



MATHS

BOOKS - BETTER CHOICE PUBLICATION

THREE DIMENSIONAL GEOMETRY

Solved Examples Section I Multiple Choice Questions

1. If a line has direction ratios < -2, -1, 2 > then its direction - cosines are

 $\begin{array}{l} \mathsf{A.} &< \frac{2}{3}, \frac{-1}{3}, \frac{-2}{3} > \\ \mathsf{B.} &< \frac{-2}{3}, \frac{-1}{3}, \frac{2}{3} > \\ \mathsf{C.} &< \frac{-2}{3}, \frac{-1}{3}, \frac{-2}{3} > \end{array}$

D. None of these

Answer: A

2. A line makes 90° , 135° , 45° with x, y and z axes respectively than its direction cosines are

A.
$$< 0, 0, 0 >$$

$$\begin{array}{l} \mathsf{B.} \ < 0, \frac{-1}{\sqrt{2}}, \frac{1}{\sqrt{2}} > \\ \mathsf{C.} \ < \frac{1}{\sqrt{2}}, \frac{-1}{\sqrt{2}}, 0 > \\ \mathsf{D.} \ < \frac{-1}{\sqrt{2}}, 0, \frac{1}{\sqrt{2}} > \end{array}$$

Answer: B

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3. If $\ < l,m,n,\ >$ are D. cosines of a line then $l^2+m^2+n^2=$

A. 0

B. 1

C. 2

D. 3

Answer: B

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4. The direction cosines of the line joining the points (-2, 4, -5) and (1, 2, 3)

is :

$$\begin{array}{l} \mathsf{A.} < \frac{-2}{\sqrt{77}}, \frac{8}{\sqrt{77}}, \frac{3}{\sqrt{77}} > \\ \mathsf{B.} < -3, 2, 8 > \\ \mathsf{C.} < \frac{3}{\sqrt{77}}, \frac{-2}{\sqrt{77}}, \frac{8}{\sqrt{77}} > \\ \mathsf{D.} < 3, -2, 8 > \end{array}$$

Answer: D

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

A. perpendicuar

B. parallel

C. intessect along y-axis

D. passes through (0,0,5/4)

Answer: B

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6. 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.
$$\frac{1}{\sqrt{29}}$$
 units.

Answer: D

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Solved Examples Section Ii Short Answer Type Questions

1. A line makes 90° , 135° , 45° with x, y and z axes respectively than its

direction cosines are

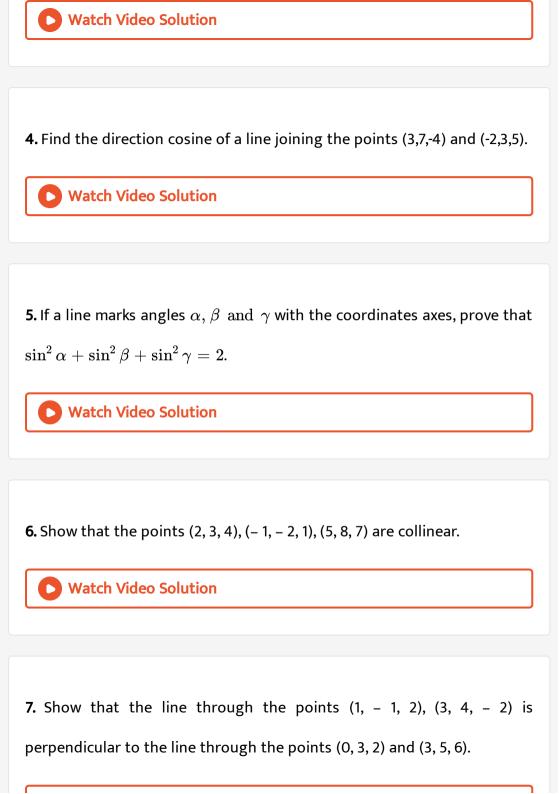
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2. Find the direction cosines of a line which makes equal angles with the coordinate axes.



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

cosines ?



8. If P,Q,R,S are the points (-2,3,4),(-4,4,6),(4,3,5),(0,1,2) prove by projection

that PQ is perpendicular to RS.

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Solved Examples Section Iii Short Answer Type Questions

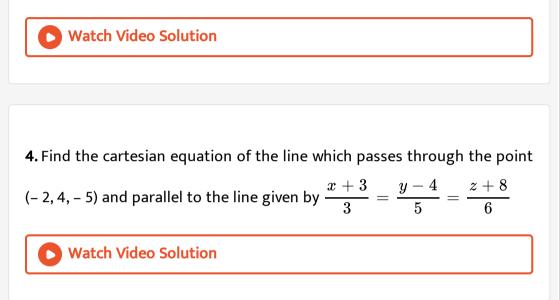
1. Find the equation of the line through the point (1,2,0) and is parallel to the vector $2\hat{i} + 3\hat{j} - 5\hat{k}$.

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2. The cartesian equation of a line is $\frac{x-1}{3} = \frac{y-4}{5} = \frac{z-3}{2}$. Write its

vector form.

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



and

Solved Examples Section Iv Short Answer Type Questions

1. Find the angle between the pair of lines

$$ec{r}=2\hat{i}-5\hat{j}+\hat{k}+\lambda\Big(3\hat{i}+2\hat{j}+6\hat{k}\Big)
onumber \ ec{r}=7\hat{i}-6\hat{k}+\widehat{h}\Big(\hat{i}+2\hat{j}+2\hat{k}\Big)$$

2. Find the angle between the lines
$$\frac{x-2}{2} = \frac{y-1}{5} = \frac{z+3}{-3}$$
 and $\frac{x+2}{-1} = \frac{y-4}{8} = \frac{z-5}{4}$
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3. Find the angle between a line with direction ratios $< 2, 1, 1 >$ and a line joining (1,2,0) to (6,2,4).
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4. 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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5. Find the values of p so that the lines $\frac{1-x}{3} = \frac{7y-14}{2}p = \frac{z-3}{2}$ and $\frac{7-7x}{3}p = \frac{y-5}{1} = \frac{6-z}{5}$ are at right angles.

ר

6. Find the angle between the lines whose direction cosines are given by

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

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7. Find the vector equation of the line passing through the point (1,2,-4)

and perpendicular to the lines

$$\frac{x-8}{3} = \frac{y+19}{-16} = \frac{z-15}{3} \text{ and } \frac{x-15}{3} = \frac{y-29}{8} = \frac{z-5}{-5}$$
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Solved Examples Section V Short Answer Type Questions

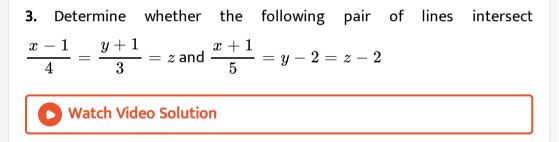
1. Find the shortest distance between the lines

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

2. Determine (by S.D.) whether or not following pair of lines intersect

$$\overrightarrow{r}=\hat{i}+\hat{j}-\hat{k}+\lambda\Big(3\hat{i}-\hat{j}\Big)$$
 and $\overrightarrow{r}=4\hat{i}-\hat{k}+\mu\Big(2\hat{i}+3\hat{k}\Big)$

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Solved Examples Section Vi Short Answer Type Questions

1. In the following case, determine the direction cosines of the normal to

the plane and the distance from the origin: 2x + 3y - z = 5

2. Find the vector equation of the plane whose cartesian form is 5x - 7y + 2z = 3.



3. Find the cartesian equation of the plane vector equation is $ec{r}.\left(\hat{i}+2\hat{j}-3\hat{k}
ight)=1$

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



5. Reduce the equation 2x + 6y + 3z + 9 = 0 to the normal form.

6. Find the vector and cartesian equations of the plane that passes through the point (1, 0, – 2) and the normal to the plane is $\hat{i}+\hat{j}-\hat{k}$

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

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8. Find the angle between the planes 2x - 3y + 4z = 1 and -x + y = 4.

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9. Find the equation of plane which passes through the point (1,-1,4) and is parallel to the plane 2x - 3y + 7z = 11.

10. 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).



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

1. Find the distance of the points (2,3,4) from the plane $ec{R}\cdot\left(3\hat{i}-6\hat{j}+2\hat{k}
ight)=-11.$

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

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3. Find the distance between the parallel planes 2x - 2y + z + 3 = 0and 4x - 4y + 2z + 5 = 0.

4. Find the angle between the line $\overrightarrow{r} = 2\hat{i} - \hat{j} + 2\hat{k} = 2\hat{i} - \hat{j} + 2\hat{k}$ the

plane
$$\overrightarrow{r} \cdot \left(2 \hat{i} - \hat{j} + \hat{k}
ight)$$

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5. Find the coordinates of the points where the line through (5,1,6) and

(3,4,1) crosses YZ-plane.

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

plane
$$\overrightarrow{r} \cdot \left(\hat{i} - \hat{j} + \hat{k}
ight) = 5$$

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8. Evaluate P(E U F), if
$$P(E) = rac{3}{4}, P(F) = rac{2}{5}$$
 and P(E/F) = $rac{5}{4}$

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Solved Examples Section Viii Long Answer Type Questions

1. A line makes angles α , β , γ , δ with the diagonals of a cube, prove that

$$\cos^2lpha+\cos^2eta+\cos^2\gamma+\cos^2\delta=rac{4}{3}$$

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

3. The length of the perpendicular drawn from the point (3, -1, 11) to

the line
$$\displaystyle rac{x}{2} = \displaystyle rac{y-2}{3} = \displaystyle rac{z-3}{4}$$
 is

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4. Find the shortest distance between the lines.
$$\frac{x-8}{3}$$
. $\frac{y+9}{-16} = \frac{z-10}{7}$
and $\frac{x-15}{3} = \frac{y-29}{8} = \frac{z-5}{-5}$.
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5. Find the equation of the plane passing through the points (2, 1, 0) and

(3, 2, 2) and parallel to the line
$$rac{x-4}{3}=rac{y-1}{-2}=rac{z-1}{1}$$

6. 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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7. find the image of the point (1,3,4) in the plane x-y+z=5

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8. A variable plane is at a constant distance 'p' from the origin and meets

the axes in a,B,C respectively, then show that locus of the centroid of the

triangle ABC is
$$rac{1}{x^2}+rac{1}{y^2}+rac{1}{z^2}=rac{9}{p^2}$$

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9. If E and F are any two events such that P(E) + P(F) - P(E and F) = P(E)Then (A) P(F/E) = 1, (B) P(E/F) = 1, (C) P(F/E) = 0, (D) P(E/F) = 0.

10. Find the vector equation of plane that contains the lines $\vec{r} = (\hat{i} + \hat{j}) + s(\hat{i} + 2\hat{j} - \hat{k})$ and $\vec{r} = (\hat{i} + \hat{j}) + t(-\hat{i} + \hat{j} - 2\hat{k})$

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11. Find the distance of the point (3,4,5) from the plane x+y+z=2

measured parallel to the line 2x = y = z.

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Assignment Most Important Questions For Practice Section I Multiple Choice Questions

1. Direction cosines of x-axis are

A. < 0, 0, 1 >B. < 1, 0, 0 >C. < 0, 1, 0 >

D. < 0, 1, 1 >

Answer: B

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2. Vector equation of the line
$$\frac{x+1}{2} = \frac{y-4}{4} = \frac{z+6}{3}$$

A. $\overrightarrow{r} = (\hat{i} - 4\hat{j} + 6\hat{k}) + \lambda(2\hat{i} + 4\hat{j} + 3\hat{k})$
B. $\overrightarrow{r} = (-\hat{i} + 4\hat{j} - 6\hat{k}) + \lambda(2\hat{i} + 4\hat{j} + 3\hat{k})$
C. $\overrightarrow{r} = (2\hat{i} + 4\hat{j} + 3\hat{k}) + \lambda(\hat{i} - 4\hat{j} + 6\hat{k})$
D. $\overrightarrow{r} = (2\hat{i} + 4\hat{j} + 3\hat{k}) + \lambda((-\hat{i} + 4\hat{j} - 6\hat{k}))$

Answer: B

3. If a line makes angles $lpha, eta, \gamma$ with x-axis and z-axis respectively, then $\sin^2lpha + \sin^2eta + \sin^2\gamma =$

A. 2

B. 1

C. 0

D. 3

Answer: A::B::C::D

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4. D. cosine of a line are $\ <rac{3}{7},rac{-2}{7},rac{-6}{7}>\$ then D. ratios of line are

A. < 3, 2, 6 >

B. < -3, 2, 6 >

C. < 7, 7, 7 >

D. None of these

Answer: B

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5. The value of λ for which the plane $\overrightarrow{r} \cdot \left(2\hat{i} - 2\hat{j} + 4\hat{k}\right) = 5$ is perpendicular to plane $\overrightarrow{r} \cdot \left(3\hat{i} - 3\hat{j} + \lambda\hat{k}\right) = 7$ is

A. 4

B. 3

C. -3

 $\mathsf{D.}-4$

Answer: C

Assignment Most Important Questions For Practice Section Ii Short Answer Type Questions

1. If a line makes angles $90^\circ,\,60^\circ,\,45^\circ$ with positive x,y and z axis, find its

direction cosines.

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2. If a line has direction ratios $\ <2,\ -1,2>\$ then what are its direction

cosines ?

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3. Write the direction cosine of a vector $\overrightarrow{a} = -2\hat{i}+\hat{j}-5\hat{k}.$

4. If α, β, γ are direction - angles of a line prove that $\cos 2lpha + \cos 2eta + \cos 2\gamma = -1$



5. Find the direction cosine of the line joining the points (1, 0, 0) and (0, 1, 1).

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6. The direction cosines of the line joining the points (-1, -1, -1) and (2, 3, 4)

are,



7. Find the direction cosines of the sides of the triangle whose vertices

are (3, 5, – 4), (– 1, 1, 2) and (– 5, – 5, – 2).



8. Show that the points A(1,2,7), B(2,6,3) ਅਤੇ C(3,10,-1) are collinear.

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9. Show that the line through the points (4, 7, 8), (2, 3, 4) is parallel to the

line through the points (- 1, - 2, 1), (1, 2, 5).

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

11. Find the projection of the line segment joining the points (1,2,3), (4,3,1) on the line with direction ratios <3, -6, 2>.



12. If P,Q,R,S are the points (1, -1, 0), (2, 1, -1), (-3, 2, 2) and

(0, -2, -1) respectively. Find the projection of PQ on RS.

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Assignment Most Important Questions For Practice Section Iii Short Answer Type Questions

1. Find the eqution of a line which is

parallel to $2\hat{i} + \hat{j} - \hat{k}$ and passes through the point (1,2,3).

2. Find the eqution of a line which is

parallel to $\hat{i}+\hat{j}+\hat{k}$ and passes through the point (2,3,1).



3. Find the eqution of a line which is

passes through the point (1,1,1) and parallel to $2\hat{i}+\hat{j}-3\hat{k}.$



4. Find a vector equation for the following line

$$rac{x+3}{2} = rac{y-5}{4} = rac{z+5}{2}$$

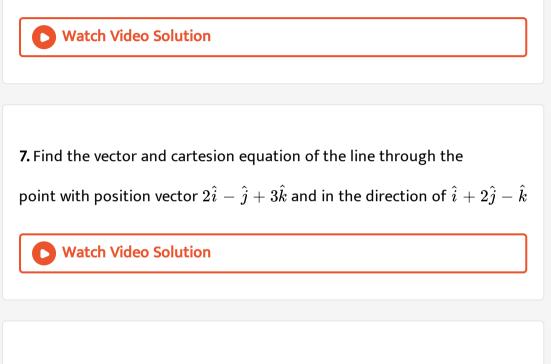
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5. Find a vector equation for the following line

$$rac{3-x}{5} = rac{y+4}{7} = rac{2z-6}{4}$$

6. Find the vector and cartesion equation of the line through the

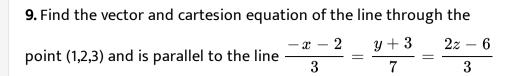
point (5,2,-4) and parallel to vector $3\hat{i} + 2\hat{j} = 8\hat{k}.$



8. Find the vector and cartesion equation of the line through the

point (1,2,3) and (2,-1,4).







10. Find the vector and cartesion equation of the line through the

point (3,0,3) and is parallel to the line $rac{x-2}{3}=rac{y+1}{1}=rac{z-7}{9}.$

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11. Find the vector equation of the line through the point (2,-1,-1) and is

parallel to the line 6x - 2 = 3y + 1 = 2z - 2.

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Assignment Most Important Questions For Practice Section Iv Short Answer Type Questions

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



2. Find the angle between the following lines

$$ec{r} = 3\hat{i} + \hat{j} - 2\hat{k} + \lambda \left(\hat{i} - \hat{j} - 2\hat{k}
ight)$$
 and $r = 2\overrightarrow{i} - \overrightarrow{j} - 6\overrightarrow{k} + \mu \left(3\overrightarrow{i} - 5\overrightarrow{j} - 4\overrightarrow{k}
ight)$

3. Find the angle between the following lines

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

$$rac{x-5}{1} = rac{2y+6}{-2} = rac{z-3}{1}$$
 and $rac{x-2}{3} = rac{1+y}{4} = rac{z-6}{5}$

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$$rac{5-x}{3} = rac{y+3}{-2}, z = 5 ext{ and } rac{x}{1} = rac{1-y}{3} = rac{z-5}{2}$$

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6. Find the angle between the pairs of line with direction ratios

$$<5,\;-12,13>,\;<-3,4,5>$$

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7. Find the angle between the lines whose direction ratios are a, b, c and

b-c, c-a, a-b



8. Show that the following lines are perpendicular

$$rac{x-3}{2} = rac{y+1}{-3} = rac{z-2}{4}$$
 and $rac{x+2}{2} = rac{y-4}{4} = rac{z-5}{2}$

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9. Show that the following lines are perpendicular

$$\frac{-x+2}{-2} = \frac{y-1}{7} = \frac{z+3}{-3} \text{ and } \frac{x+2}{-1} = \frac{2y-8}{4} = \frac{z+5}{4}$$
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10. 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.

11. Find the value of λ of the following pair of lines are perpendicular to

each other

$$\frac{1-x}{3} = \frac{7y-14}{2\lambda} = \frac{5z-10}{11} \text{ and } \frac{7-7x}{3\lambda} = \frac{y-5}{3\lambda} = \frac{6-z}{5}$$

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12. Find the value of λ of the following pair of lines are perpendicular to

each other

$$\frac{1-x}{3} = \frac{y-2}{2\lambda} = \frac{z-3}{2}$$
 and $\frac{x-1}{3\lambda} = \frac{y-1}{1} = \frac{6-z}{7}$

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13. Find the value of λ of the following pair of lines are perpendicular to

each other

$$rac{x-5}{5\lambda+2} = rac{2-y}{5} = rac{1-z}{-1}$$
 and $rac{x}{1} = rac{2y+1}{4\lambda} = rac{1-z}{-3}$

14. The angle between the lines whose direction cosines are given by the

equatios $l^2 + m^2 - n^2 = 0, m + n + l = 0$ is

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15. If a line makes angles 30°,60° and 90° with x,y and z-axis respectively,

find its direction cosines.



16. Find the angle between the two lines whose direction cosines are

given by the equation

l+m+n=0, 2l+2m-mn=0



17. Find the equation of a line passing through the point P(2,-1,-3) and perpendicular to the lines

$$\frac{x-1}{2} = \frac{y-1}{-2} = \frac{z+1}{1} \text{ and } \frac{x-2}{1} = \frac{y+1}{2} = \frac{z+3}{2}$$
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18. Find the vector and cartesian equation of the line passing through the

point (2,1,3) and perpendicular to the lines.

$$rac{x-1}{1}=rac{y-2}{2}=rac{z-3}{3}$$
 and $rac{x}{-2}=rac{y}{2}=rac{z}{5}$

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Assignment Most Important Questions For Practice Section V Short Answer Type Questions

1. Find the shortest distance between the lines

$$egin{aligned} \overrightarrow{r} &= \left(4\hat{i}-\hat{j}
ight) + \lambda \Big(\hat{i}+4\hat{j}-3\hat{k}\Big) & ext{and} \ \overrightarrow{r} &= \left(\hat{i}-\hat{j}+2\hat{k}
ight) + \mu \Big(2\hat{i}+3\hat{j}-2\hat{k}\Big) \end{aligned}$$
 and

2. Find the shortest distance between the lines

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

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3. Find the shortest distance between the lines

$$ec{r} = \hat{i} + 2\hat{j} + 3\hat{k} + \lambda\Big(2\hat{i} + 3\hat{j} + 4\hat{k}\Big)$$
 and $ec{r} = 2\hat{i} + 4\hat{j} + 5\hat{k} + \mu\Big(3\hat{i} + 4\hat{j} + 4\hat{k}\Big)$

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4. Find the shortest distance between the lines

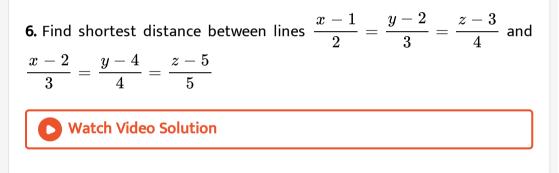
$$ec{r}=4\hat{i}-3\hat{j}+\lambda\Big(\hat{i}+2\hat{j}-2\hat{k}\Big)$$
 and $ec{r}=\hat{i}+\hat{j}-\hat{k}-\mu\Big(2\hat{i}+4\hat{j}-4\hat{k}\Big)$

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5. Find the shortest distance between the lines

$$ec{r}=\hat{i}+2\hat{j}+3\hat{k}+\lambda\Big(2\hat{i}+3\hat{j}+4\hat{k}\Big)$$
 and $ec{r}=(2\mu-1)\hat{i}+(1+\mu)\hat{j}+(9-3\mu)\hat{k}$

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7. if a line has the direction ratios 3,-1,2 , then what are its direction cosines?



8. Determine whether the following pair of lines intersect

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

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9. Determine whether the following pair of lines intersect

$$egin{aligned} \overrightarrow{r} &= \left(\hat{i}-2\hat{j}+3\hat{k}
ight) + \lambda\Big(-\hat{i}+\hat{j}-2\hat{k}\Big) & ext{and} \ \overrightarrow{r} &= \left(\hat{i}-\hat{j}-\hat{k}
ight) + \mu\Big(\hat{i}+2\hat{j}-2\hat{k}\Big) \end{aligned}$$
 and

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10. Prove that the lines :
$$\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$$
 and $\frac{x-2}{3} = \frac{y-3}{4} = \frac{z-4}{5}$ are coplanar.
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Assignment Most Important Questions For Practice Section Vi Short Answer Type Questions 1. Find the cartesian equation of plane $\overrightarrow{r}\cdot\left(\hat{i}+\hat{j}-\hat{k}
ight)=2$



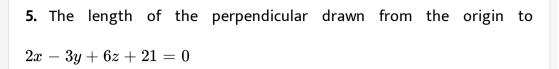
2. Find the Cartesian equation of the following plane: $\vec{r} \cdot \left[(s-2t)\hat{i} + (3-t)\hat{j} + (2s+t)\hat{k} \right] = 15$

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3. Find the vector equation of the plane whose cartesian from of the equation is x - 2y + 32 + 1 = 0

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4. Find the direction cosine of the perpendicular from origin to plane $ec{r}\cdot\left(\hat{i}+2\hat{j}-2\hat{k}
ight)=18$





6. Find the intercepts cut off by the plane x + 2y - 2z = 9 with the axes.



7. Find the vector and cartesian equation of the plane passing through the point (1,2,3) and perpendicular to the line with direction ratio < 2, 3, -4 > .

8. Find the equation of the plane passing through origin and parallel to

the plane x + 3y - 2z + 7 = 0.



9. Find the equation of plane passing through the point (1,4,-2) and

parallel to the plane 2x - y + 3z = 0

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10. Find the angle between the following planes

3x-6y-2z=7 and 2x+y-2z=5



11. Find the angle between the following planes

$$2x-y-z=6$$
 and $x+y+2z=7$

12. Find the angle between the following planes

$$\overrightarrow{r}\cdot\left(\hat{i}+\hat{j}-2\hat{k}
ight)=3$$
 and $\overrightarrow{r}\cdot\left(2\hat{i}-2\hat{j}+\hat{k}
ight)=2$

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13. Find the angle between the following planes

$$\overrightarrow{r}\cdot\left(3\hat{i}-4\hat{j}+5\hat{k}
ight)=0$$
 and $\overrightarrow{r}\cdot\left(2\hat{i}-\hat{j}-2\hat{k}
ight)=0$

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14. Find the angle between the following pair of lines



15. Find the equation of plane passing through the intersection of the planes 2x - 7y + 4z = 3, 3x - 5y + 4z + 11 = 0 and the point (-2, 1, 3)

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16. Find the vector equation of the plane through the intersection of the planes $\overrightarrow{r} \cdot (\hat{i} + \hat{j} + \hat{k}) = 6$ and $\overrightarrow{r} \cdot (2\hat{i} + 3\hat{j} + 4\hat{k}) = -5$ and the point (1,1,1).

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

18. Find the equation of the plane passing through the line of intersection of the planes 2x + y - z = 3 and 5x - 3y + 4z = 9 and parallel to the lines $\frac{x-1}{2} = \frac{y-3}{4} = \frac{z-5}{5}$

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19. Find the equation of the through to the line of intersection of the planes 3x - 4y + 5z = 10 and 2x + 2y - 3z = 4 and parallel to the lines x = 2y = 3z.



20. Find the equations of the planes passing through the following points

$$(3,\ -1,2),(\ -1,\ -1,6),(5,2,4)$$

21. Find the equations of the planes passing through the following points

$$(-3,5,1), (4,\,-1,2), (2,3,4)$$

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22. Find the equations of the planes passing through the following points

 $(2,\,5,\,\,-3),\,(\,-2,\,\,-3,\,5),\,(5,\,3,\,\,-3)$

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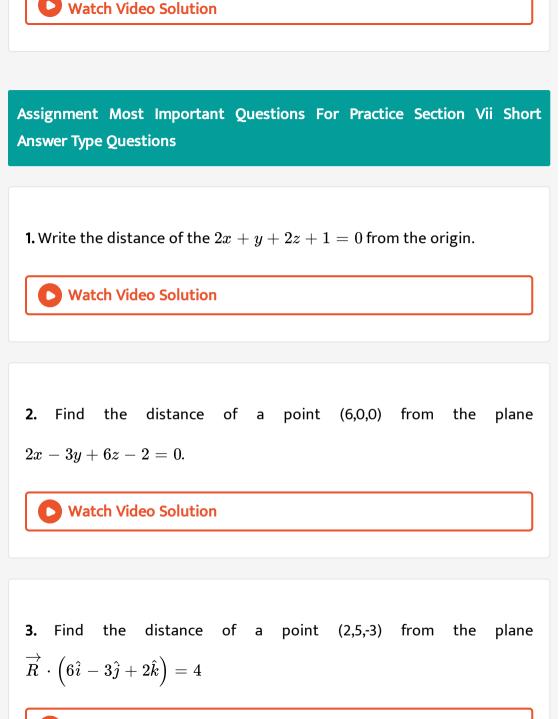
23. Find the equations of the planes passing through the following points

$$(1,\,1,\,1),\,(1,\,\,-1,\,1),\,(\,-7,\,\,-3,\,\,-5)$$



24. Show that the points (-6, 3, 2), (3, -2, 4), (5, 7, 3) and (-13, 17, -1) are coplanar.





4. Find the distance between the parallel planes 2x - 3y + z + 3 = 0

and 4x - 6y + 2z + 5 = 0

5. Find the angle between the following line and plane respectively

$$rac{x-1}{1} = rac{y-2}{-1} = rac{z+1}{1}, 2x-y+z = 1$$

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6. Find the angle between the following line and plane respectively

$$rac{x+1}{2} = rac{y-1}{2} = rac{z-2}{4}, 2x+y-3z+4 = 0$$

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7. Find the angle between the following line and plane respectively

$$\overrightarrow{v}=2\hat{i}-\hat{j}+3\hat{k}+\lambda\Big(3\hat{i}-\hat{j}+2\hat{k}\Big), \, \overrightarrow{r}\cdot\Big(3\hat{i}+4\hat{j}+\hat{k}\Big)+5=0$$

8. Find the angle between the following line and plane respectively

$$\overrightarrow{r}=\left(\hat{i}-\hat{j}+\hat{k}
ight)+\lambda\Big(2\hat{i}-\hat{j}+3\hat{k}\Big),\,\overrightarrow{r}\cdot\Big(2\hat{i}-\hat{j}+\hat{k}\Big)=4$$

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9. Find the coordinate of the point where the line through (5,1,6) and

(3,4,1) meet the XY-plane

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10. Find the points where the line $\frac{x+1}{2} = \frac{y-2}{-3} = \frac{z+3}{4}$ meets the plane 2x + 4y - z = 1.

11. Find the distance of a point (3,4,5) from the point of intersection of the line $\overrightarrow{r} = 3\hat{i} + 4\hat{j} + 5\hat{k} + \lambda(\hat{i} + 2\hat{j} + 3\hat{k})$ and the plane $\overrightarrow{r} \cdot (\hat{i} + \hat{j} + \hat{k}) = 2$

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12. Find the distace of a point (2,12,5) from the point where the line $\frac{x-2}{3} = \frac{y+4}{4} = \frac{z-2}{2}$ meets the plane x - 2y + z = 0

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13. Show that the lines

$$ec{r}=3\hat{i}+2\hat{j}-4\hat{k}+\lambda\Big(\hat{i}+2\hat{j}+2\hat{k}\Big)
onumber \ ec{r}=5\hat{i}-2\hat{j}+\hat{k}+\mu\Big(3\hat{i}+2\hat{j}+6\hat{k}\Big)$$

intersect, Hence find the point of intersection.



Assignment Most Important Questions For Practice Section Viii Long Answer Type Questions

1. Find the length of perpendicular from (2,1,3) on the line

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

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

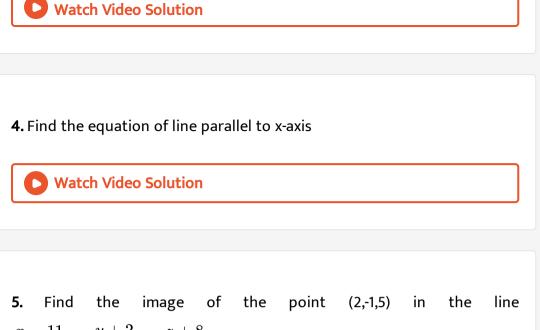
Also find the coordinates of foot of perpendicular and the equation of

the perpendicular.

3. Find the length and foot of perpendicular drawn from the point (2,-1,3)

to the line

$$\frac{x-11}{10} = \frac{y+2}{-4} = \frac{z+8}{-11}$$



 $\frac{x-11}{10} = \frac{y+2}{-4} = \frac{z+8}{-11}$. Also find the equation of the line joining the

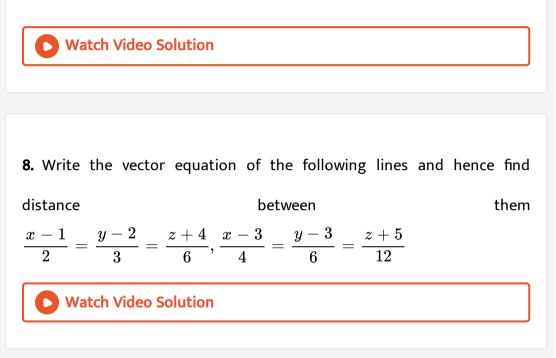
given point and its. Also the length of that line segment .

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6. Find the image of the point P(3,4,2) in the line $\overrightarrow{r}=-\hat{i}+3\hat{j}+\hat{k}+\lambda\Big(\hat{i}+3\hat{j}-\hat{k}\Big)$

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Show that the lines $\frac{x+3}{-3} = \frac{y-1}{1} = \frac{z-5}{5}$ and 7. $\frac{x+1}{1} = \frac{y-2}{2} = \frac{z-5}{5}$ are coplanar. Also find the equation of the plane containing the lines.



9. Find the equation of the plane through the point (0, 0, 0) and (3, -1, 2)

and parallel to the line.
$$rac{x-4}{1}=rac{y+3}{-4}=rac{z+1}{7}$$
 .

10. Find the equation of the plane passing through the points (2,1,0),

(3,2,2) and is parallel to the line
$$\displaystyle rac{x-1}{2} = \displaystyle rac{y-2}{3} = \displaystyle rac{z-3}{1}.$$

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11. Find the equation of the plane through the points (2,-3,-1) and (5,2,-1)

and perpendicular to the plane x - 2y + 4z = 10.

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12. Find the vector equation of the plane through the points (2,1,-1) and

(-1,3,4) and perpendicular to the plane x - 2y + 4z = 10.



13. Find the equation of the plane passing through (1,1,-1) and perpendicular to the planes x + 2y + 3z - 7 = 0, 2x - 3z + 4y = 0



14. Find the equation of the plane passing through (-1,-1,2) and perpendicular to the planes 2x + 3y + 3z = 2 and 5x - 4y + z = 6.

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15. Find the length and the foot of the perpendicular from the point

(7, 14, 5) to the plane 2x + 4y - z = 2.

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16. Find the image of (2,-1,3) in the plane 3x - 2y - z = 9.



17. A variable plane which remains at a constant distance 3p from the origin cuts the coordinate axes at A,B,C. Show that locus of the O centroid of the triangle ABC is

$$rac{1}{x^2}+rac{1}{y^2}+rac{1}{z^2}=rac{1}{p^2}.$$

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18. Find the cartesian and vector equations of the planes passing through

the intersection of te planes $\overrightarrow{r}\cdot\left(2\hat{i}+6\hat{j}
ight)+12=0$ and $\overrightarrow{r}\cdot\left(3\hat{i}-\hat{j}-4\hat{k}
ight)=0$ which are at a unit distance from the origin.

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19. Find the distance of the point P(6,5,9) and from the plane through the

points (3,-1,2), (5,2,4) and (-1,-1,6).



20. Find the distance of the point (2,3,4) measured parallel to the line $\frac{x-3}{3} = \frac{y-2}{6} = \frac{z}{2}$ from the plane 3x + 2y + 2z - 5 = 0

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21. Find the distance of the point (-2,3,-4) from the line.

 $\frac{x+2}{3} = \frac{2y+3}{4} = \frac{3z+4}{5}$ measured parallel to the line $\frac{x}{2} = \frac{y}{3} = \frac{z}{-6}.$

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22. 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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23. Find the vector and cartesian equation of the plane containing the

two lines

$$ec{r}=2\hat{i}+\hat{j}-3\hat{k}+\lambda\Big(\hat{i}+2\hat{j}+5\hat{k}\Big)$$
 and $ec{r}=3\hat{i}+3\hat{j}-7\hat{k}+\mu\Big(3\hat{i}-2\hat{j}+5\hat{k}\Big)$

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24. Find the equation of the plane containing the lines

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

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Previous Years Board S Question For Practice M C Q

1. If a line passing through two points (-2,4,-5) and (1,2,3) then its direction cosines will be :

A.
$$< 3, -2, 5 >$$

$$B. < \frac{-2}{\sqrt{77}}, \frac{3}{\sqrt{77}}, \frac{8}{\sqrt{77}} > \\ C. < \frac{3}{\sqrt{77}}, \frac{-2}{\sqrt{77}}, \frac{8}{\sqrt{77}} > \\ \end{array}$$

D. None of these

Answer: C



2. If a line makes equal angles with coordinates axes its direction - cosines are.

$$\begin{array}{l} \mathsf{A.} < \frac{1}{\sqrt{3}}, \frac{-1}{\sqrt{3}}, \frac{1}{\sqrt{3}} > \\ \mathsf{B.} < \pm \frac{1}{\sqrt{3}}, \pm \frac{-1}{\sqrt{3}}, \pm \frac{1}{\sqrt{3}} > \\ \mathsf{C.} < 0, 0, 0 > \end{array}$$

D.
$$< 1, 1, 1 >$$

Answer: B

3. If a line makes angles 90° , 60° and 30° with the positive direction of x,y and z-axis reapectively, then direction cosines are

$$\begin{array}{l} \mathsf{A.} \ < 1, \frac{1}{2}, \frac{\sqrt{3}}{2} > \\ \mathsf{B.} \ < 0, \frac{1}{2}, \frac{\sqrt{3}}{2} > \\ \mathsf{C.} \ < 0, \frac{-1}{2}, \frac{\sqrt{3}}{2} > \end{array}$$

D. None of these

Answer: B

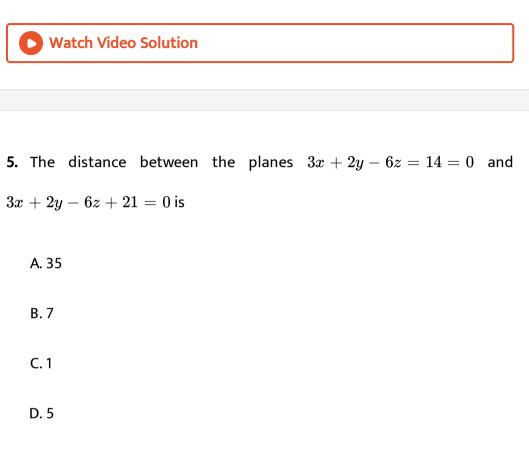
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4. Find the intercepts cut off by the plane 2x + y - z = 5

A. $\frac{5}{2}$, 5, -5B. $\frac{1}{2}$, 1, -1C. 2, 1, -1

D. None of these

Answer: A



Answer: D



6. Distance between plane defined by 3x + 4y + 5 = 0 and the point (5,

0, 7) is

A. 3		
B. 4		
C. 5		
D. 6		

Answer: B

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7. Direction casines of z-axis are

A. 1 < 0, 0, 1 >

- B. < 1, 0, 0 >
- C. < 0, 0, 0 >
- D. < 0, 1, 0 >

Answer: A

Previous Years Board S Question For Practice

1. Find the length of perpendicular drawn from the point (3,4,5) on the

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

Also find the foot of perpendicular.

2. Find the length of perpendicular from the point (5,8,1) on the line

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

3. Find the length of perpendicular from the point (5,4,-1) on the line

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

4. Find the shortest distance between the following lines

$$\stackrel{
ightarrow}{r}=\hat{i}+\hat{j}+\lambda\Big(\hat{i}-\hat{k}\Big)$$
 and $\stackrel{
ightarrow}{r}=2\hat{i}-\hat{j}+\mu\Big(\hat{i}+\hat{j}+\hat{k}\Big)$



5. Find the shortest distance between the following lines

$$\overrightarrow{r}=\hat{i}+\hat{j}+\lambda\Big(\hat{i}-\hat{j}+\hat{k}\Big)$$
 and $\overrightarrow{r}=2\hat{i}+\hat{j}-\hat{k}+\mu\Big(3\hat{i}-4\hat{j}+\hat{k}\Big)$

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6. Find the shortest distance between the following lines

$$ec{r} = \hat{i} - \hat{j} - \hat{k} + \lambda \Big(\hat{i} + \hat{j} - \hat{k} \Big)$$
 and $ec{r} = 3\hat{i} - \hat{j} - 2\hat{k} + \mu \Big(-\hat{i} + 2\hat{j} + \hat{k} \Big)$

7. Find the shortest distance between the following lines

$$ec{r} = -\hat{i}+2\hat{j}-\hat{k}+\lambdaig(\hat{i}+\hat{j}-\hat{k}ig) \qquad ext{ and } \ ec{r} = \hat{i}-\hat{j}+2\hat{k}+\muig(-\hat{i}+\hat{j}+\hat{k}ig).$$

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8. Find the shortest distance between the following lines

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

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9. Find the equation of the plane containing the line
$$\frac{x+3}{2} = \frac{y-2}{-1} = \frac{z-4}{4}$$
 and perpendicular to the plane $x+2y+z-6=0.$

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

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11. Determine whether the lines

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

or not

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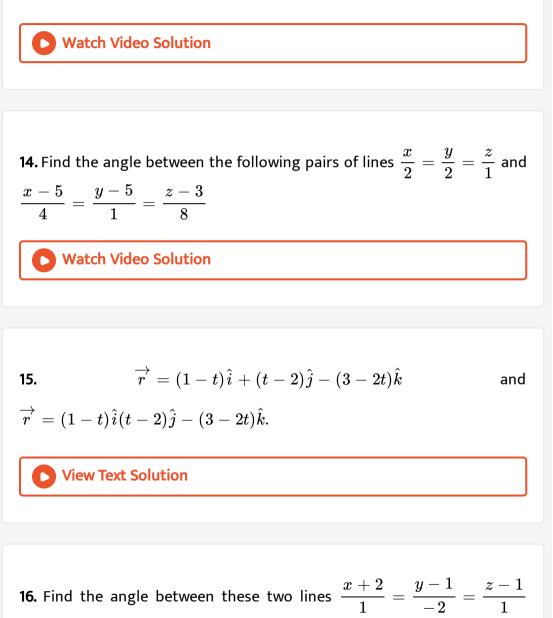
12. Find the equation of the plane passing through the points (0,-1,1),

(4,5,1) and (3,9,4)



13. Find the equation of the plane passing through the point (1,1,0),(1,2,1)

and (2,3,2).



and
$$rac{x-3}{2} = rac{y+5}{-2} = rac{z-7}{1}.$$

17. Find the vector equation of the plane which is at a distance of 7 units from the origin and which is normal to the vector $3\hat{i} + 5\hat{j} - 6\hat{k}$.

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18. Find the equation of the plane through intersection of the planes :

x-2y+3z-4=0 and x+2y+z-2=0 and the point (2,2,1)

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19. Find the equation of the plane passing through the points

$$(1, 2, \ -1), (2, 4, \ -3), (4, \ -2, 1)$$

20. Find the equation of the plane passing through the points

(1, 1, 0), (1, 3, 0), (2, 5, 1)



21. Find the direction cosine of a line parallel to the line $\frac{2x-5}{4} = \frac{y+4}{3} = \frac{6-z}{6}$ Watch Video Solution

22. Find the equation of the straight line passing through the point (2,-1,3) and perpendicular to the lines

$$egin{aligned} \overrightarrow{r} &= ig(\hat{i}+\hat{j}-\hat{k}ig) + \lambda ig(2\hat{i}+\hat{j}-3\hat{k}ig) & ext{and} \ \overrightarrow{r} &= ig(\hat{i}-\hat{j}-\hat{k}ig) + \mu ig(\hat{i}+\hat{j}+\hat{k}ig). \end{aligned}$$
 and

23. Find the equation of a plane through the points

$$(1, 0, 1), (1, 2, -2), (2, -1, 0)$$



24. Find the equation of a plane passing through the points (1,1,2) and

(1,0,-2) and parallel to the line
$$rac{x-1}{1}=rac{y-2}{3}=rac{z-3}{5}$$

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25. Find the equation of the plane through the point (-1, -1, 2) and (3, 4, 2)

and parallel to the line
$$rac{x-1}{2}=rac{y-2}{3}=rac{z-3}{1}$$

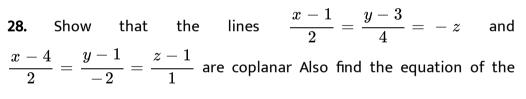
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26. Find the equation of the plane passing through the point(-1, 3, 2) and

perpendicular to the planes x + 2y + 3z = 5 and 3x + 3y + z = 0.



27. A variable plane which is at a constant 6 p from the origin meets the axes in A,B and C respectively. Show that the locus of the centroid of the triangle ABC is $\frac{1}{x^2} + \frac{1}{y^2} + \frac{1}{z^2} = \frac{1}{4p^2}$ Watch Video Solution



plane containing the lines.

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29. 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. Also find the equation of the plane containing the lines.



30. Prove that the lines :
$$\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$$
 and $\frac{x-2}{3} = \frac{y-3}{4} = \frac{z-4}{5}$ are coplanar.
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31. 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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32. Find the vector equation of the plane through the intersection of the

planes

$$\overrightarrow{r}\cdot\left(2\hat{i}-2\hat{j}+3\hat{k}
ight)=2,\,\overrightarrow{r}\cdot\left(\hat{i}-3\hat{j}+2\hat{k}
ight)=\ -3$$
 and the point

(1,2,3).

33. Find the equation of the plane through the intersection of the planes

$$\overrightarrow{r}\cdot\left(2\hat{i}+\hat{j}+3\hat{k}
ight)=7$$
 and $\overrightarrow{r}\cdot\left(2\hat{i}+3\hat{j}+3\hat{k}
ight)=9$ and passing

through the point (2,1,3).

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34. Find the equation of the straight line through the point (1,-3,2) and perpendicular to the lines
$$\frac{x-1}{1} = \frac{y-2}{2} = \frac{z-3}{3}$$
 and $\frac{x-1}{-3} = \frac{y-2}{2} = \frac{z-1}{5}$. **Vatch Video Solution**

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

36. Find the shortest distance between the line

$$\overrightarrow{r} = \hat{i} - 7\hat{j} - 2\hat{k} + \lambda\left(\hat{i} + 3\hat{j} + 2\hat{k}\right)$$
 and
 $\overrightarrow{r} = 3\hat{i} + 4\hat{j} - 2\hat{k} + \mu\left(-\hat{i} + 2\hat{j} + \hat{k}\right).$

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37. Find the equation of the plane through the point (1, 1, 1), parallel to the line $\frac{x-1}{2} = \frac{y-2}{-3} = \frac{z-3}{3}$ and perpendicular to the plane x - 2y + z - 6 = 0.

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38. Find the distance between the point with position vector $-\hat{i} - 5\hat{j} - 10\hat{k}$ and the point of intersection of the line $\frac{x-2}{3} = \frac{y+1}{4} = \frac{z-12}{12}$ with the plane x - y + z = 5.

39. 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 each other . Find also the point of intersection.

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40. 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. Also find the equation of the

plane containing the lines.

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41. Find the foot of perpendicular drawn from origin to the plane

2x + 3y + 4z - 12 = 0

42. Find the vector equation of the line passing through (1, 2, 3) and perpendicular to the plane $\overrightarrow{r}\cdot\left(\hat{i}+2\hat{j}-5\hat{k}
ight)+9=0$

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43. Find the equation of the plane passing through (a, b, c) and parallel to

the plane
$$\overrightarrow{r}\cdot\left(\hat{i}+\hat{j}+\hat{k}
ight)=2$$

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44. Find the shortest distance between the lines whose vector equations

are :

$$ec{r}=igg(-2\hat{i}+3\hat{j}+5\hat{k}igg)+\lambdaigg(7\hat{i}-\hat{k}igg)$$
 and $ec{r}=4\hat{i}+5\hat{j}+6\hat{k}+\muigg(2\hat{i}+3\hat{j}+\hat{k}igg)$

45. Find the shortest distance between the lines whose vector equations

are :

$$ec{r}_1=2\hat{i}+3\hat{j}+4\hat{k}+\lambda\Big(2\hat{i}-\hat{j}+\hat{k}\Big)
onumber \ ec{r}_2=3\hat{i}-2\hat{j}-\hat{k}+\mu\Big(3\hat{i}+2\hat{j}-4\hat{k}\Big)$$

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46. Find the shortest distance between the lines whose vector equations

are :
$$\overrightarrow{r}=6\hat{i}+2\hat{j}+2\hat{k}+\lambda\Big(\hat{i}-2\hat{j}+2\hat{k}\Big)$$
and $\overrightarrow{r}=-4\hat{i}-\hat{k}+\mu\Big(3\hat{i}-2\hat{j}-4\hat{k}\Big)$

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

48. Find the equation of the plane passing through the points (0,-1,0),

(1,1,1) and (3,3,0).



49. Find the equation of the plane passing through the points (2,2,1),

(9,3,5) and perpendicular to the plane 2x + 6y + 6z - 1 = 0.

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50. 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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51. Find the shortest distance between the lines

$$\overrightarrow{r}=\hat{i}+\hat{j}+\lambda\Big(2\hat{i}-\hat{j}+\hat{k}\Big)$$
 and $\overrightarrow{r}=2\hat{i}+\hat{j}-\hat{k}+\mu\Big(3\hat{i}-5\hat{j}+2\hat{k}\Big)$



52. Find the coordinate of the point where the line through the points

A(3,4,1) and B(5,1,6) crosses the

xy-plane

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53. Find the coordinate of the point where the line through the points

A(3,4,1) and B(5,1,6) crosses the

yz-plane

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54. Find the coordinate of the point where the line through the points

A(3,4,1) and B(5,1,6) crosses the

zx-plane

55. Find the vector equation of the plane passing through the intersection of the planes $\vec{r} \cdot (2\hat{i} + 2\hat{j} - 3\hat{k}) + 7 = 0$ and $\vec{r} \cdot (2\hat{i} + 5\hat{j} + 3\hat{k}) = 9$ and passing through the point (2,1,3).

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56. Show that the points whose position vectors are
$$-2\hat{i} + 3\hat{j} + 5\hat{k}, \hat{i} + 2\hat{j} + 3\hat{k}$$
 and $7\hat{i} - \hat{k}$ are collinear.

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57. Find the image of the point (2,0,1) in the line

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

58. Find the angle 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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59. Find the equation of the plane through the points (2, 2, 1) and (9, 3, 6) and perpendicualr to the plane 2x + 6y + 6z = 1.

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60. Find the co-ordinates of the foot of perpendicular drawn from the point (2, 3, 5) on the plane given by the equation : 2x - 3y + 4z + 10 = 0

