MATHS

BOOKS - KC SINHA ENGLISH

3D - STRAIGHT LINES

Solved Examples

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

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2. Find the angle between the pair of line: $\vec{r}=3\hat{i}+2\hat{j}-4\hat{k}+\lambda\left(\hat{i}+2\hat{j}+2\hat{k}\right), \vec{r}=5\hat{i}-2\hat{k}+\mu\left(3\hat{i}+2\hat{j}+6\hat{k}\right)$

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3. Find the angle between the following pair of lines: A lines with direction ratios 1,1,1 A line joning (2,1,4)to (7,2,12)

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

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5. Find the angle between the line: $\vec{r}=4\hat{i}-\hat{j}+\lambda\left(\hat{i}+2\hat{j}-2\hat{k}\right)$ and $vevr=\hat{i}-\hat{j}+2\hat{k}-\mu\left(2\hat{i}+4\hat{j}-4\hat{k}\right.$

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6. Find the angle between the pair of line: $\vec{r} = = (1-t)\hat{i} + (t-2)\hat{j} + (3-2t)\hat{k}$ and $\vec{r} = (s+1)\hat{i} + (2s-1)\hat{j}$

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7. Find the equation of the line parallel to $\hat{i} - 2\hat{j} - 3\hat{k}$ and passing through the point (5,-1,4)`

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

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9. Find the vector equation of the line through $A(4, 4, -7) and B(2, -1, 6)$. Find also, its Cartesian equations.

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10. 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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11. find the vector equation of the line passing through the point $A(2, -1, 1)$ and parallel to the ine joining the points $B(-1, 4, 1)$ and $C(1, 2, 2)$. Also find the Cartesian equation of the line.

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12. The Cartesian equation of a line are $3x + 1 = 6y - 2 = 1 - z$. Find the direction ratios and write down its equation in vector form.

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

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

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15. Show that if the axes are rectangular the equation of line through point (x_1, y_1, z_1) at right angle to the lines $\frac{x}{l_1} = \frac{y}{m_1} = \frac{z}{n_1}, \frac{x}{l_2} = \frac{y}{m_2} = \frac{z}{n_2}$ is $\frac{x - x_1}{m_1 n_2 - m_2 n_1} = \frac{y - y_1}{n_1 l_2 - n_2 l_1} = \frac{z - z_1}{l_1 m_2 - l_2 m_1}$

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16. Find the coordinates of those point on the line $\frac{x - 1}{2} = \frac{y + 2}{3} = \frac{z - 3}{6}$ which are at a distance of 3 units from points $(1, -2, 3)$.

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

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

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

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20. Show that the lines $\frac{x-5}{4} = \frac{y-7}{4} = \frac{z+3}{-5}$ and $\frac{x-8}{7} = \frac{y-4}{1} = \frac{z-5}{3}$ intersect each other

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

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22. Find the perpendicular distance of the point (1, 0, 0) from the line $\frac{x-1}{2}=\frac{y+1}{-3}=\frac{z+10}{8}$.

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23. Find the coordinates of the foot of perpendicular from the point $(2, 6, 3)$ to the line $\frac{x}{2}=\frac{y-1}{2}=\frac{z-2}{3}$. Also find the equation of this perpendicular.

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24. Find the coordinates of the foot of perpendicular drawn from th point $A(1, 8, 4)$ to the line joining the points $B(0, -1, 3) and C(2-3, -1)$.

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

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26. Find the shortest distance between the two lines whose vector equations are given by: $\vec{r}=\hat{i}+2\hat{j}+3\hat{k}+\lambda\left(2\hat{i}+3\hat{j}+4\hat{k}\right)$ and $\vec{r}=2\hat{i}+4\hat{j}+5\hat{k}+\mu\left(3\hat{i}+4\right.$

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27. Find the shortest distance and the vector equation of the line of shortest distance between the lines given by $\vec{r} = 3\hat{i} + 8\hat{j} + 3\hat{k} + \lambda\left(3\hat{i} - \hat{j} + \hat{k}\right)$ and $\vec{r} = -3\hat{i} - 7\hat{j} + 6\hat{k} + \mu\left(-3\right.$

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28. Find the shortest distance between the two lines whose vector equations are given by: $\vec{r} = (3 - t)\hat{i} + (4 + 2t)\hat{j} + (t - 2)\hat{k}$ and $\vec{r} = (1 + s)\hat{i} + (3s - 7)\hat{j} + ($

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29. Find the shortest distance between the two lines whose vector equations are given by: $\vec{r} = (1 + \lambda)\hat{i} + (2 - \lambda)\hat{j} + (-1 + \lambda)\hat{k}$ and $\vec{r} = 2(1 + \mu)\hat{i} - (1 - \mu)\hat{j}$

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30. Find the shortest distance between the following pairs of lines whose Cartesian equation are:

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

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31. Determine whether the following pair of lines intersect or not.

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

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

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Exercise

1. Find the angle between each of the following pair of line: $\vec{r}=5\hat{i}-7\hat{j}+\lambda\left(-\hat{i}+4\hat{j}+2\hat{k}\right)\vec{r}=-2\hat{i}+\hat{k}+\mu\left(3\hat{i}+3\hat{k}\right)$

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2. Find the angle between each of the following pair of line: $\vec{r} = (2+s)\hat{i} + (s-1)\hat{j} + (2-3s)\hat{k}$, $\vec{r} = (1-t)\hat{i} + (2t+3)\hat{j} + \hat{k}$

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3. Find the angle between the following pairs of line: $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{6}, x+1 = \frac{y+2}{2} = \frac{z-3}{2}$

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4. Find the angle between the following pairs of line: $\frac{x+1}{3} = \frac{y-1}{5} = \frac{z+3}{4}, \frac{x+1}{1} = \frac{y-4}{4} = \frac{z-5}{2}$

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

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6. Find the angle between the line: $\frac{x-3}{1}=\frac{y-2}{2}=\frac{z-2}{-4}$ and $\frac{x-0}{3}=\frac{y-5}{2}=\frac{z+2}{-6}$

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7. Find the angle between the line: $\vec{r}=4\hat{i}-\hat{j}+\lambda\left(\hat{i}+2\hat{j}-2\hat{k}\right)$ and $vevr=\hat{i}-\hat{j}+2\hat{k}-\mu\left(2\hat{i}+4\hat{j}-4\hat{k}$

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8. Show that line $\frac{x-3}{2}=\frac{y+1}{-3}=\frac{z-2}{4}$ is perpendicular to the line $\frac{x+2}{2}=\frac{y-4}{4}=\frac{z+5}{2}$

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9. 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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10. Show that the line joining the origin to the point (2, 1, 1) is perpendicular to the line determined by the points (3, 5, -10 and (4, 3, -1).

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

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

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

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

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

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16. 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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17. Find the angle between the following pair of line:

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

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18. Find the angle between the following pair 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 $\vec{r}=7\hat{i}-6\hat{k}+\mu\left(\hat{i}+2\hat{j}+2\hat{k}\right.$

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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19. Find the angle between the following pair of lines $\frac{x}{2} = \frac{y}{2} = \frac{z}{1}$ and $\frac{x-5}{4} = \frac{y+2}{1} = \frac{z+3}{8}$

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20. 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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21. 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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22. 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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23. 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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24. Find the equation of the line passing through point $2\hat{i} - \hat{j} + 3\hat{k}$ and parallel to vector $\hat{i} + \hat{j} - 2\hat{k}$ in vector form as well as Cartesian form.

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25. Findthe equation of the line passing through points $\hat{i} - 2\hat{j} + \hat{k}$ and $-2\hat{j} + 3\hat{k}$ in vector form and Cartesian form.

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26. Find the euqation of the line passing through point (1,0,2) having direction ratios 3,-1,5. Prove that this line passes through (4,-1,7)

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27. Find tehequation of the parallel to the line $\frac{x-2}{3} = \frac{y+1}{1} = \frac{z-7}{9}$ and passing through the point (3,0,5).

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28. Find the vector equation of a line passing thorugh a point with position vector $2\hat{i} - 2\hat{j} + \hat{k}$ and parallel to the line joining the point with the position vectors $-\hat{i}+3\hat{j}+\hat{k}$ and $2\hat{i}+\hat{j}+3\hat{k}$. Also find the Cartesian equation of this line.

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

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30. Find the vector equation of a line parallel to the vector $2\hat{i}-\hat{j}+2\hat{k}$ and passing through a point A with position vector $3\hat{i}+\hat{j}-\hat{k}$.

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

(5,-2,4)

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32. The Cartesian equation of a line is $\frac{x-5}{3} = \frac{y+4}{7} = \frac{z-6}{2}$. find the vector equation of the line.

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33. Findthe vector equation of a straighat line which passes through the points whose position vector are $\hat{i} - 2\hat{j} + \hat{k}$ and $3\hat{k} - 2\hat{j}$.

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34. Find the vector equation of the straighat line passing through the point: (1,1,0) and (0,1,1)`

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35. Find the vctor equation of the straighat line passing through the point: $(-2, 1, 3)$ and $(3, 1, -2)$

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36. Find the equation of a line parallel to x-axis and passing through the origin.

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37. Find the equation of the line which passes through the point (1, 2, 3) and is parallel to the vector $6\hat{i} + 4\hat{j} - 2\hat{k}$.

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

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39. Find the vector and Cartesiasn equation of the line that passes through the origin and (5,-2,3).

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

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41. 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.

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42. 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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43. Find the point on the line $\frac{x+2}{3}=\frac{y+1}{2}=\frac{z-3}{2}$ at a distance of $3\sqrt{2}$ from the point $(1, 2, 3)$.

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

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45. Find the coordinates of the foot of perpendicular drawn from th point $A(1, 8, 4)$ to the line joining the points $B(0, -1, 3) and C(2-3, -1)$.

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

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47. 2/ Find the perpendicular distance of the point (1, 0, 0) from the line $\frac{x-1}{2} = \frac{y+1}{-3} = \frac{z+10}{8}$ Also, and the coordinates of the foot of the perpendicular and the equation of the perpendicular.

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48. Find the foot of the perpendicular from (0, 2, 7) on the line $\frac{x+2}{-1} = \frac{y-1}{3} = \frac{z-3}{-2}$.

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49. Find the foot and hence the lengh of perpendicular form (5,7,3) to the line $\frac{x-15}{3}=\frac{y-29}{8}=\frac{z-5}{-5}$. Find also the equation of the perpendicular.

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50. Find the equation of the perpendicular drawn from (2,4,-1) to the line $\frac{x+5}{1}=\frac{y+3}{4}=\frac{z-6}{-9}$.

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

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52. Find the length and the foot of the perpendicular drawn from the point $(2, -1, 5)$ to the line $\frac{x-11}{10} = \frac{y+2}{-4} = \frac{z+8}{-11}$

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53. Find the shortest distance between the following pair of line: $\vec{r} = \hat{i} + \hat{j} + \lambda\left(2\hat{i} - \hat{j} + 2\hat{k}\right), \vec{r} = 2\hat{i} + \hat{j} - \hat{k} + \mu\left(3\hat{i} - 5\hat{j} + 2\hat{k}\right)$

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54. Find the shortest distance between the following pair of line: $\vec{r} = \hat{i} + 2\hat{j} + \hat{k} + \lambda\left(\hat{i} - \hat{j} + \hat{k}\right)$ 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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55. Find the angle between the pair of line: $\vec{r} = = (1-t)\hat{i} + (t-2)\hat{j} + (3-2t)\hat{k}$ and $\vec{r} = (s+1)\hat{i} + (2s-1)\hat{j}$

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56. Find the shortest distance between the following pair of line: $\overrightarrow{r} = \hat{i} + 2\hat{j} + 3\hat{k} + \lambda\left(\hat{i} - 3\hat{j} + 2\hat{k}\right) \text{ and } \overrightarrow{r} = 4\hat{i} + 5\hat{j} + 6\hat{k} + \mu\left(2\hat{i} + 3\hat{j}\right.$

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57. Find the shortest distance between the following pair of line: $\overrightarrow{r} = \hat{i} + 2\hat{j} - 4\hat{k} + \lambda\left(2\hat{i} + 3\hat{j} + 6\hat{k}\right) \text{ and } \overrightarrow{r} = 3\hat{i} + 3\hat{j} - 5\hat{k} + \mu\left(2\hat{i} + 3\right.$

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58. Find the shortest distance between the following lines: $\frac{x+1}{7} = \frac{y+1}{-6} = \frac{z+1}{1}; \frac{3-x}{-1} = \frac{y-5}{-2} = \frac{z-7}{1}$

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59. Find the shortest distance between the following pairs of lines whose Cartesian equation are: $\frac{x-1}{2}=\frac{y-2}{3}=\frac{z-3}{4} and \frac{x-2}{3}=\frac{y-3}{4}=\frac{z-5}{5}$

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60. Find the shortest distance between the lines $\vec{r}=3\hat{i}+5\hat{j}+7\hat{k}+\lambda\left(\hat{i}-2\hat{j}+\hat{k}\right)$ and $\vec{r}=-\hat{i}+\hat{j}-\hat{k}+\mu\left(2\hat{i}-6\hat{j}$

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61. The angle between a line $x=1, y=2$ and $y+1=0, z=0$ is (A) 0^0 (B) 30^0 (C) 60^0 (D) 90^0

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62. The line $x = 1, y = 2$ is

(A) parallel to x-axis

(B) parallel to y-axis

(C) parallel to z-axis

(D) ies in a plane parallelto xy-plane.

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63. The lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ and $\frac{x-1}{3} = \frac{y-2}{4} = \frac{z-3}{5}$ are (A) parallel to x-axis (B) skew (C) intersecting (D) none of these

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64. The lines $6x = 3y = 2z$ and $\frac{x-1}{-2} = \frac{y-2}{-4} = \frac{z-3}{-6}$ re (A) parallel (B) skew (C) intersecting (D) coincident

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65. The line $\frac{x-x_1}{0}=\frac{y-y_1}{1}=\frac{z-z_1}{2}$ is (A) parallel to x-axis (B) perpendicular to x-axis (C) perpendiculat to YOZ plane (D) parallel to y-axis

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66. The line $x=x_1, y=y_1$ is (A) parallel to x-axis (B) parallel to y-axis (C) parallel to z-axis (D) parallel to XOY plane

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67. The equation of y-axis are (A) $x=0, y=0$ (B) $x=0, z=0$ (C) $y=0, z=0$ (D) none of these

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68.

The equations of the line through the point (α, β, γ) and equally inclined to the axes are

(A) $x-\alpha=y-\beta=z-\gamma$

(B) $\dfrac{x-1}{\alpha}=\dfrac{y-1}{\beta}=\dfrac{z-1}{\gamma}$

(C) $\dfrac{x}{\alpha}=\dfrac{y}{\beta}=\dfrac{z}{\gamma}$

(D) none of these

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69. The length of perpendicular from the point $P(1,\ -1,2)$ on the line $\dfrac{x+1}{2}=\dfrac{y-2}{-3}=\dfrac{z+2}{4}$ is

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70. The coordinates of the foot of perpendicular form the point $A(1,1,1)$ on the lline joining ponts $B(1,4,6)$ and $C(5,4,4)$ are

(A) (3,4,5)

(B) (4,5,3)

(C) (3,-4,5)

(D) (-3,-4,5)

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71. The directionratios of the line which is perpendicular to the lines $\frac{x-7}{2} = \frac{y+17}{-3} = z-6$ and $x+5 = \frac{y+3}{2} = \frac{z-4}{-2}$ are (A) (4,5,7)

(B) (4,-5,7) (C) (4,-5,-7) (D) (-4,5,7)

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72. The lines $\overrightarrow{r} = \left(\hat{i}+\hat{j}+\hat{k}\right)\alpha + 3\hat{k}$ and $\overrightarrow{r} = \left(\hat{i}-2\hat{j}+\hat{k}\right)\beta + 3\hat{k}$

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73. Distance of the point $P\left(\overrightarrow{p}\right)$ from the line $\overrightarrow{r} = \overrightarrow{a} + \lambda\overrightarrow{b}$ is

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

$\left|\left(\vec{b}-\vec{p}\right)+\frac{\left(\left(\vec{p}-\vec{a}\right).\vec{b}\right)\vec{b}}{\left|\vec{b}\right|^2}\right|$

(c) $\left|\left(\vec{a}-\vec{p}\right)+\frac{\left(\left(\vec{p}-\vec{b}\right).\vec{b}\right)\vec{b}}{\left|\vec{b}\right|^2}\right|$ (d)none of these

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74. The length of perpendicular from the origin to the line $\vec{r}=\left(4\hat{i}+2\hat{j}+4\hat{k}\right)+\lambda\left(3\hat{i}+4\hat{j}-5\hat{k}\right)$ is (A) 2 (B) $2\sqrt{3}$ (C) `6 (D) 7

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75. The shortest distance between the lines $\vec{r}-\vec{a}+k\vec{b}$ and $\vec{r}=\vec{a}+l\vec{c}$ is ($\vec{b}$ and $\vec{c}$ are non collinear) (A) 0 (B) $\left|\vec{b}.\vec{c}\right|$ (C) $\frac{\left|\vec{b}\times\vec{c}\right|}{\left|\vec{a}\right|}$ (D) $\frac{\left|\vec{b}.\vec{c}\right|}{\left|\vec{a}\right|}$

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76. The acute angle between the lines $\vec{r} = \left(4\hat{i} - \hat{j}\right) + \lambda\left(2\hat{i} + \hat{j} - 3\hat{k}\right)$ and $\vec{r} = \left(\hat{i} - \hat{j} + 2\hat{k}\right) + t\left(\hat{i} - 3\hat{j} + 2\right.$

is (A) $\frac{3\pi}{2}$ (B) $\frac{\pi}{3}$ (C) $\frac{2\pi}{3}$ (D) $\frac{\pi}{6}$

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