MATHS

BOOKS - KUMAR PRAKASHAN KENDRA

MATHS (GUJRATI ENGLISH)

THREE DIMENSIONAL GEOMETRY

Exercise 11 1

1. If a line makes angles $90^\circ, 135^\circ, 45^\circ$ with the x, y and z- axes respectively, find its direction cosines.

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2. Find the direction cosines of a line which makes equal angles with the coordinate axes.

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3. If a line has the direction ratios –18, 12, – 4, then what are its direction cosines ?

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4. Show that the points (2, 3, 4), (- 1, - 2, 1), (5, 8, 7) are collinear.

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5. Find the direction cosines of the sides of the triangle whose vertices are (3, 5, – 4), (1, 1, 2) and (- 5, – 5, - 2).

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Exercise 11 2

1. Show that the three lines with direction cosines $\frac{12}{13}, \frac{-3}{13}, \frac{-4}{13}, \frac{12}{13}, \frac{3}{13}, \frac{-4}{13}, \frac{12}{13}$ are mutually perpendicular.

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2. Show that the line passing through (1, -1, 2) and (3, 4, -2) is perpendicular to the line passing through the points (0, 3, 2) and (3, 5, 6).

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3. Show that the line passing through the points (4, 7, 8) and (2, 3, 4) is parallel to the line passing through the points (-1, -2, 1) and (1, 2, 5).

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4. Find the equation of the line which passes through the point (1, 2, 3) and is parallel to the vector

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

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5. Find the equation of the line in vector and in cartesian form that passes through the point with position vector $2\hat{i} - \hat{j} + 4\hat{k}$ and is in the direction $\hat{i} + 2\hat{j} - \hat{k}$.

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6. Find the cartesian equation of the line which passes through the point (-2, 4, -5) and parallel to the line given by

$$\frac{x+3}{3} = \frac{y-4}{5} = \frac{z+8}{6}$$

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7. The cartesian equation of a line is $\frac{x-5}{3} = \frac{y+4}{7} = \frac{z-6}{2}$.Write its vector form.

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8. Find the vector and the cartesian equations of the lines that passes through the origin and (5, -2, 3).

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9. Find the vector and the cartesian equations of the line that passes through the points (3, - 2, – 5), (3, -2, 6).

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10. Find the angle between the following pairs of lines :

(i) $\vec{r} = 2\hat{i} - 5\hat{j} + \hat{k} + \lambda\left(3\hat{i} + 2\hat{j} + 6\hat{k}\right)$ and $\vec{k} = 7\hat{i} - 6\hat{k} + \mu\left(\hat{i} + 2\hat{j} + 2\hat{k}\right)$

(ii) $\vec{r} = 3\hat{i} + \hat{j} - 2\hat{k} + \lambda\left(\hat{i} - \hat{j} - 2\hat{k}\right)$ and $\vec{r} = 2\hat{i} - \hat{j} - 56\hat{k} + \mu\left(3\hat{i} - 5\hat{j} - 4\hat{k}\right)$

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11. Find the angle between the following pair of lines :

(i) $\frac{x-2}{2} = \frac{y-1}{5} = \frac{z+3}{-3}$ and $\frac{x+2}{-1} = \frac{y-4}{8} = \frac{z-5}{4}$

(ii) $\frac{x}{2} = \frac{y}{2} = \frac{z}{1}$ and $\frac{x-5}{4} = \frac{y-2}{1} = \frac{z-3}{8}$

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

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

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14. Find the shortest distance between the lines

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

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

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15. Find the shortest distance between the lines

$$\frac{x+1}{7} = \frac{y+1}{-6} = \frac{z+1}{1}$$ and

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

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16. Find the shortest distance between the lines whose vector equations are

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

$$\vec{r} = 4\hat{i} + 5\hat{j} + 6\hat{k} + \mu\left(2\hat{i} + 3\hat{j} + \hat{k}\right)$$

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17. Find the shortest distance between the lines whose vector equations are

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

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

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Exercise 11 3

1. In each of the following cases, determine the direction cosines of the normal to the plane and the distance from the origin.

(a) $z=2$

(b) $x+y+z=1$

(c) $2x+3y-z=5$

(b) $5y+8=0$

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2. Find the vector equation of a plane which is at a distance of 7 units from the origin and normal to the

vector $3\hat{i} + 5\hat{j} - 6\hat{k}$.

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3. Find the Cartesian equation of the following planes :

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

(b) $\vec{r} \cdot \left(2\hat{i} + 3\hat{j} - 4\hat{k}\right) = 1$

(c) $\vec{r} \cdot \left((s - 2t)\hat{i} + (3 - t)\hat{j} + (2s + t)\hat{k}\right) = 15$

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4. In the following cases, find the coordinates of the foot of the perpendicular drawn from the origin :

(a) 2x + 3y + 4z - 12 = 0

(b) 3y + 4z - 6 = 0 (c) x + y + z = 1 (d) 5y + 8 = 0

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5. Find the vector and cartesian equations of the planes :

(a) that passes through the point (1, 0, -2) and the normal to the plane is $\hat{i} + \hat{j} - \hat{k}$.

(b) that passes through the point (1,4, 6) and the normal vector to the plane is $\hat{i} - 2\hat{j} + \hat{k}$.

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6. Find the equations of the planes that passes through three points.

(a) (1, 1, -1), (6, 4, -5), (-4, -2, 3)

(b) (1, 1, 0), (1, 2, 1), (-2, 2, -1)

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7. Find the intercepts cut off by the plane $2x+y-z=5$

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8. Find the equation of the plane with intercept 3 on the Y-axis and parallel to ZOX plane.

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9. Find the equation of the plane through the intersection of the planes 3x – y + 2z – 4 = 0 and x + y + z- 2 = 0 and the point (2, 2, 1).

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10. Find the vector equation of the plane passing through the intersection of the planes $\vec{r}.\left(2\hat{i}+2\hat{j}-3\hat{k}\right)=7, \vec{r}.\left(2\hat{i}+5\hat{j}+3\hat{k}\right)=9$ and through the point (2, 1, 3).

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11. Find the equation of the plane through the line of intersection of the planes x + y + z = 1 and 2x + 3y + 4z = 5 which is perpendicular to the plane x - y + z = 0.

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12. Find the angle between the planes whose vector equations are $\vec{r}.\left(2\hat{i}+2\hat{j}-3\hat{k}\right)=5$ and $\vec{r}.\left(3\hat{i}-3\hat{j}+5\hat{k}\right)=3.$

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13. In the following cases, determine whether the given planes are parallel or perpendicular, and in case they are

neither, find the angles between them :

(a) 7x + 5y + 6z + 30 = 0 and 3x - y-10z + 4 = 0

(b) 2x + y + 32 - 2 = 0 and x - 2y + 5 = 0

(c) 2x - 2y + 4z + 5 = 0 and 3x - 3y + 6z-1 = 0

(d) 2x – y + 3z-1 = 0 and 2x - y + 3z + 3 = 0

(e) 4x + 8y + z - 8 = 0 and y + z - 4 = 0

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14. In the following cases, find the distance of each of the given points from the corresponding given plane.

Point	Plane
(a) (0, 0, 0)	$3x - 4y + 12z = 3$
(b) (3, -2, 1)	$2x - y + 2z + 3 = 0$
(C) (2, 3, -5)	$x + 2y - 2z = 9$
(d) (6, 0, 0)	$2x - 3y + 6z - 2 = 0$

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Miscellaneous Exercise 11

1. Show that the line joining the origin to the point (2, 1, 1) is perpendicular to the line determined by the points (3, 5, - 1), (4, 3, - 1).

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2. If l_1, m_1, n_1, and l_2, m_2, n_2 are the direction cosines of two mutually perpendicular lines, show that the direction cosines of the line perpendicular to both of

these are

$m_1n_2 - m_2n_1, n_1l_2 - n_2l_1, l_1m_2 - l_2m_1$

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3. Find the angle between the lines whose direction ratios are a, b, c and b-C, c-a, a-b.

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4. Find the equation of a line parallel to X- axis and passing through the origin.

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

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

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7. Find the vector equation of the line passing through (1, 2, 3) and perpendicular to the plane

$\vec{r} \cdot \left(\hat{i} + 2\hat{j} - 5\hat{k}\right) + 9 = 0$

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

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9. Find the shortest distance between lines

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

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

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10. Find the coordinates of the point where the line through (5, 1, 6) and (3, 4,1) crosses the YZ- plane.

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11. Find the coordinates of the point where the line through (5, 1, 6) and (3, 4, 1) crosses the ZX- plane.

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12. Find the coordinates of the point where the line through (3,--4,-5) and (2, -3, 1) crosses the plane $2x + y + z = 7$.

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13. 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.

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14. If the points (1, 1, p) and (-3, 0, 1) be equidistant from the plane $\vec{r}.\left(3\hat{i}+4\hat{j}-12\hat{k}\right)+13=0$ then find the value of p.

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

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16. If O be the origin and the coordinates of P be (1, 2, -3), then find the equation of the plane passing through P and perpendicular to OP. The required plane is perpendicular to OP.

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

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

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

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20. Find the vector equation of the 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 $\frac{x-15}{3} = \frac{y-29}{8} = \frac{z-5}{-5}$.

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21. Prove that if a plane has the intercepts a, b, c and is at a distance of p units from the origin, then $\frac{1}{a^2}+\frac{1}{b^2}+\frac{1}{c^2}=\frac{1}{p^2}$

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22. Distance between the two planes : 2x + 3y + 4z = 4 and 4x + 6y + 8z = 12 is

A. 2 units

B. 4 units

C. 8 units

D. $\frac{2}{\sqrt{29}}$ units

Answer: D

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23. The planes : 2x – y + 4z = 5 and 5x – 2.5 y + 10 z = 6 are

A. Perpendicular

B. Parallel

C. intersect y- axis

D. passes through $\left(0, 0, \frac{5}{4}\right)$

Answer: B

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Practice Work

1. A vector $\vec{r}$ has length 21 and directi9on ratio $2, -3, 6$. Find the direction cosines and components of $\vec{r}$ given that $\vec{r}$ makes an acute angle with X- axis.

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2. If a vector $\vec{r}$ is in the direction of X- axis then find its direction cosines.

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3. If a line makes angles α, β and γ with the positive direction of axes then show that, $\sin^2\alpha + \sin^2\beta \sin^2\gamma = 2$

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4. If a line has direction cosines $\frac{2}{3}, -\frac{1}{3}, -\frac{2}{3}$, then find its direction.

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5. Find the direction cosines of the line joining the two points P(-2, 4, -5) and Q(1, 2, 3). 6. Prove that the points (1, 2, 3), (3, 1, 7) and (7, -1, 15) are collinear.

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6. Prove that the points P(1,2,3),(3,1,7) and (7,-1,15) are collinear.

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7. Find the vector equation of the line through the point whose position vector is $2\hat{i} - \hat{j} + \hat{k}$ and parallel to the line joining the points whose position vectors are $\hat{i} + 4\hat{j} + \hat{k}$ and $\hat{i} + 2\hat{j} + 2\hat{k}$. Also find the cartesian equation of the line.

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8. The cartesian equation of a line are 6x - 2 = 3y + 1 = 2z - 2. Find its vector equation.

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9. Find the direction cosines of the line $\frac{x-2}{2} = \frac{2y-5}{-3}, z = -1$. Also find the vector equation of the line.

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10. If the points A(-1, 3, 2), B(-4, 2, -2) and C(5, 5, λ) are collinear then find the value of λ.

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

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12. Find the vector equation of a line passing| through (2, -1, 1) and parallel to the line whose equations are $\frac{x-3}{2}=\frac{y+1}{7}=\frac{z-2}{-3}$

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13. $\square$ ABCD is a parallelogram. The position vectors of the points A, B and Care respectively $4\hat{i}+5\hat{j}-10\hat{k}, 2\hat{i}-3\hat{j}+4\hat{k}$ and $-\hat{i}+2\hat{j}+\hat{k}$. Find the vector equation of the line BD.

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14. Find the coordinates of the point where the line through (5, 1, 6) and (3, 4,1) crosses the YZ- plane.

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15. Find the angle between the lines

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

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

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

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17. Show that the lines $\frac{x-2}{3} = \frac{y+1}{-2} = 2$ and $\frac{x-1}{1} = \frac{2y+3}{3} = \frac{z+5}{2}$ are perpendiclar to each other.

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

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

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20. Find the shortest distance between the lines

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

$\vec{r} = \left(15\hat{i} + 29\hat{j} + 5\hat{k}\right) + \mu\left(3\hat{i} + 8\hat{j} - 5\hat{k}\right).$

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21. Find the shortest distance between the lines

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

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

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22. Find the shortest distance between the lines

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

and

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

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23. Find the shortest distance between the lines

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

and

$$\left(\vec{r}=(1-\mu)\hat{i}+(2\mu-1)\hat{j}+(\mu+2)\hat{k}.\right.$$

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24. Find the direction cosines of perpendicular from the origin to the plane $\vec{r}.\left(6\hat{i}-3\hat{j}-2\hat{k}\right)+1=0.$

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25. Find the vector equation of a plane which is at a distance 11 units from the origin and which is normal to the $2\hat{i}-2\hat{j}+k.$

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26. Find the vector equation of the plane $\vec{r}=\hat{i}-\hat{j}+\lambda\left(\hat{i}+\hat{j}+\hat{k}\right)+\mu\left(\hat{i}-2\hat{j}+3\hat{k}\right)$ in scalar product form. Reduce it to normal form.

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27. Find the cartesian equation of the plane through the point (2,-1, 1) and perpendicular to the vector $4\hat{i} + 2\hat{j} - 3\hat{k}$.

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28. Find the vector equation of the plane passing through the points (1, -2, 5) (0, -5, -1) and (-3, 5, 0). Transform the vector equation into cartesian equation.

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29. Find the value of a so that the four points with position vectors $-\hat{j}+\hat{k}, 2\hat{i}-\hat{j}-\hat{k}, \hat{i}+\lambda\hat{j}+\hat{k}$ and $3\hat{j}+3\hat{k}$ are co-plannar.

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30. A plane meets the co-ordinate axes at A, B and C such that the centroid of the $tra \in g \leq$ ABC is (3, 4, -6). Find the equation of the plane.

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31. Show that the plane through (1, 1, 1), (1,-1, 1) and (-7, 3, -5) is perpendicular to XZ-plane.

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32. The foot of perpendicular from the origin to the plane is (4, -2, -5) find the cartesian equation of the plane.

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33. Find the equation of the plane passing through the point (-1,2, 1) and perpendicular to the line joining the points (-3, 1, 2) and (2, 3, 4). Find also the perpendicular distance of the origin from this plane.

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

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35. Find the equation of the plane through the line of intersection of $\vec{r}.\left(2\hat{i}-3\hat{j}+4\hat{k}\right)=1$ and $\vec{r}.\left(\hat{i}-\hat{j}\right)+4=0$ and perpendicular to $\vec{r}.\left(2\hat{i}-\hat{j}+\hat{k}\right)+8=0$

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36. Find the equation of the plane passing through the intersection of the planes x + 2y + 3z-4 = 0 and 2x + y - Z+ 5 = 0 and perpendicular to the plane 5x + 3y + 6z + 8 = 0.

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37. Find the cartesian equation of the plane| through the intersection of the planes $\vec{r}.\left(2\hat{i}+6\hat{j}\right)+12=0$ and $\vec{r}.\left(3\hat{i}-\hat{j}+4\hat{k}\right)=0$ which are at a unit distance from the origin.

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38. Find the equation of the plane passing through the intersection of the planes 2x - 3y + z-4 = O and x-y + 2 + 1 = 0 and perpendicular to the plane x + 2y - 3z + 6 = 0.

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39. In the following cases, determine whether the given planes are parallel or perpendicular and in case they are neither, find the angle between them.

(i) 2x – y + z = 6 and x + y + 2z = 7

(ii) $\vec{r}.\left(\hat{i}-\hat{j}+\hat{k}\right)$ and $\vec{r}.\left(3\hat{i}+2\hat{j}-\hat{k}\right)-11=0$

(iii) x + y – 2z = 3 and 2x – 2y + z = 5

(iv) 2x – 3y + 4z = 1 and -x + y = 4

(v) $\vec{r}.\left(2\hat{i}+3\hat{j}-6\hat{k}\right)=5$ and $\vec{r}.\left(\hat{i}-2\hat{j}+2\hat{k}\right)=9$

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40. If the planes $\vec{r}.\left(\hat{i}+2\hat{j}-3\hat{k}\right)=7$ and $\vec{r}.\left(\lambda\hat{i}+2\hat{j}-7\hat{k}\right)=26$ are perpendicular to| each other then find the value of λ.

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41. Find the distance of the point (2, 1, 0) from the plane 2x + y + 2z + 5 = 0.

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42. If the points (1, 1, λ) and (-3, 0, 1) be equidistant from the plane $\vec{r}.\left(3\hat{i}+4\hat{j}-12\hat{k}\right)+13=0$ find the value of λ.

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

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44. Find the distance between the parallel planes $\vec{r}.\left(2\hat{i}-3\hat{j}+6\hat{k}\right)=5$ and $\vec{r}.\left(6\hat{i}-9\hat{j}+18\hat{k}\right)+20=0$

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45. If the distance of the plane x - y + z + λ = 0 from the point (1, 1, 1) is d_1 and the distance of this point from the origin is d_2 and $d_2 d_2$ = 5 then find the value of λ.

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46. The direction cosines of two lines are 1, -2,-2 and 0, 2, 1. Find the direction cosines of the line which is perpendicular to both the lines,

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47. The direction cosines of two lines are given by the following equations. $3l+ m + 5n = 0$, $6mn - 2nl + 5lm = 0$. Find the angle between them.

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48. Show that the line passing through the points (4, 7, 8) and (2, 3, 4) is parallel to the line passing through the points (-1, -2, 1) and (1, 2, 5).

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49. Show that the line passing through (1, -1, 2) and (3, 4, -2) is perpendicular to the line passing through the

points (0, 3, 2) and (3, 5, 6).

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50. Find the angle between the lines $\frac{5-x}{-2}=\frac{y+3}{1}=\frac{1-z}{3}$ and $\frac{x}{3}=\frac{1-y}{-2}=\frac{z+5}{-1}$.

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

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52. Find the co-ordinates of the point where the line $\frac{x+1}{2} = \frac{y+2}{3} = \frac{z+3}{4}$ cross the planel x + y + 4z = 6.

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53. Find the co-ordinates of the point where the line through A(3, 4, 1) and B(5, 1, 6) cross the XY- plane.

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54. Find the coordinates of the foot of perpendicular drawn from the point A(1, 8, 4) on the line joining the

points B(0, -1, 3) and C(2, -3, -1).

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55. Find the foot of perpendicular from the point (0, 2, 3) on the line $\frac{x+3}{5} = \frac{y-1}{2} = \frac{z+4}{3}$ Also find the length of perpendicular.

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56. Find the image of the point (3, 5, 3) with respect to the line $\frac{x}{1} = \frac{y-1}{2} = \frac{z-2}{3}$

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

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58. Find the equation of the plane passing through the line of intersection of the planes 2x + 3y - 2 + 1 = 0 and x + y - 22 + 3 = 0 and perpendicular to the plane 3x – y – 2z - 4 = 0.

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59. Find the equation of the plane passing through the point (3, 4, -1) and parallel to the plane $\vec{r}.\left(2\hat{i}-3\hat{j}+5\hat{k}\right)+2=0$

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60. Find the equation of the plane passing through the line of intersection of the planes $\vec{r}.\left(\hat{i}+3\hat{j}-\hat{k}\right)=0$ and $\vec{r}.\left(\hat{j}+2\hat{k}\right)=0$ and also passing through the point $2\hat{i}+\hat{j}-\hat{k}$.

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61. If the points (1, 1, λ) and (-3, 0, 1) be equidistant from the plane $\vec{r}.\left(3\hat{i}+4\hat{j}-12\hat{k}\right)+13=0$ find the value of λ.

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62. Find the vector equation of the plane containing the lines $\vec{r}=\left(\hat{i}+\hat{j}-\hat{k}\right)+\lambda\left(3\hat{i}-\hat{j}\right)$ and $\vec{r}=\left(4\hat{i}-\hat{k}\right)+\mu\left(2\hat{i}+3\hat{k}\right)$.

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63. Find the equation of the plane containing two parallel lines $\frac{x-4}{1}=\frac{y-3}{-4}=\frac{z-2}{5}$ and $\frac{x-3}{1}=\frac{y+2}{-4}=\frac{z}{5}$

Watch Video Solution

64. Show that the line $\vec{r}=\hat{i}+\hat{j}+\lambda\left(2\hat{i}+\hat{j}+4\hat{k}\right)$ lies in the plane $\vec{r}.\left(\hat{i}+2\hat{j}-\hat{k}\right)=3$

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65. Find the image of the point (1, 3, 4) in the plane $\vec{r}.\left(2\hat{i}-\hat{j}+\hat{k}\right)+3=0$

Watch Video Solution

66. Find the foot of perpendicular from the point (0, 2, -2) to the plane 2x – 3y + 4z – 44 = 0. Find the equation of perpendicular line passing through this point and find the length of perpendicular.

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67. Find the point of intersection of the line $\frac{x-1}{2} = \frac{2-y}{3} = \frac{z+3}{4}$ and the plane 2x + 4y - z = 1. Also find the angle between them.

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68. Find the equation of perpendicular bisector of the plane of the line segment joining (1, 2, -3) and (-3, 6, 4).

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69. Find the direction cosines of the two lines which are connected by the relation $l + m + n = 0, mn - 2nl - 2lm = 0$

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Textbook Illustrations For Parctice Work

1. If a line makes angle $90^\circ, 60^\circ$ and 30° with the positive direction of x, y and z-axis respectively, find its direction cosines.

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2. If a line has direction ratios 2, -1, -2, determine its direction cosines.

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3. Find the direction cosines of the line passing through the two points (-2, 4, -5) and (1, 2, 3).

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4. Find the direction cosines of x, y and z- axis.

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5. Show that the points A(2, 3, -4), B(1, - 2, 3) and C(3, 8, - 11) are collinear.

Watch Video Solution

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

$\vec{r} = (5 + 3\lambda)\hat{i} + (2 + 2\lambda)\hat{j} + (-4 - 8\lambda)\hat{k}$ and cartesian equations $\frac{x-5}{3} = \frac{y-2}{2} = \frac{z+4}{-8}$

Watch Video Solution

7. Find the vector equation for the line passing through the points (-1, 0, 2) and (3, 4, 6).

Watch Video Solution

8. The Cartesian equation of a line is

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

Find the vector equation for the line.

Watch Video Solution

9. Find the angle between the lines

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

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

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10. The angle bet^n two line $\frac{x+3}{3} = \frac{y-1}{5} = \frac{z+3}{4}$ and $\frac{x+1}{1} = \frac{4-y}{-1} = \frac{z-5}{2}$ is .....

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11. Find the shortest distance between the lines l_1 and l_2

whose vector equations are

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

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

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

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

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

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13. Find the vector equation of the plane which is at a distance of $\frac{6}{\sqrt{29}}$ the from the origin and its normal vector from the origin is $2\hat{i} - 3\hat{j} + 4\hat{k}$. Also find its cartesian form.

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14. Find the direction cosines of the unit vector perpendicular to the plane $\vec{r}.\left(6\hat{i} - 3\hat{j} - 2\hat{k}\right) + 1 = 0$ passing through the origin.

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15. Find the distance of the plane $2x - 3y + 4z - 6 = 0$ from the origin.

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16. Find the coordinates of the foot of the perpendicular drawn from the origin to the plane $2x - 3y + 4z - 6 = 0$.

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17. Find the vector and cartesian equations of the plane which passes through the point $(5, 2, -4)$ and perpendicular to the line with direction ratios $2, 3, -1$.

Watch Video Solution

18. Find the vector equations of the plane passing through the points R(2, 5, -3), S(-2,-3, 5) and T(5, 3, -3).

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19. Find the equation of the plane with intercepts 2, 3 and 4 on the x, y and z-axis respectively.

Watch Video Solution

20. Find the vector equation of the plane passing through the intersection of the planes

$\vec{r}.\left(\hat{i}+\hat{j}+\hat{k}\right)=6$ and $\vec{r}.\left(2\hat{i}+3\hat{j}+4\hat{k}\right)=-5$

and the points (1,1,1).

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21. Show that the lines $\frac{x+3}{-3}=\frac{y-1}{1}=\frac{z-5}{5}$ and $\frac{x+1}{-1}=\frac{y-2}{2}=\frac{z-5}{5}$ are coplanar.

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22. Find the angle between the two planes 2x + y - 2z = 5 and 3x – 6y – 2z = 7 using vector method.

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23. Find the angle between the two planes 3x – 6y + 2z = 7 and 2x + 2y – 2z = 5.

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24. Find the distance of a point (2, 5, -3) from the plane $\vec{r}.\left(6\hat{i}-3\hat{j}+2\hat{k}\right)=4$

Watch Video Solution

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

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26. A line makes the angle α, β, γ and δ with the diagonals of a cube. The $\cos^2\alpha + \cos^2\beta + \cos^2\gamma + \cos^2\delta = ...$

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27. Find the equation of the plane that contains the point (1,-1, 2) and is perpendicular to each of the planes $2x + 3y - 2z = 5$ and $x + 2y - 3z = 8$.

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28. Find the distance between the point P (6,5, 9) and the plane determined by the points A (3, - 1, 2), B (5, 2, 4) and

C (-1, - 1, 6).

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29. 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.

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30. Find the coordinates of the point where the line through the points A (3, 4, 1) and B (5, 1, 6) crosses the XY-plane.

Watch Video Solution

Solution Of Ncert Examplar Problems Short Answer Type Question

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

Watch Video Solution

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

Hint for solution : Vector equation of line passes from point $\bar{a}$ and parallel to vector $\bar{b}$ is$\bar{r} = \bar{a} + \lambda\bar{b}$.

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

Hint for solution : If shortest distance between two lines is zero then they are intersecting lines.

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4. Find the angle between the lines $\bar{r} = 3\bar{i} - 2\bar{j} + 6\bar{k} + \lambda(2\bar{i} + \bar{j} + 2\bar{k})$ and $\bar{r} = (2\bar{j} - 5\bar{k}) + \mu(6\bar{i} + 3\bar{j} + 2\bar{k})$.

Hint for solution : Angle between line $\bar{r} = a_1 + \lambda\bar{b}_1$ and $r = \bar{a}_2 + \mu\bar{b}_2$ then angle between them is obtained from $\cos\theta = \dfrac{|b_1 . b_2|}{|b_1| . |b_2|}$.

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

Watch Video Solution

6. Prove that the lines x = py + q, z = ry + s and x = p'y + q', z = r'y + s' are perpendicular if pp' + rr' + 1 = 0.

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7. Find the equation of a plane which bisects perpendicularly the line joining the points A(2, 3, 4) and B(4, 5, 8) at right angles.

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

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

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

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

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

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13. If a variable line in two adjacent positions has direction cosines l, m, n and l + δl, m + δm, n + δn, then show that the small angle $\delta\theta$ between the two positions is given by $\delta\theta^2 = \delta l^2 + \delta m^2 + \delta n^2$.

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14. If O is the origin and A is (a, b, c), then find the direction cosines of the line OA and the equation of plane through A at right angle to OA.

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

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

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17. Find the distance of a point (2, 4, -1) from the line $\frac{x+5}{1} = \frac{y+3}{4} = \frac{z-6}{-9}$.

Watch Video Solution

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

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

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

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

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

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23. If the plane ax + by = 0 is rotated about its line of intersection with the plane z = 0 through an angle α, then prove that the equation of the plane in its new position is

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

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24. Find the equation of the plane through the intersection of the planes $\vec{r}.\left(\bar{i}+3\bar{j}\right)-6=0$ and $\bar{r}.\left(3\bar{i}-\bar{j}-4\bar{k}\right)=0$, whose perpendicular distance from origin is unity.

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25. Show that the points $\bar{i}-\bar{j}+3\bar{k}$ and $3\left(\bar{i}+\bar{j}+\bar{k}\right)$ are equidistant from the plane $\bar{r}.\left(5\bar{i}+2\bar{j}-7\bar{k}\right)+9=0$ and lies on opposite side of it.

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26. $\overrightarrow{AB} = 3\bar{i} - \bar{j} + \bar{k}$ and $\overrightarrow{CD} = -3\bar{i} + 2\bar{j} + 4\bar{k}$ are two vectors. The position vectors of the points A and C are $6\bar{i} + 7\bar{j} + 4\bar{k}$ and $-9\bar{i} + 2\bar{k}$ respectively. Find the position vector of a point P on the line AB and a point Q on the line CD such that $\overrightarrow{PQ}$ is perpendicular to $\overrightarrow{AB}$ and $\overrightarrow{CD}$ both.

Watch Video Solution

27. Show that the straight lines whose direction cosines are given by 2l + 2m - n = 0 and mn + nl + lm = 0 are at right angles.

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28. If $(l_1, m_1, n_1), (l_2, m_2, n_2)$ and (l_3, m_3, n_3) are the direction cosines of three mutually perpendicular lines, prove that the line whose direction cosines are proportional to $(l_1 + l_2 + l_3, m_1 + m_2 + m_3, n_1 + n_2 + n_3)$ makes equal angles with them,

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29. Distance of the point (α, β, γ) from Y- axis is .....

A. β

B. $|\beta|$

C. $|\beta| + |\gamma|$

D. $\sqrt{\alpha^2 + \gamma^2}$

Answer: D

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30. If the directions cosines of a line are k, k and k then .....

A. $k > 0$

B. $0 < k < 1$

C. k=1

D. $k = \pm \frac{1}{\sqrt{3}}$

Answer: D

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31. The distance of the plane $\bar{r}.\left(\frac{2}{7}i+\frac{3}{7}j-\frac{6}{7}k\right)=1$ from the origin is .....

A. 1

B. 7

C. $\frac{1}{7}$

D. None of these

Answer: A

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32. The sine of the angle between the straight line $\frac{x-2}{3}=\frac{y-3}{4}=\frac{z-4}{5}$ and the plane 2x-2y+z=5 is .....

A. $\frac{10}{6\sqrt{5}}$

B. $\frac{4}{5\sqrt{2}}$

C. $\frac{2\sqrt{3}}{5}$

D. $\frac{\sqrt{2}}{10}$

Answer: D

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33. The reflection of the point (α, β, γ) in the xy - plane is .....

A. $(\alpha, \beta, 0)$

B. $(0, 0, \gamma)$

C. $(-\alpha, -\beta, \gamma)$

D. $(\alpha, \beta, -\gamma)$

Answer: D

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34. The area of the quadrilateral ABCD, where A(0, 4, 1), B(2, 3, -1), C(4, 5, 0) and D(2, 6, 2), is equal to .....

A. 9 seq. unit

B. 18 seq. unit

C. 27 seq. unit

D. 81 seq. unit

Answer: A

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35. The locus represented by $xy + yz = 0$ is .....

A. A pair of perpendicular lines

B. A pair of parallel lines

C. A pair of parallel planes

D. A pair of perpendicular planes

Answer: D

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36. The plane 2x – 3y + 6z - 11 = 0 makes an angle $\sin^{-1}\alpha$ with X- axis. The value of α is equal to .....

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

B. $\frac{\sqrt{2}}{3}$

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

D. $\frac{3}{7}$

Answer: C

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37. A plane passes through the points (2, 0, 0) (0,3,0) and (0, 0, 4). The equation of plane is .....

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38. The direction cosines of the vector $2\bar{i} + 2\bar{j} - \bar{k}$ are .....

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39. The cartesian equation of a line is $\frac{x-5}{3} = \frac{y+4}{7} = \frac{z-6}{2}$.Write its vector form.

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40. The vector equation of the line through the points (3, 4, -7) and (1, -1, 6) is .....

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41. The cartesian equation of the plane $\bar{r}.\left(\bar{i}+\bar{j}-\bar{k}\right)=2$ is.....

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42. The unit vector normal to the plane x + 2y + 3z - 6 = 0 is $\frac{1}{\sqrt{14}}\bar{i}+\frac{2}{\sqrt{14}}\bar{j}+\frac{3}{\sqrt{14}}\bar{k}$.

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43. The intercepts made by the plane 2x - 3y + 5z + 4 = 0 on the co-ordinate axis are -2, $\frac{4}{3}$ and $-\frac{4}{5}$

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44. The angle between the line $\vec{r} = \left(5\hat{i} - \hat{j} - 4\hat{k}\right) + \lambda\left(2\hat{i} - \hat{j} + \hat{k}\right)$ and the plane $\bar{r}.\left(3\hat{i} - 4\hat{j} - \hat{k}\right) + 5 = 0$ is $\sin^{-1}\left(\frac{5}{2\sqrt{91}}\right)$.

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45. The angle between the planes $\bar{r}.\left(2\bar{i}-3\bar{j}+\bar{k}\right)=1$ and $\bar{r}.(i-j)=4$ is $\cos^{-1}\left(\frac{-5}{\sqrt{58}}\right)$

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46. The line $\bar{r}=2\bar{i}-3\bar{j}-\bar{k}+\lambda\left(\bar{i}-\bar{j}+2\bar{k}\right)$ lies in the plane $\bar{r}.\left(3\bar{i}+\bar{j}-\bar{k}\right)+2=0.$

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47. The cartesian equation of a line is $\frac{x-5}{3}=\frac{y+4}{7}=\frac{z-6}{2}$.Write its vector form.

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48. The equation of a line, which is parallel to $2\bar{i}+\bar{j}+3\bar{k}$ and which passes through the point (5,-2,4) is $\frac{x-5}{2}=\frac{y+2}{-1}=\frac{z-4}{3}$

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49. If the foot of perpendicular drawn from the origin to a plane is (5, - 3, - 2), then the equation of plane is $\bar{r}.\left(5\bar{i}-3\bar{j}-2\bar{k}\right)=38.$

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Multiple Choice Questions Mcqs

1. The equation of line passing through the origin and the direction cosines $\frac{2\pi}{3}, \frac{\pi}{4}, \frac{\pi}{3}$ is .....

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

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

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

D. $x = \frac{y}{\sqrt{2}} = z$

Answer: C

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2. The direction cosines of the line passing through (3, 4, 5) and (4, 5, 6) is .....

A. (1, 1, 1)

B. $(\sqrt{3}, \sqrt{3}, \sqrt{3})$

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

D. (7, 9, 11)

Answer: C

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

A. Parallel

B. perpendicular

C. coincident

D. Intersecting in acute angle

Answer: A

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4. The equation of a line passing through origin and parallel to Y-axis is .....

A. $\frac{x}{1} = \frac{y}{0} = \frac{z}{0}$

B. $\frac{x}{0} = \frac{y}{1} = \frac{z}{0}$

C. $\frac{x}{1} = \frac{y}{0} = \frac{z}{1}$

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

Answer: B

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5. The equation of the line L passing through A(-2, 2, 3) and perpendicular to $\overleftrightarrow{AB}$ is ..... where B = (13, -3, 13).

A. $\frac{x-2}{3} = \frac{y+2}{13} = \frac{z+3}{2}$

B. $\frac{x+2}{3} = \frac{y-2}{13} = \frac{z-3}{2}$

C. $\frac{x+2}{15} = \frac{y-2}{-5} = \frac{z-3}{10}$

D. $\frac{x-2}{15} = \frac{y+2}{-5} = \frac{z+3}{10}$

Answer: B

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6. If the lines $\bar{r} = (2, -3, 7) + k(2, a, 5), \quad k\varepsilon R$ and $\bar{r} = (1, 2, 3) + k(3, -a, a), k\varepsilon R$ are perpendicular to each other then a = ...

A. 2

B. -6

C. 1

D. -1

Answer: D

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7. The lines $\frac{x-7}{k}=\frac{y-3}{1}=\frac{z-4}{1}$ and $\frac{x-8}{1}=\frac{y-2}{1}=\frac{3-z}{k}$ are coplannar then k = ...

A. 0,4

B. 1,-1

C. -1

D. 1

Answer: C

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8. The cartesian equation of the line passing through (4, 9, 8) and (3, - 2, 1) is ..

A. $\frac{x-4}{3}=\frac{9-y}{2}=\frac{z-8}{1}$

B. $\frac{x-3}{4}=\frac{y+2}{9}=\frac{z-1}{8}$

C. $\frac{x-3}{1}=\frac{y+2}{-11}=\frac{z-1}{7}$

D. $\frac{x-3}{1}=\frac{y+2}{11}=\frac{z-1}{7}$

Answer: D

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9. If the vector equation of the line is $\bar{r}$= (1, -5,9) + k(2, 2, -1), k ε R then its cartesian equation is .....

A. $\frac{x+1}{2}=\frac{y-5}{2}=\frac{z+9}{-1}$

B. $\frac{x-2}{1}=\frac{y-2}{-5}=\frac{z+1}{9}$

C. $\frac{1-x}{-2} = \frac{y+5}{2} = \frac{9-z}{1}$

D. $\frac{x-1}{2} = \frac{y-5}{2} = \frac{z-9}{-1}$

Answer: C

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10. If the cartesian equation of the line $\frac{2-x}{4} = \frac{y-3}{-2}, z+4=0$ then its vector equation is .....

A. $\bar{r} = (4, -2, 0) + k(2, 3, -4), k\varepsilon R$

B. $\bar{r} = (2, 3, -4) + k(4, 2, 0), k\varepsilon R$

C. $\bar{r} = (-2, 3, -4) + k(4, -2, 0), k\varepsilon R$

D. $\bar{r} = (2, 3, -4) + k(-4, -2, 1), k\varepsilon R$

Answer: B

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11. The angle between the lines $\bar{r} = (4, -3, 2) + k(2, 1, 2), k\varepsilon R$ and $\bar{r} = (2, 0, 5) + k(6, 3, 2), k\varepsilon R$ is .....

A. $\sin^{-1}\frac{4\sqrt{5}}{21}$

B. $\cos^{-1}\frac{4\sqrt{5}}{21}$

C. $\cos^{-1}\frac{4\sqrt{5}}{19}$

D. $\sin^{-1}\frac{19}{21}$

Answer: A

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12. The equation of line perpendicular to $\bar{r}.(1, 2, 1) = 4$ and passing through (0, 0, 0) is .....

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

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

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

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

Answer: A

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13. The symmetric equation of the line passing through (3, 1, - 1) and (3, 2, -6) is .....

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

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

C. $x = 3, \frac{y-1}{1} = \frac{z+1}{-5}$

D. $x = 3, \frac{1-y}{1} = \frac{z+1}{-5}$

Answer: B

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14. The equation of the line passes through (2,-3,5) and makes equal with axes in ..... $(k \in R)$

A. $\bar{r} = (2, -3, 5) + k(1, 1, 1), k\varepsilon R$

B. $\bar{r} = (2, -3, 5) + \left(\frac{-1}{\sqrt{3}}, \frac{-1}{\sqrt{3}}, \frac{-1}{\sqrt{3}}\right), k \in R$

C. $\bar{r} = (-2, 3, -4) + k\left(\frac{1}{\sqrt{3}}, \frac{-1}{\sqrt{3}}, \frac{-1}{\sqrt{3}}\right), k\varepsilon R$

D. $\bar{r} = (2, 3, -4) + k(-1, -1, 1), k\varepsilon R$

Answer: A

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15. If the lines $\frac{x-2}{k} = \frac{y-8}{-3} = \frac{z+5}{9}$ and $\frac{x-5}{1} = \frac{y+2}{1} = \frac{z+5}{k}$ have same direction then k =

.....

A. 3

B. -3

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

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

Answer: B

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16. If the lines $\frac{x-1}{1}=\frac{y-4}{c}=\frac{z+3}{-3}$ and $\frac{x+1}{-c}=\frac{y-3}{2}=\frac{z-1}{1}$ are perpendicular then c=

.....

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

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

C. -3

D. 3

Answer: D

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17. The vector form of the line 3x + 1 = 62 – 2, y - 1 = 0 is .....

A. $\bar{r} = \left(\frac{-1}{3}, 1, \frac{1}{3}\right) + k(2, 0, 1), k\varepsilon R$

B. $\bar{r} = (2, 0, 1) + k\left(\frac{-1}{3}, 1, \frac{1}{3}\right), k\varepsilon R$

C. $\bar{r} = (-1, 2, 1) + k(1, 1, 1), k\varepsilon R$

D. $\bar{r} = (1, 1, 1) + k(-1, 2, 1), k\varepsilon R$

Answer: A

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18. The lines $x = \frac{y-1}{1} = \frac{z+1}{3}$ and $\{(2, 1+3k, 2+k) / k\varepsilon R\}$ are .....

A. Parallel

B. Coincident

C. Intersecting perpendicular

D. Skew lines

Answer: D

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19. The perpendicular distance of the point (3, -4, -5) from the line $\frac{x-2}{4}=\frac{y+6}{5}=\frac{z-5}{-3}$ is .....

A. $\frac{1}{5}\sqrt{1657}$

B. $\frac{1}{\sqrt{5}}\sqrt{1675}$

C. $\frac{1}{5}\sqrt{1757}$

D. $\frac{1}{\sqrt{5}}\sqrt{1667}$

Answer: A

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20. The image of the point (1, 2, 3) in the line $\bar{r} = (6, 7, 7) + k(3, 2, -2), k\varepsilon Ris(5, 8, a)$ then a = ...

A. 8

B. 9

C. -15

D. 15

Answer: D

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21. If the line $\bar{r}$ = (5,5,2) + k (3,6,9) $k \in R$ and $^{-}$ = (0,3,-1) + k (1,2,b), $k \in R$ are parallel then b = ...

A. 3

B. 5

C. -5

D. 2

Answer: A

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22. The angle between the lines $\equiv (-3, 5, -1) + k(1, 2, 1), k \in R$ and

$\bar{r} = (1, 3, -2) + k(6, -3, 0), k \in R$ is ....

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

B. 0

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

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

Answer: A

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23. The angle between the lines whose direction cosines are given by l + m + n = 0 and $l^2 = m^2 + n^2$ is .....

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

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

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

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

Answer: C

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24. The cartesian equation of the line passing through $(2, 2, -3)$ and $(1, 3, 5)$ is.....

A. $\frac{x-2}{1} = \frac{y-2}{1} = \frac{z+3}{8}$

B. $\frac{x-1}{7} = \frac{y-3}{2} = \frac{z-5}{8}$

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

D. $\frac{z-2}{-1}=\frac{y-2}{1}=\frac{z+3}{8}$

Answer: D

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25. The equation of the line passes through (2,-3,5) and makes equal with axes in ..... $(k \in R)$

A. $\bar{r}=(2,\ -3,5)+k\left(-\frac{1}{\sqrt{3}},\frac{1}{\sqrt{3}},\frac{1}{\sqrt{3}}\right)$

B. $\bar{r}=(2,\ -3,5)+k\left(\frac{1}{\sqrt{3}},-\frac{1}{\sqrt{3}}-\frac{1}{\sqrt{3}}\right)$

C. $\bar{r}=(2,\ -3,5)+k(-1,1,1)$

D. $\bar{r}=(2,\ -3,5)+k(1,1,1)$

Answer: D

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26. The angle between the lines whose direction cosines are l, m, n and m-n, n-l, l-m is.....

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

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

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

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

Answer: B

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27. The vector equation of the line $\frac{3-x}{3}=\frac{2y-3}{5}=\frac{z}{2}$ is .....

A. $\bar{r}=(3,5,2)+k(3,3,0)$

B. $\bar{r}=\left(3,\frac{3}{2},0\right)+k(3,5,2)$

C. $\bar{r}=(3,3,0)+k(3,5,2)$

D. $\bar{r}=(-6,5,4)+k\left(3,\frac{3}{2},0\right)$

Answer: B

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28. The lines $\bar{r} = (-1, 2, 5) + k(-1, 2, 5), k \in R$ and $\bar{r} = (-3, 1, 5) + k(-3, 1, 5), k \in R$ .....

A. Perpendicular

B. skew

C. coplannar

D. Parallel

Answer: C

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29. The vector equation of the line joining the pionts $\hat{i} - 2\hat{j} + \hat{k}$ and $-2\hat{j} + 3\hat{k}$.....

A. $\bar{r} = t\left(\hat{i} + \hat{j} + \hat{k}\right)$

B. $\bar{r} = t_1\left(\hat{i} - 2\hat{j} + \hat{k}\right) + t_2\left(3\hat{k} - 2\hat{j}\right)$

C. $\equiv \left(\hat{i} - 2\hat{j} + \hat{k}\right) + t\left(2\hat{k} - \hat{i}\right)$

D. $\equiv t\left(2\hat{k} - \hat{i}\right)$

Answer: C

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30. If $\equiv \hat{i} + \hat{j}$ and $\bar{b} = 2\hat{i} - \hat{k}$ then the intersection piont of the lines $\bar{r} \times \bar{a} = \bar{b} \times \bar{a}$ and $\bar{r} \times \bar{b} = \bar{a} \times \bar{b}$ is .....

A. $\hat{i} + \hat{j} - \hat{k}$

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

C. $3\hat{i}\hat{j} - \hat{k}$

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

Answer: C

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31. The co-ordinats of a point on the line passing through the pionts (1,-1,2)and (3,1,1) at a distance $3\sqrt{11}$ units from the piont $\hat{i} - \hat{j} + 2\hat{k}$ is .....

A. (10,2,-5)

B. (-8,-4,-1)

C. (8,4,1)

D. (-10,-2,-5)

Answer: B

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32. The equation of the line passing through $\hat{i} + 3\hat{j} + 2\hat{k}$ and prependiccular to the lines $\bar{r} = (1, 2, -1) + \lambda(2, 1, 1)$ and bar r = (2,6,1) + mu (1,2,3)` is .....

A. $\bar{r} = (1, 2, -1) + \lambda(-1, 5, -3)$

B. $\bar{r} = (1, 3, -2) + \lambda(1, -5, 3)$

C. $\bar{r} = (1, 3, 2) + \lambda(1, 5, 3)$

D. $\bar{r} = (1, 2, 3) + \lambda(1, -5, -3)$

Answer: B

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33. The shortest distance of the lines $\bar{r}_1 = 4\hat{i} - 3\hat{j} - \hat{k} + \lambda\left(2\hat{i} - 3\hat{j} + 8\hat{k}\right)$ is.....

A. 3

B. 1

C. 2

D. 0

Answer: D

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34. The direction cosines of the line drawn from P(-5,3,1) and Q(1,5,-2) is.....

A. (6,2,-3)

B. (2,-4,1)

C. (-4,8,-1)

D. $\left(\frac{6}{7}, \frac{2}{7}, -\frac{3}{7}\right)$

Answer: D

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35. The angle between the two diagonals of a cube is .....

A. Parallel lines

B. Intersecting lines

C. Perpendicular lines

D. None of these

Answer: C

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36. The angle between the two diagonals of a cube is .....

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

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

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

D. $\cos^{-1}\left(\frac{1}{\sqrt{6}}\right)$

Answer: C

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37. A line makes the angle α, β, γ and δ with the diagonals of a cube. The $\cos^2\alpha + \cos^2\beta + \cos^2\gamma + \cos^2\delta = ...$

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

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

C. 3

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

Answer: A

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38. The edge of a cube is of length of a. The shortest distance between the diagonals of a cube an edge skew to it is .....

A. $a\sqrt{2}$

B. a

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

D. $\frac{a}{\sqrt{2}}$

Answer: D

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39. The projection of a line on the axes are 9,12, and 8. The length of the line is .....

A. 7

B. 17

C. 21

D. 25

Answer: B

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40. The straight lines whose direciton cosines are given by al + bm + cn = 0 , fmn + gnl + hlm = 0 if .....

A. $\frac{f}{a}+\frac{g}{b}+\frac{h}{c}=0$

B. $\frac{a^2}{f}+\frac{b^2}{g}+\frac{c^2}{h}=0$

C. $a^2(g+h)+b^2(h+g)+c^2(f+g)=0$

D. None of these

Answer: A

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41. The foot of perpendicular drawn from the point P(1,0,2) on the line $\frac{x+1}{3} = \frac{y-2}{-2} = \frac{z+1}{-1}$ is.....

A. (1,2,-3)

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

C. $(2, 4, -6)$

D. $(2, 3, 6)$

Answer: B

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42. The foot of perpendicular drawn from the point P(1,0,2) on the line $\frac{x+1}{3} = \frac{y-2}{-2} = \frac{z+1}{-1}$ is.....

A. $\frac{3\sqrt{6}}{2}$

B. $\frac{\frac{6}{\sqrt{3}}}{2}$

C. $3\sqrt{2}$

D. $2\sqrt{3}$

Answer: A

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

1 = 0.

A. $ac_1 + a_1c = 1$

B. $aa_1 + cc_1 + 1 = 0$

C. $bc_1 + b_1c + 1 = 0$

D. None of these

Answer: B

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44. The lines $\frac{x-1}{3} = \frac{y-1}{-1} = \frac{z+1}{0}$ and $\frac{x-4}{2} = \frac{y+0}{0} = \frac{z+1}{3}$ are .....

A. do not intersect

B. Intersect

C. Intersect at a point (4, 0,-1)

D. Intersect at a point (4,0,-1)

Answer: C

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45. The equation of motion of a point in space is x = 2t, y = -4 t, z=4t (t second). The path of the point is .....

A. Parabola

B. Circle

C. Plane

D. Straight line

Answer: D

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46. The distance of the point P (4,3,5) from Y-axis is λ then $5\lambda^2 = ...$

A. 205

B. 170

C. 125

D. 250

Answer: A

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47. A line makes an angle of measure α with X-axis and Y-axis cot $\alpha \in$ .....

A. (0,1)

B. (-1,1)

C. [-1,1]

D. [0,1]

Answer: D

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48. The angle between the lines $\frac{x+1}{2}+\frac{y+3}{2}=\frac{z-4}{-1}$ and $\frac{x-4}{1}=\frac{y+4}{2}=\frac{z+1}{2}$ is.....

A. $\cos^{-1}\left(\frac{1}{9}\right)$

B. $\cos^{-1}\left(\frac{2}{9}\right)$

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

D. $\cos^{-1}\left(\frac{4}{9}\right)$

Answer: D

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49. If the foot of perpendicular drawn from the point (a,b,c) and the line x = y = z then .....

A. r = a + b + c

B. r= 3(a+b+c)

C. 3r = a + b + c

D. r=abc

Answer: C

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50. The distance between the lines x = 1 - 4t,y=2+ t, z= 3 + 2t and x=1 +S,7y = 4-2s, z= -1 + S is .....

A. 8

B. $\frac{16}{\sqrt{90}}$

C. $\frac{8}{\sqrt{5}}$

D. $\frac{16}{\sqrt{110}}$

Answer: D

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51. The distance ratio of two lines are (5,-12,13) and (-3,4,5) . Then the angle betweend them is.....

A. $\cos^{-1}\left(\frac{2}{65}\right)$

B. $\cos^{-1}\left(\frac{3}{65}\right)$

C. $\cos^{-1}\left(\frac{1}{65}\right)$

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

Answer: C

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52. If cos $\alpha, \cos\beta, \gamma$ are direciton cosines then $\cos 2\alpha + \cos 2\beta + \cos 2\gamma$ = ...

A. -1

B. 0

C. 4

D. 3

Answer: A

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53. A line makes an angle α, β and γ with axes repectively, The values of α, β and γ are respectively $\theta, 60^\circ$ and 30° then $\sin\theta =$ .....

A. 1

B. -2

C. 0

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

Answer: A

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54. The angle between the lines 2x = 3y = -z and 6x = -y = -4x is .....

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

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

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

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

Answer: D

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55. Givne lines are $\frac{x-1}{l}=\frac{y+1}{m}=\frac{z}{n}$ and $\frac{x+1}{m}=\frac{y-3}{n}=\frac{z-1}{l}$ where $l>m>n$ l,m, n are roots of the equation $x^3+x^2-4x=4$ then the angle between them is .....

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

B. $\cos^{-1}\left(\frac{1}{4}\right)$

C. $\cos^{-1}\left(-\frac{4}{9}\right)$

D. $\cos^{-1}\left(\frac{5}{9}\right)$

Answer: C

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

A. 7

B. 5

C. 0

D. None of these

Answer: A

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

A. Coincident

B. skew

C. Intersecting

D. Parallel

Answer: A

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58. The direction ratios of the line x-y+z-5=0=x-3y-6 are

A. $3, 1, -2$

B. $2, -4, 1$

C. $\frac{3}{\sqrt{14}}, \frac{1}{\sqrt{14}}, \frac{-2}{\sqrt{14}}$

D. $\frac{2}{\sqrt{41}}, \frac{-4}{\sqrt{41}}, \frac{1}{\sqrt{41}}$

Answer: A

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59. The shortest distance 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. $3\sqrt{30}$

Answer: D

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60. The direction cosines of line satisfy the relations $\lambda(l+m)=n$ and lm + mn + ln = 0.

The value of λ for which the two lines are perpendicualr to each other is .....

A. 1

B. 2

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

D. 3

Answer: B

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61. The coordinates of a point on the line $\frac{x-1}{2}=\frac{y+1}{-3}=z$ at a disntance $4\sqrt{14}$ from the piont (1,-1,0) nearer the origin are .....

A. (9,-13,4)

B. $\left(8\sqrt{14},\ -12,\ -1\right)$

C. $\left(-8\sqrt{14,},12,1\right)$

D. $\left(-7,\ -11,4\right)$

Answer: A

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62. The symmetric from of the equation of the line $x + y - z = 1$ and $2x - 3y + z = 2$ is.....

A. $\frac{x}{2} = \frac{y}{3} = \frac{z}{5}$

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

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

D. $\frac{x}{3} = \frac{y}{3} = \frac{z}{5}$

Answer: C

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63. The direction ratios of there lines are (1,1,2), $\left(3\sqrt{3}-1, \sqrt{3}-1, 4\right)$.

The three lines form a .....triangle.

A. Equilateral

B. Isoscles

C. Right angle

D. Obtus angle triangle

Answer: A

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64. If the lines $\frac{x-2}{1}=\frac{y-3}{1}=\frac{4-z}{\lambda}$ and $\frac{x-1}{\lambda}=\frac{y-4}{2}=\frac{z-5}{1}$ are intersect each other than $\lambda =$ .....

A. 0,-3

B. $-3, 3$

C. $2, \ -2$

D. $0, 2$

Answer: A

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65. The image of the point (1,6,3) with respect to the line $\frac{x}{1} = \frac{y-1}{2} = \frac{z-2}{3}$ is.....

A. $(1, 0, 7)$

B. $(7, 0, 1)$

C. $(-1, -6, -3)$

D. $(1, 1, 7)$

Answer: A

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66. The distance of the point $P(-2, 3, 1)$ from the line $\leftrightarrow (QR)$ through Q(-3,6,2) which makes equal angles

with the axes is.....

A. 1

B. 8

C. $\sqrt{2}$

D. $2\sqrt{2}$

Answer: D

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67. If the lines 2x-y+3z + 4 = 0=ax + y-z + 2 and x-3y + z=0

=x + 2y + z +1 are coplannar then the value of a is .....

A. -2

B. 4

C. 6

D. $\frac{6}{5}$

Answer: D

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68. The distance of the plane $\bar{r}$ (12,-4,3) = 65 from the origin is .....

A. 65

B. 5

C. -5

D. $\frac{5}{13}$

Answer: B

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69. The plane 2x - 3y + 6z + 9 =0 makes an angle with positive direciton of X -axis is .....

A. $\cos^{-1}\frac{3\sqrt{5}}{7}$

B. $\sin^{-1}\frac{3}{7}$

C. $\sin^{-1}\frac{2}{\sqrt{7}}$

D. $\tan^{-1}\frac{2}{7}$

Answer: A

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70. The perpendicular distance between the planes 2x-y+ 2z = 1 and 4x - 2y + 4z =1 is.....

A. $\frac{1}{3}$

B. 3

C. $\frac{1}{6}$

D. 6

Answer: C

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71. If the plane passing through (1,1,1),(1,-1,1) and (-1,3,-5) is also passing through (2,k,4) then , k = ...

A. does not get

B. Two value exist

C. All real numbers

D. unique value exist

Answer: C

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72. The foot of perpendicular from the origin to the plane is (a,b,c). So the equation of the plane is .....

A. ax+by+cz=a+b+c

B. ax + by + cz = abc

C. $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=1$

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

Answer: D

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73. The distance of the point (2,-3,6) from the plane 3x-6y+2z + 10 = 0 is .....

A. $\frac{13}{7}$

B. $\frac{46}{7}$

C. 7

D. $\frac{10}{7}$

Answer: B

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74. The line passing through point (2,-3,1) and (3,-4,-5) intersect the ZX - plane in ..... Point.

A. $(-1, 0, 13)$

B. $(-1, 0, 19)$

C. $\left(\frac{13}{6}, 0, \frac{-19}{6}\right)$

D. $(0, -1, 13)$

Answer: B

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75. The angle between the line $\frac{x-1}{1} = \frac{2-y}{1} = \frac{z+1}{1}$ and the plane 2x-y + z = 4 is.....

A. $\sin^{-1}\frac{1}{3}$

B. $\cos^{-1}\frac{1}{3}$

C. $\cos^{-1}\frac{2\sqrt{2}}{3}$

D. $\sin^{-1}\frac{1}{2\sqrt{2}}$

Answer: B

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76. The normal unit vector of the plane x-3y + 2z = 6 is .....

A. $(1, -3, 2)$

B. $\left(\frac{1}{6}, \frac{1}{2}, \frac{1}{3}\right)$

C. $\left(\frac{-1}{\sqrt{14}}, \frac{3}{\sqrt{14}}, \frac{-2}{\sqrt{14}}\right)$

D. $\left(\frac{1}{\sqrt{14}}, \frac{3}{\sqrt{14}}, \frac{2}{\sqrt{14}}\right)$

Answer: C

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77. The equation of the plane with normal $2\hat{i}+\hat{j}-2\hat{k}$ and at distance 5 units from the origin is.....

A. $\bar{r}.(2,1,-1)=5$

B. $\bar{r}.(2,1,-2)=15$

C. $\bar{r}.(2,1,-2)=-5$

D. $\bar{r}.(2,1,-2)=-15$

Answer: B

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78. The angle between the planes $\bar{r}(1,2,-1)=3$ and $2x-y+2z=2$ is.....

A. $\tan^{-1}\frac{5}{\sqrt{2}}$

B. $\cos^{-1}\frac{5\sqrt{3}}{9}$

C. $\sin^{-1}\frac{\sqrt{6}}{9}$

D. $\pi - \cos^{-1}\frac{\sqrt{6}}{9}$

Answer: A

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

A. 2x + 4y + z = 6

B. 2x - 4y + z + 6 = 0

C. 2x + 4y -z = 6

D. 2x + 4y + z + 6 = 0

Answer: B

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80. The equation of the plane passing through the line of intersection of the planes 2x + y -z=1 and $2x + 2y - z = \frac{1}{2}$ and also passing through the origin is .....

A. x + 2y -z =0

B. $3x + 3z = 0$

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

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

Answer: D

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81. The equation of the plane passing through A(3,1,2) and perpendicular to $\leftrightarrow (AB)$ is ..... Where B(1,-2,-4).

A. $2x + 3y + 6z =21$

B. $2x + 3y + 6z + 21 =0$

C. $6x + 3y + 2z = 21$

D. $6x + 3y + 2z + 21 = 0$

Answer: A

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82. The distance of the plane $\bar{r}$ (12,-4,3) = 65 from the origin is .....

A. 1

B. 5

C. 13

D. 65

Answer: B

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83. The plane 2x - 3y + 6z + 9 =0 makes an angle with positive direciton of X -axis is .....

A. $\sin^{-1}\frac{1}{7}$

B. $\tan^{-1}\frac{2}{3\sqrt{5}}$

C. $\sin^{-1}\frac{3\sqrt{5}}{7}$

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

Answer: B

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84. Expression of x+y + z = 1 in the form of $x\cos\alpha + y\cos\beta + z\cos\gamma = p$ is .....

A. $x + y + z = 1$

B. $\frac{x}{2\sqrt{3}} + \frac{y}{2\sqrt{3}} + \frac{x}{2\sqrt{3}} = \frac{1}{\sqrt{3}}$

C. $\frac{x}{\sqrt{3}} + \frac{y}{\sqrt{3}} + \frac{z}{\sqrt{3}} = 1$

D. $\frac{x}{\sqrt{3}} + \frac{y}{\sqrt{3}} + \frac{z}{\sqrt{3}} = \frac{1}{\sqrt{3}}$

Answer: D

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85. The perpendicular distance between the planes x + 2y- 3z = 2 and 2x+4y-6z = -2 is.....

A. $\frac{3}{\sqrt{14}}$

B. $\frac{1}{\sqrt{14}}$

C. $\frac{2}{\sqrt{14}}$

D. $\frac{4}{\sqrt{14}}$

Answer: A

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86. A line $\frac{x-3}{1} = \frac{y-6}{5} = \frac{z-4}{4}$ is in the plane which passes through (3,2,0). The normal to the plane is .....

A. (1,1,1)

B. (-1,1,1)

C. (1,-1,1)

D. (-1,-1,1)

Answer: C

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87. The perpendicular distance of the point (3,2,1) from the plane 3x+4y-2z - 10 = 0 is.....

A. $\frac{3}{\sqrt{14}}$

B. $\frac{5}{\sqrt{14}}$

C. $\frac{5}{\sqrt{29}}$

D. $\frac{7}{\sqrt{29}}$

Answer: C

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88. The point of intersection of the line $\frac{x-4}{2} = \frac{y+3}{5} = \frac{z-3}{3}$ and the plane x + y + z + 2 = 0 is.....

A. $\left(\frac{18}{5}, -3, \frac{18}{5}\right)$

B. $\left(-\frac{18}{5}, -2, -\frac{8}{5}\right)$

C. $\left(\frac{13}{5}, -2, \frac{18}{5}\right)$

D. $\left(-\frac{18}{5}, -2, \frac{18}{5}\right)$

Answer: D

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89. The plane $2x + 3y - 2\sqrt{3}z + 25 = 0$ makes an angle.....with X-axis.

A. $\sin^{-1}\frac{2}{\sqrt{21}}$

B. $\tan^{-1}\frac{2}{\sqrt{21}}$

C. $\sin^{-1}\frac{1}{\sqrt{21}}$

D. $\cos^{-1}\frac{1}{21}$

Answer: B

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90. The plane passing the points (1,1,1),(1,-1,1) and (-1,3,-5) contains the point (K,1,2) then value of K = ...

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

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

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

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

Answer: C

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91. The direction of theline passing through the point (-1,2,4) and parallel to the plane 3x -4y + 7 z= 2 is.....

A. (3,-4,1)

B. (1,-4,-3)

C. (1,-1,1)

D. (-3,-4,-1)

Answer: D

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92. The equation of the plane passing through (1,-4,5) and having normal (3,1,-10) is.....

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

B. $3x + y + z - 6 = 0$

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

D. $x + y - z + 6 = 0$

Answer: C

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93. The plane x-2y + 3z= 2 makes an angle ... With Y-axis.

A. $\cos^{-1}\frac{2}{\sqrt{14}}$

B. $\sin^{-1}\frac{2}{14}$

C. $\tan^{-1}\frac{2}{\sqrt{14}}$

D. $\sin^{-1}\frac{2}{\sqrt{10}}$

Answer: B

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94. If the foot of perpendicular from origin to the plane is (2,1,0) then the equation of the plane is .....

A. $2x + y = 25$

B. $2x + y = 5$

C. $2x + y = 10$

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

Answer: B

Watch Video Solution

95. The direction of the line of instersection of the planes $3x-z=5$ and $2y+x+z=3$ is ....

A. (2,-4,6)

B. (1,-2,3)

C. (-1,2,3)

D. (1,-2,-3)

Answer: B

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96. The perpendicular distance of the plane y-2x + 5 = z from the point (0,0,0) is .....

A. $5\left(\sqrt{6}\right)$

B. $\frac{5\sqrt{6}}{6}$

C. $\frac{\sqrt{6}}{5}$

D. $2\sqrt{6}$

Answer: B

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97. The equation of the passing through the point (2,-1,3) and perpendicular to the plane 2x-y + $2\sqrt{5}z$ = 3 is .....

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

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

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

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

Answer: A

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98. The image of the line $\frac{x-1}{3}=\frac{y-3}{1}=\frac{z-4}{-5}$ in the plane 2x - y + z + 3 = 0 is the line .....

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

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

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

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

Answer: C

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99. The equation of the plane whose X- intercept 4,Y - intercept (-6), Z- intercept 3 is .....

A. 3x - 2y + 4z = 12

B. 4x - 6y+3z = 1

C. 4x-3y + 2z = 12

D. 3x - 4y += 6z = 12

Answer: A

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100. The vector equation of the plane 2x-z+1 = 0 is.....

A. $\bar{r}$. (2,-1,0) + 1 = 0

B. $\bar{r}.\ (2, 0-1)+1=0$

C. $\bar{r}$ (2,0,-1) = 1

D. $\bar{r}$. (2,-1,0) = 1

Answer: B

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101. The angle between the planes $\vec{r}$ (1,2,-1) = 3 and 2x -y + 2z = 2 is ..... .

A. $\cos^{-1}\frac{5\sqrt{2}}{9}$

B. $\sin^{-1}\frac{\sqrt{6}}{9}$

C. $\pi - \cos^{-1}\frac{\sqrt{6}}{9}$

D. $\tan^{-1}\frac{5}{\sqrt{2}}$

Answer: D

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102. The equation of the plane passing through the intersection of the planes 2x-5y = z = 3 and x+y+4z = 5

and parallel to the plane x+3y + 6z = 1 is x + 3y + 6z = k is.....

A. $2x + 6y + 12z = 13$

B. $x + 3y + 6z = -7$

C. $x + 3y + 6z = 7$

D. $2x + 6y + 12z = 13$

Answer: C

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103. The angle makes by the plane 2x + 3y + 6z - 15=0 with Y-axis is .....

A. $\sin^{-1}\left(\frac{3}{7}\right)$

B. $\sin^{-1}\left(\frac{2}{7}\right)$

C. $\sin^{-1}\left(\frac{2}{\sqrt{7}}\right)$

D. $\cos^{-1}\left(\frac{3}{7}\right)$

Answer: A

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104. The equation of the plane passing through (4,5,-1) and with normal $3\hat{i} - \hat{j} + \hat{k}$ is .....

A. $4x - 5y + z = 6$

B. $3x - y + z = 6$

C. $3x + y + z = 6$

D. $4x + 5y - z = 6$

Answer: B

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105. The sum of the Y and Z intercepts made by the plane 3x + 4y -6z = 12 is .....

A. 10

B. 4

C. 1

D. 5

Answer: C

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106. If the foot of perpendicular from the origin to the plane is (a,b,0) thne the eqution of the plane is .....

A. ax + by = a + b

B. $ax + by = a^2 + y^2$

C. $\frac{x}{a} + \frac{y}{b} = 1$

D. $ax + by = ab$

Answer: B

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107. The distance of the point (1,-5,9) from the plane x-y + z = 5 measured parallel to the line x = y =z is .....

A. $3\sqrt{10}$

B. $10\sqrt{3}$

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

D. $\frac{20}{3}$

Answer: B

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108. If the line $\frac{x-3}{2} = \frac{y+2}{-1} = \frac{z+4}{3}$ is in the plane lx + my-z = 9 then $l^2 + m^2$= .....

A. 26

B. 18

C. 5

D. 2

Answer: D

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109. If the distance between the palens 2x- y + 2z = 1 and 4x-2y + 4z = k is $\frac{1}{6}$ then k = ...

A. -3

B. 1

C. -1

D. 2

Answer: B

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110. If the foot of perpendicular from origin to the plane is (1,2,3) then the equation of the plane is.....

A. $\frac{x}{1}+\frac{y}{2}+\frac{z}{3}=1$

B. $x+2y+3z=1$

C. $x + 2y + 3z = 6$

D. $x + 2y + 3z = 14$

Answer: D

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111. If the line $\frac{x-4}{1} = \frac{y-2}{1} = \frac{z+k}{2}$ lies in the plane 2x -4y + z =7 then k =.....

A. -7

B. 6

C. 7

D. -6

Answer: A

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112. The direction of the line of intersection of the planes

$2x + 3y + z-1 = 0$ and $x+y-z-7 = 0$ is .....

A. (-4,-3,1)

B. (-4,3,1)

C. (4,3,1)

D. (4,-3,1)

Answer: D

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113. The pane x+2y -2z = 6 makes the intercepts with the axes, The centroid of the triangel whose vettices are these intersection points with axes is ....

A. (-2,-1,1)

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

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

D. $(2, 1, -1)$

Answer: D

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114. The angle between the lines $\frac{x-1}{2}=\frac{y+1}{1}=\frac{1-z}{2}$ and x = k + 1, y =2 k -1, z=2k +3, $k \in R$ is .....

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

B. $\sec^{-1}\frac{9}{4}$

C. $\cos ec^{-1}\left(\frac{3}{4}\right)$

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

Answer: D

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115. The plane passes through the point (1,-1,-1) and its normal is perpendicular to both the lines $\frac{x-1}{1}=\frac{y+2}{-2}=\frac{z-4}{3}$ and $\frac{x-2}{2}+\frac{y+1}{-1}=\frac{z+7}{-1}$. The distance of the point (1,3,-7) from thise plane is .....

A. $\frac{10}{\sqrt{74}}$

B. $\frac{20}{\sqrt{74}}$

C. $\frac{10}{\sqrt{83}}$

D. $\frac{5}{\sqrt{83}}$

Answer: C

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116. The plane ax + by + cz = 1 intersects the axes in A, B and C respetively. The centroid of $\Delta ABC is G\left(\frac{1}{6}, -\frac{1}{3}, 1\right)$. Then a + b + 3c = ...

A. 2

B. 4

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

D. $\frac{5}{6}$

Answer: A

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117. The plane makes the angles $\frac{\pi}{4}, \frac{\pi}{4}$ and $\frac{\pi}{2}$ with the positive direction of X - axis, Y - axis and Z- axis respectively. The length of perpendicular drawn from origin to the plane is $\sqrt{2}$, then the equation of the plane is .....

A. x+y = 2

B. x+y+z = 1

C. x+y+z = $\sqrt{2}$

D. $x = \sqrt{2}$

Answer: A

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118. The equation of the plane passing through the pionts (2,5,-3) and perpendicular to both the planes $x + 2y + 2z = 1$ and $x - 2y + 3z = 4$ is .....

A. $3x - 4y + 2z - 20 = 0$

B. $7x - y + 5z = 30$

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

D. $10x - y - 4z = 27$

Answer: D

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119. The equation of the plane passing through the pionts (0,-4,-6) and (-2,9,3) and perpendicular to x-4y-2z = 8 is .....

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

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

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

D. $5x - 3y + 2z = 0$

Answer: C

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120. The line joining the pionts (1,1,2) and (3,-2,1) meets the plane $3x + 2y + z = 6$ in ..... Point.

A. (1,1,2)

B. (3,-2,1)

C. (2,-3,1)

D. (3,2,1)

Answer: B

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121. The plane passing through (5,1,2) and perpendicular to the line $2(x-2)\ y - 4 = z-5$ meets the line in the .....

Point.

A. (1,2,3)

B. (2,3,1)

C. (1,3,2)

D. (3,2,1)

Answer: A

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122. The intercepts on the axes cut off by the plane which is perpendicular bisector of the line segment joining the pionts (1,2,3) and (-3,4,5) are .....

A. $-\frac{9}{2}, 9, 9$

B. $\frac{9}{2}, 99$

C. $9, -\frac{9}{2}, 9$

D. $9, \frac{9}{2}, 9$

Answer: A

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123. The equation of the plane passing through the intersection of the planes 2x-5y = z = 3 and x+y+4z = 5 and parallel to the plane x+3y + 6z = 1 is x + 3y + 6z = k is.....

A. 5

B. 3

C. 7

D. 2

Answer: C

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124. If from the point (a,b,c) perpendiculars PL and PM be drawn to YOZ and ZOX 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. $\frac{x}{a} - \frac{y}{b} - \frac{z}{c} = 0$

Answer: C

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125. The line $\frac{x+1}{2} = \frac{y+1}{3} = \frac{z+1}{4}$ meets the plane $x + 2y + 3z = 14$ in ..... Point.

A. (3,-2,5)

B. (3,2,-5)

C. (2,0,4)

D. (1,2,3)

Answer: D

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126. The plane containing the two lines $\frac{x-3}{1}=\frac{y-2}{4}=\frac{z-1}{5}$ and $\frac{x-2}{1}=\frac{y+3}{-4}=\frac{z+1}{5}$ is 11x+my + nz = 28 where .....

A. m= -1, n=3

B. m= 1, n = -3

C. m=-1,n=-3

D. m =1,n=3

Answer: C

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127. A variable plane passes through a fixed point (1,-2,3) and meets the co-ordinate axes in A, B and C . The locus of the point of intersection of the plane through A,B and C parallel to the co-ordinate planes is the surface.....

A. $xy - \frac{1}{2}yz + \frac{1}{3}zn = 6$

B. $yz - 2zx + 3xy = xyz$

C. $xy - 2yz + 3zx = 3xyz$

D. None of these

Answer: B

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128. The equation to the plane through the pionts (2,-1,00) and (3,-4,5) parallel to a line with direction cosines proportional to 2,3,4 is 9x-2y-3z = k , where k is .....

A. 20

B. -20

C. 10

D. -10

Answer: A

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129. Through a point P(f,g,h) a plane is drawn at right angles to $\overline{OP}$, to meet the axes in A, B and C. If OP = r, the centroid of the triangle ABC is.....

A. $\left(\frac{f}{3r}, \frac{g}{3r}, \frac{h}{3r}\right)$

B. $\left(\frac{r^2}{3f^2}, \frac{r^2}{3g^2}, \frac{r^2}{3h^2}\right)$

C. $\left(\frac{r^2}{3f^2}, \frac{r^2}{3g^2}, \frac{r^2}{3h^2}\right)$

D. None to these

Answer: C

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130. If p_1, P_2, P_3 denot the distances of the plane 2x-3y+4z +2 = 0 from the planes 2x-3y + 4z + 6 = 0, 4x-6y+8z +3 = 0 and 2x -3y + 4z -6 = 0 repectively then , ... Is not true.

A. $P_1 + 8P_2 - P_3 = 0$

B. $P_3 = 16P_2$

C. $8P_2 \neq P_1$

D. $P_1 + 2P_2 + 3P_3 = \sqrt{29}$

Answer: C

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131. The image of the piont P(2,3,1) in the plane x-y-z -2 = 0 is .....

A. $\left(\frac{14}{3}, \frac{1}{3}, -\frac{5}{3}\right)$

B. $\left(-\frac{14}{3}, -\frac{1}{3}, \frac{5}{3}\right)$

C. $\left(\frac{14}{3}, \frac{1}{3}, \frac{5}{3}\right)$

D. None of these

Answer: A

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132. If the plane $\lambda x - \mu y + vz = \phi$ contains line $\frac{x-\lambda}{\lambda} = \frac{y-2\phi}{\mu} = \frac{z-v}{v}$ then the value of $\frac{\mu}{\phi}$ is.....

A. 2

B. 1

C. -1

D. 3

Answer: A

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133. The difference between the distances of the points (2,3,4) and (1,1,4) from the plane 3x -6y + 2x + 11 =0 is .....

A. $\frac{9}{7}$

B. $\frac{1}{7}$

C. $\frac{8}{7}$

D. $\frac{5}{7}$

Answer: A

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134. The vector equation of the plane which is at distance 8 units from origin and having normal $2\hat{i}+\hat{j}+2\hat{k}$ is.....

A. $\bar{r}.\left(2\hat{i}+\hat{j}+\hat{k}\right)=24$

B. $\bar{r}.\left(2\hat{i}+\hat{j}+2\hat{k}\right)=24$

C. $\bar{r}.\left(2\hat{i}+\hat{j}+2\hat{k}\right)=24$

D. $\bar{r}.\left(\hat{i}+\hat{j}+\hat{k}\right)=24$

Answer: B

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135. The modulus of the vector $\bar{n}$ is 8. makes an angle 45° with X -axis. 60° with Y - axis an acute angle with Z - axis. The equation of the plane passing through $\left(\sqrt{2},\ -1, 1\right)$ and having normal $\bar{n}$ is .....

A. $\bar{r}.\left(\sqrt{2}\hat{i}+\hat{j}+\hat{k}\right)=4$

B. $\bar{r}.\left(\sqrt{2}\hat{i}+\hat{j}+\hat{k}\right)=2$

C. $\bar{r}\left(\hat{i}+\hat{j}+\hat{k}\right)=4$

D. None of these

Answer: B

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136. The position vectors of the points P and Q are (3,1,2) and (1,-2,-4) repectively. The equation of the plane passing through the point Q and perpendicular to $\overline{P}Q$ is.....

A. $\bar{r}.\left(2\hat{i}+3\hat{j}+6\hat{k}\right)=28$

B. $\bar{r}.\left(2\hat{i}+3\hat{j}+6\hat{k}\right)=32$

C. $\bar{r}.\left(2\hat{i}+3\hat{j}+6\hat{k}\right)+28=0$

D. None of these

Answer: C

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137. The position vectors of the points A and B are respectively $\hat{i} - \hat{j} + 3\hat{k}$ and $3\hat{i} + 3\hat{j} + 3\hat{k}$. The equation of the plane $\bar{r}.\left(5\hat{i} + 2\hat{j} - 7\hat{k}\right) + 9 = 0$

Then points A and B.

A. are one the plane

B. lie on the same side of the plane

C. lie on the opposite side of the plane

D. None of these

Answer: C

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138. The equation of the plane passing through the point $\hat{i}+2\hat{j}+-\hat{k}$ and perpendicular to the intersection line of the planes $\bar{r}.\left(3\hat{i}-\hat{j}+\hat{k}\right)=1$ and $\overline{\hat{i}+4\hat{j}-2\hat{}}=2$ is.....

A. $\bar{r}.\left(2\hat{i}-7\hat{j}-13\hat{k}\right)=1$

B. $\bar{r}.\left(2\hat{i}-7\hat{j}-13\hat{k}\right)=1$

C. $\bar{r}.\left(2\hat{i}-7\hat{j}-13\hat{}\right)=1$

D. None of these

Answer: B

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139. The cartessian form of the plane $\bar{r} = (1 + \lambda - \mu)\hat{i}(2 - \lambda)\hat{j} + (3 - 2\lambda + 2\mu)\hat{k}$ is.....

A. 2x + y = 5

B. 2x - y = 5

C. 2x+ z=5

D. 2x-z = 5

Answer: C

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140. The plane is passing through the point $A(\bar{a})$ and contais the line $\bar{r} = \bar{b} + \lambda\bar{c}$. The length of perpendicular

drawn from the origin to this plane is.....

A. $\frac{\left[\bar{a}\bar{b}\bar{c}\right]}{\left[\bar{a}\times\bar{b}\times\bar{b}\times\bar{c}+\bar{c}\times\bar{a}\right]}$

B. $\frac{\left[\bar{a}\bar{b}\bar{c}\right]}{\left[\bar{a}\times\bar{b}+\bar{b}\times\bar{c}\right]}$

C. $\frac{\left[\bar{a}\bar{b}\bar{c}\right]}{\left[\bar{b}\times\bar{c}\times\bar{c}\times\bar{a}\right]}$

D. $\frac{\left[\bar{a}\bar{b}\bar{c}\right]}{\left[\bar{c}\times\bar{a}+\bar{a}\times\bar{b}\right]}$

Answer: C

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141. The angle between the line $\bar{r}=\left(2\hat{i}-\hat{j}+\hat{k}\right)+\lambda\left(-\hat{i}+\hat{j}+\hat{k}\right)$ and the plane $\bar{\cdot}\left(3\hat{i}+2\hat{j}-\hat{k}\right)=4$ is.....

A. $\cos^{-1}\left(\frac{2}{\sqrt{42}}\right)$

B. $\cos^{-1}\left(\frac{-2}{\sqrt{42}}\right)$

C. $\sin^{-1}\left(\frac{2}{\sqrt{42}}\right)$

D. $\sin^{-1}\left(\frac{-2}{\sqrt{42}}\right)$

Answer: D

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

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

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

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

D. $\frac{10}{3\left(\sqrt{3}\right)}$

Answer: D

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143. The plane is passing through A(2,-1,3) and it is parallel to $\bar{a} = (3, 0, -1)$ and $\bar{b} = (-3, 2, 2)$. The equation of this plane is .....

A. $2x - 3y + 6z - 25 = 0$

B. $2x - 3y + 6z + 25 = 0$

C. $3x - 2y + 6z - 25 = 0$

D. $3x - 2y + 6z - 25 = 0$

Answer: A

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144. One plane is parallel to the vectors $\hat{i} + \hat{j} + \hat{k}$ and $2\hat{i}$ Other plane is parallel to the vectros $\hat{i} + \hat{j}$ and $\hat{i} - \hat{k}$. The angle between the line of intersection of both the planes and the vector $2\hat{i} - \hat{j}$ is .....

A. $\cos^{-1}\left(\frac{3}{\sqrt{50}}\right)$

B. $\cos^{-1}\left(\frac{2}{\sqrt{30}}\right)$

C. $\cos^{-1}\left(\frac{1}{\sqrt{10}}\right)$

D. $\cos^{-1}\left(\frac{19}{\sqrt{30}}\right)$

Answer: C

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145. The line segment joining the points (2,4,5) and (3,5,-4) divides the YZ - plane in the ..... Ratio.

A. $2:3$

B. $3:2$

C. $-2:3$

D. $1:2$

Answer: C

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146. The equation of the plane passing through (1,-3,-2) and perpendicular to the planes x+2y + 3z = 5 and 3x + 3y+2z = 8 is .....

A. $5x - 7y + 3z - 20 = 0$

B. $2x - 4y - 3z + 8 = 0$

C. $2x + 4y + 3z + 8 = 0$

D. $5x + 7y - 3z - 20 = 0$

Answer: A

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

A. 10

B. 11

C. 12

D. 13

Answer: D

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148. The distance of the point (1,-2,3) from the plane x-y+z = 5, measured parallel to the line $\frac{x}{2} = \frac{y}{3} = \frac{z}{-6}$ is .....

A. 1

B. $\frac{6}{7}$

C. $\frac{7}{6}$

D. None of these

Answer: A

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149. The plane contains the vectors $2\hat{i}+3\hat{j}-\hat{k}$ and $\hat{i}+\hat{j}+2\hat{k}$. The acute angle made by this plane with the vector $2\hat{i}+3\hat{j}-\hat{k}$ is .....

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

B. $\sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$

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

D. $\cot^{-1}\left(\sqrt{2}\right)$

Answer: D

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150. A plane meets the axes in the points, A, B and C. If the centroid of ΔABC is (α, β, γ) then the plane is .....

A. $\frac{x}{\alpha} + \frac{y}{\beta} + \frac{z}{\gamma} = 3$

B. $\frac{x}{\alpha} + \frac{y}{\beta} + \frac{z}{\gamma} = 1$

C. $\frac{3x}{\alpha} + \frac{3y}{\beta} + \frac{3z}{\gamma} = 1$

D. $\alpha x + \beta y + \gamma z = 1$

Answer: A

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151. Out of the following planes , which plane is passing through theline of intersection of the palnes $x-y+2z = 3$ and $4x-3y-z = 1$.

A. $11x + 10y - 5z = 0$

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

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

D. None to these

Answer: A

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152. A plane is passing through (1,0,0) and (0,1,0) and it makes and angle $\frac{\pi}{4}$ with x+y = 3. The direction rations of this plane are .....

A. $(1, \sqrt{2}, 1)$

B. $(1, 1, \sqrt{2})$

C. $(1, 1, 2)$

D. $(\sqrt{2}, 1, 1)$

Answer: B

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153. The equation of the plane passing through origin and the line of intersection of the planes $\vec{r}.\vec{a} = \lambda$ and $\vec{r}.\vec{b} = \mu is.....$

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

Answer: B

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154. The equation of the plane containing the lines $\vec{r} = \vec{a_1} + \lambda \vec{b}$ and $\vec{r} = \vec{a_2} + \mu \vec{b}$ is.....

A. $\vec{r} . \left(\vec{a}_1 - \vec{a}_1 \right) \times \vec{b} = \left[\vec{a}_1 \vec{a}_2 \vec{a}_3 \right]$

B. $\vec{r} . \left(\vec{a}_2 - \vec{a}_1 \right) \times \vec{b} = \left[\vec{a_1} \vec{a}_2 \vec{b} \right]$

C. $\vec{r} . \left(\vec{a_1} - \vec{a_2} \right) \times \vec{b} = \left[\vec{a}_2 \vec{a}_1 \vec{b} \right]$

D. None of these

Answer: B

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155. If the lines $\vec{r} = \vec{a} + \lambda \left(\vec{b} \times \vec{c} \right)$ and $\vec{r} = \vec{b} + \mu \left(\vec{c} \times \vec{a} \right)$ are intersect then .....

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

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

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

D. None of these

Answer: B

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156. The distance between the planes

$2x + 2y - z + 2 = 0$ and $4x + 4y - 2x + 5 = 0$ is

.....

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

B. $\frac{1}{4}$

C. $\frac{1}{6}$

D. None of these

Answer: C

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157. The plane $2x-(1-\lambda)y+3\lambda z=0$ is passing through the line of intersectoin of ..... Planes.

A. $2x-y=0, y-3z=0$

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

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

D. None of these

Answer: A

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158. A plane passes through (1,1,1). It is perpendicular to the line $\frac{x-1}{3} = \frac{y-1}{0} - \frac{z-1}{4}$

Then the distance of this plane from the origin is.....

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

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

C. $\frac{7}{5}$

D. 1

Answer: C

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159. The equation of the plane passing through the line of intersection of the planes ax + by+cz + d = 0 and lx + my + nz + p = 0 and it is parallel to the line y = 0 z = 0 is.....

A. $(bl - am)y + (cl - an)z + dl - ap = 0$

B. $(am - bl)x(mc - bn)z + md - bp = 0$

C. $(na - cl)x + (bn - cm)y + nd - cp = 0$

D. None of these

Answer: A

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160. The vector equation of the plane containing the line $\vec{r}\left(-2\hat{i}-3\widehat{+}4\hat{k}\right)+\lambda\left(3\hat{i}-2\hat{j}-\hat{k}\right)$ and the point $\hat{i}+2\hat{j}+3\hat{k}$ is .....

A. $\vec{r}.\left(\vec{i}+3\hat{k}\right)=10$

B. $\vec{r}.\left(\hat{i}-3\hat{k}\right)=10$

C. $\vec{r}.\left(3\hat{i}+\hat{k}\right)=10$

D. None of these

Answer: A

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161. The plane passing through the intersection of the planes x+y +z =1 and 2x+3y -z + 4 = 0 and parallel to Y - axis is also passing through ..... Point.

A. (-3,0,1)

B. (3,2,2)

C. $(-3, 1, 1)$

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

Answer: B

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162. The equation of line passing through the point (-4,3,1) parallel to the plane x + 2y-z-5 = 0 and intersect the lien $\frac{x+1}{-3} = \frac{y-3}{2} = \frac{z-2}{-1}$ is.....

A. $\frac{x+4}{-1}\frac{y-3}{1} = \frac{z-1}{1}$

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

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

D. $\frac{x+4}{1} = \frac{y-3}{1} = \frac{z-1}{3}$

Answer: B

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163. The equation of plane containing the line $\frac{x}{2}=\frac{y}{3}=\frac{z}{4}$ and perpendicular the plane which is containing the lines $\frac{x}{3}=\frac{y}{4}=\frac{z}{2}$ and $\frac{x}{4}=\frac{y}{2}=\frac{z}{3}$ is.....

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

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

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

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

Answer: B

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164. If the lines x = ay + b ,z = cy + d and x= a'z + b',y = c'z + d'' are perpendicular then .....

A. $\mathrm{cc}' + a + a' = 0$

B. $\mathrm{aa}' + c + c' = 0$

C. $ab' + bc' + 1 = 0$

D. $\mathrm{bb}' + ' + 1 = 0$

Answer: B

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165. The plane parallel to the lines $\frac{x+2}{3} = \frac{y-2}{-1} = \frac{z+1}{2}$ and

$\frac{x-2}{1}=\frac{y-3}{1}=\frac{y-3}{2}=\frac{z-4}{3}$ and passing through the point (4,-1,2) is point also through.....

A. (1,1,1)

B. (-1,-1,-1)

C. (1,1,-1)

D. (-1,-1,1)

Answer: A

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166. A point A is on the line $\overrightarrow{r}=(1-3\mu)\hat{i}+(\mu-1)\hat{j}+(2+5\mu)\hat{k}$. $B(3,2,6)$ is

a point of the plane . If the vector $\overline{AB}$ is parallel to the plane x-4y+3z = 1 then the value of μ is .....

A. $\frac{1}{4}$

B. $\frac{1}{8}$

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

D. $-\frac{1}{4}$

Answer: A

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167. The distance of the point (2,-1,-2) from the line $\frac{x-1}{2} = \frac{y+3}{2} = \frac{z-3}{3}$, measured parallel to the plane x+2y + z=4 is .....

A. $\sqrt{10}$

B. $\sqrt{20}$

C. $\sqrt{5}$

D. $\sqrt{30}$

Answer: D

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168. Three planes 4y+6z = 5, 2x + 3y + 5z = 5 and 6x + 5y + 9z = 10 .....

A. meet in a piont

B. meet in a line

C. makes a triangular prism

D. do not say anythings

Answer: B

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169. A variable plane makes with the co-ordinates plane, tetrahedron of contant volume $64k^3$ Then the locus of the centroid of tetrahedron is the surface.

A. $xyz = 6k^3$

B. $xy + yz + zx = 6k^2$

C. $x^2 + y^2 + z^2 = 8k^2$

D. None of these

Answer: A

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170. If the lines $\frac{2x-5}{k}=\frac{y+2}{-5}=\frac{z}{1}$ and $\frac{x}{1}=\frac{y}{2}=\frac{z}{3}$ are perpendicular to each other, then value of k is.....

A. -7

B. 14

C. 7

D. 26

Answer: B

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171. If the plane 2x + 3y + 4z = 1 intersects X-axis, Y-axis and Z-axis at the points A,B and C repectively, then the centroid of a ΔABC is.....

A. $\left(\frac{2}{3}, 1, \frac{4}{3}\right)$

B. $(6, 9, 12)$

C. $\left(\frac{1}{6}, \frac{1}{9}, \frac{1}{12}\right)$

D. $\left(\frac{1}{2}, \frac{1}{3}, \frac{1}{4}\right)$

Answer: C

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172. Distance between the two planes 2x-2y+z = 5 and 6x-6y+3z = 25 is ..... Units.

A. $\frac{20}{9}$

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

C. $\frac{20}{3}$

D. 10

Answer: B

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173. Let P be a plane passing through the points (2,1,0), (4,1,1) and (5,0,1) and R be any point (2,1,6). Then the image of R is the plan P is :

A. (6,5,2)

B. (6,5,-2)

C. (4,3,2)

D. (3,4,-2)

Answer: B

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Practice Paper 11

1. Find the direction cosines of a line which makes equal angles with the coordinate axes.

A. $(\pm 1, \pm 1, \pm 1)$

B. $\left(\pm \frac{1}{\sqrt{2}}, \pm \frac{1}{\sqrt{2}}, \pm \frac{1}{\sqrt{2}}\right)$

C. $\left(+m\frac{1}{\sqrt{3}}, \pm \frac{1}{\sqrt{3}}, \pm \frac{1}{\sqrt{3}}\right)$

D. $\left(\pm \frac{1}{2}, \pm \frac{1}{2}, \pm \frac{1}{2}\right)$

Answer:

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2. Find the direction cosines of the line passing through the two points (-2, 4, -5) and (1, 2, 3).

A. $\left(\frac{3}{\sqrt{77}}, \frac{-2}{\sqrt{77}}, \frac{8}{\sqrt{77}}\right)$

B. $\left(\frac{-3}{\sqrt{77}}, \frac{-2}{\sqrt{77}}, \frac{-8}{\sqrt{77}}\right)$

C. $\left(\frac{3}{\sqrt{77}}, \frac{2}{\sqrt{77}}, \frac{8}{\sqrt{77}}\right)$

D. None to these

Answer:

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3. The foot of perpendicular drawn from the origin to the plane 2x + 3y + 4z - 12 = 0 is.....

A. $\left(\frac{2}{29}, \frac{3}{29}, \frac{-4}{29}\right)$

B. $\left(\frac{24}{29}, \frac{36}{29}, \frac{48}{29}\right)$

C. $\left(\frac{36}{29}, \frac{24}{29}, \frac{48}{29}\right)$

D. $\left(\frac{24}{29}, \frac{48}{29}, \frac{36}{29}\right)$

Answer:

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4. The plane 2x+3y+6z = 15 makes an angle of measure .....with Y-axis.

A. $\sin^{-1}\left(\frac{3}{7}\right)$

B. $\sin^{-1}\left(\frac{2}{7}\right)$

C. $\sin^{-1}\left(-\frac{2}{7}\right)$

D. $\cos^{-1}\left(\frac{3}{7}\right)$

Answer:

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5. The symmetric from of the equation of the line $x + y - z = 1$ and $2x - 3y + z = 2$ is.....

A. $\frac{x}{2} = \frac{y}{3} = \frac{z}{5}$

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

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

D. $\frac{x}{2} = \frac{y}{3} = \frac{z}{5}$

Answer:

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6. A variable plane makes with the co-ordinates plane, tetrahedron of contant volume $64k^3$ Then the locus of the centroid of tetrahedron is the surface.

A. $xyz = 6k^3$

B. $xy + yz + zx = 6k^2$

C. $x^2 + y^2 + z^2 = 8k^2$

D. None to these

Answer:

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

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8. Find the distance of the point (3,-2,1) from the plane 2x-y+2z + 3 = 0.

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

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10. Find the vector and the cartesian equations of the line that passes through the points (3, - 2, – 5), (3, -2, 6).

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11. Find the shortest distance between the lines

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

and

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

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12. Find the equation of the plane through the line of intersection of the planes $x + y + z = 1$ and $2x + 3y + 4z = 5$ which is perpendicular to the plane $x - y + z = 0$.

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13. Find the coordinates of the point where the line through $(3,-4,-5)$ and $(2, -3, 1)$ crosses the plane $2x + y + z = 7$.

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14. Prove that the lines x=2 $\frac{y-1}{3}=\frac{z-2}{1}$ and $x=\frac{y-1}{1}=\frac{z+1}{3}$ are skew lines.

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15. A line makes the angle α, β, γ and δ with the diagonals of a cube. The $\cos^2\alpha+\cos^2\beta+\cos^2\gamma+\cos^2\delta=$ .....

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16. Find the image of the point (1,3,4) in the plane 2x-y +z = -3.

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