MATHS

BOOKS - TARGET MATHS (HINGLISH)

THREE DIMENSIONAL GEOMETRY

Classical Thinking

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

A. $y = 0, z = 0$

B. $x = 0$

C. $x = 0, y = 0$

D. $x = 0, z = 0$

Answer: A

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2. If a line makes angles $45^\circ, 60^\circ \text{ and } 60^\circ$ with the X, Y and Z-axes respectively, then its direction cosines are

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

B. $0, \frac{1}{2}, \frac{1}{2}$

C. $\frac{1}{\sqrt{2}}, 0, \frac{1}{2}$

D. $\frac{1}{2}, 0, \frac{1}{\sqrt{2}}$

Answer: A

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3. If a line makes angle $90o$, $60o$and $30o$with the positive direction of x, y and z-axis respectively, find its direction cosines.

A. $\frac{1}{2}, \frac{\sqrt{3}}{2}, 0$

B. $0, \frac{1}{2}, \frac{\sqrt{3}}{2}$

C. $\frac{1}{2}, 0, \frac{\sqrt{3}}{2}$

D. $\frac{\sqrt{3}}{2}, \frac{1}{2}, 0$

Answer: B

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4. What are the direction cosines of the y-axis ?

A. $0, 1, 0$

B. $1, 0, 0$

C. $0, 0, 1$

D. $0, 1, 1$

Answer: A

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5. The direction cosines of x-axis are (A) 0,0,1 (B) 1,0,0 (C) 0,1,0 (D) 0,1,1

A. $1, 0, 0$

B. $0, 1, 0$

C. $0, 0, 1$

D. $1, 1, 1$

Answer: A

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6. If l, m, n are the direction consines of a line, then

A. $l^2 + m^2 + n^2 = 1$

B. $l^2 + m^2 + n^2 = 0$

C. $l + m + n = 1$

D. $l + m + n = 0$

Answer: A

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7. Which of the following angles made by a line with co-ordinate axes are not possible?

A. $30^\circ, 60^\circ, 90^\circ$

B. $30^\circ, 45^\circ, 60^\circ$

C. $45^\circ, 90^\circ, 45^\circ$

D. $60^\circ, 45^\circ, 60^\circ$

Answer: B

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8. If the direction cosines of a line are $k, \frac{1}{2}, 0$ then k =

A. $\pm\frac{1}{2}$

B. $\pm\frac{\sqrt{3}}{4}$

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

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

Answer: C

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9. A line makes angles of 45° and 60° with the positive axes of X and Y respectively. The angle made by the same line with the positive axis of Z is

A. 30° or 60°

B. 60° or 90°

C. 90° or 120°

D. 60° or 120°

Answer: D

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10. A line makes angles α, β, γ with co-ordinates axes. If $\alpha + \beta = 90^\circ$ then γ is equal to

A. 0°

B. 90°

C. 180°

D. 60°

Answer: B

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11. If a line makes angles 60° and 45° with the Y and Z-axes respectively, then the direction cosines of the line are

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

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

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

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

Answer: A

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12. The co-ordinate of the point P are (x, y, z) and the direction cosines of the line OP when O is the origin are l, m, n. If OP = r, then

A. $l = x, m = y, n = z$

B. $l = xr, m = yr, n = zr$

C. $x = lr, y = mr, z = nr$

D. $x = lx, y = r, z = n$

Answer: C

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13. The direction cosines of the vector $2\hat{i} + 2\hat{j} - \hat{k}$ are

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

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

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

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

Answer: D

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14. The direction cosines of the vector $3\hat{i} + 4\hat{k}$ are

A. $\frac{3}{4}, 0, \frac{4}{5}$

B. $\frac{3}{5}, \frac{4}{5}, 0$

C. $0, \frac{3}{5}, \frac{4}{5}$

D. $\frac{3}{5}, 0, \frac{4}{5}$

Answer: D

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15. If the length of a vector be 7 and direction ratios be 2, -3, 6, then its direction cosines are

A. $\frac{2}{21}, \frac{-1}{7}, \frac{2}{7}$

B. $\frac{2}{7}, \frac{-3}{7}, \frac{6}{7}$

C. $\frac{2}{7}, \frac{3}{7}, \frac{6}{7}$

D. $\frac{2}{3}, \frac{-7}{3}, \frac{6}{3}$

Answer: B

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16. The direction ratios of a line passing through the points A(1,2,6) and B(-4,5,0) are

A. $-1, 3, -4$

B. $-6, 2, -4$

C. $-5, 3, -6$

D. $-2, -3, -5$

Answer: C

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17. The direction ratios of Y-axis are

A. $1, 0, 0$

B. $0, 2, 0$

C. $0, 0, 1$

D. $1, 2, 0$

Answer: B

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18. If l,m,n are direction cosines of the line then $-l, -m, -n$ can be

A. only direction ratios of the line

B. only direction cosines of the line

C. direction cosines and direction ratios of the line

D. neither direction cosines nor direction ratios of the line

Answer: C

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19. If a line has direction ratios 2,-1,-2 then what are its direction cosines ?

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

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

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

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

Answer: C

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20. If a line has the direction ratios $\sqrt{2}, -\sqrt{5}, \sqrt{2}$, then its direction cosines are

A. $\sqrt{5}, -\sqrt{2}, \sqrt{5}$

B. $\frac{\sqrt{2}}{5}, \frac{-\sqrt{5}}{5}, \frac{\sqrt{2}}{5}$

C. $\sqrt{2}, \sqrt{5}, \sqrt{2}$

D. $\frac{\sqrt{2}}{3}, \frac{-\sqrt{5}}{3}, \frac{\sqrt{2}}{3}$

Answer: D

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

A. $-3, 1, 4$

B. $-1, 5, -2$

C. $\frac{-3}{\sqrt{26}}, \frac{1}{\sqrt{26}}, \frac{4}{\sqrt{26}}$

D. $\frac{-1}{\sqrt{30}}, \frac{5}{\sqrt{30}}, \frac{-2}{\sqrt{30}}$

Answer: C

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22. The direction cosines of AB if $A \equiv (2, -3, 1)$ and $B \equiv (14, 5, -3)$ are

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

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

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

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

Answer: D

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23. If $P \equiv (1, 2, 3)$ then direction cosines of OP are

A. $1, 2, 3$

B. $-1, -2, -3$

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

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

Answer: C

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24. If the line through the points $(3, 1, 2)$ and $(4, \lambda, 0)$ is parallel to the line through the points $(1, 2, 1)$ and $(2, 3, -1)$, find λ

A. 1

B. 2

C. 3

D. 4

Answer: B

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25. Find the values of a for which points $(8, -7, a), (5, 2, 4)$ and $96, -1, 2)$ are collinear.

A. 2

B. -1

C. 3

D. -2

Answer: D

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26. The value of λ for which the points $(-2, 4, \lambda), (3, -6, -8), (1, -2, -2)$ are collinear is

A. 6

B. 7

C. 5

D. 4

Answer: B

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27. If the direction cosines of two lines are $\frac{1}{\sqrt{6}}, \frac{-1}{\sqrt{6}}, \frac{2}{\sqrt{6}}$ and $\frac{2}{\sqrt{6}}, \frac{1}{\sqrt{6}}, \frac{-1}{\sqrt{6}}$ respectively, then the acute angle between them is

A. $\cos^{-1}\left(\frac{-1}{6}\right)$

B. $\cos^{-1}\left(\frac{1}{6}\right)$

C. $\cos^{-1}\left(\frac{-1}{\sqrt{6}}\right)$

D. $\cos^{-1}\left(\frac{1}{\sqrt{6}}\right)$

Answer: A

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28. If direction ratios of two lines are $5, -12, 13$ and $-3, 4, 5$, then the angle between them is

A. $\cos^{-1}\left(\frac{1}{65}\right)$

B. $\cos^{-1}\left(\frac{2}{65}\right)$

C. $\cos^{-1}\left(\frac{3}{65}\right)$

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

Answer: A

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29. If A(1,2,3),B(4,5,7) ,C(-4,3,-6) and D(2,9,2) are four given points then find the angle between the lines AB and CD.

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

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

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

D. 0°

Answer: D

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30. 31.If the angle between the lines whose direction ratios are 2,-1,2 and a,3,5 be 45°, then a =(A) 1(B) 2(C) 3(D) 4

A. 1

B. 2

C. 3

D. 4

Answer: D

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31. If the co-ordinates of the points P and Q are $(1, -2, 1)$ and $(2, 3, 4)$ and O is the origin, then

A. $OP = OQ$

B. $OP \perp OQ$

C. $OP \| OQ$

D. OP and OQ intersect at an angle of 45°

Answer: B

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Critical Thinking

1. If α, β, γ are direction angles of a line, then

A. $0 \leq \alpha, \beta, \gamma \leq \frac{\pi}{2}$

B. $0 \leq \alpha, \beta, \gamma \leq \pi$

C. $0 < \alpha, \beta, \gamma < \frac{\pi}{2}$

D. $0 < \alpha, \beta, \gamma < \pi$

Answer: B

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2. Which of the triplet can not represent direction cosines of a line ?

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

B. $\frac{3}{\sqrt{50}}, \frac{4}{\sqrt{50}}, \frac{4}{\sqrt{50}}$

C. $\frac{4}{\sqrt{77}}, \frac{5}{\sqrt{77}}, \frac{6}{\sqrt{77}}$

D. $\frac{2}{\sqrt{25}}, \frac{3}{\sqrt{25}}, \frac{4}{\sqrt{25}}$

Answer: D

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3. The valid direction angle triple of a line L is

A. $\frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{3}$

B. $\frac{\pi}{4}, \frac{\pi}{3}, \frac{\pi}{3}$

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

D. $0, \frac{\pi}{3}, \frac{\pi}{3}$

Answer: B

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4. If α, β, γ are the direction angles of a vector and $\cos\alpha = \frac{14}{15}, \cos\beta = \frac{1}{3}$, then $\cos\gamma =$

A. $\pm\frac{2}{15}$

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

C. $\pm\frac{1}{15}$

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

Answer: A

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5. A straight line which makes an angle of 60° with each of Y and Z-axis, the angle this lines makes with X-axis is

A. 60°

B. 30°

C. 45°

D. 75°

Answer: C

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6. The direction consines of a line which lies in XZ-plane and making an angle of 30° with positive Z-axis are

A. $\pm\frac{1}{2}, 0, \pm\frac{\sqrt{3}}{2}$

B. $\pm\frac{\sqrt{3}}{2}, 0, \pm\frac{1}{2}$

C. $\pm\frac{1}{2}, 0, \pm\frac{\sqrt{3}}{4}$

D. $\pm\frac{\sqrt{3}}{4}, 0, \pm\frac{1}{2}$

Answer: A

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7. If a line makes angles of 30° and 45° with X-axis and Y-axis respectively, then the angle made by it with Z-axis

is

A. 45°

B. 60°

C. 120°

D. does not exist

Answer: D

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

A. $1, 1, 1$

B. $-\frac{4}{\sqrt{3}}, -\frac{4}{\sqrt{3}}, -\frac{4}{\sqrt{3}}$

C. $\pm\left(\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}\right)$

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

Answer: C

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9. The sum of the direction cosines of a line which makes equal angles with the positive direction of co-ordinate axes is

A. 3

B. 1

C. $\sqrt{3}$

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

Answer: C

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10. If a line makes angles α, β, γ with co-ordinate axes, then $\cos 2\alpha + \cos 2\beta + \cos 2\gamma =$

A. -2

B. -1

C. 1

D. 2

Answer: B

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11. If a line makes angles α, β, γ with coordinate axes , then

$\sin^2\alpha + \sin^2\beta + \sin^2\gamma$ .....

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

B. 1

C. 2

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

Answer: C

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12. Show that no line in space can make angles $\frac{\pi}{6}$ and $\frac{\pi}{4}$ with x -axis and y -axis.

A. 0

B. 1

C. 2

D. infinite

Answer: A

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13. A line line makes the same angle θ with each of the x and z-axes. If the angle β, which it makes with y-axis, is such that $\sin^2\beta = 3\sin^2\theta$ then $\cos^2\theta$ equals

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

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

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

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

Answer: C

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14. The projections of a line on the co-ordinate axes are 4,6,12. The direction cosines of the line are

A. $\frac{2}{7}, \frac{3}{7}, \frac{6}{7}$

B. $2, 3, 6$

C. $\frac{2}{11}, \frac{3}{11}, \frac{6}{11}$

D. $\frac{2}{5}, \frac{3}{5}, \frac{6}{5}$

Answer: A

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15. If $P(x, y, z)$ is a point in space at a distance r from the origin O, then the direction cosines of the line OP

are

A. $\frac{r}{x}, \frac{r}{y}, \frac{r}{z}$

B. rx, ry, rz

C. $\frac{x}{r}, \frac{y}{r}, \frac{z}{r}$

D. r^2x, r^2y, r^2z

Answer: C

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16. A line AB is inclined to OX at 45° and to OY at 60° and let P be any point on line AB such that OP = 12 units. Then the position vector of 'P' is

A. $12\left(\frac{1}{2}\hat{i}+\frac{1}{2}\hat{j}\pm\frac{1}{\sqrt{2}}\hat{k}\right)$

B. $12\left(\frac{1}{\sqrt{2}}\hat{i}+\frac{1}{2}\hat{j}\pm\frac{1}{\sqrt{2}}\hat{k}\right)$

C. $12\left(\frac{1}{\sqrt{2}}\hat{i}+\frac{1}{2}\hat{j}\pm\frac{1}{2}\hat{k}\right)$

D. $12\left(\frac{1}{2}\hat{i}+\frac{1}{\sqrt{2}}\hat{j}\pm\frac{1}{\sqrt{2}}\hat{k}\right)$

Answer: C

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17. The vector of magnitude 6 which is equally inclined to the co-ordinate axes is

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

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

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

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

Answer: A

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18. 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. $(-3, 6, -9)$

D. $\left(-\frac{1}{3}, \frac{2}{3}, \frac{2}{3}\right)$

Answer: B

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19. Line with direction ratios 1, 1, 1 is

A. parallel to X-axis

B. parallel to Y-axis

C. parallel to Z-axis

D. equally inclined to axes

Answer: D

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20. The angle made by the vector $3\hat{i} - 4\hat{j} + 5\hat{k}$ with the Z-axis is

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

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

C. 0

D. $\cos^{-1}\left(\frac{3}{5\sqrt{2}}\right)$

Answer: A

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21. A line passes through the point $(6, -7, -1)$ and $(2, -3, 1)$. The direction cosines

of the line so directed that the angle made by it with the positive direction of x-axis is acute, are

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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22. If first two numbers of the direction cosines of a line joining points (1,2,0) and (3,-1,z) are $\left(\frac{2}{7}\right), -\left(\frac{3}{7}\right)$

then z is equal to

A. 5

B. ± 6

C. ± 3

D. ± 4

Answer: B

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23. If the points $(2, a, -1), (3, 4, b)$ and $(1, -2, 3)$ are collinear, the values of a and b are

A. $-2, -5$

B. $10, 5$

C. $1, -5$

D. $2, 5$

Answer: C

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24. If $(1, a, 1), (3, -1, 2)$ and $(1, a^2, 1)$ are collinear, then the values of a are

A. $0, -1$

B. $0, 1$

C. $1, -1$

D. $-1, \ -1$

Answer: B

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25. Points (-2, 4, 7), (3, -6 -8) and (1, -2, -2) are

A. collinear

B. vertices of an equilateral triangle

C. vertices of an isosceles triangle

D. none of these

Answer: A

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26. If the angle between the lines whose direction cosines are $a, \frac{-2}{3}, \frac{1}{3}$ and $\frac{2}{3}, \frac{1}{3}, \frac{-2}{3}$ is $\frac{\pi}{2}$, then the value of a is

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

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

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

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

Answer: B

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27. The acute angle between the lines having direction ratios $5, 4, 1$ and $-3, 2, 1$ is

A. $\cos^{-1}\left(\frac{\sqrt{3}}{6}\right)$

B. $\cos^{-1}\left(\frac{5}{\sqrt{3}}\right)$

C. $\cos^{-1}\left(\frac{\sqrt{3}}{7}\right)$

D. $\cos^{-1}\left(\frac{\sqrt{7}}{3}\right)$

Answer: C

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28. Find the angle between the lines whose direction ratios are:

$2, -3, 4$ and $1, 2, 1$.

A. 0

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

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

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

Answer: D

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29. Let θ be the angle between the lines AB and AC, where A, B and C are the three points with co-ordinates $(1, 2, -1), (2, 0, 3), (3, -1, 2)$ respectively, then $\sqrt{462}\cos\theta$ is equal to

A. 20

B. 10

C. 30

D. 40

Answer: A

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30. The direction cosines l, m and n of two lines are connected by the relations $l + m + n = 0$ and $lm = 0$, then the angle between the lines is

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

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

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

D. 0

Answer: A

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31. Find the angle between the line whose direction cosines are given by $l + m + n = 0 and d 2l^2 + 2m^2 - n^2 - 0.$

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

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

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

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

Answer: B

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32. The direction cosines of a line equally inclined to three mutually perpendiclar lines having direction cosines as $l_1, m_1, n_1, l_2, m_2, n_2$ and l_3, m_3, n_3 are

A. $l_1 + l_2 + l_3, m_1 + m_2 + m_3, n_1 + n_2 + n_3$

B. $\frac{l_1 + l_2 + l_3}{\sqrt{3}}, \frac{m_1 + m_2 + m_3}{\sqrt{3}}, \frac{n_1 + n_2 + n_3}{\sqrt{3}}$

C. $\frac{l_1 + l_2 + l_3}{3}, \frac{m_1 + m_2 + m_3}{3}, \frac{n_1 + n_2 + n_3}{3}$

D. none of these

Answer: B

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33. 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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34. The diection cosines of two lines are proportional to $(2, 3, -6)$ and $(3, -4, 5)$, then the acute angle between them is (A) $\cos^{-1}\left\{\frac{49}{36}\right\}$ (B) $\cos^{-1}\left\{\frac{18\sqrt{2}}{35}\right\}$ (C) 96^0 (D) $\cos^{-1}\left(\frac{18}{35}\right)$

A. $\sin^{-1}\left(\frac{18\sqrt{2}}{35}\right)$

B. $\sin^{-1}\left(\frac{16\sqrt{2}}{25}\right)$

C. $\cos^{-1}\left(\frac{18\sqrt{2}}{35}\right)$

D. $\cos^{-1}\left(\frac{16\sqrt{2}}{25}\right)$

Answer: C

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35. If the line joining the points $(-2, 1, -8)$ and (a, b, c) is parallel to the line whose direction ratios are 6, 2, 3, then a, b, c are

A. $4, 3, -5$

B. $1, 2, -4$

C. $0, 3, -2$

D. $6, 2, 3$

Answer: A

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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. 0

B. 1

C. 2

D. $\sqrt{3}$

Answer: A

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37. Direction ratios of two lines are $a, b, cand 1/bc, 1/ca, 1/ab$. Then the lines are _____.

A. mutually perpendicular

B. parallel

C. coincident

D. intersecting

Answer: B

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38. If the direction cosines of two lines are l_1, m_1, n_1 and l_2, m_2, n_2, then find the direction cosine of a line perpendicular to these lines.

A. $l_1 + l_2, m_1 + m_2, n_1 + n_2$

B. $l_1 - l_2, m_1 - m_2, n_1 - n_2$

C. $m_1n_2 - m_2n_1, n_1l_2 - n_2l_1, l_1m_2 - l_2m_1$

D. $l_1 + 2l_2, m_1 + 2m_2, n_1 + 2n_2$

Answer: C

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39. The direction cosines of a line perpendicular to lines whose direction ratios are $2, 1, -3$ and $1, -2, 1$ are

A. $-5, -5, -5$

B. $\frac{5}{\sqrt{3}}, \frac{5}{\sqrt{3}}, \frac{5}{\sqrt{3}}$

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

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

Answer: C

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40. Find the direction cosines of the line which is perpendicular to the lines with direction ratios $4, 1, 3$ and $2, -3, 1$.

A. $\frac{1}{\sqrt{3}}, \frac{1}{5\sqrt{3}}, \frac{-7}{5\sqrt{3}}$

B. $\frac{5}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{7}{5}$

C. $\frac{2}{\sqrt{3}}, \frac{5}{2\sqrt{3}}, \frac{1}{7\sqrt{3}}$

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

Answer: A

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Competitive Thinking

1. If α, β, γ be the angles which a line makes with the coordinates axes, then

A. $\sin^2\alpha + \cos^2\beta + \sin^2\gamma = 1$

B. $\cos^2\alpha + \cos^2\beta + \cos^2\gamma = 1$

C. $\sin^2\alpha + \sin^2\beta + \sin^2\gamma = 1$

D. $\cos^2\alpha + \cos^2\beta + \sin^2\gamma = 1$

Answer: B

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2. If $\cos\alpha, \cos\beta, \cos\gamma$ are the direction cosines of a vector $\vec{a}$, then $\cos 2\alpha + \cos 2\beta + \cos 2\gamma$ is equal to

A. 3

B. 0

C. 2

D. -1

Answer: D

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

Answer: A

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4. If the direction cosines of a line are $\frac{1}{c}, \frac{1}{c}, \frac{1}{c}$ rthen

(A) $c.0$ (B) $0 < c < 1$ (C) $c = \pm\sqrt{3}$ (D) $c > 2$

A. $c > 0$

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

C. $0 < c < 1$

D. $c > 2$

Answer: B

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5. 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

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6. If a line makes angle $120^\circ \text{ and } 60^\circ$ with the positive directions of X and Z-axes respectively, then the angle made by theline with positive Y-axis is

A. 150°

B. 60°

C. 135°

D. 120°

Answer: C

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7. If a line makes an angle of $\frac{\pi}{4}$ with the positive directions of each of x-axis and y-axis, then the angle that the line makes with the positive direction of the z-axis is (1) $\frac{\pi}{6}$ (2) $\frac{\pi}{3}$ (3) $\frac{\pi}{4}$ (4) $\frac{\pi}{2}$

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

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

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

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

Answer: D

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8. If a vector $\bar{x}$ makes angles with measure $\frac{\pi}{4}$ and $\frac{5\pi}{4}$ with positive directions of X-axis and Y-axis respectively. Then $\bar{x}$ made angle of measure _____ with positive direction of Z-axis.

A. $\frac{5\pi}{4}$

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

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

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

Answer: C

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9. A line makes 45° with positive x-axis and makes equal angles with positive y,z axes, respectively. What is the sum of the three angles which the line makes with positive x, y and z axes ?

A. 180°

B. 165°

C. 150°

D. 135°

Answer: B

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10. If a line lies in the octant OXYZ and it makes equal angles with the axes, then

A. $l = m = n = \frac{1}{\sqrt{3}}$

B. $l = m = n = \pm \frac{1}{\sqrt{3}}$

C. $l = m = n = -\frac{1}{\sqrt{3}}$

D. $l = m = n = \pm\frac{1}{\sqrt{2}}$

Answer: B

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11. The number of lines which are equally inclined to the axes is :

A. 2

B. 4

C. 6

D. 8

Answer: B

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12. If vector r wiith dc's l,m,n is equally inclined to the coordinate axes, then the total number of such vectors is

A. 4

B. 6

C. 8

D. 2

Answer: A

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13. If a line makes angles α, β and γ with the coordinate axes, then prove that $\cos 2\alpha + \cos 2\beta + \cos 2\gamma = -1$

A. $\cos 2\alpha + \cos 2\beta + \cos 2\gamma - 1 = 0$

B. $\cos 2\alpha + \cos 2\beta + \cos 2\gamma - 2 = 0$

C. $\cos 2\alpha + \cos 2\beta + \cos 2\gamma + 1 = 0$

D. $\cos 2\alpha + \cos 2\beta + \cos 2\gamma + 2 = 0$

Answer: C

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14. If a line makes angles $\frac{\alpha}{2}, \frac{\beta}{2}, \frac{\gamma}{2}$ with co-ordinate axes, then $\cos\alpha + \cos\beta + \cos\gamma =$

A. 1

B. -1

C. 2

D. 3

Answer: B

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15. The projection of a line segment on the co-ordinate

3, 4, 5, then its length is

A. 12

B. 50

C. $5\sqrt{2}$

D. none of these

Answer: C

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16. The projection of a line segment on the coordinate axes are 2,3,6. Then the length of the line segment is

A. 7

B. 5

C. 1

D. 11

Answer: A

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

A. $\frac{6}{7}, \frac{2}{7}, \frac{3}{7}$

B. $6, 2, 3$

C. $2, 4, -13$

D. $\frac{4}{5}, \frac{3}{5}, \frac{6}{5}$

Answer: B

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18. ABC is a triangle and $A = (235)\dot{B} = (-1, 3, 2) and C = (\lambda, 5, \mu)$. If the median through A is equally inclined to the axes, then find the value of $\lambda and \mu$.

A. $10, 7$

B. $9, 10$

C. $7, 9$

D. $7, 10$

Answer: D

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19. If the direction ratios of a lines are proportional to $1, -3, 2$ 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

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

A. $\left(\frac{6}{7}, \frac{2}{7}, \frac{3}{7}\right)$

B. $\left(\frac{2}{7}, \frac{3}{7}, \frac{6}{7}\right)$

C. $\left(\frac{6}{7}, \frac{3}{7}, \frac{2}{7}\right)$

D. none of these

Answer: A

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21. The co-ordinates of a point P are (3, 12, 4) with respect to 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

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22. The projection of a vector on the three coordinate axes are $6, -3, 2$, respectively. The direction cosines of

the vector are

A. $6, -3, 2$

B. $\frac{6}{5}, -\frac{3}{5}, \frac{2}{5}$

C. $\frac{6}{7}, -\frac{3}{7}, \frac{2}{7}$

D. $-\frac{6}{7}, -\frac{3}{7}, \frac{2}{7}$

Answer: C

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

Answer: B

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24. Which of the following set of points are non-collinear?

A. $(1, -1, 1), (-1, 1, 1), (0, 0, 1)$

B. $(1, 2, 3), (3, 2, 1), (2, 2, 2)$

C. $(-2, 4, -3), (4, -3, -2), (-3, -2, 4)$

D. $(2, 0, -1), (3, 2, -2), (5, 6, -4)$

Answer: C

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25. If the points $(5, -2, 7), (2, 2, \beta)$ and $(-1, 6, -1)$ are collinear, then the value of β is

A. 0

B. -3

C. 3

D. 4

Answer: C

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26. If the points $(-1, 2-3), (4, a, 1)$ and $(b, 8, 5)$ are collinear, then a and b are respectively equal to

A. 5 and 5

B. 9 and 5

C. 5 and 9

D. -5 and 9

Answer: C

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27. IF points $p(4, 5, x), Q(3, y, 4)$ and $R(5, 8, 0)$ are collinear , then the value of $x + y$ is

A. -4

B. 3

C. 5

D. 4

Answer: D

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28. The points $A(1, 0, 1), B(-1, 2, 3)$ and $C(0, 1, 2)$ are

A. Non-collinear

B. Collinear

C. Non-coplanar

D. none of these

Answer: B

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29. The direction rations of the diagonals of a cube which joins the origin to the opposite corner are (when

the three concurrent edges of the cube are coordinate axes)

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

B. $1, 1, 1$

C. $2, -2, 1$

D. $1, 2, 3$

Answer: B

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30. The acute angle between the lines whose direction ratios are 1, 2, 2 and $\sqrt{3}-1, -\sqrt{3}-1, 4$ is

A. 30°

B. 45°

C. 60°

D. 90°

Answer: C

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31. 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)

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

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

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

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

Answer: A

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32. 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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33. The angle between the lines whose direction cosines satisfy the equations $l + m + n = 0$ and $l^2 = m^2 + n^2$ is (1) $\frac{\pi}{3}$ (2) $\frac{\pi}{4}$ (3) $\frac{\pi}{6}$ (4) $\frac{\pi}{2}$

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

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

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

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

Answer: C

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34. Direction ratios of the line which is perpendicular to the lines with direction ratios (-1,2,2) and (0,2,1) are

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

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

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

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

Answer: B

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35. The direction cosines of the line which is perpendicular to the lines whose direction cosines are proportional to $1, -1, 2$ and $2, 1, -1$ are

A. $\frac{-1}{\sqrt{35}}, \frac{5}{\sqrt{35}}, \frac{3}{\sqrt{35}}$

B. $\frac{13}{\sqrt{35}}, \frac{-1}{\sqrt{35}}, \frac{1}{\sqrt{35}}$

C. $\frac{2}{\sqrt{3}}, \frac{5}{\sqrt{3}}, \frac{7}{\sqrt{3}}$

D. $\frac{3}{\sqrt{35}}, \frac{5}{\sqrt{35}}, \frac{7}{\sqrt{35}}$

Answer: A

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36. If a line makes $\alpha, \beta, \gamma, \delta$ angles with four diagonals of a cube, then

$\cos 2\alpha + \cos 2\beta + \cos 2\gamma + \cos 2\delta =$

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

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

C. $-\frac{4}{3}$

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

Answer: C

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37. A line makes an angle $\alpha, \beta, \gamma, \delta$ with the four diagonals of a cube, then $\sin^2\alpha + \sin^2\beta + \sin^2\gamma + \sin^2\delta =$

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

B. $\frac{8}{3}$

C. $\frac{7}{3}$

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

Answer: B

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Evaluation Test

1. If α, β and γ are angles made by a line with coordinate axes such that $\alpha = \beta = 2\gamma$ and $\angle\alpha$ is acute, then $\cos\alpha$=

A. $\frac{\sqrt{17}-1}{8}$

B. $\frac{\sqrt{17}+1}{8}$

C. $\frac{-\sqrt{17}+1}{8}$

D. none of these

Answer: A

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2. If θ is the acute angle between two intersecting straight lines, one having direction cosines l_1, m_1, n_1 and the other having direction cosines l_2, m_2, n_2 then $\sin^2\theta$=

A. $(l_1 + l_2 + l_3)^2 + (m_1 + m_2 + m_3)^2$

B.

$$(l_1m_2 + l_2m_1)^2 + (m_1n_2 + m_2n_1)^2 + (n_1l_2 + n_2l_1)^2$$

C.

$$(l_1m_2 - l_2m_1)^2 + (m_1n_2 - m_2n_1)^2 + (n_1l_2 - n_2l_1)^2$$

D. none of these

Answer: C

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3. $A(2, 3, 7), B(-1, 3, 2), C(p, 5, r)$ are vertices of ΔABC. If the median through A is equally inclined to the co-ordinate axes, then the values of p and r are

A. $7, 14$

B. $14, 7$

C. $7, 7$

D. $14, 14$

Answer: A

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4. If ΔABC, if $A \equiv (3, 2, 6), B \equiv (1, 4, 5)$ and $C \equiv (3, 5, 3)$, then $m\angle ABC =$

A. 30°

B. 45°

C. 60°

D. 90°

Answer: D

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5. Find the angle between the lines whose direction cosines are given by the equations $3l + m + 5n = 0$

and $6mn - 2nl + 5lm = 0$

A. $\cos^{-1}\left(\frac{1}{\sqrt{6}}\right)$

B. $\cos^{-1}\left(\frac{-1}{6}\right)$

C. $\cos^{-1}\left(\frac{2}{\sqrt{6}}\right)$

D. $\cos^{-1}\left(\frac{-2}{\sqrt{6}}\right)$

Answer: B

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6. If l, m, n are direction cosines of a line, then the maximum value of $lm + mn + nl$ is

A. 3

B. 1

C. $\sqrt{3}$

D. 2

Answer: B

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7. If the point $(a, 2, 3), (3, b, 7)$ and $(-3, -2, -5)$ are collinear, the values of a and b respectively are

A. $-4, 2$

B. $4, 2$

C. $-2, 4$

D. $2, 4$

Answer: D

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8. The direction cosines of a line which is perpendicular to both the lines whose direction ratios are $1, -1, 0$ and $2, -1, 1$ are

A. $-1, -1, 1$

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

C. $1, -1, -1$

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

Answer: B

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9. What are the direction cosines of a line which is equally inclined to the axes?

A. $1, 1, 1$

B. $1, 0, 0$

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

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

Answer: D

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