MATHS

BOOKS - NDA PREVIOUS YEARS

3-D GEOMETRY

Mcq

1. Conisder the points (a-1, a, a + 1), (a, a + 1,a - 1) and (a + 1, a - 1, a).

1. These points always form the vertices of an equilateral triangle for any real value of a.

2. The area of the triangle formed by these points is independent of a.

Which of the statement (s) given above is/are correct ?

A. 1 only

B. 2 only

C. Both 1 and 2

D. Neither 1 nor 2

Answer: C

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2. What are corrdinates of the point equidistant from the points $(a, 0, 0), (0, a, 0), (0, 0, a)$ and $(0, 0, 0)$?

A. $\left(\frac{a}{3}, \frac{a}{3}, \frac{a}{3}\right)$

B. $\left(\frac{a}{2}, \frac{a}{2}, \frac{a}{2}\right)$

C. (a,a,a)

D. $(2a, 2a, 2a)$

Answer: B

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3. 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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4. What is the angle between the two lines whose direction numbers are $(\sqrt{3}-1, -\sqrt{3}-1, 4)$ and $(-\sqrt{3}-1, \sqrt{3}-1, 4)$?

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

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

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

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

Answer: C

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5. Consider the following statements :

1. Equations $ax+by+cz+d=0a'x+b'y+c'z+d'=0$ represent a straigth line.

2. Equation of the form

$$\frac{x-\alpha}{l}=\frac{y-\beta}{m}=\frac{z-\gamma}{n}$$

represent a straight line passing through the point $(\alpha, \beta, \gamma)$and

having direction ratio proportional to l,m,n.

Which of the statements given above is/are correct?

A. 1 only

B. 2 only

C. Both 1 and 2

D. Neither 1 nor 2

Answer: C

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6. If the centre of the sphere

$ax^2+by^2+cx^2-2x+4y+2z-3=0$ is $(1/2, -1, 1/2)$,

what is the value of b?

A. 1

B. -1

C. 2

D. -2

Answer: C

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7. What is the length of the perpendicular from the origin to the plane $ax + by + \sqrt{ab}z = 1$?

A. 1/(ab)

B. 1/(a+b)

C. a + b

D. ab

Answer: B

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8. If the direction ratios of the normal to a plane are lt l, m, n gt and the length of the normal is p, then what is the sum of intercepts cut-off by the plane from the coordinate axes?

A. $p\left(\frac{1}{l}+\frac{1}{m}+\frac{1}{n}\right)$

B. $p\sqrt{\left(l^2+m^2+n^2\right)}$

C. $p\sqrt{\left(l^2+m^2+n^2\right)}\left(\frac{1}{l}+\frac{1}{m}+\frac{1}{n}\right)$

D. $\frac{p}{\sqrt{\left(l^2+m^2+n^2\right)}}\left(\frac{1}{l}+\frac{1}{m}+\frac{1}{n}\right)$

Answer: A

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9. How many arbitray constants are there in the equation of a plane ?

A. 2

B. 3

C. 4

D. Any finite number

Answer: C

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10. If P,Q are (2, 5, -7),(-3, 2, 1) respectively, then what are the direction ratios of the line PQ ?

A. $< 10, 6, -16 >$

B. lt 5, 3, 8 gt

C. lt -5, -3 -8 gt

D. None of these

Answer: D

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11. If the axes are rectangular and P is the point (2, 3, -1), find the equation of the plane through P at right angle to OP.

A. $2x + 3y + z = 16$

B. $2x + 3y - z = 14$

C. $2x + 3y + z = 14$

D. $2x + 3y - z = 0$

Answer: B

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12. Show that the coplanar points $(0, 4, 1), (2, 3, -1), (4, 5, 0)$ and $92, 6, 2)$ are the vertices of a square.

A. Rhombus

B. Rectangle

C. Square

D. Parallelogram

Answer: C

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13. If the sum of the squares of the distances of the point (x, y, z) from the points (a, 0, 0) and (-a, 0, 0) is $2c^2$, then which are of the following is correct?

A. $x^2 + a^2 = 2c^2 - y^2 - z^2$

B. $x^2 + a^2 = c^2 - y^2 - z^2$

C. $x^2 - a^2 = c^2 - y^2 - z^2$

D. $x^2 + a^2 = c^2 + y^2 + z^2$

Answer: B

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14. Which one of following is correct ?

The three planes

$2x + 3y - z - 2 = 0, 3x + 3y + z - 4 = 0, x - y + 2z - 5 = 0$

intersect

A. at a point

B. at two points

C. at three points

D. in a line

Answer: D

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15. The following question consist of two statements, one labelled as the 'Assertion (A)' and the other as 'Reason(R)'. You are to axamine these two statements carefully and select the answer.

Assertion (A) : If lt l, m, n gt are direction cosines of a line, there

can be a line whose direction cosines are

$$\left(\sqrt{\frac{l^2+m^2}{2}}, \sqrt{\frac{m^2+n^2}{2}}, \sqrt{\frac{n^2+l^2}{2}},\right).$$

Reason(R) : The sum of direction cosines of a line is unity.

A. Both A and R individually true, and R is the correct explanation of A.

B. Both A and R are individually true but R is not the correct explanation of A.

C. A is true but R is false.

D. A is false but R is true.

Answer: C

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16. Which one of the following is the plane containing the line $\frac{x-2}{2}=\frac{y-3}{3}=\frac{z-4}{5}$ and parallel to z-axis?

A. $2x-3y=0$

B. $5x-2z=0$

C. $5y-3z=0$

D. $3x-2y=0$

Answer: D

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17. What is the centre of the sphere $ax^2+by^2+cz^2-6x=0$ if the radius is 1 unit?

A. (0,0,0)

B. (1,0,0)

C. (3,0,0)

D. cannot be determined as values of a,b,c are unknown

Answer: D

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18. Under what condition do $\left(\frac{1}{\sqrt{2}}, \frac{1}{2}, K\right)$ represent direction cosines of a line ?

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

B. $k = -\frac{1}{2}$

C. $k = \pm\frac{1}{2}$

D. k can take any value

Answer: C

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19. If $x = a\sec\theta\cos\varphi,\ \ y = b\sec\theta\sin\varphi$ and $z = c\tan\theta$, show that $\frac{x^2}{a^2} + \frac{y^2}{b^2} - \frac{z^2}{c^2} = 1$

A. 1

B. 0

C. -1

D. $a^2 + b^2$

Answer: A

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20. A line makes angles θ, ϕ and Ψ with x,y,z axes respectively.

Consider the following ltbRgt 1. $\sin^2\theta + \sin^2\phi = \cos^2\Psi$

2. $\cos^2\theta + \cos^2\phi = \sin^2\Psi$

3. $\sin^2\theta + \cos^2\phi = \cos^2\Psi$

Which of the above is/are correct?

A. 1 only

B. 2 only

C. 3 only

D. 2 and 3

Answer: B

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21. What is the equation of the plane passing through (x_1, y_1, z_1) and normal to the line with lt a, b, c gt as firection ratios ?

A. $ax + by + cz = ax_1 + by_1 + cz_1$

B. $a(x + x_1) + b(y + y_1) + c(z + z_1) = 0$

C. $ax + by + cz = 0$

D. $ax + by + cz = x_1 + y_1 + z_1 = 0$

Answer: A

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22. What are the direction cosines of the line represented by $3x + y + 2z = 7, x + 2y + 3z = 5$?

A. $(-1, -7, 5)$

B. $(-1, 7, 5)$

C. $\left(-\frac{1}{\sqrt{75}}, -\frac{7}{\sqrt{75}}, \frac{5}{\sqrt{75}}\right)$

D. $\left(-\frac{1}{\sqrt{75}}, \frac{7}{\sqrt{75}}, \frac{5}{\sqrt{75}}\right)$

Answer: C

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23. The equation of a sphere is $x^2 + y^2 + z^2 - 10z = 0$. If one end point of a diameter of the sphere is $(-3, 4, -5)$, what is the other en point?

A. $(-3, -4, -5)$

B. (3,4,5)

C. (3,4,-5)

D. (-3,4,-5)

Answer: B

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24. O(0,0),A(0,3),B(4,0) are the vertices of triangle OAB. A force $10\hat{i}$ acts at B. What is the magnitude of moment of force about the vertex A?

A. 0

B. 30 unit

C. 40 unit

D. 50 unit

Answer: B

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25. What is the ratio in which the line joining the points (2,4,5) and (3,5,-4) is internally divided by the xy-plane?

A. $5:4$

B. $3:4$

C. $1:2$

D. $7:5$

Answer: A

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26. Under which one of the following conditions will the two planes $x+y+z=7$ and $\alpha x+\beta y+\gamma z=3$, be parallel (but not coincident)?

A. $\alpha = \beta = \gamma = 1$ only

B. $\alpha = \beta = \gamma = \frac{1}{7}$ only

C. $\alpha = \beta = \gamma$

D. None of the above

Answer: C

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27. The straight line $\frac{x-3}{2} = \frac{y-4}{3} = \frac{z-5}{4}$ is parallel to which one of the following?

A. $4x + 3y - 5z = 0$

B. $4x + 5y - 4z = 0$

C. $4x + 4y - 5z = 0$

D. $5x + 4y - 5z = 0$

Answer: C

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28. If θ is tbe acute angle between the diagonals of a cube, then which one of the following is correct?

A. $\theta < 30^\circ$

B. $\theta = 60^\circ$

C. $30^\circ < \theta < 60^\circ$

D. $\theta > 60^\circ$

Answer: D

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29. Which one of the following planes contains the z-axis?

A. $x - z = 0$

B. $z + y = 0$

C. $3x + 2y = 0$

D. $3x + 2z = 0$

Answer: C

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30. Under what condition are the two lines

$y = \frac{m}{l}x + \alpha, z = \frac{n}{l}x + \beta,$ and $y = \frac{m'}{l'}x + \alpha', z = \frac{n'}{l'}x + \beta'$

orthogonal?

A. $\alpha\alpha' + \beta\beta' + 1 = 0$

B. $(\alpha + \alpha') + (\beta + \beta') = 0$

C. $ll' + mm' + \cap' = 1$

D. $ll' + mm' + \cap' = 0$

Answer: D

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31. Find the coordinates of the point equidistant from the points $(0, 0, 0), (2, 0, 0), (0, 4, 0)$ and $(0, 0, 6)$

A. (1,2,3)

B. (2,3,1)

C. (3,1,2)

D. (1,3,2)

Answer: A

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32. The angle between the lines with direction ratios $(1, 0, \pm \cos\alpha)$ is 60°. What is the value of α?

A. $\cos^{-1}(1/\sqrt{2})$

B. $\cos^{-1}(1/\sqrt{3})$

C. $\cos^{-1}(1/3)$

D. $\cos^{-1}(1/2)$

Answer: B

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33. The line passing through (1, 2, 3) and having direction ratios given by lt 1, 2, 3 gt cuts the x-axis distance k form origin.

What is the value of k?

A. 0

B. 1

C. 2

D. 3

Answer: A

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34. In the space the equation $by + cz + d = 0$ represents a plane perpendicular to the plane

A. x-axis

B. y-axis

C. z-axis

D. None of these

Answer: A

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35. Which one of the following planes is normal to the plane $3x + y + z = 5$?

A. $x + 2y + z = 6$

B. $x - 2y + z = 6$

C. $x + 2y - z = 6$

D. $x - 2y - z = 6$

Answer: D

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36. If the radius of the sphere

$x^2 + y^2 + z^2 - 6x - 8y + 10z + \lambda = 0$ is unity, what is the value of λ ?

A. 49

B. 7

C. -49

D. -7

Answer: A

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37. Curve of intersection of two spheres in

A. an ellipse

B. a circle

C. a parabola

D. None of these

Answer: B

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38. Show that the points $A(1, 3, 4),\ B(-1, 6, 10),\ C(-7, 4, 7) and\ D(-5, 1, 1)$ are have vertices of a rhombus.

A. rhombus

B. rectangle

C. parallelogram

D. square

Answer: A

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39. What is the number of planes passing through three non-collinear points?

A. 3

B. 2

C. 1

D. 0

Answer: C

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40. what is the angle between the lines x+z=0,y=0 and 20x=15y=12z?

A. $\cos^{-1}(1/5)$

B. $\cos^{-1}(1/7)$

C. $\frac{\cos^{-1}45}{7\sqrt{61}}$

D. $\sin^{-1}(1/7)$

Answer: A

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41. Under what condition does the equations $x^2 + y^2 + z^2 + 2ux + 2uy + 2w + d = 0$ represent a real sphere?

A. $u^2 + v^2 + w^2 = d^2$

B. $u^2 + v^2 + w^2 < d$

C. $u^2 + v^2 + w^2 > d$

D. $u^2 + v^2 + w^2 > d^2$

Answer: B

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42. What is the angle between the plane $2x - y + z = 6$ and $x + y + 2z = 3$?

A. $\pi/2$

B. $\pi/3$

C. $\pi/4$

D. $\pi/6$

Answer: B

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43. What is the equation of a plane through the x-axis and passing through the point $(1, 2, 3)$?

A. $x + y + z = 6$

B. $x = 1$

C. $y + z = 5$

D. $z + y = 1$

Answer: B

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44. What is the value of n so that the angle between the lines having direction ratios (1,1,1) and (1,-1,n) is 60°?

A. $\sqrt{3}$

B. $\sqrt{6}$

C. 3

D. None of these

Answer: B

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45. The direction cosines of a line are proportional to (2,1,2) and the line intersects a plane perpendicularly at the point (1, -2, 4). What is the distance of the plane from the point (3,2,3) ?

A. $\sqrt{3}$

B. 2

C. $2\sqrt{2}$

D. 4

Answer: B

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46. The foot of the perpendicular drawn from the origin to a plane is the point $(1, -3, 1)$. What is the intercept cut on the x-axis by the plane ?

A. 1

B. 3

C. $\sqrt{11}$

D. 11

Answer: D

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47. A line makes the same angle α with each of the x and y axes. If the angle θ, which it makes with the z-axis, is such that $\sin^2\theta = 2\sin^2\alpha$, then what is the value of α?

A. $\pi/4$

B. $\pi/6$

C. $\pi/3$

D. $\pi / 2$

Answer: A

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48. What is the equation of the sphere which has its centre at (6,-1,2) and touches the plane $2x - y + 2z - 2 = 0$?

A. $x^2 + y^2 + z^2 + 12x - 2y + 4z + 16 = 0$

B. $x^2 + y^2 + z^2 + 12x - 2y + 4z - 16 = 0$

C. $x^2 + y^2 + z^2 - 12x + 2y - 4z + 16 = 0$

D. $x^2 + y^2 + z^2 - 12x + 2y - 4z + 25 = 0$

Answer: C

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49. What are the direction ratios of the line determined by the planes $x - y + 2z = 1$ and $x + y - z = 3$?

A. (-1,3,2)

B. (-1,-32)

C. (2,1,3)

D. (2,3,2)

Answer: A

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50. Under what condition do the planes $bx - ay = n, cy - bz = l, az - cx = m$ intersect in a line?

A. $a + b + c = 0$

B. $a = b = c$

C. $al + bm + cn = 0$

D. $l + m + n = 0$

Answer: C

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51. The planes $px + 2y + 2z - 3 = 0$ and $2x - y + z + 2 = 0$ intersect at an angle $\frac{\pi}{4}$. What is the value of p^2?

A. 24

B. 12

C. 6

D. 3

Answer: A

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52. Find the angel between any two diagonals of a cube.

A. $\cos^{-1}(1/2)$

B. $\cos^{-1}(1/3)$

C. $\cos^{-1}(1/\sqrt{3})$

D. $\cos^{-1}(\sqrt{2}/3)$

Answer: B

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53. The angle between diagonal of a cube and diagonal of a face of the cube will be

A. $\cos^{-1}(1/\sqrt{3})$

B. $\cos^{-1}(1/3)$

C. $\cos^{-1}(1/\sqrt{3})$

D. $\cos^{-1}(2/\sqrt{3})$

Answer: D

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54. What is the angle between the diagonal of one of the faces of the cube and the diagonal of the cube intersecting the diagonal of the face of the cube?

A. $\cos^{-1}(1/\sqrt{3})$

B. $\cos^{-1}(2/\sqrt{3})$

C. $\cos^{-1}\left(\sqrt{2/3}\right)$

D. $\cos^{-1}(\sqrt{2}/3)$

Answer: C

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55. What is the equation of the plane through z-axis and parallel to the line $\frac{x-1}{\cos\theta} = \frac{y+2}{\sin\theta} = \frac{z-3}{0}$?

A. $x\cot\theta + y = 0$

B. $x\tan\theta - y = 0$

C. $x + y\cot\theta = 0$

D. $x - y\tan\theta = 0$

Answer: B

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56. If the line through the points A (k,1,-1) and B(2k,0,2) is perpendicular to the line through the points B and $C(2+2, k, 1)$, then what is the value of k?

A. -1

B. 1

C. -3

D. 3

Answer: D

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57. The two planes $ax + by + cz + d = 0$ and $ax + by + cz + d = 0$ where $d \neq d_1$, have

A. one point only in common

B. three points in common

C. infinite points in common

D. no points in common

Answer: D

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58. What is the distance of the origin from the plane $x + 6y - 3z + 7 = 0$?

A. 1

B. 2

C. 3

D. 6

Answer: A

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59. The acute angle between the planes $2x - y + z = 6$ and $x + y = 2z = 3$ is

A. $\pi / 5$

B. $\pi / 4$

C. $\pi / 6$

D. $\pi / 3$

Answer: D

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60. What is the radius of the sphere $x^2 + y^2 + z^2 - x - y - z = 0$?

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

B. $\sqrt{\frac{1}{2}}$

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

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

Answer: A

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61. Consider the following relations among the angles α, β and γ made by a vector with the coordinate axes

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

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

Which of the above is/are correct?

A. only I

B. Only II

C. Both I and II

D. Neither I or II

Answer: A

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62. Which one of the following points lies on the plane $2x + 3y - 6z = 21$?

A. (3,2,2)

B. (3,7,1)

C. (1,2,3)

D. (2,1,-1)

Answer: B

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63. What is the angle between the lines whose direction cosines are proportional to (2,3,4) and (1,-2,1) respectively?

A. 90°

B. 60°

C. 45°

D. 30°

Answer: A

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64. What is the locus of points of intersection of a sphere and a plane ?

A. Circle

B. Elipse

C. Parabola

D. Hyperbola

Answer: A

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65. What is the angle between two planes $2x - y + z = 4$ and $x + y + 2z = 6$?

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

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

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

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

Answer: B

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66. What is the equation of the plane passing through point (1,-1,-1) and perpendicular to each of the planes $x - 2y - 8z = 0$ and $2x + 5y - z = 0$?

A. $7x - 3y + 2z = 14$

B. $2x + 5y - 3z = 12$

C. $x - 7y + 3z = 4$

D. $14x - 5y + 3z = 16$

Answer: D

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67. The equation to sphere passing throrugh origin and the points (-1,0,0),(0,-2,0) and (0,0,-3) is $x^2 + y^2 + z^2 + f(x, y, z) = 0$. What if f(x,y,z) equal to ?

A. $-x-2y-3z$

B. $x+2y+3z$

C. $x+2y+3z-1$

D. $x+2y+3z+1$

Answer: B

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68. If a line makes the angles α, β, γ with the axes, then what is the value of $1+\cos 2\alpha+\cos 2\beta+\cos \gamma$ equal to

A. -1

B. 0

C. 1

D. 2

Answer: B

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69. What are the direction ratios of normal to the plane $2x - y + 2z + 1 = 0$?

A. $\langle 2, 1, 2 \rangle$

B. $\left\langle 1, -\frac{1}{2}, 1 \right\rangle$

C. $\langle 1, -2, 1 \rangle$

D. None of the above

Answer: B

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70. What is the cosines of angle between the planes $x + y + z + 1 = 0$ and $2x - 2y + 2z + 1 = 0$?

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71. What is the sum of the squares of direction cosines of the line joining the points (1,2,-3) and (-2,3,1)?

A. 0

B. 1

C. 3

D. $\frac{2}{\sqrt{26}}$

Answer: B

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72. What is the diameter of the sphere $x^2 + y^2 + z^2 - 4x + 6y - 8z - 7 = 0$

A. 4 units

B. 5 units

C. 6 units

D. 12 units

Answer: D

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73. If the distance between the points (7,1,-3) and $(4, 5, \lambda)$ is 13 units, then what is one of the value of λ?

A. 20

B. 10

C. 9

D. 8

Answer: C

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74. If O be the origin and OP=r and OP makes an angle theta with the positive direction of x-axis and lies in the XY plane find the coordinates of P.

A. $(r\cos\alpha, 0, r\sin\alpha)$

B. $(0, 0, r\sin\alpha)$

C. $(r\cos\alpha, 0, 0)$

D. $(0, 0, r\cos\alpha)$

Answer: A

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75. What is the distance of the point (1,2,0) from yz-plane is :

A. 1 unit

B. 2 units

C. 3 units

D. 4 units

Answer: A

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

A. $\left\langle \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}} \right\rangle$

B. $\left\langle -\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}} \right\rangle$

C. $\left\langle -\frac{1}{\sqrt{3}}, -\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}} \right\rangle$

D. $\left\langle \frac{1}{3}, \frac{1}{3}, \frac{1}{3} \right\rangle$

Answer: A

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77. What is the angle between the lines $\frac{x-2}{1} = \frac{y+1}{-2} = \frac{z+2}{1}$ and $\frac{x-1}{1} = \frac{2y+3}{3} = \frac{z+5}{2}$?

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

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

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

D. None of the above

Answer: A

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78. What is the equation to the planes through (1,2,3) parallel to $3x + 4y - 5z = 0$?

A. $3x + 4y + 5z + 4 = 0$

B. $3x + 4y - 5z + 14 = 0$

C. $3x + 4y - 5z + 4 = 0$

D. $3x + 4y - 5z - 4 = 0$

Answer: C

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79. What are the direction ratios of the line of intersection of the planes $x = 3z + 4$ and $y = 2z - 3$?

A. $\langle 1, 2, 3 \rangle$

B. $\langle 2, 1, 3 \rangle$

C. $\langle 3, 2, 1 \rangle$

D. $\langle 1, 3, 2 \rangle$

Answer: C

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80. The equations to the straight line through (a, b, c) parallel to the z-axis are

A. $\frac{x-a}{1} = \frac{y-b}{0} = \frac{z-c}{0}$

B. $\frac{x-a}{0} = \frac{y-b}{0} = \frac{z-c}{1}$

C. $\frac{x-a}{0} = \frac{y-b}{1} = \frac{z-c}{0}$

D. $\frac{x-a}{0} = \frac{y-b}{1} = \frac{z-c}{1}$

Answer: B

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81. The sum of the direction cosines of z-axis is

A. 0

B. $1/3$

C. 1

D. 3

Answer: C

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82. What is the area of the triangle whose vertices are (0,0,0), (1,2,3) and (-3,-2,1) ?

A. $3\sqrt{5}$ square unit

B. $6\sqrt{5}$ square unit

C. 6 square unit

D. 12 square unit

Answer: A

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83. What is the distance between the planes $x - 2y + z - 1 = 0$ and $-3x + 6yy - 3z + 2 = 0$?

A. 3 unit

B. 1 unit

C. 0

D. None of the above

Answer: D

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84. If a makes30° with the positive direction of x-axis, angle β with the positive direction of y-axis and angle γ with the positive

direction of z-axis, then what is $\cos^2\beta + \cos^2\gamma$ eqaul to ?

A. $1/4$

B. $1/2$

C. $3/4$

D. 1

Answer: A

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85. What should be the value of k for which the equation $3x^2 + 2y^2 + (k+1)z^2 + x - y + z = 0$ represents the sphere?

A. 3

B. 2

C. 1

D. -1

Answer: B

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86. What is the angle between the planes $2x - y - 2z + 1 = 0$ and $3x - 4y + 5z - 3 = 0$?

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

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

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

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

Answer: D

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87. The condition that the line $\frac{x-x_1}{l}=\frac{y-y_1}{m}=\frac{z-z_1}{n}$ lies in the plane $ax+by+cz+d=0$ is

A. $l+m+n=0$

B. $a+b+c=0$

C. $\frac{a}{l}+\frac{b}{m}+\frac{c}{n}=0$

D. $al+bm+cn=0$

Answer: D

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88. Find the angel between any two diagonals of a cube.

A. $\theta=30^\circ$

B. $\theta=45^\circ$

C. $2\cos\theta = 1$

D. $3\cos\theta = 1$

Answer: D

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89. Which is the equation of the sphere with unit radius having centre at the origin ?

A. $x^2 + y^2 + z^2 = 0$

B. $x^2 + y^2 + z^2 = 1$

C. $x^2 + y^2 + z^2 = 2$

D. $x^2 + y^2 + z^2 = 3$

Answer: B

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90. What is the sum of the squares of direction cosines of x-axis?

A. 0

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

C. 1

D. 3

Answer: C

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91. What is the distance of the line $2x + y + 2z = 3$ from the origin ?

A. 1 unit

B. 1.5 units

C. 2 units

D. 2.5 units

Answer: A

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

A. 5 units

B. 7 units

C. 11 units

D. 49 units

Answer: B

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93. A straight line passes through (1, -2, 3) and perpendicular to the plane $2x + 3y - z = 7$.

What are the direction ratios of normal to plane?

A. $< 2, 3, -1 >$

B. $< 2, 3, 1 >$

C. $< -1, 2, 3 >$

D. None of these

Answer: A

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94. A straight line passes through (1, -2, 3) and perpendicular to the plane $2x + 3y - z = 7$.

Where does the line meet the plane ?

A. (2, 3, -1)

B. (1,2,3)

C. (2,1,3)

D. (3,1,2)

Answer: D

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95. A straight line passes through (1, -2, 3) and perpendicular to the plane $2x + 3y - z = 7$.

What are the direction ratios of normal to plane?

A. (2, -1, 5)

B. (-1, 2, -3)

C. (5,4,1)

D. None of these

Answer: C

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96. Consider the spheres $x^2 + y^2 + z^2 - 4y + 3 = 0$ and $x^3 + y^2 + z^2 + 2x + 4z - 4 = 0$.

What is the distance between the centres of the two spheres?

A. 5 units

B. 4 units

C. 3 units

D. 2 units

Answer: C

Watch Video Solution

97. Consider the spheres $x^2 + y^2 + z^2 - 4y + 3 = 0$ and $x^3 + y^2 + z^2 + 2x + 4z - 4 = 0$.

Consider the following statements :

1. The two spheres intersect each other.

2. The radius of first sphere is less than that of second sphere.

Which of the above statements is/are correct?

A. 1 only

B. 2 only

C. Both 1 and 2

D. Neither 1 nor 2

Answer: C

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98. Consider the spheres $x^2 + y^2 + z^2 - 4y + 3 = 0$ and $x^3 + y^2 + z^2 + 2x + 4z - 4 = 0$.

A line passes through the points (6, -7, -1) and (2, -3, 1). What are the direction ratios of the line?

A. $< 4, -4, 2 >$

B. $< 4, 4, 2 >$

C. $< -4, 4, 2 >$

D. $< 2, 1, 1 >$

Answer: C

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99. Consider a sphere passing through the origin and the points

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

What is the radius of the sphere

A. $\sqrt{12}$

B. $\sqrt{14}$

C. 12

D. 14

Answer: B

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100. Consider a sphere passing through the origin and the points (2,1,-1),(1,5,-4),(-2,4,-6).

What is the centre of the sphere ?

A. (-1,2,-3)

B. (1,-2,3)

C. (1,2,-3)

D. (-1,-2,-3)

Answer: A

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101. Consider a sphere passing through the origin and the points (2,1,-1),(1,5,-4),(-2,4,-6).

Consider the following statements :

1. The sphere passes through the point (0,4,0).

2. The point (1,1,1) is at a distance of 5 unit from the centre of the sphere.

Which of the above statement is/are correct?

A. 1 only

B. 2 only

C. Both 1 and 2

D. Neither 1 nor 2

Answer: A

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102. The line joining the points (2, 1, 3) and (4, -2, 5) cuts the plane $2x + y - z = 3$.

Where does the line cut the plane ?

A. (0, -4, -1)

B. (0, -4, 1)

C. (1,4,0)

D. (0,4,1)

Answer: D

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103. The line joining the points (2, 1, 3) and (4, -2, 5) cuts the plane

$2x + y - z = 3.$

What is the ratio in which the plane divideds the line ?

A. $1:1$

B. $2:3$

C. $3:4$

D. None of these

Answer: D

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104. Conisder the plane passing through the points A(2,2,1),B(3,4,2) and C(7,0,6).

Which one of the following points lines on the plane ?

A. (1,0,0)

B. (1,0,1)

C. (0,0,1)

D. None of these

Answer: A

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105. Conisder the plane passing through the points A(2,2,1),B(3,4,2) and C(7,0,6).

What are the direction ratios of the normal to the plane ?

A. lt 1,0,1 gt

B. lt 0,1,0 gt

C. lt1,0,-1gt

D. None of these

Answer: C

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106. 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. 19 units

B. 17 units

C. 15 units

D. 13 units

Answer: D

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107. 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. $\left\langle \frac{12}{13}, \frac{4}{13}, \frac{3}{13} \right\rangle$

B. $\left\langle \frac{12}{13}, -\frac{4}{13}, \frac{3}{13} \right\rangle$

C. $\left\langle \frac{12}{13}, -\frac{4}{13}, -\frac{3}{13} \right\rangle$

D. $\left\langle -\frac{12}{13}, -\frac{4}{13}, \frac{3}{13} \right\rangle$

Answer: A

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108. From the points $P(3, -1, 11)$, a perpendicular is drawn on the line L given by the equation $\frac{x}{2} = \frac{y-2}{3} = \frac{z-3}{4}$. Let Q be the foot of the perpendicular.

What are the drection ratios of the line segment PQ?

A. $\langle 1, 6, 4 \rangle$

B. $\langle -1, 6, -4 \rangle$

C. $\langle -1, -6, 4 \rangle$

D. $\langle 2, -6, 4 \rangle$

Answer: B

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109. Find the equation of the perpendicular from point $(3, -1, 11)$ to line $\frac{x}{2} = \frac{y-2}{3} = \frac{z-3}{4}$. Also, find the coordinates of foot of perpendicular and the length of perpendicular.

A. $\sqrt{47}$ units

B. 7 units

C. $\sqrt{53}$ units

D. 8 units

Answer: C

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110. A triangular plane ABC with centroid (1,2,3) cuts the coordinate axes at A, B, C respectivley.

What are the intercepts made by the plane ABC on the axes ?

A. 3,6,9

B. 1,2,3

C. 1,4,9

D. 2,4,6

Answer: A

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111. A plane meets the coordinate axes at A, B and C respectively such that the centroid of ΔABC is (1 -2, 3). Find the equation of the plane.

A. $x + 2y + 3z = 1$

B. $3x + 2y + z = 3$

C. $2x + 3y + 6z = 18$

D. $6x + 3y + 2z = 18$

Answer: D

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112. A point $P(1, 2, 3)$ is one of a cuboid formed by the coordinate planes and the planes passing through P and parallel

to the coordinate planes. What is the length of one of the diagonals of the cuboid?

A. $\sqrt{10}$ units

B. $\sqrt{14}$ units

C. 4 units

D. 5 units

Answer: B

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113. A points P(1,2,3) is one vertex of a cuboid formed by the coordinate planes and the planes passing through P and parallel to the coordinate planes.

What is the equation of the plane passing through P(1,2,3) and parallel to xy-plane ?

A. $x + y = 3$

B. $x - y = -1$

C. $z = 3$

D. $x + 2y + 3z = 14$

Answer: C

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114. A points P(1,2,3) is one vertex of a cuboid formed by the coordinate planes and the planes passing through P and parallel to the coordinate planes.

The radius of the sphere

$3x^2 + 3y^2 + 3z^2 - 8x + 4y + 8z - 15 = 0$ is

A. 2

B. 3

C. 4

D. 5

Answer: B

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115. A points P(1,2,3) is one vertex of a cuboid formed by the coordinate planes and the planes passing through P and parallel to the coordinate planes. The direction ratios of the line perpendicular to the lines with direction ratios $< 1, -2, 2 >$ and $< 0, 2, 1 >$ are

A. lt 2,-1,2 gt

B. lt -2,1,2 gt

C. lt 2,1,-2 gt

D. lt -2,-1,-2 gt

Answer: A

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116. A points P(1,2,3) is one vertex of a cuboid formed by the coordinate planes and the planes passing through P and parallel to the coordinate planes.

What are the co-ordinates of the foot of the perpendicular drawn from the point (3,5,4) on the plane z = 0 ?

A. (0,5,4)

B. (3,5,0)

C. (3,0,4)

D. (0,0,4)

Answer: B

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117. A points P(1,2,3) is one vertex of a cuboid formed by the coordinate planes and the planes passing through P and parallel to the coordinate planes.

The lengths of the intercepts on the co-ordinate axes made by the plane $5x + 2y + z - 13 = 0$ are

A. 5,2,1 unit

B. $\frac{13}{5}, \frac{13}{2}, 13$ unit

C. $\frac{5}{13}, \frac{2}{13}, \frac{1}{13}$ unit

D. 1,2,5 unit

Answer: B

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118. A plane P passes through the line of intersection of the planes $2x - y + 3z = 2$, $x + y - z = 1$ and the point (1,0,1). What are the direction ratios of the line of intersection of the given planes ?

A. $\langle 2, -5, -3 \rangle$

B. $\langle 1, -5, -3 \rangle$

C. $\langle 2, 5, 3 \rangle$

D. $\langle 1, 3, 5 \rangle$

Answer: A

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119. A plane P passes through the line of intersection of the planes $2x - y + 3z = 2, x + y - z = 1$ and the point (1,0,1).

What is the equation of the plane P?

A. $2x + 5y - 2 = 0$

B. $5x + 2y - 5 = 0$

C. $x + z - 2 = 0$

D. $2x - y - 2z = 0$

Answer: B

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120. A plane P passes through the line of intersection of the planes $2x - y + 3z = 2, x + y - 2 = 1$ and the point $(1, 0, 1)$.

What are the direction ratios of the line of intersection of the given planes? What is the equation of the plane P? If the plane P touches the sphere $x^2 + y^2 + z^2 = r^2$, then what is r equal to?

A. $\frac{2}{\sqrt{29}}$

B. $\frac{4}{\sqrt{29}}$

C. $\frac{5}{\sqrt{29}}$

D. 1

Answer: C

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121. Let Q be the image of the point P(-2,1,-5) in the plane $3x - 2y + 2z + 1 = 0$

Consider the following :

1. The coordinates of Q are (4,-3,-1).

2. PQ is of length more than 8 units.

3. The point (1,-1,-3) is the mid-point of the line segment PQ and lines on the given plane.

Which of the above statements are correct?

A. 1 and 2 only

B. 2 and 3 only

C. 1 and 3 only

D. 1,2 and 3

Answer: D

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122. Let Q be the image of the point P(-2,1,-5) in the plane $3x - 2y + 2z + 1 = 0$

Consider the following :

Consider the following :

1. The direction ratios of the line segment PQ are lt 3,-2,2 gt.

2. The sum of the squares of direction cosines of the line segment PQ is unity.

Which of the above statements is/are correct?

A. 1 only

B. 2 only

C. Both 1 and 2

D. Neither 1 nor 2

Answer: C

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123. A line L passes through the point $P(5, -6, 7)$. and is parallel to the planes $x + y + z = 1$ and $2x - y - 2z = 3$. What

are the direction ratios of the line of intersection of the given planes?

A. lt 1,4,3 gt

B. lt -1,-4,3 gt

C. lt 1,-4,3 gt

D. lt 1, -4,-3 gt

Answer: C

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124. A line L passes through the point $P(5, -6, 7)$. and is parallel to the planes $x + y + z = 1$ and $2x - y - 2z = 3$. What are the direction ratios of the line of intersection of the given planes?

A. $\frac{x-5}{-1}=\frac{y+6}{4}=\frac{z-7}{-3}$

B. $\frac{x+5}{-1}=\frac{y-6}{4}=\frac{z+7}{-3}$

C. $\frac{x+5}{-1}=\frac{y-6}{4}=\frac{z+7}{-3}$

D. $\frac{x-5}{-1}=\frac{y+6}{-4}=\frac{z-7}{-3}$

Answer: A

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125. A straight line with direction cosines $(0, 1, 0)$ is (a) parallel to x-axis (b) parallel to yaxis (c) parallel to z-axis (d) equally inclined to all the axes

A. parallel to x-axis

B. parallel to y-axis

C. parallel to z-axis

D. equally inclined to all the axes

Answer: B

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126. 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. $\left(\frac{a+b+c}{3}, \frac{a+b+c}{3}, \frac{a+b+c}{3}\right)$

B. (a,b,c)

C. $\left(\frac{a}{2}, \frac{b}{2}, \frac{c}{2}\right)$

D. $\left(\frac{a}{3}, \frac{b}{3}, \frac{c}{3}\right)$

Answer: C

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127. The points $P(3, 2, 4), Q(4, 5, 2), R(5, 8, 0)$ and $S(2, -1, 6)$ are

A. vertices of a rhombus which is not a square

B. non-coplanar

C. collinear

D. copanar but not collinear

Answer: C

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128. The line passing through the points $(1, 2, -1)$ and $(3, -1, 2)$ meets the yz-plane at which one of the following points? (A) $\left(0, -\frac{7}{2}, \frac{5}{2}\right)$ (B) $\left(0, \frac{7}{2}, \frac{1}{2}\right)$ (C) $\left(0, -\frac{7}{2}, -\frac{5}{2}\right)$ (D) $\left(0, \frac{7}{2}, -\frac{5}{2}\right)$

A. $\left(0, -\frac{7}{2}, \frac{5}{2}\right)$

B. $\left(0, \frac{7}{2}, \frac{1}{2}\right)$

C. $\left(0, -\frac{7}{2}, \frac{5}{2}\right)$

D. $\left(0, \frac{7}{2}, -\frac{5}{2}\right)$

Answer: D

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129. Under which one of the following conditions are the lines $x = ay + b, z = cy + d$ and $x = ey + f; z = gy + h$ perpendicular?

A. $ae + cg - 1 = 0$

B. $ae + bf - 1 = 0$

C. $ae + cg + 1 = 0$

D. $ag + ce + 1 = 0$

Answer: C

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130. The point of intersection of the line joining the points (-3,4,-8) and (5,-6,4) with the XY-plane is

A. 2 units

B. 3 units

C. 4 units

D. 5 units

Answer: B

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131. The point of intersection of the line joining the points (-3,4,-8) and (5,-6,4) with the XY-plane is

A. $\left(\frac{7}{3}, -\frac{8}{3}, 0\right)$

B. $\left(-\frac{7}{3}, -\frac{8}{3}, 0\right)$

C. $\left(-\frac{7}{3}, \frac{8}{3}, 0\right)$

D. $\left(\frac{7}{3.8}/3, 0\right)$

Answer: A

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132. 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. 52

B. 4

C. 2

D. 1

Answer: B

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133. A variable plane passes through a fixed point (a, b, c) and cuts the coordinate axes at points $A, B, andC$. Show that eh locus of the centre of the sphere $OABCis\frac{a}{x}+\frac{b}{y}+\frac{c}{z}=2.$

A. $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=1$

B. $\frac{a}{x}+\frac{b}{y}+\frac{c}{z}=1$

C. $\frac{a}{x}+\frac{b}{y}+\frac{c}{z}=2$

D. $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=2$

Answer: C

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134. The equation of the plane passing through the line of intersection of the planes $x + y + z = 1, 2x + 3y + 4z = 7$, and perpendicular to the plane $x - 5y + 3z = 5$ is given by

A. $x + 2y + 3z - 6 = 0$

B. $x + 2y + 3z + 6 = 0$

C. $3x + 4y + 5z - 8 = 0$

D. $3x + 4y + 5z + 8 = 0$

Answer: A

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135. Let the coordinates of the points A, B, C be (1,8,4), (0,-11,4) and (2,-3,1) respectively. What are the coordinates of the point D which is the foot of the perpendicular from A on BC ?

A. (3,4,-2)

B. (4,-2,5)

C. (4,5,-2)

D. (2,4,5)

Answer: C

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136. What is the equation of the plane passing through the point (-2,6,-6),(-3,10,-9) and (-5,0,-6)?

A. $2x - y - 2z = 2$

B. $2x + y + 3z = 3$

C. $x + y + z = 16$

D. $x - y - z = -3$

Answer: A

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137. A sphere of constant radius k, passes through the origin and meets the axes at $A, BandC$. Prove that the centroid of triangle ABC lies on the sphere $9(x^2 + y^2 + z^2) = 4k^2$.

A. $x^2 + y^2 + z^2 = r^2$

B. $x^2 + y^2 = z^2 = 4r^2$

C. $9(x^2 + y^2 + z^2) = 4r^2$

D. $3(x^2 + y^2 + z^2) = 2r^2$

Answer: C

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138. The coordinates of the vertices P,Q and R of a triangle PQR are (1,-1,1), (3,-2,2) and (0,2,6) respectively. If $\angle RQP = \theta$, then what is $\angle PRQ$ equal to ?

A. $30^\circ = \theta$

B. $45^\circ + \theta$

C. $60^\circ - \theta$

D. $90^\circ - \theta$

Answer: D

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139. What is the equation to the sphere whose centre is at (-2,3,4) and radius is 6 units?

A. $x^2 + y^2 + z^2 + 4x - 6y - 8z = 7$

B. $x^2 = y^2 + z^2 + 6x - 4y - 8z = 7$

C. $x^2 + y^2 + z^2 + 4x - 6y - 8z = 4$

D. $x^2 + y^2 + z^2 + 4x + 6y + 8z = 4$

Answer: A

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140. What is the distance of the point (2,3,4) from the plane $3x - 6y + 2z + 11 = ?$

A. 1 unit

B. 2 unit

C. 3 unit

D. 4 units

Answer: A

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141. Coordinates of the point O, P, Q and R are respectively (0,0,4), (4,6,2m),(2,0,2n) and (2,4,6). Let L,M,N and K be points on the sides OR, OP, PQ and QR respectively such that LMNK is a parallelogram whose two adjecent sides LM and side LK are each of length $\sqrt{2}$. What are the values of m and n respectively ?

A. 6,2

B. 1,3

C. 3,1

D. None of the above

Answer: C

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142. The line $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{3}$ is given by

A. $x + y + z = 6, x + 2y - 3z = -4$

B. $x + 2y - 2z = -1, 4x + 4y - 5z - 3 = 0$

C. $3x + 2y - 3z = 0, 3x - 6y + 3z = -2$

D. $x + 2y - 3z = -2, 3x - 6y + 3z = 0$

Answer: D

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143. Consider the following statements :

1. The angle between the planes

$2x - y + z = 1$ and $x + y + 2z = 3$ is $\frac{\pi}{3}$.

2. The distance between the planes

$6x - 3y + 6z = 0$ and $2x - y + 2z + 4 = 0$ is $\frac{10}{9}$

Which of the above statements is/are correct

A. 1 only

B. 2 only

C. Both and 2

D. Neither 1 nor 2

Answer: C

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144. What is the radius of the sphere $x^2 + y^2 + z^2 - 6x + 8y - 10z + 1 = 0$?

A. 5

B. 2

C. 7

D. 3

Answer: C

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145. The equation of the plane passing through the intersection of the planes $2x + y + 2z = 9, 4x - 5y - 4z = 1$ and the point (3,2,1) is

A. $10x - 2y + 2z = 28$

B. $10x + 2y + 2z = 28$

C. $10x + 2y - 2z = 28$

D. $10x - 2y - 2z = 14$

Answer: A

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146. The distance between the parallel planes $4x - 2y + 4z + 9 = 0$ and $8x - 4y + 8z + 21 = 0$ is (A) $\frac{1}{4}$ (B) $\frac{1}{2}$ (C) $\frac{3}{2}$ (D) $\frac{7}{4}$

A. $\frac{1}{4}$

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

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

D. $\frac{7}{4}$

Answer: A

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147. What are the direction cosines of Z-axis?

A. lt1,1,1,gt

B. lt1,0,0gt

C. lt0,1,0gt

D. lt0,0,1gt

Answer: D

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