MATHS

BOOKS - VIKRAM PUBLICATION (ANDHRA PUBLICATION)

DIRECTION COSINES AND DIRECTION RATIOS

Solved Problem

1. If P(2,3,-6) , Q (3, -4,5) are two points, find the d.c's of $\overrightarrow{OP}, \overrightarrow{QO}$ and $\overrightarrow{PQ}$ where O is the origin.

2. Find the d.c's of a line that makes equal angles with the axes, and find number of such lines.

3. If the d.c's of a line are $(1/c, 1/c, 1c)$ then find c.

4. Find the direction cosines of the two lines which are connected by the relations l + m + n = 0 an mn - 2nl - 2lm = 0.

5. A ray makes angles $\pi/3, \pi/3$ with $\overline{OX}$ and $\overline{OY}$ respectively. Find the angle made by it with $\overline{OZ}$

6. Find the dr's and dc'r of the line joining the points (4,-7,3),(6,-5,2).

7. If the d.c's of a line are proportional to (1, -2, 1) find its d.c's

8. Show that the line joining the points P(0,1,2) and Q(3,4,8) is parallel to the line joining the points $R\left(-2, \dfrac{3}{2}, -3\right)$ and $S\left(\dfrac{5}{2}, 6, 6\right)$

9. Show that the line joining the points A(2,3,-1) and B(3,5,-3) is perpendicular to the line joining C(1,2,3) and $D(3, 5, 7)$.

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10. For what value of x the line joining A(4,1,2), B(5,x,0) is perpendicular to the line joining C(1,2,3), D(3,5,7).

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11. Show that the points A(1,2,3) , B(4,0,4), C (-2,4,2) are collinear

12. $\triangle ABC$ is formed by a (1,8,4), B (0, -11,4) and C(2,-3,1) . If D is the foot of the perpendicular from A to BC . Then the coordinates of D are
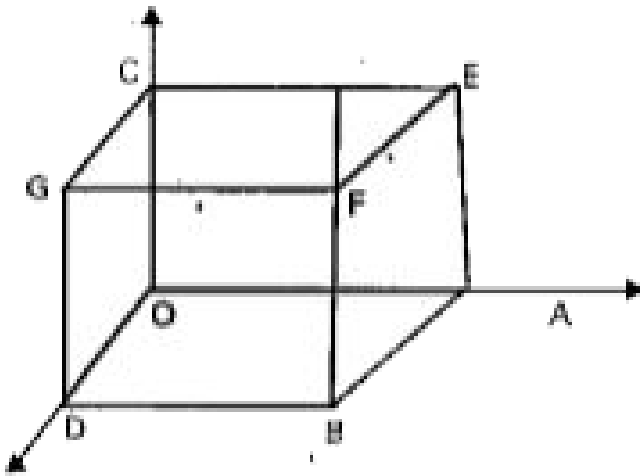
13. Lines $\overrightarrow{OA}, \overrightarrow{OB}$ are drawn from with direction cosines of the normal to the plane AOB.

14. Find the angle between the diagonals of a cube .

15. Show that the lines whose d.c's are proportional to $(2,1,1)$, $\left(4, \sqrt{3} - 1, -\sqrt{3} - 1\right)$ are inclined to one another at angle $\dfrac{\pi}{3}$.

1. A line makes angles $90°, 60°, 30°$ with the positive direction of X,Y,Z axes respectively. Find its direction cosisnes.

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2. If a line makes angles α, β, γ with positive axes, then the range of $\sin\alpha\sin\beta + \sin\beta\sin\gamma + \sin\gamma\sin\alpha$ is

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3. If $P(\sqrt{3}, 1, 2\sqrt{3})$ is a point in space, find direction cosines of $\overrightarrow{OP}$.

4. Find the direction cosines of the line joining the points (-4,1,7),(2,-3,2)`

5. Find the direction cosines of the sides of the triangles whose vertices are $(3, 5, -4)$

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6. Show that the lines $\overline{PQ}$ and $\overline{RS}$ are parallel where P,Q,R,S are the poits (2,3,4), (4,7,8), (-1,-2,1) and (1,2,5) respectively.

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7. Find the direction cosines of the two lines which are connected by the relations $l - 5m + 3n = 0,\ 7l^2 + 5m^2 - 3n^2 = 0$

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1. Find the direction ratios of the line joining the points (3,4,0) and (4,4,4).

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2. The direction ratios of a line are (-6,2,3) Find its direction cosines.

3. Find the conine of the angle between the lines whose direction cosines are $\left(\dfrac{1}{\sqrt{3}}, \dfrac{1}{\sqrt{3}}, \dfrac{1}{\sqrt{3}}\right)$ and $\left(\dfrac{1}{\sqrt{2}}, \dfrac{1}{\sqrt{2}}, 0\right)$.

4. Find the angle between the lines whose direction ratios are $(1, 1, 2)(\sqrt{3}, \ -\sqrt{3}, 0)$

5. Show that the lines with direction cosines $\left(\dfrac{12}{13}, \dfrac{-3}{13}, \dfrac{-4}{13}\right)$ and $\left(\dfrac{4}{13}, \dfrac{12}{13}, \dfrac{3}{13}\right)$ are perpendicular to each other.

6. O is the origin, P(2,3,4) and Q(1,k,1) are points such that $\overline{OP} \perp \overline{OQ}$. Find k.

7. If the direction ratios of a line are (3,4,0) find its direction cosines and also the angles made with the coordinate axes.

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

9. Find the angle between $\overline{DC}$ and $\overline{AB}$ where

A = (3,4,5), B = (4,6,3), C = (-1,2,4) and D(1,0,5_

10. Find the direciton cosines of a line which is perpendicular to the lines whose direcition ratios are (1,-2,3) and (2,1,-1)

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

12. Show that the points (4,7,8), (2,3,4) and (-1,-2,1),(1,2,5) are vertices of a parallelogram.

13. Show that the lines whose direction cosines are given by $l + m + n = 0$, $2mn + 3nl - 5lm = 0$ are perpendicular to each other .

14. Find the angle between the lines whose direction cosines satisfy the equaitons $l + m + n = 0, l^2 + m^2 - n^2 = 0.$

15. If a line makes angles $\alpha, \beta, \lambda, \delta$ with the four diagonals of a cube, then show that $\cos^2 \alpha + \cos^2 \beta + \cos^2 \lambda + \cos^2 \delta = \dfrac{4}{3}.$

16. If (l_1, m_1, n_1), (l_2, m_2, n_2) are d.c.s of two intersecting lines, show that d.c.s of two lines bisecting the angles between them are proportional to $l_1 + l_2, m_1 + m_2, n_1 + n_2$.

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17. A (-1,2-3), B(5,0,-6), C(0,4,-1) are three points, Show that direction cosines of the bisectors of $\lfloor BAC$ are proportional to (25,8,5)and (-11,20,23).

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18. If (6,10,10),(1,0,-5), (6,-10,0) are vertices of a triangle, find the direciton ratios of its sides. Determine wherther it is right angled or isosceles.

19. If the vertices of a triangle are $A(1, 4, 2), B(-2, 1, 2), C(2, 3, -4)$ then find $\angle A, \angle B, \angle C$.

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

21. If a variable line in two adjacent positions has direction cosines (l,m,n) and $(l + \delta l, m + \delta m, n + \delta n)$, then show that the

small angle $\delta\theta$ between the two position is given by $(\delta\theta)^2 = (\delta l)^2 + (\delta m)^2 + (\delta n)^2$

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