2}-\frac{1}{c'^2}=0$

C. $\frac{1}{a^2}+\frac{1}{b^2}+\frac{1}{c^2}-\frac{1}{a'^2}-\frac{1}{b'^2}-\frac{1}{c'^2}=0$

D. $\frac{1}{a^2}+\frac{1}{b^2}+\frac{1}{c^2}+\frac{1}{a'^2}+\frac{1}{b'^2}+\frac{1}{c'^2}=0$

Answer: c

Watch Video Solution

46. The plane, which passes throught the point (3,2,0) and line $\frac{x-3}{1}=\frac{y-6}{5}=\frac{z-4}{4}$ is

A. $x-y+z=1$

B. $x+y+z=5$

C. $x+2y-z=1$

D. $2x-y+z=5$

Answer: a

Watch Video Solution

47. The direction ratios of a normal to the plane through $(1, 0, 0) and (0, 1, 0)$, which makes and angle of $\frac{\pi}{4}$ with the plane $x + y = 3,$ are a. $\langle 1, \sqrt{2}, \rangle$ b. $\langle 1, 1, \sqrt{2} \rangle$ c. $\langle 1, 1, 2 \rangle$ d. `<>`

A. $< 1, \sqrt{2}, 1 >$

B. $< 1, 1, \sqrt{2} >$

C. $< 1, 1, 2 >$

D. $< \sqrt{2}, 1, 1 >$

Answer: b

Watch Video Solution

48. The centre of the circle given by $\vec{r}.\left(\hat{i} + 2\hat{j} + 2\hat{k}\right) = 15 and \left|\vec{r}.\left(\hat{j} + 2\hat{k}\right)\right| = 4$ is a. $(0, 1, 2)$ b. $(1, 3, 4)$ c. $(\ -1, 3, 4)$ d. none of these

A. (0,1,2)

B. (1,3,4)

C. (-1,3,4)

D. none of these

Answer: b

Watch Video Solution

49. The lines which intersect the skew lines $y = mx, z = c; y = -mx, z = -c$ and the x-axis lie on the surface a. $cz = mxy$ b. $xy = cmz$ c. $cy = mxz$ d. none of these

A. $cz = mxy$

B. $xy = cmz$

C. $cy = mxz$

D. none of these

Answer: c

Watch Video Solution

50. Distance of the point $P\left(\overrightarrow{p}\right)$ from the line $\overrightarrow{r} = \overrightarrow{a} + \lambda\overrightarrow{b}$ is a. $\left|\left(\overrightarrow{a} - \overrightarrow{p}\right) = \dfrac{\left(\left(\overrightarrow{p} - \overrightarrow{a}\right)\dot{\overrightarrow{b}}\right)\overrightarrow{b}}{\left|\overrightarrow{b}\right|^2}\right|$ b. $\left|\left(\overrightarrow{b} - \overrightarrow{p}\right) = \dfrac{\left(\left(\overrightarrow{p} - \overrightarrow{a}\right)\dot{\overrightarrow{b}}\right)\overrightarrow{b}}{\left|\overrightarrow{b}\right|^2}\right|$ c. $\left|\left(\overrightarrow{a} - \overrightarrow{p}\right) = \dfrac{\left(\left(\overrightarrow{p} - \overrightarrow{b}\right)\dot{\overrightarrow{b}}\right)\overrightarrow{b}}{\left|\overrightarrow{b}\right|^2}\right|$ d. none of these

A. $\left|\left(\overrightarrow{a} = \overrightarrow{p}\right) + \dfrac{\left(\left(\overrightarrow{p} - \overrightarrow{a}\right).\overrightarrow{b}\right)\overrightarrow{b}}{\left|\overrightarrow{b}\right|^2}\right|$

B. $\left|\left(\overrightarrow{b} - \overrightarrow{p}\right) + \dfrac{\left(\left(\overrightarrow{p} - \overrightarrow{a}\right).\overrightarrow{b}\right)\overrightarrow{b}}{\left|\overrightarrow{b}\right|^2}\right|$

C. $\left|\left(\overrightarrow{a} - \overrightarrow{p}\right) + \dfrac{\left(\left(\overrightarrow{p} - \overrightarrow{a}\right).\overrightarrow{b}\right)\overrightarrow{b}}{\left|\overrightarrow{b}\right|^2}\right|$

D. none of these

Answer: c

Watch Video Solution

51. From the point $P(a, b, c)$, let perpendiculars $PLandPM$ be drawn to $YOZandZOX$ planes, respectively. Then the equation of the plane OLM is

a. $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=0$ b. $\frac{x}{a}+\frac{y}{b}-\frac{z}{c}=0$ c. $\frac{x}{a}-\frac{y}{b}-\frac{z}{c}=0$ d. $\frac{x}{a}-\frac{y}{b}+\frac{z}{c}=0$

A. $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=0$

B. $\frac{x}{a}+\frac{y}{b}-\frac{z}{c}=0$

C. $\frac{x}{a}-\frac{y}{b}-\frac{z}{c}=0$

D. $\frac{x}{a}-\frac{y}{b}+\frac{z}{c}=0$

Answer: b

Watch Video Solution

52. The plane $\vec{r}\dot{\vec{n}} = q$ will contain the line $\vec{r} = \vec{a} + \lambda \vec{b}$, if a. $b\dot{n} \neq 0, a\dot{n} \neq q$ b. $b\dot{n} =$, $a\dot{n} \neq q$ c. $b\dot{n} = 0, a\dot{n} = q$ d. $b\dot{n} \neq 0, a\dot{n} = q$

A. $\vec{b} . \vec{n} \neq 0, \vec{a} . \vec{n} \neq q$

B. $\vec{b} . \vec{n} = 0, \vec{a} . \vec{n} \neq q$

C. $\vec{b} . \vec{n} = 0, \vec{a} . \vec{n} = q$

D. $\vec{b} . \vec{n} \neq 0, \vec{a} . \vec{n} = q$

Answer: c

Watch Video Solution

53. The projection of point $P\left(\vec{p}\right)$ on the plane $\vec{r} . \vec{n} = q$ is $\left(\vec{s}\right)$, then a. $\vec{s} = \frac{\left(q - \vec{p} . \vec{n}\right)\vec{n}}{\left|\vec{n}\right|^2}$ b. $\vec{s} = p + \frac{\left(q - \vec{p} . \vec{n}\right)\vec{n}}{\left|\vec{n}\right|^2}$ c. $\vec{s} = p - \frac{\left(\vec{p} . \vec{n}\right)\vec{n}}{\left|\vec{n}\right|^2}$ d. $\vec{s} = p - \frac{\left(q - \vec{p} . \vec{n}\right)\vec{n}}{\left|\vec{n}\right|^2}$

A. $\vec{s} = \dfrac{\left(q - \vec{p}\,.\,\vec{n}\right)\vec{n}}{\left|\vec{n}\right|^2}$

B. $\vec{s} = \vec{p} + \dfrac{\left(q - \vec{p}\,.\,\vec{n}\right)\vec{n}}{\left|\vec{n}\right|^2}$

C. $\vec{s} = \vec{p} - \dfrac{\left(\vec{p}\,.\,\vec{n}\right)\vec{n}}{\left|\vec{n}\right|^2}$

D. $\vec{s} = \vec{p} - \dfrac{\left(q - \vec{p}\,.\,\vec{n}\right)\vec{n}}{\left|\vec{n}\right|^2}$

Answer: b

Watch Video Solution

54. The angle between i and line of the intersection of the plane $\vec{r}\,.\left(\hat{i} + 2\hat{j} + 3\hat{k}\right) = 0$ and $\vec{r}\,.\left(3\hat{i} + 3\hat{j} + \hat{k}\right) = 0$ is a. $\cos^{-1}\left(\frac{1}{3}\right)$ b. $\cos^{-1}\left(\frac{1}{\sqrt{3}}\right)$ c. $\cos^{-1}\left(\frac{2}{\sqrt{3}}\right)$ d. none of these

A. $\cos^{-1}\left(\dfrac{1}{3}\right)$

B. $\cos^{-1}\left(\dfrac{1}{\sqrt{3}}\right)$

C. $\cos^{-1}\left(\frac{2}{\sqrt{3}}\right)$

D. none of these

Answer: d

Watch Video Solution

55. The line $\frac{x+6}{5} = \frac{y+10}{3} = \frac{z+14}{8}$ is the hypotenuse of an isosceles right-angled triangle whose opposite vertex is $(7, 2, 4)\cdot$ Then which of the following in not the side of the triangle?

a. $\frac{x-7}{2} = \frac{y-2}{-3} = \frac{z-4}{6}$

b. $\frac{x-7}{3} = \frac{y-2}{6} = \frac{z-4}{2}$

c. $\frac{x-7}{3} = \frac{y-2}{5} = \frac{z-4}{-1}$

d. none of these

A. $\frac{x-7}{2} = \frac{y-2}{-3} = \frac{z-4}{6}$

B. $\frac{x-7}{3} = \frac{y-2}{6} = \frac{z-4}{2}$

C. $\frac{x-7}{3} = \frac{y-2}{5} = \frac{z-4}{-1}$

D. none of these

Answer: c

Watch Video Solution

56. The equation of the plane which passes through the line of intersection of planes $\vec{r}.\vec{n}_1 = , q_1, \vec{r}.\vec{n}_2 = q_2$ and the is parallel to the line of intersection of planers $\vec{r}.\vec{n}_3 = q_3 and \vec{r}.\vec{n}_4 - q_4$ is

A. $\left[\vec{n}_2\vec{n}_3\vec{n}_4\right]\left(\vec{r}.\vec{n}_1 - q_1\right) = \left[\vec{n}_1\vec{n}_3\vec{n}_4\right]\left(\vec{r}.\vec{n}_2 - q_2\right)$

B. $\left[\vec{n}_1\vec{n}_2\vec{n}_3\right]\left(\vec{r}.\vec{n}_4 - q_4\right) = \left[\vec{n}_4\vec{n}_3\vec{n}_1\right]\left(\vec{r}.\vec{n}_2 - q_2\right)$

C. $\left[\vec{n}_4\vec{n}_3\vec{n}_1\right]\left(\vec{r}.\vec{n}_4 - q_4\right) = \left[\vec{n}_1\vec{n}_2\vec{n}_3\right]\left(\vec{r}.\vec{n}_2 - q_2\right)$

D. none of these

Answer: a

Watch Video Solution

57. Consider triangle AOB in the $x-y$ plane, where $A \equiv (1, 0, 0), B \equiv (0, 2, 0) and O \equiv (0, 0, 0)$. The new position of O, when triangle is rotated about side AB by 90^0 can be a. $\left(\frac{4}{5}, \frac{3}{5}, \frac{2}{\sqrt{5}}\right)$ b. $\left(\frac{-3}{5}, \frac{\sqrt{2}}{5}, \frac{2}{\sqrt{5}}\right)$ c. $\left(\frac{4}{5}, \frac{2}{5}, \frac{2}{\sqrt{5}}\right)$ d. $\left(\frac{4}{5}, \frac{2}{5}, \frac{1}{\sqrt{5}}\right)$

A. $\left(\frac{4}{5}, \frac{3}{5}, \frac{2}{\sqrt{5}}\right)$

B. $\left(\frac{-3}{5}, \frac{\sqrt{2}}{5}, \frac{2}{\sqrt{5}}\right)$

C. $\left(\frac{4}{5}, \frac{2}{5}, \frac{2}{\sqrt{5}}\right)$

D. $\left(\frac{4}{5}, \frac{2}{5}, \frac{1}{\sqrt{5}}\right)$

Answer: c

Watch Video Solution

58. Let $\vec{a} = \hat{i} + \hat{j}$ and $\vec{b} = 2\hat{i} - \hat{k}$, then the point of intersection of the lines $\vec{r} \times \vec{a} = \vec{b} \times \vec{a}$ and $\vec{r} \times \vec{b} = \vec{a} \times \vec{b}$ is a. $(3, -1, 1)$ b. $(3, 1, -1)$ c. $(-3, 1, 1)$ d. $(-3, -1, -1)$

A. (3,-1,1)

B. (3,1,-1)

C. (-3,1,1)

D. (-3,-1,-1)

Answer: b

Watch Video Solution

59. The coordinates of the point P on the line $\vec{r} = (\hat{i} + \hat{j} + \hat{k}) + \lambda(-\hat{i} + \hat{j} - \hat{k})$ which is nearest to the origin is a. $\left(\frac{2}{4}, \frac{4}{3}, \frac{2}{3}\right)$ b. $\left(-\frac{2}{3}, -\frac{4}{3}, \frac{2}{3}\right)$ c. $\left(\frac{2}{3}, -\frac{4}{3}, \frac{2}{3}\right)$ d. none of these

A. $\left(\frac{2}{3}\frac{4}{3}, \frac{2}{3}\right)$

B. $\left(-\frac{2}{3} - \frac{4}{3}, \frac{2}{3}\right)$

C. $\left(\frac{2}{3}\frac{4}{3}, -\frac{2}{3}\right)$

D. none of these

Answer: a

Watch Video Solution

60. The ratio in which the line segment joining the points whose position vectors are $2\hat{i}-4\hat{j}-7\hat{k}and-3\hat{i}+5\hat{j}-8\hat{k}$ is divided by the plane whose equation is $\hat{r}.\left(\hat{i}-2\hat{j}+3\hat{k}\right)=13$ is a. $13:12$ internally b. $12:25$ externally c. $13:25$ internally d. $37:25$ internally

A. 13:12 internally

B. 12:25 externally

C. 13:25 internally

D. 37:25 internally

Answer: b

Watch Video Solution

61. Find the following are equations for the plane passing through the points $P(1, 1, -1), Q(3, 0, 2) and R(-2, 1, 0)$?

A. $\left(2\hat{i} - 3\hat{j} + 3\hat{k}\right).\left((x+2)\hat{i} + (y-1)\hat{j} + z\hat{k}\right) = 0$

B. $x = 3 - t, y = -11t, z = 2 - 3t$

C. $(x+2) + 11(y-1) = 3z$

D. $\left(2\hat{i} - \hat{j} + 3\hat{k}\right) \times \left(-3\hat{i} + \hat{j}\right).\left((x+2)\hat{i} + (y-1)\hat{j} + z\hat{k}\right) = 0$

Answer: d

Watch Video Solution

62. Given $\overrightarrow{\alpha} = 3\hat{i} + \hat{j} + 2\hat{k} and \overrightarrow{\beta} = \hat{i} - 2\hat{j} - 4\hat{k}$ are the position vectors of the points $A and B$. Then the distance of the point $-\hat{i} + \hat{j} + \hat{k}$ from the plane passing through B and perpendicular to AB is

A. 5

B. 10

C. 15

D. 20

Answer: a

Watch Video Solution

63. $L_1 and L_2$ and two lines whose vector equations are $L_1: \vec{r} = \lambda\left(\left(\cos\theta + \sqrt{3}\right)\hat{i} + \left(\sqrt{2}\sin\theta\right)\hat{j} + \left(\cos\theta - \sqrt{3}\right)\hat{k}\right)$ $L_2: \vec{r} = \mu\left(a\hat{i} + b\hat{j} + c\hat{k}\right)$, where $\lambda and \mu$ are scalars and α is the acute angel between $L_1 and L_2$. If the angel α is independent of θ, then the value of α is a. $\frac{\pi}{6}$ b. $\frac{\pi}{4}$ c. $\frac{\pi}{3}$ d. $\frac{\pi}{2}$

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

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

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

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

Answer: a

Watch Video Solution

64. The shortest distance between the lines $\frac{x-3}{3}=\frac{y-8}{-1}=\frac{z-3}{1} and \frac{x+3}{-3}=\frac{y+7}{2}=\frac{z-6}{4}$ is a. $\sqrt{30}$ b. $2\sqrt{30}$ c. $5\sqrt{30}$ d. $3\sqrt{30}$

A. $\sqrt{3}$

B. $2\sqrt{3}$

C. $5\sqrt{3}$

D. $3\sqrt{3}$

Answer: d

Watch Video Solution

65. The line through $\hat{i}+3\hat{j}+2\hat{k}$ and perpendicular to the lines $\overrightarrow{r}=\left(\hat{i}+2\hat{j}-\hat{k}\right)+\lambda\left(2\hat{i}+\hat{j}+\hat{k}\right)$ and $\overrightarrow{r}=\left(2\hat{i}+6\hat{j}+\hat{k}\right)+\mu\left(\hat{i}+2\hat{j}+3\hat{k}\right)$ is

A. a. $\vec{r} = (\hat{i} + 2\hat{j} - \hat{k}) + \lambda(-\hat{i} + 5\hat{j} - 3\hat{k})$

B. b. $\vec{r} = \hat{i} + 3\hat{j} + 2\hat{k} + \lambda(\hat{i} - 5\hat{j} + 3\hat{k})$

C. c. $\vec{r} = \hat{i} + 3\hat{j} + 2\hat{k} + \lambda(\hat{i} + 5\hat{j} + 3\hat{k})$

D. d. $\vec{r} = \hat{i} + 3\hat{j} + 2\hat{k} + \lambda(-\hat{i} - 5\hat{j} - 3\hat{k})$

Answer: b

Watch Video Solution

66. The equation of the plane passing through lines $\frac{x-4}{1} = \frac{y-3}{1} = \frac{z-2}{2} and \frac{x-3}{2} = \frac{y-2}{-4} = \frac{z}{5}$ is a. $11x - y - 3z = 35$ b. $11x + y - 3z = 35$ c. $11x - y + 3z = 35$ d. none of these

A. $11x - y - 3z = 35$

B. $11x + y - 3z = 35$

C. $11x - y + 3z = 35$

D. none of these

Answer: d

Watch Video Solution

67. The three planes $4y + 6z = 5, 2x + 3y + 5z = 5 and 6x + 5y + 9z = 10$ a. meet in a point b. have a line in common c. form a triangular prism d. none of these

A. meet in a point

B. have a line in common

C. form a triangular prism

D. none of these

Answer: b

Watch Video Solution

68. about to only mathematics

A. $(ab' - a'b)x + (bc' - b'c)y + (ad' - a'd) = 0$

B. $(ab' - a'b)x + (bc' - b'c)y + (ad' - a'd)z = 0$

C. $(ab' - a'b)y + (bc' - b'c)z + (ad' - a'd) = 0$

D. none of these

Answer: c

Watch Video Solution

69. Equation of the pane passing through the points $(2, 2, 1) and (9, 3, 6), and \perp$ to the plane $2x + 6y + 6z - 1 = 0$ is a. $3x + 4y + 5z = 9$ b. $3x + 4y - 5z = 9$ c. $3x + 4y - 5z = 9$ d. none of these

A. $3x + 4y + 5z = 9$

B. $3x + 4y - 5z = 9$

C. $3x + 4y - 5z = 9$

D. none of these

Answer: b

Watch Video Solution

70. Value of λ such that the line $\frac{x-1}{2}=\frac{y-1}{3}=\frac{z-1}{\lambda}$ is $\perp$ to normal to the plane $\vec{r}.\left(2\vec{i}+3\vec{j}+4\vec{k}\right)=0$ is a. $-\frac{13}{4}$ b. $-\frac{17}{4}$ c. 4 d. none of these

A. $-\frac{13}{4}$

B. $-\frac{17}{4}$

C. 4

D. none of these

Answer: a

Watch Video Solution

71. The equation of the plane through the intersection of the planes $x + 2y + 3z - 4 = 0nd4x + 3y + 2z + 1 = 0$ and passing through the origin is a. $17x + 14y + 11z = 0$ b. $7x + 4y + z = 0$ c. $x + 14 + 11z = 0$ d. $17x + y + z = 0$

A. $17x + 14y + 11z = 0$

B. $7x + 4y + z = 0$

C. $x + 14y + 11z = 0$

D. $17x + y + z = 0$

Answer: a

Watch Video Solution

72. The plane $4x + 7y + 4z + 81 = 0$ is rotated through a right angle about its line of intersection with the plane $5x + 3y + 10z = 25$. The equation of the plane in its new position is $x - 4y + 6z = k$ where k is

A. $x-4y+6z=106$

B. $x-8y+13z=103$

C. $x-4y+6z=110$

D. $x-8y+13z=19=105$

Answer: a

Watch Video Solution

73. The vector equation of the plane passing through the origin and the line of intersection of the planes $\vec{r}\dot{\vec{a}}=\lambda and \vec{r}\dot{\vec{b}}=\mu$ is (a) $\vec{r}\lambda\dot{\vec{a}}-\mu\vec{b}=0$ (b) $\vec{r}\lambda\dot{\vec{b}}-\mu\vec{a}=0$ (c) $\vec{r}\lambda\dot{\vec{a}}+\mu\vec{b}=0$ (d) $\vec{r}\lambda\dot{\vec{b}}+\mu\vec{a}=0$

A. $\vec{r}.\left(\lambda\vec{a}-\mu\vec{b}\right)=0$

B. $\vec{r}.\left(\lambda\vec{b}-\mu\vec{a}\right)=0$

C. $\vec{r}.\left(\lambda\vec{a}+\mu\vec{b}\right)=0$

D. $\vec{r} \cdot \left(\lambda \vec{b} + \mu \vec{a}\right) = 0$

Answer: b

Watch Video Solution

74. The two lines $\vec{r} = \vec{a} + \vec{\lambda}\left(\vec{b} \times \vec{c}\right)$ and $\vec{r} = \vec{b} + \mu\left(\vec{c} \times \vec{a}\right)$ intersect at a point where $\vec{\lambda}$ and μ are scalars then

A. $\vec{a} \times \vec{c} = \vec{b} \times \vec{c}$

B. $\vec{a} \cdot \vec{c} = \vec{b} \cdot \vec{c}$

C. $\vec{b} \times \vec{a} = \vec{c} \times \vec{a}$

D. none of these

Answer: b

Watch Video Solution

75. The projection of the line $\frac{x+1}{-1}=\frac{y}{2}=\frac{z-1}{3}$ on the plane $x-2y+z=6$ is the line of intersection of this plane with the plane a. $2x+y+2=0$ b. $3x+y-z=2$ c. $2x-3y+8z=3$ d. none of these

A. $2x+y+2=0$

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

C. $2x-3y+8z=3$

D. none of these

Answer: a

Watch Video Solution

76. The direction cosines of a line satisfy the relations $\lambda(l+m)=nandmn+nl+lm=0.$ The value of $\lambda,$ for which the two lines are perpendicular to each other, is a. 1 b. 2 c. $1/2$ d. none of these

A. 1

B. 2

C. $1/2$

D. none of these

Answer: b

Watch Video Solution

77. The intercepts made on the axes by the plane the which bisects the line joining the points $(1, 2, 3)$ and $(-3, 4, 5)$ at right angles are a. $\left(-\frac{9}{2}, 9, 9\right)$ b. $\left(\frac{9}{2}, 9, 9\right)$ c. $\left(9, -\frac{9}{2}, 9\right)$ d. $\left(9, \frac{9}{2}, 9,\right)$

A. $\left(-\frac{9}{2}, 9, 9\right)$

B. $\left(\frac{9}{2}, 9, 9\right)$

C. $\left(9, -\frac{9}{2}, 9\right)$

D. $\left(9, \frac{9}{2}, 9\right)$

Answer: a

Watch Video Solution

78. Find the angle between the lines whose direction cosines are given by the equations $3l+m+5n=0$ and $6mn-2nl+5lm=0$

A. 1.parallel

B. 2.perpendicular

C. 3.inclined at $\cos^{-1}\left(\frac{1}{6}\right)$

D. 4.none of these

Answer: c

Watch Video Solution

79. A sphere of constant radius $2k$ passes through the origin and meets the axes in $A, B, andC$. The locus of a centroid of the tetrahedron $OABC$ is a. $x^2+y^2+z^2=4k^2$ b. $x^2+y^2+z^2=k^2$ c. $2(x^2+y^2+z)^2=k^2$ d. none of these

A. $x^2+y^2+z^2=k^2$

B. $x^2+y^2+z^2=k^2$

C. $2\left(k^2+y^2+z\right)^2=k^2$

D. none of these

Answer: b

Watch Video Solution

80. A plane passes through a fixed point (a, b, c). The locus of the foot of the perpendicular to it from the origin is a sphere of radius a. $\frac{1}{2}\sqrt{a^2+b^2+c^2}$ b. $\sqrt{a^2+b^2+c^2}$ c. $a^2+b^2+c^2$ d. $\frac{1}{2}\left(a^2+b^2+c^2\right)$

A. $\frac{1}{2}\sqrt{a^2+b^2+c^2}$

B. $\sqrt{a^2+b^2+c^2}$

C. $a^2+b^2+c^2$

D. $\frac{1}{2}\left(a^2+b^2+c^2\right)$

Answer: a

Watch Video Solution

81. What is the nature of the intersection of the set of planes $x + ay + (b + c)z + d = 0, x + by + (a + a)z + d = 0 and x + cy + (a +$

a. they meet at a point b. the form a triangular prism c. the pass through a line d. they are at equal distance from the origin

A. They meet at a point

B. They form a triangular prism

C. They pass through a line

D. They are at equal distance from the origin

Answer: c

Watch Video Solution

82. Find the equation of a straight line in the plane $\vec{r}\dot{\vec{n}} = d$ which is parallel to $\vec{r} = \vec{a} + \lambda\vec{b}$ and passes through the foot of the perpendicular drawn from point $P(\vec{a}) \to \vec{r}\dot{\vec{n}} = d\left(where\vec{n}\dot{\vec{b}} = 0\right)$. a. $\vec{r} = \vec{a} + \left(\frac{d - \vec{a}\dot{\vec{n}}}{n^2}\right)n + \lambda\vec{b}$ b. $\vec{r} = \vec{a} + \left(\frac{d - \vec{a}\dot{\vec{n}}}{n}\right)n + \lambda\vec{b}$ c. $\vec{r} = \vec{a} + \left(\frac{\vec{a}\dot{\vec{n}} - d}{n^2}\right)n + \lambda\vec{b}$ d. $\vec{r} = \vec{a} + \left(\frac{\vec{a}\dot{\vec{n}} - d}{n}\right)n + \lambda\vec{b}$

A. $\vec{r} = \vec{a} + \left(\frac{d - \vec{a}.\vec{n}}{n^2}\right)\vec{n} + \lambda\vec{b}$

B. $\vec{r} = \vec{a} + \left(\frac{d - \vec{a}.\vec{n}}{n}\right)\vec{n} + \lambda\vec{b}$

C. $\vec{r} = \vec{a} + \left(\frac{\vec{a}.\vec{n} - d}{n^2}\right)\vec{n} + \lambda\vec{b}$

D. $\vec{r} = \vec{a} + \left(\frac{\vec{a}.\vec{n} - d}{n}\right)\vec{n} + \lambda\vec{b}$

Answer: a

Watch Video Solution

83. What is the equation of the plane which passes through the z-axis and is perpendicular to the line $\frac{x-a}{\cos\theta}=\frac{y+2}{s\int h\eta}=\frac{z-3}{0}?$ a. $x+ytan\theta=0$ b. $y+xtan\theta=0$ c. $x\cos\theta-y\sin\theta=0$ d. $x\sin\theta-y\cos\theta=0$

A. $x+y\tan\theta=0$

B. $y+x\tan\theta=0$

C. $x\cos\theta-y\sin\theta=0$

D. $x\sin\theta-y\cos\theta=0$

Answer: a

Watch Video Solution

84. A straight line L on the xy-plane bisects the angle between $OXandOY\cdot$ What are the direction cosines of $L?$ a. $((1/\sqrt{2}),(1/\sqrt{2}),0)$ b. $((1/2),(\sqrt{3}/2),0)$ c. $(0,0,1)$ d. (2/3, 2/3, 2/3)

A. $< (1/\sqrt{2}), (1/\sqrt{2}), 0 >$

B. $< (1/2), (\sqrt{3}/2), 0 >$

C. $< 0, 0, 1 >$

D. $< (2/3), (2/3), (1/3) >$

Answer: a

Watch Video Solution

85. For what value (s) of a will the two points $(1, a, 1)$ and $(-3, 0, a)$ lie on opposite sides of the plane $3x + 4y - 12z + 13 = 0$?

A. $a < -1$ or $a > 1/3$

B. a=0 only

C. $0 < a < 1$

D. $-1 < a < 1$

Answer: a

Watch Video Solution

86. If the plane $\frac{x}{2}+\frac{y}{3}+\frac{z}{6}=1$ cuts the axes of coordinates at points, $A, B, andC$, then find the area of the triangle $ABC\cdot$ a. $18sq\cdot$ unit b. $36sq\cdot$ unit c. $3\sqrt{14}sq\cdot$ unit d. $2\sqrt{14}sq\cdot$ unit

A. 18 sq unit

B. 36 sq unit

C. $3\sqrt{14}\ \text{ sq unit}$

D. $2\sqrt{14}\ \text{ sq unit}$

Answer: c

Watch Video Solution

MULTIPLE CORRECT ANSWER TYPE

1. Let PM be the perpendicular from the point $P(1, 2, 3)$ to the $x-y$ plane. If $\overrightarrow{O}P$ makes an angle θ with the positive direction of the $z-$ axis and$\overrightarrow{O}M$ makes an angle φ with the positive direction of $x-$ axis, $where O$ is the origin and $\theta and \varphi$ are acute angels, then a. $\cos\theta\cos\varphi = 1/\sqrt{14}$ b. $\sin\theta\sin\varphi = 2/\sqrt{14}$ c. $\tan\varphi = 2$ d. $\tan\theta = \sqrt{5}/3$

A. $\cos\theta\cos\phi = 1/\sqrt{14}$

B. $\sin\theta\sin\phi = 2/\sqrt{14}$

C. $\tan\phi = 2$

D. $\tan\theta = \sqrt{5}/3$

Answer: b, c, d

Watch Video Solution

2. Let P_1 denote the equation of a plane to which the vector $\left(\hat{i}+\hat{j}\right)$ is normal and which contains the line whose equation is

$\overrightarrow{r} = \hat{i} + \hat{j} + \overrightarrow{k} + \lambda\left(\hat{i} - \hat{j} - \hat{k}\right)$ and P_2 denote the equation of the plane containing the line L and a point with position vector j. Which of the following holds good? (a) The equation of P_1 is$x + y = 2.$ (b) The equation of P_2 is $\overrightarrow{r}.\left(\hat{i} - 2\hat{j} + \hat{k}\right) = 2.$ (c) The acute angle the P_1 and P_2 is $\cot^{-1}\left(\sqrt{3}\right)$. (d) The angle between the plnae P_2 and the line L is $\tan^{-1}\sqrt{3}$.

A. The equation of P_1 is$x + y = 2.$

B. The equation of P_2 is $\overrightarrow{r}.\left(\hat{i} - 2\hat{j} + \hat{k}\right) = 2.$

C. The acute angle the P_1 and P_2 is $\cot^{-1}\left(\sqrt{3}\right)$.

D. The angle between the plnae P_2 and the line L is $\tan^{-1}\sqrt{3}$.

Answer: a, c

Watch Video Solution

3. If the planes $\overrightarrow{r}\left(\hat{i} + \hat{j} + \hat{k}\right) = q_1, \overrightarrow{r}\left(\hat{i} + 2a\hat{j} + \hat{k}\right) = q_2 and \overrightarrow{r}\left(a\hat{i} + a^2\hat{j} + \hat{k}\right) = q_3$ intersect in a line, then the value of a is a. 1 b. $1/2$ c. 2 d. 0

A. 1

B. $1/2$

C. 2

D. 0

Answer: a, b

Watch Video Solution

4. A line with direction cosines proportional to $1, -5, and -2$ meets lines $x = y + 5 = z + 11 and x + 5 = 3y = 2z$. The coordinates of each of the points of the intersection are given by a. $(2, -3, 1)$ b. $(1, 2, 3)$ c. $(0, 5/3, 5/2)$ d. $(3, -2, 2)$

A. (2,-3,1)

B. (1,2,3)

C. $(0, 5/3, 5/2)$

D. (3,-2,2)

Answer: a, b

Watch Video Solution

5. Let $P=0$ be the equation of a plane passing through the line of intersection of the planes $2x-y=0 and 3z-y=0$ and perpendicular to the plane $4x+5y-3z=8.$ Then the points which lie on the plane $P=0$ is/are a. $(0,9,17)$ b. $(1/7,21/9)$ c. $(1,3,-4)$ d. $(1/2,1,1/3)$

A. (0,9,17)

B. $(1/7, 2, 1/9)$

C. (1,3,-4)

D. $(1/2, 1, 1/3)$

Answer: a, d

Watch Video Solution

6. about to only mathematics

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

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

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

7. Consider the planes $3x-6y+2z+5=0 and 4x-12+3z=3.$ The plane $67x-162y+47z+44=0$ bisects the angle between the given planes which a. contains origin b. is acute c. is obtuse d. none of these

A. contains origin

B. is acute

C. is obtuse

D. none of these

Answer: a, b

Watch Video Solution

8. The lines $\frac{x-2}{1}=\frac{y-3}{1}=\frac{z-4}{-k}$ and $\frac{x-1}{k}=\frac{y-4}{2}=\frac{z-5}{1}$ are coplaner if

A. $\lambda=-1$

B. $\lambda=2$

C. $\lambda=-3$

D. $\lambda=0$

Answer: a,d

Watch Video Solution

9. The equations of the plane which passes through $(0, 0, 0)$ and which is equally inclined to the planes $x - y + z - 3 = 0 and x + y = z + 4 = 0$ is/are a. $y = 0$ b. $x = 0$ c. $x + y = 0$ d. $x + z = 0$

A. $y = 0$

B. $x = 0$

C. $x + y = 0$

D. $x + z = 0$

Answer: a, c

Watch Video Solution

10. The x-y plane is rotated about its line of intersection with the y-z plane by 45^0 , then the equation of the new plane is/are a. $z + x = 0$ b. $z - y = 0$ c. $x + y + z = 0$ d. $z - x = 0$

A. $z + x = 0$

B. $z - y = 0$

C. $x + y + z = 0$

D. $z - x = 0$

Answer: a, d

Watch Video Solution

11. The equation of the plane which is equally inclined to the lines $\frac{x-1}{2} = \frac{y}{-2} = \frac{z+2}{-1} and = \frac{x+3}{8} = \frac{y-4}{1} = \frac{z}{-4}$ and passing through the origin is/are a. $14x - 5y - 7z = 0$ b. $2x + 7y - z = 0$ c. $3x - 4y - z = 0$ d. $x + 2y - 5z = 0$

A. $14x - 5y - 7z = 0$

B. $2x + 7y - z = 0$

C. $3x - 4y - z = 0$

D. $x + 2y - 5z = 0$

Answer: a, b

Watch Video Solution

12. Which of the following lines lie on the plane $x+2y-z+4=0$? a. $\frac{x-1}{1}=\frac{y}{-1}=\frac{z-5}{1}$ b. $x-y+z=2x+y-z=0$ c. $\hat{r}=2\hat{i}-\hat{j}+4\hat{k}+\lambda\left(3\hat{i}+\hat{j}+5\hat{k}\right)$ d. none of these

A. $\frac{x-1}{1}=\frac{y}{-1}=\frac{z-5}{-1}$

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

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

D. none of these

Answer: a, c

Watch Video Solution

13. If the volume of tetrahedron $ABCD$ is 1 cubic units, where $A(0, 1, 2), B(-1, 2, 1) and C(1, 2, 1),$ then the locus of point D is a. $x + y - z = 3$ b. $y + z = 6$ c. $y + z = 0$ d. $y + z = -3$

A. $x + y - z = 0$

B. $y + x = 6$

C. $y + z = 0$

D. $y + z = -3$

Answer: b, c

Watch Video Solution

14. A rod of length 2 units whose one end is $(1, 0, -1)$ and other end touches the plane $x - 2y = 2Z + 4 = 0,$ then a. the rod sweeps the figure whose volume is $b. \pi c.$ d. cubic units. e. the area of the region which the rod traces on the plane is $f. g.2\pi h.$ i. j. the length of projection of the rod on the plane is $k. l. \sqrt{m.3n.} \odot p.$ q. units. r. the centre of the region which the rod traces on the plane is $s.t.\left(u.v.w\frac{.2}{x}.3y.z.,aa\frac{.2}{b}b.3cc.dd.,-ee\frac{.5}{f}f.3gg.hh.ii.\right)\dot{j}j.$ kk.

A. the rod sweeps the figure whose volume is π cubic units.

B. the area of the region which the rod traces on the plane is 2π.

C. the length of projection of the rod on the plane is $\sqrt{3}$ units.

D. the centre of the region which the rod traces on the plane is $\left(\frac{2}{3},\frac{2}{3},\frac{-5}{3}\right)$

Answer: b

Watch Video Solution

15. Consider a set of points R in the space which is at a distance of 2 units from the line $\frac{x}{1}=\frac{y-1}{-1}=\frac{z+2}{2}$ between the planes $x-y+2z+3=0andx-y+2z=0.$ a. The volume of the bounded figure by points $b.Rc.$ d. and the planes is $e.f.\left(g.h.103\sqrt{i.3j.}k.l.\right)\pi m.$ n. cube units. o. The area of the surface formed by the set of points $p.\ Rq.$ r. is $s.\ t.\ \left(u.\ v.\ 20\pi\,/\,\sqrt{w.6x.}\ y.\ z.\ \right)aa.$ bb. sq. units. cc. The volume of the bounded figure by the set of points $dd.\ Ree.$ ff. and the planes is $gg.\ hh.\ \left(ii.\ jj.\ 20\pi\,/\,\sqrt{kk.6ll.}\ mm.\ \cap\ .\ \right)oo.$ pp. cubic units. qq. The area of the curved surface formed by the set of points $rr.\ Rss.$ tt. is $uu.\ \vee\ .\ \left(ww.\ \times\ .\ 10/\sqrt{yy.3zz.}\ aaa.\ .\ \right)\pi ccc.$ ddd. sq. units.

A. The volume of the bounded figure by points R and the planes is $\left(10\,/\,3\sqrt{3}\right)\pi$ cube units.

B. The area of the curved surface formed by the set of points R is $\left(20\pi\,/\,\sqrt{6}\right)$ sq. units.

C. The volume of the bounded figure by the set of points R and the planes is $\left(20\pi\,/\,\sqrt{6}\right)$ cubic units.

D. The area of the curved surface formed by the set of points R is $\left(10\,/\,\sqrt{3}\right)\pi$ sq. units.

Answer: b,c

Watch Video Solution

16. The equation of a line passing through the point $\vec{a}$ parallel to the plane $\vec{r}\,.\,\vec{n}=q$ 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. $\left(\vec{r}-\vec{a}\right)\times\left(\vec{n}\times\vec{c}\right)$ c. $\vec{r}=\vec{b}+\lambda\left(\vec{n}\times\vec{c}\right)$ d. none of these

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, d

Watch Video Solution

17. about to only mathematics

A. $\dfrac{x+1}{1}=\dfrac{y-2}{-2}=\dfrac{z-0}{1}$

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

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

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

Answer: a,b,c

Watch Video Solution

REASONING TYPE

1. Statement 1: Lines $\vec{r}=\hat{i}+\hat{j}-\hat{k}+\lambda\left(3\hat{i}-\hat{j}\right) and \vec{r}=4\hat{i}-\hat{k}+\mu\left(2\hat{i}+3\hat{k}\right)$ intersect. Statement 2: $\vec{b}\times\vec{d}=0$, then lines $\vec{r}=\vec{a}+\lambda\vec{b} and \vec{r}=\vec{c}+\lambda\vec{d}$ do not intersect.

A. Both the statements are true, and Statement 2 is the correct explanation for Statement 1.

B. Both the Statements are true, but Statement 2 is not the correct explanation for Statement 1.

C. Statement 1 is true and Statement 2 is false.

D. Statement 1 is false and Statement 2 is true.

Answer: b

Watch Video Solution

2. Statement 1: Lines $\vec{r} = \hat{i} + \hat{j} - \hat{k} + \lambda\left(3\hat{i} - \hat{j}\right) and\, \vec{r} = 4\hat{i} - \hat{k} + \mu\left(2\hat{i} + 3\hat{k}\right)$ intersect.

Statement 2: $\vec{b} \times \vec{d} = 0$, then lines $\vec{r} = \vec{a} + \lambda\vec{b}\, and\, \vec{r} = \vec{c} + \lambda\vec{d}$ do not intersect.

A. Both the statements are true, and Statement 2 is the correct explanation for Statement 1.

B. Both the Statements are true, but Statement 2 is not the correct explanation for Statement 1.

C. Statement 1 is true and Statement 2 is false.

D. Statement 1 is false and Statement 2 is true.

Answer: c

Watch Video Solution

3. The equation of two straight lines are $\frac{x-1}{2}=\frac{y+3}{1}=\frac{z-2}{-3} and \frac{x-2}{1}=\frac{y-1}{3}=\frac{z+3}{2}$. Statement 1: the given lines are coplanar. Statement 2: The equations $2r-s=1, r+3s=4 and 3r+2s=5$ are consistent.

A. Both the statements are true, and Statement 2 is the correct explanation for Statement 1.

B. Both the Statements are true, but Statement 2 is not the correct explanation for Statement 1.

C. Statement 1 is true and Statement 2 is false.

D. Statement 1 is false and Statement 2 is true.

Answer: d

Watch Video Solution

4. Statement 1: A plane passes through the point $A(2, 1, -3)$. If distance of this plane from origin is maximum, then its equation is $2x + y - 3z = 14$. Statement 2: If the plane passing through the point $A\left(\vec{a}\right)$ is at maximum distance from origin, then normal to the plane is vector $\vec{a}$.

A. Both the statements are true, and Statement 2 is the correct explanation for Statement 1.

B. Both the Statements are true, but Statement 2 is not the correct explanation for Statement 1.

C. Statement 1 is true and Statement 2 is false.

D. Statement 1 is false and Statement 2 is true.

Answer: b

Watch Video Solution

5. Statement 1: Line $\frac{x-1}{1}=\frac{y-0}{2}=\frac{z+2}{-1}$ lies in the plane $2x-3y-4z-10=0$. Statement 2: if line $\vec{r}=\vec{a}+\lambda\vec{b}$ lies in the plane $\vec{r}.\vec{c}=n$ (where n is scalar),then $\vec{b}.\vec{c}=0$. (a) Both the statements are true, and Statement 2 is the correct explanation for Statement 1. (b) Both the Statements are true, but Statement 2 is not the correct explanation for Statement 1. (c)Statement 1 is true and Statement 2 is false. (d) Statement 1 is false and Statement 2 is true.

A. Both the statements are true, and Statement 2 is the correct explanation for Statement 1.

B. Both the Statements are true, but Statement 2 is not the correct explanation for Statement 1.

C. Statement 1 is true and Statement 2 is false.

D. Statement 1 is false and Statement 2 is true.

Answer: c

Watch Video Solution

6. Statement 1: Let θ be the angle between the line $\frac{x-2}{2}=\frac{y-1}{-3}=\frac{z+2}{-2}$ and the plane $x+y-z=5$. Then $\theta=\sin^{-1}(1/\sqrt{51})\cdot$ Statement 2: The angle between a straight line and a plane is the complement of the angle between the line and the normal to the plane. Which of the following statements is/are correct ?

A. Both the statements are true, and Statement 2 is the correct explanation for Statement 1.

B. Both the Statements are true, but Statement 2 is not the correct explanation for Statement 1.

C. Statement 1 is true and Statement 2 is false.

D. Statement 1 is false and Statement 2 is true.

Answer: c

Watch Video Solution

7. Statement 1: let $A\left(\vec{i}+\vec{j}+\vec{k}\right) and B\left(\vec{i}-\vec{j}+\vec{k}\right)$ be two points. Then point $P\left(2\vec{i}+3\vec{j}+\vec{k}\right)$ lies exterior to the sphere with AB as its diameter. Statement 2: If $A and B$ are any two points and P is a point in space such that $\vec{P}A\dot{\vec{P}}B>0$, then point P lies exterior to the sphere with AB as its diameter.

A. Both the statements are true, and Statement 2 is the correct explanation for Statement 1.

B. Both the Statements are true, but Statement 2 is not the correct explanation for Statement 1.

C. Statement 1 is true and Statement 2 is false.

D. Statement 1 is false and Statement 2 is true.

Answer: b

Watch Video Solution

8. Statement 1: there exists a unique sphere which passes through the three non-collinear points and which has the least radius. Statement 2: The centre of such a sphere lies on the plane determined by the given three points.

A. (a) Both the statements are true, and Statement 2 is the correct explanation for Statement 1.

B. (b) Both the Statements are true, but Statement 2 is not the correct explanation for Statement 1.

C. (c) Statement 1 is true and Statement 2 is false.

D. (d) Statement 1 is false and Statement 2 is true.

Answer: c

Watch Video Solution

9. Statement 1: There exist two points on the $\frac{x-1}{1}=\frac{y}{-1}=\frac{z+2}{2}$ which are at a distance of 2 units from point $(1, 2, -4)$. Statement 2: Perpendicular distance of point $(1, 2, -4)$ form the line $\frac{x-1}{1}=\frac{y}{-1}=\frac{z+2}{2}$ is 1 unit.

A. Both the statements are true, and Statement 2 is the correct explanation for Statement 1.

B. Both the Statements are true, but Statement 2 is not the correct explanation for Statement 1.

C. Statement 1 is true and Statement 2 is false.

D. Statement 1 is false and Statement 2 is true.

Answer: b

Watch Video Solution

10. Statement 1: The shortest distance between the lines $\frac{x}{-3}=\frac{y-1}{1}=\frac{z+1}{-1} and \frac{x-2}{1}=\frac{y-3}{2}=\left(\frac{z+(13/7)}{-1}\right)$ is zero.

Statement 2: The given lines are perpendicular.

A. Both the statements are true, and Statement 2 is the correct explanation for Statement 1.

B. Both the Statements are true, but Statement 2 is not the correct explanation for Statement 1.

C. Statement 1 is true and Statement 2 is false.

D. Statement 1 is false and Statement 2 is true.

Answer: d

Watch Video Solution

LINKED COMPREHENSION TYPE

1. Given four points $A(2, 1, 0), B(1, 0, 1), C(3, 0, 1)$ and $D(0, 0, 2)$. Point D lies on a line L orthogonal to the plane determined by the points A, B and C.

The equation of the plane ABC is

A. $x + y + z - 3 = 0$

B. $y + z - 1 = 0$

C. $x + z - 1 = 0$

D. $2y + z - 1 = 0$

Answer: b

Watch Video Solution

2. Given four points $A(2, 1, 0), B(1, 0, 1), C(3, 0, 1)$ and $D(0, 0, 2)$. Point D lies on a line L orthogonal to the plane determined by the points A, B and C.

The equation of the plane ABC is

A. $\overrightarrow{r} = 2\hat{k} + \lambda\left(\hat{i} + \hat{k}\right)$

B. $\overrightarrow{r} = 2\hat{k} + \lambda\left(2\hat{j} + \hat{k}\right)$

C. $\overrightarrow{r} = 2\hat{k} + \lambda\left(\hat{j} + \hat{k}\right)$

D. none

Answer: c

Watch Video Solution

3. Given four points $A(2, 1, 0), B(1, 0, 1), C(3, 0, 1)$ and $D(0, 0, 2)$.

Point D lies on a line L orthogonal to the plane determined by the points A, B and C.

The equation of the plane ABC is

A. $\sqrt{2}$

B. $1/2$

C. 2

D. $1/\sqrt{2}$

Answer: d

Watch Video Solution

4. A ray of light comes light comes along the line L = 0 and strikes the plane mirror kept along the plane P = 0 at B. $A(2, 1, 6)$ is a point on the line L = 0 whose image about P = 0 is A'. It is given that L = 0 is $\frac{x-2}{3} = \frac{y-1}{4} = \frac{z-6}{5}$ and $P = 0$ is $x + y - 2z = 3$.

The coordinates of B' are

A. $(6, 5, 2)$

B. $(6, 5, -2)$

C. $(6, -5, 2)$

D. none of these

Answer: b

Watch Video Solution

5. A ray of light comes along the line L = 0 and strikes the plane mirror kept along the plane P = 0 at B. $A(2, 1, 6)$ is a point on the line L = 0 whose image about P = 0 is A'. It is given that L = 0 is $\frac{x-2}{3} = \frac{y-1}{4} = \frac{z-6}{5}$ and $P = 0$ is $x + y - 2z = 3$.

The coordinates of B are

A. $(5, 10, 6)$

B. $(10, 15, 11)$

C. $(-10, -15, -14)$

D. none of these

Answer: c

Watch Video Solution

6. A ray of light comes along the line L = 0 and strikes the plane mirror kept along the plane P = 0 at B. $A(2, 1, 6)$ is a point on the line L = 0 whose image about P = 0 is A'. It is given that L = 0 is

$\frac{x-2}{3}=\frac{y-1}{4}=\frac{z-6}{5}$ and $P=0$ is $x+y-2z=3$.

If $L_1=0$ is the reflected ray, then its equation is

A. $\frac{x+10}{4}=\frac{y-5}{4}=\frac{z+2}{3}$

B. $\frac{x+10}{3}=\frac{y+15}{5}=\frac{z+14}{5}$

C. $\frac{x+10}{4}=\frac{y+15}{5}=\frac{z+14}{3}$

D. none of these

Answer: c

Watch Video Solution

7. For what values of p and q the system of equations $2x+py+6z=8$, $x+2y+qz=5$, $x+y+3z=4$ has (i) no solution (ii) a unique solution (iii) in finitely many solutions.

A. 1.$p=2, q\neq 3$.

B. 2.$p\neq 2, q\neq 3$

C. 3.$p\neq 2, q=3$

D. $4.p = 2, q = 3$

Answer: b

Watch Video Solution

8. For what values of p and q the system of equations $2x + py + 6z = 8, x + 2y + qz = 5, x + y + 3z = 4$ has (i) no solution (ii) a unique solution (iii) in finitely many solutions.

A. $p = 2, q \neq 3.$

B. $p \neq 2, q \neq 3$

C. $p \neq 2, q = 3$

D. $p = 2, q = 3$

Answer: c

Watch Video Solution

9. For what values of p and q the system of equations $2x + py + 6z = 8, x + 2y + qz = 5, x + y + 3z = 4$ has (i) no solution (ii) a unique solution (iii) in finitely many solutions.

A. $p = 2, q \in 3$

B. $p \in 2, q \in 3$

C. $p \neq 2, q = 3$

D. $p = 2, q = 3$

Answer: b

Watch Video Solution

10. Consider a plane $x + y - z = 1$ and point $A(1, 2, -3)$. A line L has the equation $x = 1 + 3r, y = 2 - r$ and $z = 3 + 4r$.

The coordinate of a point B of line L such that AB is parallel to the plane is

A. (a) $(10, -1, 15)$

B. (b) $(-5, 4, -5)$

C. (c) $(4, 1, 7)$

D. (d) $(-8, 5, -9)$

Answer: d

Watch Video Solution

11. Consider a plane $x+y-z=1$ and point $A(1, 2, -3)$. A line L has the equation $x=1+3r, y=2-r$ and $z=3+4r$.

The coordinate of a point B of line L such that AB is parallel to the plane is

A. $x-3y+5=0$

B. $x+3y-7=0$

C. $3x-y-1=0$

D. $3x+y-5=0$

Answer: b

Watch Video Solution

12. Consider a plane $x + y - z = 1$ and point $A(1, 2, -3)$. A line L has the equation $x = 1 + 3r, y = 2 - r \text{ and } z = 3 + 4r.$

The coordinate of a point B of line L such that AB is parallel to the plane is

A. a. $4\sqrt{26}$

B. b. 20

C. c. $10\sqrt{13}$

D. d. none of these

Answer: d

Watch Video Solution

MATRIX-MATCH TYPE

1.

Column I	Column II
a. A vector perpendicular to the line $x = 2t + 1, y = t + 2$ and $z = -t - 3$	p. $7\hat{i} + 3\hat{j} + 8\hat{k}$
b. A vector parallel to the planes $x + y + z - 3 = 0$ and $2x - y + 3z = 0$	q. $4\hat{i} - \hat{j} - 3\hat{k}$
c. A vector along which the distance between the lines $\frac{x}{2} = \frac{y}{3} = \frac{z}{1}$ and $\vec{r} = (3\hat{i} - \hat{j} + \hat{k}) + t(\hat{i} + \hat{j} - 2\hat{k})$ is the shortest	r. $11\hat{i} + 7\hat{j} + 5\hat{k}$
d. A vector normal to the plane $\vec{r} = -\hat{i} + 4\hat{j} - 0\hat{k} + \lambda(\hat{i} + 3\hat{j} - 2\hat{k}) + \mu(-\hat{i} + 2\hat{j} - 5\hat{k})$	s. $\hat{i} + 5\hat{j} + \hat{k}$

View Text Solution

2.

https://d10lpgp6xz60nq.cloudfront.net/physics_images/PAT_CHE_0XI_B05_C11_

Watch Video Solution

3. Match the following Column I to Column II

Column I	Column II
a. The coordinates of a point on the line $x = 4y + 5, z = 3y - 6$ at a distance 3 from the point $(5, 3, -6)$ is/are	**p.** $(-1, -2, 0)$
b. The plane containing the lines $\frac{x-2}{3} = \frac{y+3}{5} = \frac{z+5}{7}$ and parallel to $\hat{i} + 4\hat{j} + 7\hat{k}$ has the point	**q.** $(5, 0, -6)$
c. A line passes through two points $A(2, -3, -1)$ and $B(8, -1, 2)$. The coordinates of a point on this line nearer to the origin and at a distance of 14 units from A is/are	**r.** $(2, 5, 7)$
d. The coordinates of the foot of the perpendicular from the point $(3, -1, 11)$ on the line $\frac{x}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ is/are	**s.** $(14, 1, 5)$

Watch Video Solution

4. Match the following Column I to Column II

Column I	Column II
a. The distance between the line $\vec{r} = (2\hat{i} - 2\hat{j} + 3\hat{k}) + \lambda(\hat{i} - \hat{j} + 4\hat{k})$ and plane $\vec{r} \cdot (\hat{i} + 5\hat{j} + \hat{k}) = 5$	**p.** $\frac{25}{3\sqrt{14}}$
b. The distance between parallel planes $\vec{r} \cdot (2\hat{i} - \hat{j} + 3\hat{k}) = 4$ and $\vec{r} \cdot (6\hat{i} - 3\hat{j} + 9\hat{k}) + 13 = 0$ is	**q.** 13/7
c. The distance of a point $(2, 5, -3)$ from the plane $\vec{r} \cdot (6\hat{i} - 3\hat{j} + 2\hat{k}) = 4$ is	**r.** $\frac{10}{3\sqrt{3}}$
d. The distance of the point $(1, 0, -3)$ from the plane $x - y - z - 9 = 0$ measured parallel to line $\frac{x-2}{2} = \frac{y+2}{3} = \frac{z-6}{-6}$	**s.** 7

Watch Video Solution

5. Match the following Column I to Column II

Column I	Column II
a. Image of the point (3, 5, 7) in the plane $2x + y + z = -18$ is	p. $(-1, -1, -1)$
b. The point of intersection of the line $\frac{x-2}{-3} = \frac{y-1}{-2} = \frac{z-3}{2}$ and the plane $2x + y - z = 3$ is	q. $(-21, -7, -5)$
c. The foot of the perpendicular from the point (1, 1, 2) to the plane $2x - 2y + 4z + 5 = 0$ is	r. $\left(\frac{5}{2}, \frac{2}{3}, \frac{8}{3}\right)$
d. The intersection point of the lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ and $\frac{x-4}{5} = \frac{y-1}{2} = z$ is	s. $\left(-\frac{1}{12}, \frac{25}{12}, \frac{-2}{12}\right)$

Watch Video Solution

INTEGER TYPE

1. Find the number of sphere of radius r touching the coordinate axes.

Watch Video Solution

2. Find the distance of the z-axis from the image of the point $M(2-3, 3)$ in the plane $x - 2y - z + 1 = 0$.

Watch Video Solution

3. The length of projection of the line segment joining the points $(1, 0, -1) and (-1, 2, 2)$ on the plane $x + 3y - 5z = 6$ is equal to a. 2 b. $\sqrt{\frac{271}{53}}$ c. $\sqrt{\frac{472}{31}}$ d. $\sqrt{\frac{474}{35}}$

Watch Video Solution

4. If the angle between the plane $x - 3y + 2z = 1$ and the line $\frac{x-1}{2} = \frac{y-1}{1} = \frac{z-1}{-3} is, \theta$ then the find the value of $\cos ec\theta$.

Watch Video Solution

5. Let A_1, A_2, A_3, A_4 be the areas of the triangular faces of a tetrahedron, and h_1, h_2, h_3, h_4 be the corresponding altitudes of the tetrahedron. If the volume of tetrahedron is $1/6$ cubic units, then find the minimum value of $(A_1 + A_2 + A_3 + A_4)(h_1 + h_2 + h_3 + h_4)$ (in cubic units).

Watch Video Solution

6. In how many ways three letters a,b,c can be arranged without repetition ?

Watch Video Solution

7. If (a, b, c) is a point on the plane $3x + 2y + z = 7,$ then find the least value of 2($a^2 + b^2 + c^2$), using vector method.

Watch Video Solution

8. The plane $4x + 7y + 4z + 81 = 0$ is rotated through a right angle about its line of intersection with the plane $5x + 3y + 10z = 25.$ The equation of the plane in its new position is $x - 4y + 6z = k$ where k is

Watch Video Solution

9. Find the distance of the point $(-2, 3, -4)$ from the line $\frac{x+2}{3} = \frac{2y+3}{4} = \frac{3z+4}{5}$ measured parallel to the plane $4x + 12y - 3z + 1 = 0$.

Watch Video Solution

10. about to only mathematics

Watch Video Solution

ARCHIVES SUBJECTIVE TYPE

1. Find the equation of the plane passing through the points $(2, 1, 0), (5, 0, 1)$ and $(4, 1, 1)$.

Watch Video Solution

2. about to only mathematics

Watch Video Solution

3. A parallelepiped S has base points $A, B, CandD$ and upper face points $A', B', C', andD'$. The parallelepiped is compressed by upper face $A'B'C'D'$ to form a new parallepiped T having upper face points $A^{''}, B^{''}, C^{''}$ and $D^{''}$. The volume of parallelepiped T is 90 percent of the volume of parallelepiped S. Prove that the locus of $A^{''}$ is a plane.

Watch Video Solution

4. about to only mathematics

Watch Video Solution

5. A line with positive direction cosines passes through the point P(2, -1, 2) and makes equal angle with co-ordinate axes. The line meets the plane $2x + y + z = 9$ at point Q. The length of the line segment PQ equals

Watch Video Solution

ARCHIVES SINGLE CORRECT ANSWER TYPE

1. The value of k such that $\frac{x-4}{1} = \frac{y-2}{1} = \frac{z-k}{2}$ lies in the plane $2x - 4y = z = 7$ is a. 7 b. -7 c. no real value d. 4

A. 7

B. -7

C. no real value

D. 4

Answer: a

Watch Video Solution

Watch Video Solution

2. If the lines $\frac{x-1}{2}=\frac{y+1}{3}=\frac{z-1}{4} and \frac{x-3}{1}=\frac{y-k}{2}=\frac{z}{1}$ intersect, then find the value of k.

A. $3/2$

B. $9/2$

C. $-2/9$

D. $-3/2$

Answer: b

Watch Video Solution

3. Factorise the expression: $5y^2 – 20y – 8z + 2yz$

Watch Video Solution

4. A plane passes through (1,-2,1) and is perpendicualr to two planes $2x - 2y + z = 0$ and $x - y + 2z = 4$, then the distance of the plane from the point (1,2,2) is

A. a.0

B. b.1

C. c.$\sqrt{2}$

D. d.$2\sqrt{2}$

Answer: d

Watch Video Solution

5. Let $P(3, 2, 6)$ be a point in space and Q be a point on line $\overrightarrow{r} = \left(\hat{i} - \hat{j} + 2\hat{k}\right) + \mu\left(-3\hat{i} + \hat{j} + 5\hat{k}\right)$. Then the value of μ for which the vector $\overrightarrow{P}Q$ is parallel to the plane $x - 4y + 3z = 1$ is a. 1/4 b. -1/4 c. 1/8 d. -1/8

A. $1/4$

B. $-1/4$

C. $1/8$

D. $-1/8$

Answer: a

Watch Video Solution

6. about to only mathematics

A. $x+2y-2z=0$

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

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

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

Answer: c

Watch Video Solution

7. If the distance of the point $P(1, -2, 1)$ from the plane $x + 2y - 2z = \alpha, where\alpha > 0, is5,$ then the foot of the perpendicular from P to the place is a. $\left(\frac{8}{3}, \frac{4}{3}, -\frac{7}{3}\right)$ b. $\left(\frac{4}{3}, -\frac{4}{3}, \frac{1}{3}\right)$ c. $\left(\frac{1}{3}, \frac{2}{3}, \frac{10}{3}\right)$ d. $\left(\frac{2}{3}, -\frac{1}{3}, -\frac{5}{3}\right)$

A. $\left(\frac{8}{3}, \frac{4}{3}, -\frac{7}{3}\right)$

B. $\left(\frac{4}{3}, -\frac{4}{3}, \frac{1}{3}\right)$

C. $\left(\frac{1}{3}, \frac{2}{3}, \frac{10}{3}\right)$

D. $\left(\frac{2}{3}, -\frac{1}{3}, \frac{5}{2}\right)$

Answer: a

Watch Video Solution

8. about to only mathematics

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

B. $\sqrt{2}$

C. 2

D. $2\sqrt{2}$

Answer: a

Watch Video Solution

9. about to only mathematics

A. $\frac{x}{5}=\frac{y-1}{8}=\frac{z-2}{-13}$

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

C. $\frac{x}{4}=\frac{y-1}{3}=\frac{z-2}{-7}$

D. $\frac{x}{2}=\frac{y-1}{-7}=\frac{z-2}{5}$

Answer: d

Watch Video Solution

ARCHIVES MULTIPLE CORRECT ANSWERS TYPE

1. Two lines $L_1 x = 5, \dfrac{y}{3-\alpha} = \dfrac{z}{-2} and L_2 : x = \alpha \dfrac{y}{-1} = \dfrac{z}{2-\alpha}$ are coplanar. Then α can take value (s) a. 1 b. 2 c. 3 d. 4

A. 1

B. 2

C. 3

D. 4

Answer: a, d

Watch Video Solution

2. A line l passing through the origin is perpendicular to the lines $l_1 : (3+t)\hat{i} + (-1+2t)\hat{j} + (4+2t)\hat{k}, \ -\infty < t < \infty, l_2 : (3+s)\hat{i} + (3$

then the coordinates of the point on l_2 at a distance of $\sqrt{17}$ from the point of intersection of $l \& l_1$ is/are:

A. $\left(\frac{7}{3}, \frac{7}{3}, \frac{5}{3}\right)$

B. $(-1, -1, 0)$

C. $(1, 1, 1)$

D. $\left(\frac{7}{9}, \frac{7}{9}, \frac{8}{9}\right)$

Answer: b, d

Watch Video Solution

3. let L be a straight line passing through the origin. Suppose that all the points on L are at a constant distance from the two planes $P_1 : x + 2y - z + 1 = 0$ and $P_2 : 2x - y + z - 1 = 0$, Let M be the locus of the feet of the perpendiculars drawn from the points on L to the plane P_1. Which of the following points lie(s) on M? (a) $\left(0, -\frac{5}{6}, -\frac{2}{3}\right)$ (b) $\left(-\frac{1}{6}, -\frac{1}{3}, \frac{1}{6}\right)$ (c) $\left(-\frac{5}{6}, 0, \frac{1}{6}\right)$ (d) $\left(-\frac{1}{3}, 0, \frac{2}{3}\right)$

A. $\left(0, -\frac{5}{9}, -\frac{2}{3}\right)$

B. $\left(-\frac{1}{6}, -\frac{1}{3}, \frac{1}{6}\right)$

C. $\left(-\frac{5}{6}, 0, \frac{1}{6}\right)$

D. $\left(-\frac{1}{3}, 0, \frac{2}{3}\right)$

Answer: a, b

Watch Video Solution

4. In R^3, consider the planes $P_1 : y = 0$ and $P_2, x + z = 1$. Let P_3 be a plane, different from P_1 and P_2 which passes through the intersection of P_1 and P_2, If the distance of the point (0,1,0) from P_3 is 1 and the distance of a point (α, β, γ) from P_3 is 2, then which of the following relation(s) is/are true? (a) $2\alpha + \beta + 2\gamma + 2 = 0$ (b) $2\alpha - \beta + 2\gamma + 4 = 0$ (c) $2\alpha + \beta - 2\gamma - 10 = 0$ (d) $2\alpha - \beta + 2\gamma - 8 = 0$

A. $2\alpha + \beta + 2\gamma + 2 = 0$

B. $2\alpha - \beta + 2\gamma + 4 = 0$

C. $2\alpha + \beta - 2\gamma - 10 = 0$

D. $2\alpha - \beta + 2\gamma - 8 = 0$

Answer: b, d

Watch Video Solution

ARCHIVES REASONING TYPE

1. Consider the planes $3x - 6y - 2z - 15 = 0$ and $2x + y - 2z - 5 = 0$ Statement 1:The parametric equations of the line intersection of the given planes are $x = 3 + 14t, y = 2t, z = 15t$. Statement 2: The vector $14\hat{i} + 2\hat{j} + 15\hat{k}$ is parallel to the line of intersection of the given planes. which of the statement is true?

A. a. Both the statements are true, and Statement 2 is the correct explanation for Statement 1.

B. b. Both the Statements are true, but Statement 2 is not the correct explanation for Statement 1.

C. c. Statement 1 is true and Statement 2 is false.

D. d Statement 1 is false and Statement 2 is true.

Answer: d

Watch Video Solution

2. Consider three planes $P_1 : x - y + z = 1$, $P_2 : x + y - z = -1$ and $P_3 : x - 3y + 3z = 2$ Let L_1, L_2 and L_3 be the lines of intersection of the planes P_2 and P_3, P_3 and P_1 and P_1 and P_2 respectively. Statement 1: At least two of the lines L_1, L_2 and L_3 are non-parallel . Statement 2:The three planes do not have a common point

A. Both the statements are true, and Statement 2 is the correct explanation for Statement 1.

B. Both the Statements are true, but Statement 2 is not the correct explanation for Statement 1.

C. Statement 1 is true and Statement 2 is false.

D. Statement 1 is false and Statement 2 is true.

Answer: d

Watch Video Solution

ARCHIVES LINKED COMPREHENSION TYPE

1. Consider the line L 1 : x +1/3 = y+ 2/1= z +1/2 L2 : x-2/1= y+2/2= z-3/3 The unit vector perpendicular to both L 1 and L 2 lines is

A. $\dfrac{-\hat{i}+7\hat{j}+7\hat{k}}{\sqrt{99}}$

B. $\dfrac{-\hat{i}-7\hat{j}+5\hat{k}}{5\sqrt{3}}$

C. $\dfrac{-\hat{i}+7\hat{j}+5\hat{k}}{5\sqrt{3}}$

D. $\dfrac{7\hat{i}-7\hat{j}-\hat{k}}{\sqrt{99}}$

Answer: b

Watch Video Solution

2. Consider the line L 1 : x 1 y 2 z 1 312 +++ ==, L2 : x2y2z3 123

A. 0

B. $\dfrac{17}{\sqrt{3}}$

C. $\dfrac{41}{5\sqrt{3}}$

D. $\dfrac{17}{5\sqrt{3}}$

Answer: d

Watch Video Solution

3. Consider the line L 1 : x 1 y 2 z 1 312 +++ ==, L2 : x2y2z3 123

A. $\dfrac{12}{\sqrt{65}}$

B. $\dfrac{14}{\sqrt{75}}$

C. $\dfrac{13}{\sqrt{75}}$

D. $\dfrac{13}{\sqrt{65}}$

Answer: c

Watch Video Solution

ARCHIVES MATRIX-MATCH TYPE

1. Consider the following linear equations: $ax + by + cz = 0$ $bx + cy + az = 0$ $cx + ay + bz = 0$ Match the expression/statements in column I with expression/statements in Column II. Column I, Column II $a + b + c \neq 0$and $a^2 + b^2 + c^2 = ab + bc + ca$, p. the equations represent planes meeting only at a single point $a + b + c = 0 and a^2 + b^2 + c^2 \neq ab + bc + ca$, q. the equations represent the line $x = y = z$ $a + b + c \neq 0 and a^2 + b^2 + c^2 \neq ab + bc + ca$, r. the equations represent identical planes $a + b + c \neq 0$ and $a^2 + b^2 + c^2 \neq ab + bc + ca$, s. the equations represent the whole of the three dimensional space

Watch Video Solution

2. Consider the lines $L_1 : \dfrac{x-1}{2} = \dfrac{y}{-1} = \dfrac{z+3}{1}, L_2 : \dfrac{x-4}{1} = \dfrac{y+3}{1} = \dfrac{z+3}{2}$ and the planes $P_1 : 7x + y + 2z = 3, P_2 : 3x + 5y - 6z = 4.$ Let $ax + by + cz = d$ be the equation of the plane passing through the point match Column I with Column II. Column I, Column II $a =$, p. 13 $b =$, q. -3 $c =$, r. 1 $d =$, s. -2

Watch Video Solution

ARCHIVES INTEGER TYPE

1. If the distance between the plane ax 2y + z = d and the plane containing the lines $\dfrac{x-1}{2} = \dfrac{y-2}{3} = \dfrac{z-3}{4}$ and $\dfrac{x-2}{3} = \dfrac{y-3}{4} = \dfrac{z-4}{5}$ is $\sqrt{6}$, then value of |d| is

Watch Video Solution