



MATHS

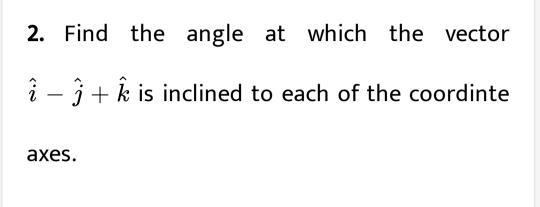
BOOKS - KC SINHA MATHS (HINGLISH)

3D - ANGLE BETWEEN TWO LINES

Solved Examples

1. Find the direction cosines of the vector

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





3. Show by using direction ratios, that the points

(2, -4, 5), (1, -1, 3) and (5, -13, 11)

are collinear



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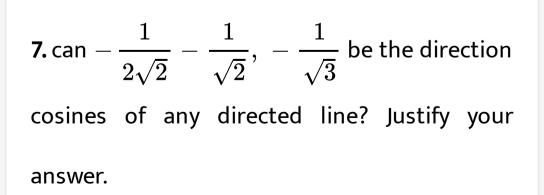
4. Find the values of a for which points (8, -7, a), (5, 2, 4) and (6, -1, 2) are collinear.

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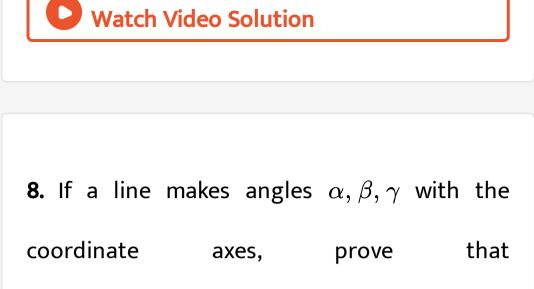
5. If Q be the foot of perpendicular from P(2, 4, 3) on the line joining the points A(1, 2, 4) and B(3, 4, 5), then co-ordinate of Q is given by



6. Find the direction cosines of the lines, connected by the relations: l + m + n = 0 and $2lm + 2\ln - mn = 0$.



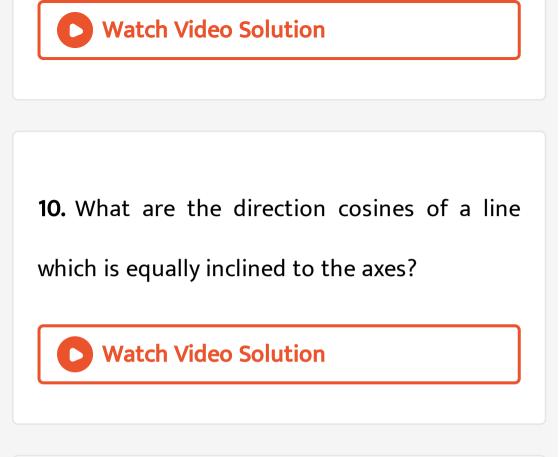




 $\sin^2lpha+\sin^2eta+\sin^2\gamma=2$

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9. A line OP through origin O is inclined at 60° and 45° to OX and OY respectivey, where O is the origin. Find the angle at which it is inclined to OZ.



11. What are the direction cosines of a line

whose direction ratios are 3,4,12?

12. Find the angles at which a line with direction ratios 2, -1, 2 is inclined to each of the coordinate axes.

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

14. Show that the three lines drawn from the origin with direction cosines proportional to 1,-1,1,2,-3,0 and 1,0,3 are coplanar

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15. 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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16. Prove that the lines whose direction cosines are given by the equations l+m+n=0 and 3lm-5mn+2nl=0

are mutually perpendicular.

17. The direction cosines of two lines are given

by the equations

3m + n + 5l = 0, 6nl - 2lm + 5mn = 0.

find the angle between them

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18. Find the angel between any two diagonals

of a cube.

19. Find the projection of the line joining (1,2,3) and (-1,4,2)` on the line having direction ratios 2,3,-6.



20. If P,Q,R,S are (3,6,4),(2,5,2),(6,4,4,),(0,2,1)

respectively find the projection of PQ on RS.

21. The projection of a vector on the coordinate axes are 6, -3, 2. Find its length and direction cosines.





1. If a line makes angle 90*o*, 60*o* and 30*o* with the positive direction of x, y and z-axis respectively,

find its direction cosines.





2. If a line makes angles 90o, 135o, 45o with the x, y and z-axes respectively, find its direction cosines.

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3. If
$$\overrightarrow{r}=2\hat{i}-3\hat{j}+2\hat{k}$$
 find the direction

cosines of `vecr.

4. Find the direction COSINES of the joining the points P(4, 3, -5) and Q(-2, 1, -8)

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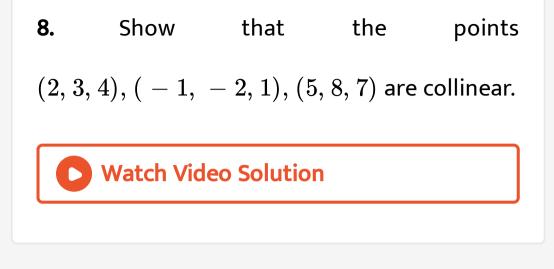
5. If a line has direction ratios -18, -12, -4 then what are its direction cosines?

6. Show that the joint of the points (1,2,3), (4,5,7) is parallel to the join of the points (-4,3,-6),(2,9,2).



7. Show that the line joining the points (1,2,3), (-1,-2,-3) is perpendicular to the line joining (-2,1,5),(3,3,2).





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

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



11. Determine the value of k so that the line joining points A(k, 1, -1) and B(2, 0, 2k) is perpendicular to the line joining the points C(4, 2k, 1) and D(2, 3, 2).

12. Determine the values of x and y so that thelinejoiningthepointsA(x, 3, 11), B(1, 1, -2) is parallel to thelinejoiningthepointsC(2, 5, 3), D(-4, y, -6).

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13. Find the direction cosines of the lines, connected by the relations: l+m+n=0 and $2lm+2\ln-mn=0$.



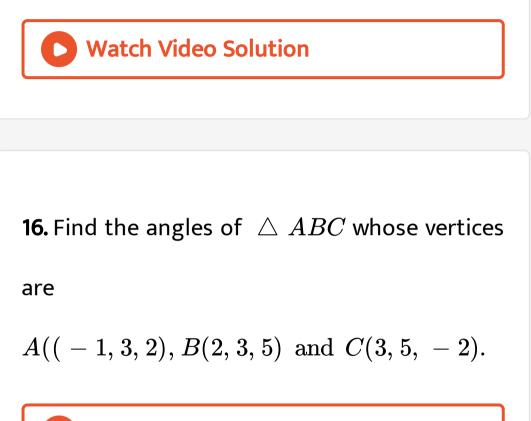
14. Find the coordinates of the foot of the perpendicular from P(2, 1, 3) on the lines joining the points A(1, 2, 4) and B(3, 4, 5).



15. If O be the origin and OP makes an angle of 45^0 and 60^0 with the positive direction of x

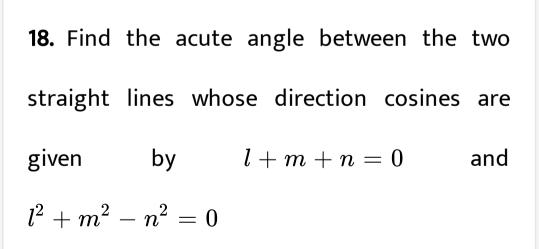
and y axes respectively and OP=12 units, find

the coordinates of P.





17. Find the angle between the lines whose direction-cosines are give / + 2m + 3n = 0 and 3/m - 4/n + mn = 0



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19. Find the projection of the line segment joining (2,-1,3) and (4, 2, 5) on a line which makes equal acute angles with co-ordinate axes.

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20. The length of the line segment whose projection on the coordinate axes are of magnitudes 12,4,3 is (1) 13 (2) 17 (3) 19 (4) 21

21. The direction cosines of x-axis are (A) 0,0,1

(B) 1,0,0 (C) 0,1,0 (D) 0,1,1



22. The direction cosines of any normal to the

xy-plane are (A) 1,0,0 (B) 0,1,0 (C) 1,1,0 (D) 0,01

23. How many lines through the origin make equal angles with the coordinate axes? (A) 1 (B) 4 (C) 8 (D) 2



24. The number 3,4,5 can be (A) direction cosines of a line in space (B) direction numbers of a line in space (C) coordinates of a point on the line y = 4z = 0 (D) coordinates of a point in the plane x + y - z = 0



25. If the direction cosines of a straighat line are k,k,k the (A) k > 0 (B) 0 < k < 1 (C) k = 1(D) $k = \frac{1}{\sqrt{3}}$ or $-\frac{1}{\sqrt{3}}$ Watch Video Solution

26. The direction cosines of line joining (1, -1, 1) and (-1, 1, 1) are (A) 2, -2, 0 (B) 1, -1, 0 (C) $\frac{1}{\sqrt{2}} - \frac{1}{\sqrt{2}}$, 0 (D) none of

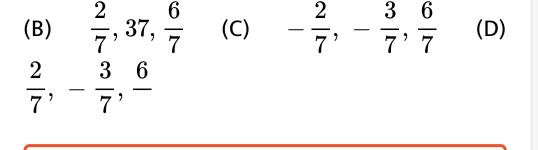
these

27. If $\alpha + \beta + \gamma$ are the angle which a half ray makes with the positive direction of the axes then $\sin^2 \alpha + \sin^2 \beta + \sin^2 \gamma = (A) \ 1 (B) \ 2 (C)$ 0 (D) -1

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28. The direction cosines of the ray from $(0,0,0)
ightarrow (2,\ -3,6)$ are (A) $-rac{2}{7},rac{3}{7},\ -rac{6}{7}$



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29. Two lines with direction cosines l_1, m_1, n_1 and l_2, m_2, n_2 are at righat angles iff (A) $l_1 l_2 + m_1 m_2 + n_1 n_2 = 0$ (B) $l_1 = l_2, m_1 = m_2, n_1 = n_2$ (C) $\frac{l_1}{l_2} = \frac{m_1}{m_2} = \frac{n_1}{n_2}$ (D) $l_1 l_2 = m_1 m_2 = n_1 n_2$

30. The projections of the segment PQ on the coordinate axes are -9,12,-8 respectively. The direction cosines of the line PQ are (A) $-\frac{9}{\sqrt{17}}, \frac{12}{\sqrt{17}}, -\frac{8}{\sqrt{17}}$ (B) $-\frac{9}{288}, \frac{12}{289}, -\frac{8}{289}$ (C) $-\frac{9}{17}, \frac{12}{17}, -\frac{8}{17}$ (D) none of these

31. If the direction cosines of a line are
$$rac{1}{c}, rac{1}{c}, rac{1}{c}$$
 rthen (A) $c.0$ (B) $0 < c < 1$ (C) $c = \pm \sqrt{3}$ (D) $c > 2$



32. A line making angles 45^{0} and 60^{0} with the positive directions of the x and y axes respectively, makes with the positive direction of z-axis an angle of (A) 60^{0} (B) 120^{0} (C) 60^{0} or 120^{0} (D) none of these

33. Find the angle between the following pair

of lines: A lines with direction ratios 2,2,1 A line

joning (3,1,4)to (7,2,12)



34. Show that the direction cosines of a vector

equally inclined to the axes OX, OY and OZ are

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

35. If a line makes angles α, β, γ with the axes

then $\cos 2\alpha + \cos 2\eta + \cos 2\gamma$ =

(A) - 2(B) - 1(C)1(D)2