Three Dimensional Geometry

Question 1.

The angle between the line $\frac{x-5}{7}=\frac{y+2}{-5}=\frac{z}{1}$ and $\frac{x}{1}=\frac{y}{2}=\frac{z}{3}$ is

(a) 0 (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{4}$

Answer:
(b) $\frac{\pi}{2}$

Question 2.
The angle between the lines passing through the points (4, 7, 8), (2, 3, 4) and (-1, -2, 1), (1, 2, 5) is
(a) 0
(b) $\frac{\pi}{2}$
(c) $\frac{\pi}{4}$
(d) $\frac{\pi}{6}$
Answer:
(a) 0

Question 3.

Find the equation of line passing through the origin which intersect the line $\frac{x-3}{2}=\frac{y-3}{1}=\frac{z-0}{1}$ at angle $\frac{\pi}{3}$.

(a) $\frac{x}{1}=\frac{y}{2}=\frac{z}{-1}$ (b) $\frac{x}{-1}=\frac{y}{1}=\frac{z}{-2}$

(c) $\frac{x}{1}=\frac{y}{3}=\frac{z}{2}$ (d) Both (a) and (b)

Answer:
(d) Both (a) and (b)

Question 4.

Equation of a line passing through (1, 2, –3) and parallel to the line $\frac{x-2}{1}=\frac{y+1}{3}=\frac{z-1}{4}$ is

(a) $\frac{x-1}{1}=\frac{y-2}{3}=\frac{z+3}{4}$ (b) $\frac{x-2}{1}=\frac{y+1}{2}=\frac{z-1}{-3}$

(c) $\frac{x-1}{1}=\frac{y-3}{2}=\frac{z-4}{-3}$ (d) None of these

Answer:
(a) $\frac{x-1}{1}=\frac{y-2}{3}=\frac{z+3}{4}$

Question 5.

If lines $\frac{x-1}{-3}=\frac{y-2}{2k}=\frac{z-3}{2}$ and $\frac{x-1}{3k}=\frac{y-5}{1}=\frac{z-6}{-5}$ are mutually perpendicular, then k is equal to

(a) $-\frac{10}{7}$ (b) $-\frac{7}{10}$ (c) -10 (d) -7

Answer:
(a) $-\frac{10}{7}$

Question 6.
Equation of the plane passing through three points A, B, C with position vectors

$$-6\hat{i}+3\hat{j}+2\hat{k}, 3\hat{i}-2\hat{j}+4\hat{k}, 5\hat{i}+7\hat{j}+3\hat{k}$$

(a) $\vec{r}.(\hat{i}-\hat{j}-2\hat{k})+23=0$

(b) $\vec{r}.(\hat{i}+\hat{j}+7\hat{k})=23$

(c) $\vec{r}.(\hat{i}+\hat{j}-7\hat{k})+23=0$

(d) $\vec{r}.(\hat{i}-\hat{j}-7\hat{k})=23$

Answer:
(a) $\pi(\hat{i}-\hat{j}-2\hat{k})+23=0$

Question 7.
Four points (0, -1, -1) (-4, 4, 4) (4, 5, 1) and (3, 9, 4) are coplanar. Find the equation of the plane containing them.
(a) 5x + 7y + 11z – 4 =0
(b) 5x – 7y + 11z + 4 = 0
(c) 5x – 7y – 11z – 4 = 0
(d) 5x + 7y – 11z + 4 = 0
Answer:
(b) 5x – 7y + 11z + 4 = 0

Question 8.
Find the equation of plane passing through the points P(1, 1, 1), Q(3, -1, 2), R(-3, 5, -4).
(a) x + 2y = 0
(b) x – y = 2
(c) -x + 2y = 2
(d) x + y = 2
Answer:
(d) x + y = 2

Question 9.
The vector equation of the plane passing through the origin and the line of intersection of the plane r.a = λ and r.b = μ is
(a) r.(λa – μb) = 0
(b) r.(λb – μa) = 0
(c) r.(λa + μb)= 0
(d) r.(λb + μa) = 0
Answer:
(b) r.(λb – μa) = 0

Question 10.
The vector equation of a plane passing through the intersection of the planes $r.(\hat{i}+\hat{j}+\hat{k})=6$ and $r.(2\hat{i}+3\hat{j}+4\hat{k})=-5$ and the point (1, 1, 1) is

(a) $\vec{r}.(3\hat{i}+4\hat{j}+5\hat{k})=1$ (b) $\vec{r}.(8\hat{i}+5\hat{j}+2\hat{k})=99$

(c) $\vec{r}.(20\hat{i}+23\hat{j}+26\hat{k})=69$

(d) $\vec{r}.(20\hat{i}-23\hat{j}-26\hat{k})=69$

Answer:
(c) $r.(20\hat{i}+23\hat{j}+26\hat{k})=69$

Question 11.
The lines $\frac{x-1}{2}=\frac{y+1}{-3}=\frac{z+10}{8}$ and $\frac{x-4}{4}=\frac{y+3}{k}=\frac{z+1}{7}$ are coplanar if k =

(a) 4 (b) –4
(c) 2 (d) –2

Answer:
(b) -4

Question 12.
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

(a) coplanar
(b) non-coplanar
(c) perpendicular
(d) None of the above
Answer:
(a) coplanar

Question 13.
The angle between the planes 3x + 2y + z – 5 = 0 and x + y – 2z – 3 = 0 is

(a) $\cos^{-1}\left(\frac{3}{2\sqrt{7}}\right)$ (b) $\cos^{-1}\left(\frac{3}{2\sqrt{14}}\right)$

(c) $\cos^{-1}\left(\frac{3}{2\sqrt{21}}\right)$ (d) None of these

Answer:
(c) $\cos^{-1}\left(\frac{3}{2\sqrt{21}}\right)$

Question 14.
The equation of the plane through the point (0, -4, -6) and (-2, 9, 3) and perpendicular to the plane 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) 2x + y – z = 2

Question 15.
The angle between the planes $r \cdot (\hat{i} + 2\hat{j} + \hat{k}) = 4$ and $r(-\hat{i} + \hat{j} + 2\hat{k}) = 9$ is
(a) 30°
(b) 60°
(c) 45°
(d) None of these
Answer:
(b) 60°

Question 16.
The value of p, so that the line $\frac{1-x}{3} = \frac{7y-14}{2p} = \frac{z-3}{2}$ **and** $\frac{7-7x}{3p} = \frac{y-5}{1} = \frac{6-z}{5}$ **intersect at right angle, is**

(a) $\frac{10}{11}$ (b) $\frac{70}{11}$ (c) $\frac{10}{7}$ (d) $\frac{70}{9}$

Answer:
(b) $\frac{70}{11}$

Question 17.
The shortest distance between the lines
$\vec{r} = -(\hat{i} + \hat{j} + \hat{k})\lambda(2\hat{i} + 3\hat{j} + 4\hat{k})$ **and**

$$\vec{r} = -\hat{i} + \mu(3\hat{i} + 4\hat{j} + 5\hat{k}) \text{ is}$$

(a) 1 (b) $\frac{1}{\sqrt{2}}$ (c) $\frac{1}{\sqrt{3}}$ (d) $\frac{1}{\sqrt{6}}$

Answer:
(d) $\frac{1}{\sqrt{6}}$

Question 18.
The shortest distance between 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 equal
(a) $3\sqrt{30}$
(b) $\sqrt{30}$
(c) $2\sqrt{30}$
(d) None of these
Answer:
(a) $3\sqrt{30}$

Question 19.
The shortest distance between the lines x = y = z and $x + 1 - y = \frac{z}{0}$ is
(a) $\frac{1}{2}$
(b) $\frac{1}{\sqrt{2}}$
(c) $\frac{1}{\sqrt{3}}$
(d) $\frac{1}{\sqrt{6}}$
Answer:
(d) $\frac{1}{\sqrt{6}}$

Question 20.
The shortest distance between the lines x = y + 2 = 6z – 6 and x + 1 = 2y = -12z is
(a) $\frac{1}{2}$
(b) 2
(c) 1
(d) $\frac{3}{2}$
Answer:
(b) 2

Question 21.
The angle θ between the line r = a + λb is given by

(a) $\sin^{-1}\left(\frac{\vec{b}.\hat{n}}{|\vec{b}|}\right)$ (b) $\cos^{-1}\left(\frac{\vec{b}.\hat{n}}{|\vec{b}|}\right)$

(c) $\sin^{-1}\left(\frac{\vec{a}.\hat{n}}{|\vec{a}|}\right)$ (d) $\cos^{-1}\left(\frac{\vec{a}.\hat{n}}{|\vec{a}|}\right)$

Answer:
(a) $\sin^{-1}\left(\frac{\vec{b}.\hat{n}}{|\vec{b}|}\right)$

Question 22.
Find the angle between the line $\vec{r} = \hat{i} + 2\hat{j} - \hat{k} + \lambda(\hat{i} - \hat{j} + \hat{k})$ and the plane $\vec{r}.(2\hat{i} - \hat{j} + \hat{k}) = 4$.

(a) $\sin^{-1}\left(\frac{2\sqrt{2}}{3}\right)$ (b) $\sin^{-1}\left(\frac{2}{3}\right)$

(c) $\sin^{-1}\left(\frac{2}{\sqrt{3}}\right)$ (d) $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$

Answer:
(a) $\sin^{-1}\left(\frac{2\sqrt{2}}{3}\right)$

Question 23.
The angle between the straight line $\frac{x-1}{2} = \frac{y+3}{-1} = \frac{z-5}{2}$ and the plane 4x – 2y + 4z = 9 is
(a) 60°
(b) 90°
(c) 45°
(d) 30°
Answer:
(b) 90°

Question 24.
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) $\sqrt{\alpha^2 + \gamma^2}$

Question 25.
The distance of the plane $r \cdot \left(\frac{2}{7}\hat{i} + \frac{3}{7}\hat{j} - \frac{6}{7}\hat{k}\right) = 1$ from the origin is
(a) 1
(b) 7
(c) $\frac{1}{7}$
(d) None of these
Answer:
(a) 1

Question 26.
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) $\frac{\sqrt{2}}{10}$

Question 27.
The reflection of the point (α, β, γ) in the xy-plane is
(a) (α, β, 0)
(b) (0, 0, γ)
(c) (-α, -β, -γ)
(d) (α, β, -y)
Answer:
(d) (α, β, -y)

Question 28.
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 sq. units
(b) 18 sq. units
(c) 27 sq. units
(d) 81 sq. units
Answer:
(a) 9 sq. units

Question 29.
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) A pair of perpendicular planes

Question 30.
Direction cosines of the line that makes equal angles with the three axes in space are

(a) $\pm\frac{1}{\sqrt{3}}, \pm\frac{1}{3}, \pm\frac{1}{3}$ (b) $\pm\frac{6}{7}, \pm\frac{2}{7}, \pm\frac{3}{7}$

(c) $\pm\frac{1}{\sqrt{3}}, \pm\frac{1}{\sqrt{3}}, \pm\frac{1}{\sqrt{3}}$ (d) $\sqrt{\frac{1}{7}}, \pm\sqrt{\frac{3}{14}}, \frac{1}{\sqrt{14}}$

Answer:
(c) $\pm\frac{1}{\sqrt{3}}, \pm\frac{1}{\sqrt{3}}, \pm\frac{1}{\sqrt{3}}$

Question 31.
If the direction ratios of a line are 1, -3, 2, then its direction cosines are

(a) $\frac{1}{\sqrt{14}}, \frac{-3}{\sqrt{14}}, \frac{2}{\sqrt{14}}$ (b) $\frac{1}{\sqrt{14}}, \frac{2}{\sqrt{14}}, \frac{3}{\sqrt{14}}$

(c) $\frac{-1}{\sqrt{14}}, \frac{-3}{\sqrt{14}}, \frac{2}{\sqrt{14}}$ (d) $\frac{-1}{\sqrt{14}}, \frac{-2}{\sqrt{14}}, \frac{-3}{\sqrt{14}}$

Answer:
(a) $\frac{1}{\sqrt{14}}, \frac{-3}{\sqrt{14}}, \frac{2}{\sqrt{14}}$

Question 32.
The cosines of the angle between any two diagonals of a cube is
(a) $\frac{1}{3}$

(b) $\frac{1}{2}$
(c) $\frac{2}{3}$
(d) $\frac{1}{\sqrt{3}}$
Answer:
(a) $\frac{1}{3}$

Question 33.
Which of the following is false?
(a) 30°, 45°, 60° can be the direction angles of a line is space.
(b) 90°, 135°, 45° can be the direction angles of a line is space.
(c) 120°, 60°, 45° can be the direction angles of a line in space.
(d) 60°, 45°, 60° can be the direction angles of a line in space.
Answer:
(a) 30°, 45°, 60° can be the direction angles of a line is space.

Question 34.
A line makes angles α, β and γ with the co-ordinate axes. If $\alpha + \beta = 90°$, then γ is equal to
(a) 0°
(b) 90°
(c) 180°
(d) None of these
Answer:
(b) 90°

Question 35.
If a line makes an angle $\theta_1, \theta_2, \theta_3$ with the axis respectively, then $\cos 2\theta_1 + \cos 2\theta_2 + \cos 2\theta_3 =$
(a) -4
(b) -2
(c) -3
(d) -1
Answer:
(d) -1

Question 36.
The coordinates of a point P are (3, 12, 4) w.r.t. origin O, then the direction cosines of OP are

(a) 3, 12, 4 (b) $\frac{1}{4}, \frac{1}{3}, \frac{1}{2}$

(c) $\frac{3}{\sqrt{13}}, \frac{1}{\sqrt{13}}, \frac{2}{\sqrt{13}}$ (d) $\frac{3}{13}, \frac{12}{13}, \frac{4}{13}$

Answer:
(d) $\frac{3}{13}, \frac{12}{13}, \frac{4}{13}$

Question 37.
Find the direction cosines of the line joining A(0, 7, 10) and B(-1, 6, 6).

(a) $\frac{-1}{3\sqrt{2}}, \frac{-1}{3\sqrt{2}}, \frac{2}{3\sqrt{2}}$ (b) $\frac{1}{3\sqrt{2}}, \frac{1}{3\sqrt{2}}, \frac{4}{3\sqrt{2}}$

(c) $\frac{1}{3}, \frac{-1}{3}, \frac{4}{3}$ (d) None of these

Answer:
(b) $\frac{1}{3\sqrt{2}}, \frac{1}{3\sqrt{2}}, \frac{4}{3\sqrt{2}}$

Question 38.
The direction cosines of a line passing through two points $P(x_1, y_1, z_1)$ and $Q(x_2, y_2, z_2)$ are

(a) $(x_2 - x_1), (y_2 - y_1), (z_2 - z_1)$

(b) $(x_2 + x_1), (y_2 + y_1), (z_2 + z_1)$

(c) $\frac{x_2 - x_1}{PQ}, \frac{y_2 - y_1}{PQ}, \frac{z_2 - z_1}{PQ}$

(d) $\frac{x_2 + x_1}{PQ}, \frac{y_2 + y_1}{PQ}, \frac{z_2 + z_1}{PQ}$

Answer:
(c) $\frac{x_2 - x_1}{PQ}, \frac{y_2 - y_1}{PQ}, \frac{z_2 - z_1}{PQ}$

Question 39.
The equation of a line which passes through the point (1, 2, 3) and is parallel to the vector $3\hat{i} + 2\hat{j} - 2\hat{k}$, is

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

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

(c) $\vec{r} = (\hat{i} + 2\hat{j} + 3\hat{k}) + \lambda(2\hat{i} - 5\hat{k})$

(d) $\vec{r} = (\hat{i} + 2\hat{j} + 3\hat{k}) + \lambda(4\hat{i} + 4\hat{j} + \hat{k})$

Answer:
(b) $r = (\hat{i} + 2\hat{j} + 3\hat{k}) + \lambda(3\hat{i} + 2\hat{j} - 2\hat{k})$

Question 40.
The equation of line passing through the point (-3, 2, -4) and equally inclined to the axes are
(a) x – 3 = y + 2 = z – 4
(b) x + 3 = y – 2 = z + 4
(c) $\frac{x+3}{1} = \frac{y-2}{2} = \frac{z+4}{3}$
(d) None of these
Answer:
(b) x + 3 = y – 2 = z + 4

Question 41.
If l, m and n are the direction cosines of line l, then the equation of the line (l) passing through (x_1, y_1, z_1) is

(a) $\frac{x-x_1}{l} = \frac{y-y_1}{m} = \frac{z-z_1}{n}$

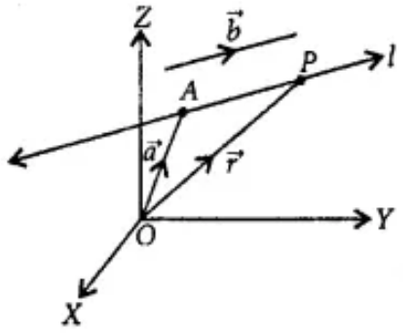
(b) $\left(\frac{x-x_1}{l}\right)\left(\frac{y-y_1}{m}\right) = \left(\frac{z-z_1}{n}\right)$

(c) $\frac{x+x_1}{l} = \frac{y+y_1}{m} = \frac{z+z_1}{n}$

(d) None of these

Answer:
(a) $\frac{x-x_1}{l} = \frac{y-y_1}{m} = \frac{z-z_1}{n}$

Question 42.
In the figure, a be the position vector of the point A with respect to the origin O. l is a line parallel to a
vector b. The vector equation of line l is



(a) $\vec{r} = \lambda(\vec{a} \times \vec{b})$ (b) $\vec{r} = \lambda\vec{a} - \vec{b}$
(c) $\vec{r} = \vec{a} + \lambda\vec{b}$ (d) $\vec{r} = \lambda(\vec{a}.\vec{b})$

Answer:
(c) r = a + λb

Question 43.
The certesian equation of the line l when it passes through the point (x_1, y_1, z_1) and parallel to the vector
b = $a\hat{i} + b\hat{j} + c\hat{k}$, is
(a) $x - x_1 = y - y_1 = z - z_1$
(b) $x + x_1 = y + y_1 = z + z_1$
(c) $\frac{x+x_1}{a} = \frac{y+y_1}{b} = \frac{z+z_1}{c}$
(d) $\frac{x-x_1}{a} = \frac{y-y_1}{b} = \frac{z-z_1}{c}$
Answer:
(d) $\frac{x-x_1}{a} = \frac{y-y_1}{b} = \frac{z-z_1}{c}$

Question 44.
The equation of the straight line passing through the point (a, b, c) and parallel to Z-axis is
(a) $\frac{x-a}{1} = \frac{y-b}{1} = \frac{z-c}{0}$
(b) $\frac{x-a}{0} = \frac{y-b}{1} = \frac{z-c}{1}$
(c) $\frac{x-a}{1} = \frac{y-b}{0} = \frac{z-c}{0}$
(d) $\frac{x-a}{0} = \frac{y-b}{0} = \frac{z-c}{1}$
Answer:
(d) $\frac{x-a}{0} = \frac{y-b}{0} = \frac{z-c}{1}$

Question 45.
The coordinates of a point on the line $\frac{x+2}{3} = \frac{y+1}{2} = \frac{z-3}{2}$ at a distance of $\frac{6}{\sqrt{12}}$ from the point (1, 2, 3) is
(a) (56, 43, 111)
(b) $\left(\frac{56}{17}, \frac{43}{17}, \frac{111}{17}\right)$
(c) (2, 1, 3)
(d) (-2, -1, -3)
Answer:
(b) $\left(\frac{56}{17}, \frac{43}{17}, \frac{111}{17}\right)$

Question 46.
Find the coordinatets of the point where the line through the points (5, 1, 6) and (3, 4, 1) crosses the yz-plane.
(a) $\left(0, -\frac{17}{2}, \frac{13}{2}\right)$
(b) $\left(0, \frac{17}{2}, -\frac{13}{2}\right)$
(c) $\left(10, \frac{19}{2}, \frac{13}{2}\right)$
(d) (0, 17, 13)
Answer:
(b) $\left(0, \frac{17}{2}, -\frac{13}{2}\right)$

Question 47.
The point A(1, 2, 3), B(-1, -2, -1) and C(2, 3, 2) are three vertices of a parallelogram ABCD. Find the equation of CD.

(a) $\frac{x}{1} = \frac{y}{2} = \frac{z}{2}$ (b) $\frac{x+2}{1} = \frac{y+3}{2} = \frac{z-2}{2}$

(c) $\frac{x}{2} = \frac{y}{3} = \frac{z}{2}$ (d) $\frac{x-2}{1} = \frac{y-3}{2} = \frac{z-2}{2}$

Answer:
(d) $\frac{x-2}{1} = \frac{y-3}{2} = \frac{z-2}{2}$

Question 48.
The equation of the line joining the points (-3, 4, 11) and (1, -2, 7) is

(a) $\frac{x+3}{2} = \frac{y-4}{3} = \frac{z-11}{4}$

(b) $\frac{x+3}{-2} = \frac{y-4}{3} = \frac{z-11}{2}$

(c) $\frac{x+3}{-2} = \frac{y+4}{3} = \frac{z+11}{4}$

(d) $\frac{x+3}{2} = \frac{y+4}{-3} = \frac{z+11}{2}$

Answer:
(b) $\frac{x+3}{-2} = \frac{y-4}{3} = \frac{z-11}{2}$

Question 49.
The vector equation of the line through the points A(3, 4, -7) and B(1, -1, 6) is

(a) $\vec{r} = (3\hat{i} - 4\hat{j} - 7\hat{k}) + \lambda(\hat{i} - \hat{j} + 6\hat{k})$

(b) $\vec{r} = (\hat{i} - \hat{j} + 6\hat{k}) + \lambda(3\hat{i} - 4\hat{j} - 7\hat{k})$

(c) $\vec{r} = (3\hat{i} + 4\hat{j} - 7\hat{k}) + \lambda(-2\hat{i} - 5\hat{j} + 13\hat{k})$

(d) $\vec{r} = (\hat{i} - \hat{j} + 6\hat{k}) + \lambda(4\hat{i} + 3\hat{j} - \hat{k})$

Answer:

(c) $r = (3\hat{i} + 4\hat{j} - 7\hat{k}) + \lambda(-2\hat{i} - 5\hat{j} + 13\hat{k})$

Question 50.

The angle between the lines $\vec{r} = (4\hat{i} - \hat{j}) + s(2\hat{i} + \hat{j} - 3\hat{k})$ and $\vec{r} = (\hat{i} - \hat{j} + 2\hat{k}) + t(\hat{i} - 3\hat{j} + 2\hat{k})$ is

(a) $\frac{3\pi}{2}$ (b) $\frac{\pi}{3}$ (c) $\frac{2\pi}{3}$ (d) $\frac{\pi}{6}$

Answer:

(d) $\frac{\pi}{6}$

Question 51.

The angle between the line 2x = 3y = -z and 6x = -y = -4z is

(a) 30°

(b) 45°

(c) 90°

(d) 0°

Answer:

(c) 90°

Question 52.

The angle between the lines 3x = 6y = 2z and $\frac{x-2}{-5} = \frac{y-1}{7} = \frac{z-3}{1}$ is

(a) $\frac{\pi}{6}$

(b) $\frac{\pi}{4}$

(c) $\frac{\pi}{3}$

(d) $\frac{\pi}{2}$

Answer:

(d) $\frac{\pi}{2}$

Question 53.

Find the angle between the pair of lines given by

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

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

(a) $\cos^{-1}\left(\frac{19}{21}\right)$ (b) $\cos^{-1}\left(\frac{23}{19}\right)$

(c) $\cos^{-1}\left(\frac{17}{13}\right)$ (d) $\cos^{-1}\left(\frac{13}{9}\right)$

Answer:

(a) $\cos^{-1}\left(\frac{19}{21}\right)$

Question 54.

The angle between the lines x = 1, y = 2 and y = -1, z = 0 is

(a) 90°

(b) 30°

(c) 60°

(d) 0°

Answer:

(a) 90°

Question 55.

Shortest distance between the two lines $\frac{x+1}{3} = \frac{y+3}{5} = \frac{z+5}{7}$ **and** $\frac{x-2}{1} = \frac{y-4}{3} = \frac{z-6}{5}$ **is**

(a) 0 (b) $\frac{1}{2\sqrt{3}}$ (c) 3 (d) None of these

Answer:

(a) 0

Question 56.

The distance between line $\vec{r} = \vec{a_1} + t\vec{b}$ and $\vec{r} = \vec{a_2} + s\vec{b}$ is

(a) $\left|(\vec{a_2} - \vec{a_1}) \times \vec{b}\right|$ (b) $\frac{\left|(\vec{a_2} - \vec{a_1}) \times \vec{b}\right|}{|\vec{b}|}$

(c) $\frac{\left|(\vec{a_2} - \vec{a_1}) \times \vec{b}\right|}{|\vec{a_2} - \vec{a_1}|}$ (d) $\frac{\left|(\vec{a_2} - \vec{a_1}) \times \vec{b}\right|}{|\vec{a_2} - \vec{a_1}||\vec{b}|}$

Answer:

(b) $\frac{|(\vec{a}_2 - a_1) \times b|}{|b|}$

Question 57.

The distance between the lines given by $\vec{r} = \hat{i} + \hat{j} + \lambda(\hat{i} - 2\hat{j} + 3\hat{k})$ and

$\vec{r} = (2\hat{i} - 3\hat{k}) + \mu(\hat{i} - 2\hat{j} + 3\hat{k})$ is

(a) $\sqrt{\frac{59}{14}}$ (b) $\sqrt{\frac{59}{7}}$ (c) $\sqrt{\frac{118}{7}}$ (d) $\frac{\sqrt{59}}{7}$

Answer:

(b) $\sqrt{\frac{59}{7}}$

Question 58.

The distance between the lines $\frac{x-4}{5} = \frac{y+1}{2} = \frac{z}{1}$ and

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

(a) $5\sqrt{129}$ (b) $\frac{\sqrt{129}}{5}$ (c) $\sqrt{\frac{129}{10}}$ (d) $\sqrt{\frac{129}{5}}$

Answer:

(d) $\sqrt{\frac{129}{5}}$

Question 59.
The direction cosines of the unit vector perpendicular to the plane $r \cdot (6\hat{i} - 3\hat{j} - 2\hat{k}) + 1 = 0$ passing through the origin are
(a) $\frac{6}{7}, \frac{3}{7}, \frac{2}{7}$
(b) 6, 3, 2
(c) $-\frac{6}{7}, \frac{3}{7}, \frac{2}{7}$
(d) -6, 3, 2
Answer:
(c) $-\frac{6}{7}, \frac{3}{7}, \frac{2}{7}$

Question 60.
The coordinate of the foot of perpendicular drawn from origin to the plane 2x – 3y + 4z – 6 = 0 is

(a) $\left(\frac{2}{\sqrt{29}}, \frac{-3}{\sqrt{29}}, \frac{4}{\sqrt{29}}\right)$ (b) $\left(\frac{12}{29}, \frac{-18}{29}, \frac{24}{29}\right)$

(c) (12, –18, 24 (d) $\left(\frac{12}{\sqrt{29}}, \frac{-18}{\sqrt{29}}, \frac{24}{\sqrt{29}}\right)$

Answer:
(d) $\left(\frac{12}{\sqrt{29}}, \frac{-18}{\sqrt{29}}, \frac{24}{\sqrt{29}}\right)$

Question 61.
The vector equation of a plane which is at a distance of 7 units from the origin and normal to the vector
$3\hat{i} + 5\hat{j} - 6\hat{k}$ is

(a) $\vec{r}.(3\hat{i} + 5\hat{j} - 6\hat{k}) = 7$ (b) $\vec{r}.(3\hat{i} + 5\hat{j} - 6\hat{k}) = \frac{7}{\sqrt{70}}$

(c) $\vec{r}.\left(\frac{3}{70}\hat{i} + \frac{5}{70}\hat{j} - \frac{6}{70}\hat{k}\right) = 7\sqrt{70}$

(d) $\vec{r}.\left(\frac{3\hat{i}}{70} + \frac{5\hat{j}}{70} - \frac{6\hat{k}}{70}\right) = 7$

Answer:
(d) $r \cdot \left(\frac{3\hat{i}}{70} + \frac{5\hat{j}}{70} - \frac{6\hat{k}}{70}\right) = 7$

Question 62.
Find the vector equation of the plane which is at a distance of 8 units from the origin and which is

normal to the vector $2\hat{i} + \hat{j} + 2\hat{k}$.

(a) $\vec{r}.(2\hat{i} + \hat{j} + 2\hat{k}) = 0$ (b) $\vec{r}.(\hat{i} + \hat{j} + \hat{k}) = 24$

(c) $\vec{r}.(2\hat{i} + \hat{j} + 2\hat{k}) = 24$ (d) None of these

Answer:

(c) $r.(2\hat{i} + \hat{j} + 2\hat{k}) = 24$

Question 63.

Find the length of perpendicular from the origin to the plane $r(3\hat{i} - 4\hat{j} + 12\hat{k})$.

(a) $\frac{5}{13}$

(b) $\frac{5}{\sqrt{13}}$

(c) $\frac{5}{23}$

(d) $\frac{\sqrt{5}}{13}$

Answer:

(a) $\frac{5}{13}$

Question 64.

The equation of the plane passing through three non- collinear points with position vectors a, b, c is

(a) r.(b × c + c × a + a × b) = 0

(b) r.(b × c + c × a + a × b) = [abc]

(c) r.(a × (b + c)) = [abc]

(d) r.(a + b + c) = 0

Answer:

(b) r.(b × c + c × a + a × b) = [abc]