MATHS

BOOKS - OBJECTIVE RD SHARMA

ENGLISH

THREE DIMENSIONAL COORDINATE SYSTEM

Illustration

1. In the following figure, if the coordinates of P are (a, b, c) then the coordinates of A, B and C are respectively

A. $(a, 0, 0), (b, 0, 0), (c, 0, 0)$

B. $(a, 0, 0), (0, b, 0), (0, 0, c)$

C. $(0, 0, a), (0, b, 0), (c, 0, 0)$

D. $(a, b, c), (b, c, a), (c, a, b)$

Answer: A

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2. In Fig 4 the coordinates of point D are

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3. In fig. 28.7 if the coordinates of point P are (a, b, c) then Write the coordinates of points A, B, C, D, E and F. Write the coordinates of the feet of the perpendiculars from the point P to the coordinate axes. Write the coordinates of the feet of the perpendicular from the point P on the coordinate planes XY, YZ and ZX. Find the perpendicular

distances of point P from $XY, YZ\ and\ ZX -$ planes. Find the perpendicular distances of the point P fro the coordinate axes. Find the coordinates of the reflection of P are (a, b, c) . Therefore $OA = a,\ OB = b\ nd\ OC =$.

A. $(a, b, 0), (0, b, c), (a, 0, c)$

B. $(a, b, 0), (b, c, 0), (a, c, 0)$

C. $(0, b, c), (a, 0, c), (a, b, 0)$

D. $(a, 0, c), (0, b, c), (a, b, 0)$

Answer: A

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4. In fig. 28.7 if the coordinates of point $P\ are\ (a, b, c)$ then Write the coordinates of points A, B, C, D, E and F. Write the coordinates of the feet of the perpendiculars from the point P to the coordinate axes. Write the coordinates of the feet of the perpendicular from the point P on the coordinate planes $XY,\ YZ\ and\ ZX.$ Find the perpendicular distances of point P from $XY, YZ\ and\ ZX -$ planes. Find the perpendicular distances of the point P fro the coordinate axes. Find the

coordinates of the reflection of P are (a, b, c) .

Therefore $OA = a,\ OB = b\, nd\, OC =$.

A. a, b, c

B. b, c, a

C. c, a, b

D. none of these

Answer: C

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5. In fig. 28.7 if the coordinates of point $P\ are\ (a, b, c)$ then Write the coordinates of points A, B, C, D, E and F. Write the coordinates of the feet of the perpendiculars from the point P to the coordinate axes. Write the coordinates of the feet of the perpendicular from the point P on the coordinate planes $XY,\ YZ\ and\ ZX.$ Find the perpendicular distances of point P from $XY, YZ\ and\ ZX -$ planes. Find the perpendicular distances of the point P fro the coordinate axes. Find the

coordinates of the reflection of P are (a, b, c) .

Therefore $OA = a,\ OB = b\ nd\ OC =$.

A. $\sqrt{a^2 + b^2}, \sqrt{b^2 + c^2}, \sqrt{c^2 + a^2}$

B. $\sqrt{b^2 + c^2}, \sqrt{c^2 + a^2}, \sqrt{a^2 + b^2}$

C. $\sqrt{c^2 + a^2}, \sqrt{a^2 + b^2}, \sqrt{b^2 + c^2}$

D. a, b, c

Answer: B

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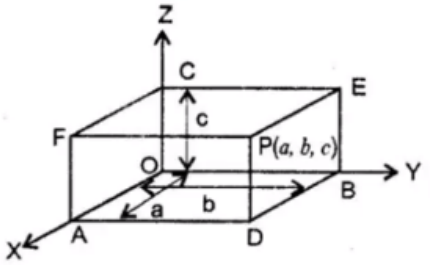
6. In the adoining figure if the coordinates of point P are (a, b, c) write the coordinates of A,B,C,D,E and F.



A. $(a, b, -c), (-a, b, c), (a, -b, c)$

B.

$(a, -b, -c), (-a, b, -c), (-a, -b, c)$

C.

$(-a, -b, c), (a, -b, -c), (-a, b, -c)$

D. $(a, b, 0), (0, b, c), (a, 0, c)$

Answer: A

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7. Planes are drawn parallel to the coordinate planes through the point $P(x_1, y_1, z_1)$ and $Q(x_2, y_2, z_2)$. Find the length of the edges of the parallelopiped so formed.

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. x_1x_2, y_1y_2, z_1z_2

D. none of these

Answer: A

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8. The perpendicular distance of the point $(6, 5, 8)$ from y-axis is

A. 5 units

B. 6 units

C. 8 units

D. 10 units

Answer: D

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9. If the extremities of the diagonal fo a square are (1,-2,3) and (2,-3,5), then the length of the side is $\sqrt{6}$ b. $\sqrt{3}$ c. $\sqrt{5}$ d. $\sqrt{7}$

A. $\sqrt{6}$

B. $\sqrt{3}$

C. $\sqrt{5}$

D. $\sqrt{7}$

Answer: B

10. Find the coordinates of a point equidistant from th four points $O(0, 0, 0), A(a, 0, 0), B(0, b, 0) and C(0, 0, c)$.

A. (a, b, c)

B. $(a/2, b/2, c/2)$

C. $(a/3, b/3, c/3)$

D. $(a/4, b/4, c/4)$

Answer: B

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11. Determine the point in $XY - plane$ whcih is equidistant from three points $A(2, 0, 3), B(0, 3, 2) and C(0, 0, 1)$.

A. $(2, 0, 8)$

B. $(0, 3, 1)$

C. $(3, 2, 0)$

D. $(3, 2, 1)$

Answer: C

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12. The cosine of the angle of the triangle with vertices $A(1, -1, 2), B(6, 11, 2)$ and $C(1, 2, 6)$ is

A. $\frac{63}{65}$

B. $\frac{36}{65}$

C. $\frac{16}{65}$

D. $\frac{13}{64}$

Answer: B

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13. Let $P(2, -1, 4)$ and $Q(4, 3, 2)$ are two points and as point R on PQ is such that $3PQ = 5QR$, then the coordinates of R are

A. $\left(\frac{14}{5}, \frac{3}{5}, \frac{16}{5}\right)$

B. $\left(\frac{16}{5}, \frac{7}{5}, \frac{14}{5}\right)$

C. $\left(\frac{11}{4}, \frac{1}{2}, \frac{13}{4}\right)$

D. none of these

Answer: A

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14. Let $A(2, -1, 4)$ and $B(0, 2, -3)$ be the points and C be a point on AB produced such

that $2AC = 3AB$, then the coordinates of C are

A. $\left(\frac{1}{2}, \frac{5}{4}, -\frac{5}{4}\right)$

B. $\left(-\frac{1}{2}, \frac{7}{4}, -\frac{13}{4}\right)$

C. $(6, -7, 18)$

D. none of these

Answer: D

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15. Find the ratio in which the line joining the points $(1, 2, 3) and (-3, 4, -5)$ is divided by the $xy - plane$. Also, find the coordinates of the point of division.

A. 3:5 internally

B. 5:3 externally

C. 3:5 externally

D. 5:3 internally

Answer: A

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16. In triangle ABC the mid point of the sides AB, BC and AC respectively (l, 0, 0), (0, m, 0) and (0, 0, n). Then, $\frac{AB^2 + BC^2 + CA^2}{l^2 + m + n^2}$ is equal to

A. 2

B. 4

C. 8

D. 16

Answer: C

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17. Find the coordinate of the point where the line through (5, 1, 6) and (3, 4, 1) crosses the i. yz-plane ii. zx-plane.

A. $\left(0, \frac{17}{2}, \frac{13}{2}\right)$

B. $\left(0, -\frac{17}{2}, \frac{13}{2}\right)$

C. $\left(0, \frac{17}{2}, -\frac{13}{2}\right)$

D. $\left(0, -\frac{17}{2}, -\frac{13}{2}\right)$

Answer: C

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18. Find the ratio in which the join the $A(2, 1, 5) and B(3, 4, 3)$ is divided by the plane $2x + 2y - 2z = 1$. Also, find the coordinates of the point of division.

A. $7:5$

B. $5:7$

C. $5:3$

D. $3:5$

Answer: B

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19. If a vector $\overrightarrow{A}$ makes an angles α, β and γ respectively with the x, y and z axes respectively. Then $\sin^2\alpha + \sin^2\beta + \sin^2\gamma$ is equal to

A. 1

B. 2

C. 3

D. none of these

Answer: B

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20. If a line makes angles α, β, γ with the axes respectively tehn $\cos 2\alpha + \cos 2\beta + \cos 2\gamma =$ -2 b. -1 c. 1 d. 2

A. 2

B. -1

C. 1

D. 2

Answer: B

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21. If a line makes angle $\frac{\pi}{3}$ and $\frac{\pi}{4}$ with x-axis and y-axis respectively, then the angle made by the line with z-axis is $\pi/2$ b. $\pi/3$ c. $\pi/4$ d. $5\pi/12$

A. $\frac{\pi}{2}$

B. $\frac{\pi}{3}$

C. $\frac{\pi}{4}$

D. $\frac{5\pi}{12}$

Answer: B

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22. The direction cosines of a vector $\vec{r}$ which is equally inclined with OX,OY and OZ are

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

B. $\pm\frac{1}{3}, \pm\frac{1}{3}, \pm\frac{1}{3}$

C. $\pm\frac{1}{\sqrt{2}}, \pm\frac{1}{2}, \pm\frac{1}{2}$

D. none of these

Answer: A

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23. A vector $\vec{r}$ is inclined at equal to $OX, OY and OZ$. If the magnitude of $\vec{r}$ is 6 units, find $\vec{r}$.

A. $\sqrt{3}\left(\pm\hat{i}\pm\hat{j}\pm\hat{k}\right)$

B. $2\sqrt{3}\left(\pm\hat{i}\pm\hat{j}\pm\hat{k}\right)$

C. $6\left(\pm\hat{i}\pm\hat{j}\pm\hat{k}\right)$

D. none of these

Answer: B

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24. If OA is equally inclined to OX,OY ,OZ and if A is $\sqrt{3}$ units from the origin then the cordinates of A are

A. $(3, 3, 3)$

B. $(-1, 1, -1)$

C. $(-1, 1, 1)$

D. $(1, 1, 1)$

Answer: D

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25. If $\frac{1}{2}, \frac{1}{3}, n$ are direction cosines of a line, then the value of n is

A. $\frac{\sqrt{23}}{6}$

B. $\frac{23}{6}$

C. $\frac{2}{3}$

D. $\frac{1}{6}$

Answer: A

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26. If the direction ratios of a line are proportional to (1, -3, 2) then its direction cosines are $\frac{1}{\sqrt{14}}, -\frac{3}{\sqrt{14}}, \frac{2}{\sqrt{14}}$ 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. $-\frac{1}{\sqrt{14}}, -\frac{2}{\sqrt{14}}, -\frac{3}{\sqrt{14}}$

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

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27. The projections of a line segment on the coordinate axes are 12,4,3 respectively. The length and direction cosines of the line segment are

A. $13, \frac{12}{13}, \frac{4}{13}, \frac{3}{13}$

B. $19, \frac{12}{19}, \frac{4}{19}, \frac{3}{19}$

C. $11, \frac{12}{11}, \frac{14}{11}, \frac{3}{11}$

D. none of these

Answer: A

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28. If $\vec{r}$ is a vector of magnitude 21 and has direction ratios 2, -3 and 6, then find $\vec{r}$.

A. $6\hat{i} + 9\hat{j} - 18\hat{k}$

B. $6\hat{i} - 9\hat{j} - 18\hat{k}$

C. $6\hat{i} - 9\hat{j} + 18\hat{k}$

D. none of these

Answer: C

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29. If $P(x, y, z)$ is a point on the line segment joining Q(2,2,4) and R(3,5,6) such that the projection of $\overrightarrow{OP}$ on the axes are $\frac{13}{9}, \frac{19}{5}, \frac{26}{5}$ respectively, then P divides QR in the ratio:

A. $1:2$

B. $3:2$

C. $2:3$

D. $3:1$

Answer: B

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30. The direction cosines of the line passing through $P(2, 3, -1)$ and the origin are

A. $\frac{2}{\sqrt{14}}, \frac{3}{\sqrt{14}}, \frac{1}{\sqrt{14}}$

B. $\frac{2}{\sqrt{14}}, -\frac{3}{\sqrt{14}}, \frac{1}{\sqrt{14}}$

C. $-\frac{2}{\sqrt{14}}, -\frac{3}{\sqrt{14}}, \frac{1}{\sqrt{14}}$

D. $-\frac{2}{\sqrt{14}}, -\frac{3}{\sqrt{14}}, -\frac{1}{\sqrt{14}}$

Answer: D

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31. The projection of the line segment joining the points $A(-1, 0, 3)$ and $B(2, 5, 1)$ on the line whose direction ratios are proportional to 6,2,3 is

A. $\frac{10}{7}$

B. $\frac{22}{7}$

C. $\frac{18}{7}$

D. none of these

Answer: B

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32. The direction cosines of a vector $\vec{r}$ which is equally inclined with OX,OY and OZ are

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

B. $\pm\frac{1}{3}, \pm\frac{1}{3}, \pm\frac{1}{3}$

C. $\pm\frac{1}{\sqrt{2}}, \pm\frac{1}{2}, \pm\frac{1}{2}$

D. none of these

Answer: A

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33. A vector $\vec{r}$ is inclined at equal to $OX, OY and OZ$. If the magnitude of $\vec{r}$ is 6 units, find $\vec{r}$.

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34. Find the angle between two lines whose direction ratios are proportional to $1, 1, 2 and \left(\sqrt{3}-1\right), \left(-\sqrt{3}-1\right), 4$.

A. 45°

B. 30°

C. 60°

D. 90°

Answer: A

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35. If $P(0, 1, 2),\ Q(4, -2, 1) and\ O(0, 0, 0)$ are three points then $POQ = \frac{\pi}{6}$ b. $\frac{\pi}{4}$ c. $\frac{\pi}{3}$ d. $\frac{\pi}{2}$

A. $\frac{\pi}{6}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{2}$

Answer: D

36. If A,B,C,D are (2,3,-1),(3,5,-3),(1,2,3),(3,5,7) respectively, then the angel between AB and CD, is

A. $\frac{\pi}{2}$

B. $\frac{\pi}{3}$

C. $\frac{\pi}{4}$

D. $\frac{\pi}{6}$

Answer: A

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37. Find the angle between the lines whose direction cosines are given by the equation $l + m + n = 0$ and $l^2 + m^2 - n^2 = 0$

A. $\frac{\pi}{2}$

B. $\frac{\pi}{3}$

C. $\frac{\pi}{4}$

D. $\frac{\pi}{6}$

Answer: B

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38. ABC is a triangle in a plane with vertices $A(2, 3, 5), B(-1, 3, 2)$ and $C(\lambda, 5, \mu)$. If the median through A is equally inclined to the

coordinate axes, then the value of $\lambda^3 + \mu^3 + 5$ is

A. 676

B. 1130

C. 1348

D. 1077

Answer: C

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Section I Solved Mcqs

1. For every point $P(x,\ y,\ z)$ on the xy-plane, a. $x = 0$ b. $y = 0$ c. $z = 0$ d. $x = y = z = 0$

A. $x = 0$

B. $y = 0$

C. $z = 0$

D. none of these

Answer: C

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2. For every point $P(x, y, z)$ on the x-axis, (except the origin),

A. $x = 0, y = 0, y \neq 0$

B. $x = 0, z = 0, y \neq 0$

C. $y = 0, z = 0, x \neq 0$

D. none of these

Answer: C

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3. A rectangular parallelopiped is formed by planes drawn through the points $(5, 7, 9)$ and $(2, 3, 7)$ parallel to the coordinate planes. The length of an edge of this rectangular parallelopiped is

A. 2

B. 3

C. 4

D. all of these

Answer: D

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4. A rectangular parallelepiped is formed by planes drawn through the points $(2, 3, 5)$ and $(5, 9, 7)$ parallel to the coordinate planes. The length of a diagonal of the parallelepiped is

A. 7

B. $\sqrt{38}$

C. $\sqrt{155}$

D. none of these

Answer: A

5. The xy-plane divides the line joining the points (-1,3,4) aned (2,-5,6)

A. internally in the ratio 2:3

B. externally in the ratio 2:3

C. internally in the ratio 3:2

D. externally in the ratio 3:2

Answer: B

6. Verify the following: (5,-1,1),(7,-4,7), (1,-6,10) and (-1,-3,4) are the vertices of a rhombus.

A. trapezium

B. rectangle

C. rhombus

D. square

Answer: C

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7. A line makes an angle of 60^0 with each of X-axis and Y-axis. Find the acute angle made by the line with Z-axis.

A. 30°

B. 60°

C. 75°

D. 45°

Answer: D

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8. If the direction cosines of a line are $\left(\frac{1}{c}, \frac{1}{c}, \frac{1}{c}\right)$ then :

A. $0 < c < 1$

B. $c > 2$

C. $c > 0$

D. $c = \pm\sqrt{3}$

Answer: D

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9. Find the angle between the lines whose direction cosines are given by the equation $l + m + n = 0$ and $l^2 + m^2 - n^2 = 0$

A. 0

B. $\pi / 6$

C. $\pi / 4$

D. $\pi / 3$

Answer: D

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10. If the direction ratios of two lines are given by $a+b+c=0$ and $2ab+2ac-bc=0$, then the angle between the lines is

A. π

B. $\frac{2\pi}{3}$

C. $\frac{\pi}{2}$

D. $\frac{\pi}{3}$

Answer: B

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11. The angle between a line with direction ratios $< 2, 2, 1 >$ and a line joining the points $(3, 1, 4)$ and $(7, 2, 12)$ is

A. $\cos^{-1}\left(\frac{2}{3}\right)$

B. $\cos^{-1}\left(-\frac{2}{3}\right)$

C. $\tan^{-1}\left(\frac{2}{3}\right)$

D. none of these

Answer: A

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12. The projection of the line joining the ponts $(3, 4, 5)$ and $(4, 6, 3)$ on the line joining the points (-1,2,4) and (1,0,5) is

A. $\frac{4}{3}$

B. $\frac{2}{3}$

C. $\frac{1}{3}$

D. $\frac{1}{2}$

Answer: A

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13. The projection of a line segment on the axis 2, 3, 6 respectively. Then find the length of line segment.

A. 7

B. 5

C. 1

D. 11

Answer: A

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14. A line makes the same angle θ with X-axis and Z-axis. If the angle β, which it makes with Y-axis, is such that $\sin^2(\beta) = 3\sin^2\theta$, then the value of $\cos^2\theta$ is

A. $\frac{2}{5}$

B. $\frac{1}{5}$

C. $\frac{3}{5}$

D. $\frac{2}{3}$

Answer: C

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15. A line AB in three-dimensional space makes angles 45° and 120° with the positive X-axis and The positive Y-axis, respectively. If AB makes an acute angleθ with the positive Z-axis, then θ equals

A. 60°

B. 75°

C. 30°

D. 45°

Answer: A

16. The angle between the lines whose direction cosines satisfy the equations $l + m + n = 0$ and $l^2 = m^2 + n^2$ is

A. $\pi / 6$

B. $\pi / 2$

C. $\pi / 3$

D. $\pi / 4$

Answer: C

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Exercise

1. If the x-coordinate of a point P on the join of $Q(2, 2, 1) and R(5, 1, -2) is 4,$ then find its $z-$ coordinate.

A. 2

B. 1

C. -1

D. -2

Answer: C

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2. The distance of the point P(a,b,c)` from the x-axis is

A. $\sqrt{b^2 + c^2}$

B. $\sqrt{a^2 + c^2}$

C. $\sqrt{a^2 + b^2}$

D. $\sqrt{a^2 + b^2 + c^2}$

Answer: A

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3. Ratio in which the xy-plane divides the join of (1, 2, 3) and (4, 2, 1) is a. 3:1 internally b. 3:1 externally c. 1:2 internally d. 2:1 externally

A. $3:1$ internally

B. $3:1$ externally

C. $1:2$ internally

D. $2:1$ externally

Answer: B

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4. If P (3,2,−4) , Q (5,4,−6) and R (9,8,−10) are collinear, then divides in the ratio a. 3:2 internally b. 3:2 externally c. 2:1 internally d. 2:1 externally

A. $3:2$ internally

B. $3:2$ externally

C. $2:1$ internally

D. $2:1$ externally

Answer: B

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5. $A(3, 2, 0), B(5, 3, 2)C(-9, 6, -3)$ are three points forming a triangle. AD, the bisector of angle BAC meets BC in D. Find the coordinates of the point D.

A. $(19/8, 57/16, 17/16)$

B. $(-19/8, 57/16, 17/16)$

C. $(19/8, -57/16, 17/16)$

D. none of these

Answer: A

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6. 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.

A. $\frac{2}{3}, -\frac{2}{3}, -\frac{1}{3}$

B. $-\frac{2}{3}, \frac{2}{3}, \frac{1}{3}$

C. $\frac{2}{3}, -\frac{2}{3}, \frac{1}{3}$

D. $\frac{2}{3}, \frac{2}{3}, \frac{1}{3}$

Answer: A

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7. If a line makes angles α, β, γ with the positive direction of coordinate axes, then write the value of $\sin^2\alpha + \sin^2\beta + \sin^2\gamma$.

A. 1

B. 2

C. 3

D. 4

Answer: B

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8. If P is a point in space such that $OP = 12$ and $\overrightarrow{OP}$ is inclied at angle of 45° and 60° with OX and OY respectively, then the position vector of P is

A. $6\hat{i} + t\hat{j} \pm 6\sqrt{2}\hat{k}$

B. $6\hat{i} + 6\sqrt{2}\hat{j} \pm 6\hat{k}$

C. $6\sqrt{2}\hat{i} + 6\sqrt{j} \pm 6\hat{k}$

D. none of these

Answer: C

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9. A vector $\overrightarrow{OP}$ is inclined to $OX at 45^0$ and $OY at 60^0$. Find the angle at which $\overrightarrow{OP}$ is inclined to OZ.

A. 75°

B. 60° or 120°

C. 75° or 105°

D. 255°

Answer: B

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10. vector is equal inclined with the coordinate axes. If the tip of $\vec{r}$ is in the positive octant and $\left|\vec{r}\right| = 6,$ then $\vec{r}$ is:

A. $2\sqrt{3}\left(\hat{i} - \hat{j} + \hat{k}\right)$

B. $2\sqrt{3}\left(-\hat{i}+\hat{j}+\hat{k}\right)$

C. $2\sqrt{3}\left(\hat{i}+\hat{j}-\hat{k}\right)$

D. $2\sqrt{3}\left(\hat{i}+\hat{j}+\hat{k}\right)$

Answer: D

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11. If $\vec{r}$ is a vector of magnitude 21 and has direction ratios 2, -3 and 6, then find $\vec{r}$.

A. $6\hat{i}-i\hat{j}+18\hat{k}$

B. $6\hat{i} + 9\hat{j} + 18\hat{k}$

C. $6\hat{i} - 9\hat{j} + 18\hat{k}$

D. $6\hat{i} + 9\hat{j} - 18\hat{k}$

Answer: A

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12. The direction cosines of the lines bisecting the angle between the line whose direction cosines are l_1, m_1, n_1 and l_2, m_2, n_2 and the angle between these lines is θ, are

A. $\frac{l_1+l_2}{2\sin\theta/2}, \frac{m_1+m_2}{2\sin\theta/2}, \frac{n_1+n_2}{2\sin\theta/2}$

B. $\frac{l_1+l_2}{2\cos\theta/2}, \frac{m_1+m_2}{2\cos\theta/2}, \frac{n_1+n_2}{2\cos\theta/2}$

C. $\frac{l_1-l_2}{2\sin\theta/2}, \frac{m_1-m_2}{2\sin\theta/2}, \frac{n_1-n_2}{2\sin\theta/2}$

D. $\frac{l_1-l_2}{2\cos\theta/2}, \frac{m_1-m_2}{2\cos\theta/2}, \frac{n_1-n_2}{2\cos\theta/2}$

Answer: B

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13. Find the coordinates of the foot of the perpendicular drawn from point $A(1, 0, 3)$ to the join of points $B(4, 7, 1) and C(3, 5, 3)$.

A. $(5/3, 7/3, 17/3)$

B. $(5, 7, 17)$

C. $(5/7, -7/3, 17/3)$

D. $(-5/3, 7/3, -17/3)$

Answer: A

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14. The projections of a line segment on the coordinate axes are 12,4,3 respectively. The

length and direction cosines of the line segment are

A. $\frac{12}{13}, -\frac{4}{13}, \frac{3}{13}$

B. $-\frac{12}{13}, -\frac{4}{13}, \frac{3}{13}$

C. $\frac{12}{13}, \frac{4}{13}, \frac{3}{13}$

D. none of these

Answer: C

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15. If $P(x, y, z)$ is a point on the line segment joining Q(2,2,4) and R(3,5,6) such that the projection of $\overrightarrow{OP}$ on the axes are $\frac{13}{9}, \frac{19}{5}, \frac{26}{5}$ respectively, then P divides QR in the ratio:

A. $1:2$

B. $3:2$

C. $2:3$

D. $1:3$

Answer: B

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16. If O is the origin, OP = 3, with direction ratios -1, 2 and -2, then find the coordinates of P.

A. $(-1, 2, -2)$

B. $(1, 2, 2)$

C. $(-19, 2/9, -2/9)$

D. $(3, 5, -9)$

Answer: A

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17. A mirror and a source of light are situated at the origin O and at a point on OX, respectively. A ray of light from the sources strikes the mirror and is reflected. If the direction ratios of the normal to the plane are 1, -1, 1, then find the DCs of the reflected ray.

A. $\frac{1}{3}, \frac{2}{3}, \frac{2}{3}$

B. $-\frac{1}{3}, \frac{2}{3}, \frac{2}{3}$

C. $-\frac{1}{3}, -\frac{2}{3}, -\frac{2}{3}$

D. $-\frac{1}{3}, -\frac{2}{3}, \frac{2}{3}$

Answer: D

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18. Find the angle between any two diagonals of a cube.

A. 30°

B. 45°

C. $\cos^{-1}\left(\frac{1}{\sqrt{3}}\right)$

D. $\cos^{-1}\left(\frac{1}{3}\right)$

Answer: D

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19. A line makes angles $\angle, \beta, \gamma$ and δ with the diagonals of a cube. Show that $\cos^2\alpha + \cos^2\beta + \cos^2\gamma + \cos^2\delta = 4/3.$

A. $1/3$

B. $2/3$

C. $4/3$

D. $8/3$

Answer: C

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20. If $P(0, 1, 2),\ Q(4, -2, 1) and\ O(0, 0, 0)$ are three points then $POQ = \frac{\pi}{6}$ b. $\frac{\pi}{4}$ c. $\frac{\pi}{3}$ d. $\frac{\pi}{2}$

A. $\frac{\pi}{6}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{2}$

Answer: D