



MATHS

BOOKS - DEEPTI MATHS (TELUGU ENGLISH)

THE PLANE

Solved Examples

1. If $(2, 3, -1)$ is the foot of the perpendicular from $(4, 2, 1)$ to a plane, the equation of the plane is

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

B. $2x + y - 2z - 9 = 0$

C. $2x + y + 2z - 5 = 0$

D. $2x - y + 2z + 1 = 0$

Answer: D



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2. The point which is equidistant from $A(3, 4, -1)$ and $B(1, -2, 5)$ on y-axis is

A. $(0, 1, 0)$

B. $(0, 1/3, 0)$

C. $(0, -1/3, 0)$

D. $(0, -5/3, 0)$

Answer: C



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3. Find the ratio in which the plane $2x - 3y + 6z = 5$ divides the line joining $(2, 3, -1)$, $(-1, 4, 1)$.

A. $(5, 2, 0)$

B. $(5, 4, -4)$

C. $(-3, -1, -6)$

D. $(10, -15, 12)$

Answer: B



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4. Find the coordinates of the point at which yz plane intersects the line segment joining the points $(-2, 3, 7)$ and $(6, -1, 2)$.

A. $(0, 2, 23/4)$

B. $(0, 2, 33/4)$

C. $(0, 1, 23/4)$

D. $(0, 1, 33/4)$

Answer: A



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5. The equation of the plane which is parallel to x-axis and making intercepts 3 and 8 on y and z-axes respectively is

A. $3y + 8z = 24$

B. $3y - 8z = 24$

C. $8y - 3z = 24$

D. $8y + 3z = 24$

Answer: D



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6. If $\lambda x + 4y + 5z = 7$, $4x + 4\lambda y + 10z - 14 = 0$ represent the same plane the value of $\lambda =$

A. 1

B. 2

C. 0

D. 3

Answer: B



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7. The angle between the planes $2x + y + z = 3$, $x - y + 2z = 5$ is

A. $\pi / 2$

B. $\pi / 6$

C. $3\pi / 4$

D. $\pi / 3$

Answer: D



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8. The equation of the plane passing through the points $(2, 1, -1)$, $(1, 1, 1)$, $(3, 3, 0)$ is

A. $4x - 3y + 2z - 3 = 0$

B. $4x - 4z + 1 = 0$

C. $4x + 3y - 2z + 8 = 0$

D. $4x - 3y + 5z - 16 = 0$

Answer: A



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9. The equation of the plane through the point $(-1, 6, 2)$ and perpendicular to the planes $x + 2y + 2z - 5 = 0$ and $3x + 3y + 2z - 8 = 0$ is

A. $2x - 3y + 2z + 15 = 0$

B. $4x + y - 3z - 26 = 0$

C. $2x - 4y + 3z + 8 = 0$

$$D. 3x + 5y - 2z + 12 = 0$$

Answer: C



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10. The equation of the plane through the line of intersection of the planes $x + y + z - 6 = 0$, $2x + 3y + 4z + 5 = 0$ and the point $(1,1,1)$ is

A. $7x - 9y + 8z = 0$

B. $7x + y + 8z = 0$

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

D. $20x + 23y + 26z - 69 = 0$

Answer: D



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11. A plane passing through (1, 2, 3) and whose normal makes equal angles with the coordinate axes is

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

B. $2x+y-z+11=0$

C. $x-y+2+6=0$

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

Answer: A



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12. A tetrahedron has vertices $O(0,0,0)$, $A(1,2,1)$, $B(2,1,3)$ and $C(-1,1,2)$. Then the angle between the faces OAB and ABC is

A. $\cos^{-1}\left(\frac{\sqrt{3}}{35}\right)$

B. $\cos^{-1}\left(\frac{21}{35}\right)$

C. $\cos^{-1}\left(\frac{9}{35}\right)$

$$D. \cos^{-1}\left(\frac{\sqrt{35}}{3}\right)$$

Answer: A



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13. R is the set of real numbers. If $a^2 + b^2 + c^2 \neq ab + bc + ca$ and $a + b + c \neq 0$ then the set of points satisfying the equations $ax+by+z=0$, $bx + by + az = 0$, $cx+ay+bz = 0$ is

A. $R \times R \times R$

B. $[0 \ 0 \ 0]$

C. $R \times R \times [0]$

D. $R \times [0] \times R$

Answer: B



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14. The plane $x = 0$, $x = a$, $y = 0$, $y = a$, $z = 0$ and $z = a$ form a

- A. Parallelepiped
- B. Rectangular parallelepiped with distinct edges
- C. Cube
- D. Tetrahedron

Answer: C

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15. A tetrahedron has vertices $O(0,0,0)$, $A(1,2,1)$, $B(2,1,3)$ and $C(-1,1,2)$. Then the angle between the faces OAB and ABC is

- A. 90°
- B. $\cos^{-1}\left(\frac{19}{35}\right)$
- C. $\cos^{-1}\left(\frac{17}{31}\right)$
- D. 30°

Answer: B



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Exercise 1

1. The projection of the line segment joining the origin and the point P (5, 2, 4) on the line whose d.c.'s are $\left(\frac{2}{7}, -\frac{3}{7}, \frac{6}{7}\right)$ is

A. $6x - 2y - 3z = 35$

B. $6x + 2y - 3z = 50$

C. $3x - 12y + 4z = 26$

D. $2x + y + z = 3\sqrt{11}$

Answer: A



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2. If $(2, 4, -3)$ is the foot of the perpendicular drawn from the origin to a plane then the equation of the plane is

A. $2x + 4y - 3z - 29 = 0$

B. $2x + 4y - 3z - 39 = 0$

C. $2x + 4y + 3z + 29 = 0$

D. $5x + 6y - 3z - 29 = 0$

Answer: A



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3. If the foot of the perpendicular from $(0,0,0)$ to a plane is $(1, 2, 2)$, then the equation of the plane is

A. $-x + 2y + 8z - 9 = 0$

B. $x + 2y + 2z - 9 = 0$

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

$$D. x + 2y - 3z + 1 = 0$$

Answer: B



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4. If the foot of the perpendicular from $(0, 0, 0)$ to a plane is $(1, 2, 3)$, then the equation of the plane is

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

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

C. $x + 2y + 3z + 14 = 0$

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

Answer: B



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5. The foot of the perpendicular from $(1, 3, 4)$ to $2x - y + z + 3 = 0$ is

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

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

C. $(0, 3, 0)$

D. $(1, 2, 3)$

Answer: B



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6. The foot of the perpendicular from $(0, 0, 0)$ to $3x + 4y - 6z = 0$ is

A. $(3, 4, -6)$

B. $(0, 4, -6)$

C. $(3, 0, -6)$

D. $(0, 0, 0)$

Answer: D

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7. The image of $(1, 3, 4)$ in the plane $2x - y + z + 3 = 0$ is

A. $(3, -5, 2)$

B. $(3, 5, -2)$

C. $(-3, 5, 2)$

D. $(3, 5, 2)$

Answer: C

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8. The image of the point $(3, 2, 1)$ in the plane $2x - y + 3z = 7$ is:

A. $(1, 2, 3)$

B. (2, 3, 1)

C. (3, 2, 1)

D. (2, 1, 3)

Answer: C



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9. The image of the point $(-1, 3, 4)$ in the plane $x - 2y = 0$ is

A. $\left(-\frac{17}{3}, -\frac{19}{3}, 1\right)$

B. $\left(\frac{9}{5}, -\frac{14}{5}, 4\right)$

C. $\left(-\frac{17}{3}, -\frac{19}{3}, 4\right)$

D. (15, 11, 4)

Answer: B



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10. The d.c.'s of the normal to the plane $2x + 3y - 6z + 5 = 0$ are

A. $(3, -2, 6)$

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

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

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

Answer: B



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11. The perpendicular distance from the origin to the plane $x - 2y + 2z - 9 =$

0 is

A. 3

B. 6

C. 4

D. 2

Answer: A



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12. The perpendicular distance from the point $(-2, 3, 1)$ to the plane $2x - 3y - 6z + 5 = 0$ is

A. $\sqrt{14}$

B. $1\sqrt{14}$

C. $5\sqrt{14}$

D. 2

Answer: D



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13. The normal form of $2x - 2y + z = 5$ is

A. $12x - 4y + 3z = 39$

B. $-\frac{6}{7}x + \frac{2}{7}y + \frac{3}{7}z = 1$

C. $\frac{12}{13}x - \frac{4}{13}y + \frac{3}{13}z = 3$

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

Answer: D



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14. The equation of the plane passing through (3, 4,-2) and whose normal has the d.r.'s (2, 3, 4) is

A. $3x + 4y + 5z + 20 = 0$

B. $3x + 4y + 5z - 20 = 0$

C. $x - 2y - 3z + 20 = 0$

D. $2x - 3y + 4z + 14 = 0$

Answer: D

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15. A plane passing through $(-1, 2, 3)$ and whose normal makes equal angles with the coordinate axes is

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

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

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

D. $x+y +z = 0$

Answer: C

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16. A plane passes through $(2, 3, -1)$ and is perpendicular to the line having direction ratios $3, -4, 7$. The perpendicular distance from the origin to this plane is

A. $\frac{3}{\sqrt{74}}$

B. $\frac{5}{\sqrt{74}}$

C. $\frac{6}{\sqrt{74}}$

D. $\frac{13}{\sqrt{74}}$

Answer: D



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17. A plane Π passes through the point $(1, 1, 1)$. If b, c, a are the direction ratios of a normal to the plane, where a, b, c (a

A. $29x + 31y + 3z = 63$

B. $23x + 29y - 29z = 23$

C. $23x + 29y + 3z = 55$

D. $31x + 27y + 3z = 71$

Answer: C

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18. The equation of the plane which is at a distance of 5 unit from the origin and whose normal has the d.r.'s (6, 12, - 4) is

A. $3x + 6y - 2z = 5$

B. $6x + 12y - 2z = 5$

C. $3x + 6y - 2z = 7$

D. $3x + 6y - 2z = 35$

Answer: D

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19. The equation of the plane having intercepts 2, 3, 6 is

A. $3x + 3y + 6z = 12$

B. $3x + 3y - 6z = 12$

C. $4x + 3y - 6z = 12$

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

Answer: D



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20. The intercepts of the plane $2x - 3y + 5z - 30 = 0$ are

A. 15, -10, 6

B. 5, 10, 6

C. $\frac{1}{8}$, $-\frac{1}{6}$, $\frac{1}{4}$

D. 3, -4, 6

Answer: A



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21. The intercepts form of $6x - 3y - 2z + 12 = 0$ is

A. $\frac{x}{-2} + \frac{y}{4} + \frac{z}{6} = 1$

B. $\frac{x}{6} + \frac{y}{3} + \frac{z}{-2} = 1$

C. $-\frac{2}{3}x + \frac{1}{3}y - \frac{2}{3}z = 4$

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

Answer: A



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22. The area of the triangle formed by $\frac{x}{4} + \frac{y}{3} - \frac{z}{2} = 1$ with x-axis and y-axis is is

axis is is

A. 2

B. 3

C. 6

D. 12

Answer: C



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23. If the areas of triangles formed by a plane with the positive x, y, z, 2, x axes respectively are 12, 9, 6 sq. unit respectively then the equation of the plane is

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

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

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

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

Answer: A



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24. If the plane $7x + 11y + 13z = 3003$ meets the coordinate axes in A, B, C then the centroid of the $\triangle ABC$ is

A. (143, 91, 77)

B. (143, 77, 91)

C. (91, 143, 77)

D. (143, 66, 91)

Answer: A



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25. Find the angle between the planes $2x - y + z = 6$ and $x + y + 2z = 7$.

A. 60° , 120°

B. 60°

C. 120°

D. 90°

Answer: A



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26. The angle between the planes $2x + 6y + 6z = 9$, $3x + 4y - 5z = 9$ is

A. $\pi / 2$

B. $2\pi / 3$

C. $3\pi / 4$

D. $5\pi / 6$

Answer: A



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27. If the planes $2x + 3y - z + 5 = 0$, $x + 2y - kz + 7 = 0$ are perpendicular then $k =$

A. 4

B. 6

C. 8

D. -8

Answer: D



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28. If the planes $2x + 3y + 4z + 7 = 0$ and $4x + ky + 8z + 1 = 0$ are parallel then $k =$

A. 2

B. 4

C. 5

D. 6

Answer: D

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29. The equation of the plane passing through the point $(1, 2, -3)$ and parallel to the plane $2x - 3y + z + 5 = 0$ is

A. $2x - 3y + z + 7 = 0$

B. $2x + 3y - z - 7 = 0$

C. $2x + 3y - z - 9 = 0$

D. $2x + 3y - z + 9 = 0$

Answer: A

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30. The equation of the plane passing through the point $(-1, 2, 4)$ and parallel to the plane $2x + 3y - 5z + 6 = 0$ is

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

B. $2x + 3y - z - 7 = 0$

C. $2x + 3y - 2z - 9 = 0$

D. $2x + 3y - 5z + 16 = 0$

Answer: D



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31. An equation of a plane parallel to the plane $x - 2y + 2z - 5 = 0$ and at a unit distance from the origin is

A. $x - 2y + 2z - 1 = 0$

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

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

D. $x - 2y + 2z + 1 = 0$

Answer: C



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32. The equation of the plane passing through the point (1, 2, 3) and parallel to xy-plane is

A. $x + 2 = 0$

B. $y - 3 = 0$

C. $z = 3$

D. $x - 2 = 0$

Answer: C



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33. The equation of the plane passing through the point (3, -6, 9) and perpendicular to the x-axis is

A. $x + 2 = 0$

B. $y - 3 = 0$

C. $z - 7 = 0$

D. $x - 3 = 0$

Answer: D



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

A. YOZ

B. ZOX

C. XOY

D. $z = k$

Answer: A



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35. Distance between to parallel planes $2x + y + 2z = 8$ and $4x + 2y + 4z + 5 = 0$ is

A. $\frac{7}{2}$

B. $\frac{9}{2}$

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

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

Answer: A



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36. The distance between the parallel planes $12x - 3y + 4z - 7 = 0$, $12x - 3y + 4z + 6 = 0$ is

A. 1

B. 2

C. $1/2$

D. 3

Answer: A



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37. The planes $x = \pm a$, $y = \pm a$, $z = \pm a$ form a

A. parallelepiped

B. rectangular parallelepiped

C. cube

D. tetrahedron

Answer: B



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38. The plane $x = 0$, $x = a$, $y = 0$, $y = a$, $z = 0$ and $z = a$ form a

A. parallelepiped

B. rectangular parallelepiped

C. cube

D. tetrahedron

Answer: C



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39. The four planes

$$7x + 4y - 4z + 3 = 0, 36x - 51y + 12z + 17 = 0, 14x + 8y - 8z - 12 = 0$$

are the four faces of a

A. parallelepiped

B. rectangular parallelepiped

C. cube

D. tetrahedron

Answer: A



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40. The ratio in which the plane $2x + 3y - 2z + 7 = 0$ divides the line segment joining the points $(-1, 2, 3)$, $(2, 3, 5)$ is

A. 3 : 5

B. 7 : 5

C. 9 : 11

D. 1 : 2 externally

Answer: D



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41. The ratio in which the line joining $(2, -4, 3)$ and $(-4, 5, -6)$ is divided by the plane $3x + 2y + z - 4 = 0$ is

A. 2:1

B. 4:3

C. -1:4

D. 2:3

Answer: C



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42. For the plane $4x - 3y + 2z - 3 = 0$, the points $A(-2, 1, 2)$ $B(3, 1, -2)$

A. lie on the same side of $4x - 3y + 2z - 3 = 0$

B. lie on the opposite sides of $4x - 3y + 2z - 3 = 0$

C. lie on the normal to $4x - 3y + 2z - 3 = 0$

D. None

Answer: A

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43. For the plane $\Pi = 4x - 3y + 2z - 3 = 0$, the points $A = (-2, 1, 2)$, $B = (3, 1, -2)$ lie on the same side of $\Pi = 0$

A. lie on the same side of $\Pi = 0$

B. lie on the opposite sides of $\Pi = 0$

C. lie on the normal to $\Pi = 0$

D. None

Answer: B

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44. For the plane $\Pi = x + y + z - 4 = 0$, the point $(1, 2, 3)$ lie in the

A. opposite to the origin side

B. origin side

C. plane

D. none

Answer: A



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45. Which point lies on the origin side of the plane $2x + 3y + 4z + 7 = 0$?

A. $(1, 2, -7)$

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

C. $(1, 1, -4)$

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

Answer: B



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46. The direction ratios of a normal to the plane passing through $(0, 0, 1)$, $(0, 1, 2)$ and $(1, 2, 3)$ are

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

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

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

D. $(1, 0, 0)$

Answer: A



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47. The equation of the plane passing through the points $(1, 2, 1)$, $(1, 1, 0)$, $(-2, 2, -1)$ is

A. $2x + 3y - 3z - 5 = 0$

B. $2x - 3y + 2z - 11 = 0$

C. $4x + 3y - 2z + 8 = 0$

D. $2x - 3y + 5z - 16 = 0$

Answer: A



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48. The equation of the plane passing through the points $(1, 1, 1)$, $(1, -1, 1)$, $(-7, -3, -5)$ is

A. $4x - 3y + 2z + 11 = 0$

B. $3x - 4z + 1 = 0$

C. $3x + 3y - 2z + 8 = 0$

D. $3x - 3y + 5z - 16 = 0$

Answer: B



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49. If $A = (2, 4, 1)$, $B(-1, 0, 1)$, $C = (-1, 4, 2)$, then the distance of $(1, -2, 1)$ from the plane ABC is

A. $2/3$

B. $14/13$

C. $4/3$

D. 1

Answer: B



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50. The distance from the plane passing through $(1, 3, 2)$, $(-5, 0, 2)$, $(1, 1, -4)$ to the point $(2, 3, 4)$ is

A. 1 unit

B. 5 unit

C. 8 unit

D. 10 unit

Answer: A



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51. The equation of the plane through the points (2, 2, 1), (9, 3, 6) and perpendicular to the plane $2x + 6y + 6z = 9$ is

A. $x + 16y + 11z - 7 = 0$

B. $x + 16y - 11z + 37 = 0$

C. $x + y + z - 2 = 0$

D. $3x + 4y - 5z - 9 = 0$

Answer: D



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52. The equation of the plane passing through $(1, -2, 4)$, $(3, -4, 5)$ and perpendicular to xy -plane is

A. $x + y + 1 = 0$

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

C. $y + 2z - 6 = 0$

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

Answer: A



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53. The equation of the plane passing through $(1, -2, 4)$, $(3, -4, 5)$ and parallel to x -axis is

A. $5x + 3y = 19$

B. $5x + 3y + 19 = 0$

C. $3x + 5y = 21$

$$D. y + 2z - 6 = 0$$

Answer: D



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54. The equation of the plane through the point $(-1, 6, 2)$ and perpendicular to the planes $x + 2y + 2z - 5 = 0$ and $3x + 3y + 2z - 8 = 0$ is

A. $2x - 4y + 3z + 20 = 0$

B. $2x + y - 3z - 26 = 0$

C. $2x - 4y + 3z + 23 = 0$

D. $2x + 5y - 2z + 12 = 0$

Answer: A



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55. The equation of the perpendicular bisecting plane of the line segment joining $(-3, 3, 2)$, $(9, 5, 4)$ is

A. $x - y + 4z - 13 = 0$

B. $2x - 2y + 7z - 23 = 0$

C. $x - 7y + 2z - 1 = 0$

D. $6x + y + z - 25 = 0$

Answer: D



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56. The equation of the perpendicular bisecting plane of the line segment joining origin, $(4, 6, -2)$ is

A. $2x + 3y - z - 14 = 0$

B. $2x - 2y + 7z - 23 = 0$

C. $3x - 7y + 2z - 1 = 0$

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

Answer: A



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57. The plane $2x + 3y + kz - 7 = 0$ is parallel to the line whose d.r's are $(2, -3, 1)$ then $k =$

A. 5

B. 8

C. 1

D. 0

Answer: A



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58. $P = (0, 1, 0)$, $Q = (0, 0, 1)$ then projection of \overline{PQ} on the plane $x + y + z = 3$ is

A. 2

B. 3

C. $\sqrt{2}$

D. $\sqrt{3}$

Answer: C



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59. A variable plane through a fixed point $(1, 2, 3)$ then the foot of the perpendicular from the origin to the plane lies on

A. a circle

B. a sphere

C. an ellipse

D. a parabola

Answer: B



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60. The locus of the point whose distance from the origin is twice its distance from the plane $2x + 3y - 6z = 0$ is

A. $33x^2 - y^2 - 5z^2 - 16xy + 112x - 56y + 196 = 0$

B. $4x^2 - y^2 = 49$

C. $33x^2 + 13y^2 - 95z^2 + 144yz + 96xz - 48xy = 0$

D. $4x^2 + y^2 = 49$

Answer: C



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61. The locus of a point for which the sum of the squares of the distances from the coordinate planes is 5 unit is

A. $x^2 + y^2 + z^2 = 7$

B. $x^2 + y^2 + z^2 = 5$

C. $x + y + z = \sqrt{5}$

D. $x^2 + y^2 + z^2 = 25$

Answer: A



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62. The locus of the point such that the sum of the squares of its distances from the planes $x+y+z = 0$, $x - y = 0$ and $x + y - 2z = 0$ is equal to the double of the square of its distance from the plane $x=z$ is

A. $x^2 + xy = 0$

B. $x^2 + 2yz = 0$

$$C. y^2 = zx$$

$$D. y^2 + 2zx = 0$$

Answer: D



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63. The locus of a point P whose distance from the plane $6x - 2y + 3z + 4 = 0$ is equal to its distance from the point $(-1, 1, 2)$ is

$$A. 5(x^2 + y^2 + z^2) + 4(xy + 2yz - xz) - 18(2x - y + 3z) + 126 = 0$$

$$B. 8x^2 + 5y^2 + 5z^2 + 4xy + 8yz - 4zx - 36x + 18y - 54z + 126 = 0$$

$$C. 8x^2 + y^2 + z^2 + 4(xy + 2yz - xz) + 18(2x - y + 3z) + 126 = 0$$

D.

$$13x^2 + 44y^2 + 40z^2 + 12yz - 36xz + 24xy + 50x - 82y - 220z + 278 = 0$$

Answer: D



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64. If a plane meets the coordinate axes in A, B, C such that the centroid of the triangle ABC is the point (p,q, r) then the equation of the plane is

A. $\frac{x}{p} + \frac{y}{q} + \frac{z}{r} = 1$

B. $\frac{x}{p} + \frac{y}{q} + \frac{z}{r} = 2$

C. $\frac{x}{p} + \frac{y}{q} + \frac{z}{r} = 3$

D. $px + qy + rz = 3$

Answer: C



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65. A plane meets the coordinate axes at A,B,C so that the centroid of the triangle ABC is (1, 2, 4) Then the equation of the plane is :

A. $x + 2y + 4z = 12$

B. $4x + 2y + z = 12$

C. $x + 2y + 4z = 3$

D. $4x + 2y + z = 3$

Answer: B



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66. A variable plane is at a constant distance p from the origin and meets the axes in A, B and C. The locus of the centroid of the triangle ABC is

A. $x^{-2} + y^{-2} + z^{-2} = p^{-2}$

B. $x^{-2} + y^{-2} + z^{-2} = 3p^{-2}$

C. $x^{-2} + y^{-2} + z^{-2} = 9p^{-2}$

D. $x^{-2} + y^{-2} + z^{-2} = 16p^{-2}$

Answer: A



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67. A variable plane is at a constant distance p from the origin and meets the axes in A, B and C. The locus of the centroid of the triangle ABC is

A. $x^{-2} + y^{-2} + z^{-2} = p^{-2}$

B. $x^{-2} + y^{-2} + z^{-2} = 4p^{-2}$

C. $x^{-2} + y^{-2} + z^{-2} = 16p^{-2}$

D. $x^{-2} + y^{-2} + z^{-2} = 9p^{-2}$

Answer: D



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68. A variable plane is at a constant distance P from the origin and meets the axes in A, B and C. The locus of the centroid of tetrahedron OABC is

A. $x^{-2} + y^{-2} + z^{-2} = p^{-2}$

B. $x^{-2} + y^{-2} + z^{-2} = 3p^{-2}$

C. $x^{-2} + y^{-2} + z^{-2} = 9p^{-2}$

$$D. x^{-2} + y^{-2} + z^{-2} = 16p^{-2}$$

Answer: D



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69. Two systems of rectangular axes have the same origin. If a plane cuts them at distances a, b, c and a_1, b_1, c_1 respectively from the origin, then

$$a^{-2} + b^{-2} + c^{-2}$$

A. $a_1^{-2} + b_1^{-2} + c_1^{-2}$

B. $a^2 + b^2 + c^2$

C. $a^{-2} + b^{-2} + c^{-2}$

D. None

Answer: A



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70. The equation of the plane which is parallel to y-axis and making intercepts of lengths 3 and 4 on x-axis and z-axis is

A. $2x + 2z = 20$

B. $4x + 3z = 12$

C. $4x - 3z = 12$

D. $6x + 13z = 15$

Answer: B



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71. The point on x-axis which is equidistant to $(2, -1, 4)$, $(-4, 3, 0)$ is

A. $(0, 0, 0)$

B. $(-26/3, 0, 0)$

C. $(1, 0, 1)$

D. $(1, 1, 1)$

Answer: B



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72. The plane passing through the points $(1, 1, 1)$, $(1, -1, 1)$ and $(-7, -3, -5)$ is parallel to

A. x-axis

B. y-axis

C. z-axis

D. none

Answer: B



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73. The plane determined by the points $(-1, 2, -2)$, $(0, 1, 1)$ and $(1, 1, 2)$ passes through

A. (1, 1, 0)

B. (-1,1,0)

C. (-1,0,1)

D. (1, 0, - 1)

Answer: B



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74. The equation of the plane through the line of intersection of the planes $x - 3y + 2z + 3 = 0$, $3x - y + 2z - 5 = 0$ and the origin is

A. $7x - 4y + 8z = 0$

B. $7x + y + 8z = 0$

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

D. none

Answer: A



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75. The equation of the plane through the line of intersection of the planes $x - 2y + 3z - 1 = 0$, $2x + y + z - 2 = 0$ and the point $(1, 2, 3)$ is

A. $7x - 4y + 8z = 0$

B. $7x + y + 8z = 0$

C. $x + 3y - 2z - 1 = 0$

D. none

Answer: C



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76. The equation of the plane through the line of intersection of the planes $x + y + z - 1 = 0$, $2x + 3y + 4z - 5 = 0$ and perpendicular to the plane $x + y + z = 0$ is

A. $7x - y - 6z - 17 = 0$

B. $x - y - 6z - 27 = 0$

C. $7x + y + 6z - 27 = 0$

D. none

Answer: A



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77. The equation of the plane through the line of intersection of the planes $2x + 3y + 4z - 7 = 0$, $x + y + z - 1 = 0$ and perpendicular to the plane $x - 5y + 3z - 2 = 0$ is

A. $7x - y - 6z - 17 = 0$

B. $x - y - 6z - 27 = 0$

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

D. none

Answer: C



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78. The equations to the plane through the line of intersection of $2x + y + 3z - 2 = 0$, $x - y + z + 4 = 0$ such that each plane is at a distance of 2 unit from the origin is

A. $x + y + 2z + 13 = 0$, $x + y + z - 3 = 0$

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

C. $15x - 12y + 16z + 50 = 0$, $x + 2y + 2z - 6 = 0$

D. none

Answer: C



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79. Equation of the bisector of the angle between the planes

$$x + 2y + 2z - 9 = 0, 4x - 3y + 12z + 13 = 0$$

A. $25x + 17y + 62z - 78 = 0, x + 35y - 10z - 156 = 0$

B. $15x - 27y + 2z - 78 = 0, x - 5y - 15z - 15 = 0$

C. $50x + 70y + 62z - 80 = 0, x - 35y + 10z + 15 = 0$

D. $y-1=0, x+z - 3 = 0, y - 1 = 0$

Answer: A



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80. The equations of the bisectors of the angles between the planes $3x -$

$$6y + 2z + 5 = 0, 4x - 12y + 3z - 3 = 0$$
 is

A. $25x + 17y + 62z - 78 = 0, x + 35y - 10z - 156 = 0$

B. $15x - 27y + 2z - 78 = 0, x - 5y - 15z - 15 = 0$

C. $67x - 162y + 47z + 44 = 0, 11x + 6y + 5z + 86 = 0$

D. $y-1=0, x+z-3=0, y-1=0$

Answer: C



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81. Find the equation of locus of point which lies on bisectors of angles between the co-ordinate axes.

A. $x - z = 0, x + 2z = 0$

B. $x - z + 2 = 0$

C. $x + z = 0, x - z = 0$

D. $x + y = 0, x - y = 0$

Answer: C



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82. The equations of bisectors of angles between yz -plane and xz -plane is

A. $x - z = 0, x + 2z = 0$

B. $x - z + 2 = 0$

C. $x + z = 0, x - z = 0$

D. $x + y = 0, x - y = 0$

Answer: D



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Exercise 2 Special Type Questions Set 1

1. I: The foot of the perpendicular from $(1, 3, 4)$ to $2x - y + z + 3 = 0$ is $(-1, 4, 3)$

II: The image of $(1, 3, 4)$ in the plane $2x - y + z + 3 = 0$ is $(-3, 5, 2)$

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II are true

Answer: C



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2. I: The equation of the plane passing through the point $(1, 2, -3)$ and parallel to the plane $2x - 3y + z + 5 = 0$ is $2x - 3y + z + 7 = 0$

II : The equation of the plane passing through the point $(1, 2, 3)$ and parallel to xy -plane is $x + 2 = 0$

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II are true

Answer: A



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3. I: The equation of the plane through the points $(1, -2, 2)$, $(3, 1, -2)$ and perpendicular to the plane $x + 2y - 3z = 5$ is $x + 16y - 11z + 37 = 0$

II : The equation of the plane passing through $(1, -2, 4)$, $(3, -4, 5)$ and parallel to x-axis is $y + 2z - 6 = 0$

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II are true

Answer: B



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4. I : The equation of the perpendicular bisecting plane of the line segment joining $(-3, 3, 2)$, $(9, 5, 4)$ is $x - 7y + 2z - 1 = 0$

II : The equation of the plane passing through the points $(1, 2, 1)$, $(1, 1, 0)$, $(-2, 2, -1)$ is $2x - 3y + 2z - 11 = 0$

A. only I is true

B. only II is true

C. both I and II are true

D. neither I nor II are true

Answer: D



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Exercise 2 Special Type Questions Set 2

1. If a , b , c are the intercepts of the plane $2x + 3y + 5z - 30 = 0$ on the coordinate axes respectively then the increasing order of a , b , c is

A. a, b, c

B. b, c, a

C. c, a, b

D. c, b, a

Answer: A



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2. If the plane $ax + by + cz = 5$ passes through the points $(1, 2, 1)$, $(1, 1, 0)$, $(-2, 2, -1)$ then the decreasing order of a, b, c is

A. a, b, c

B. b, c, a

C. c, a, b

D. c, b, a

Answer: C

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3. The equation of the plane through the point $(-1, 6, 2)$ and perpendicular to the planes $x + 2y + 2z - 5 = 0$ and $3x + 3y + 2z - 8 = 0$ is

A. a, b, c

B. b, c, a

C. c, a, b

D. c, b, a

Answer: A

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Exercise 2 Special Type Questions Set 3

1. Match the following

Point and plane

I. $(1, 3, 4), 2x - y + z + 3 = 0$

II. $(7, 14, 5), 2x + 4y - z = 2$

III. $(0, 0, 0), 3x + 4y - 6z = 0$

IV. $(0, 0, 0), 3x - 5y + 8z + 98 = 0$

Foot of the perpendicular

a) $(-3, 5, -8)$

b) $(-1, 4, 3)$

c) $(1, 2, 8)$

d) $(0, 0, 0)$

A. a, b, c, d

B. b, a, d, c

C. c, b, d, a

D. b, c, d, a

Answer: D



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2. Match the following

Parallel planes

I. $12 - 3y + 4z - 7 = 0, 12x - 3y + 4z + 6 = 0$

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

III. $2x + 3y - 6z + 5 = 0, 2x + 3y - 6z - 9 = 0$

IV. $x + 2y + 2z - 1 = 0, x + 2y + 2z + 8 = 0$

Distance between the planes

a) 1

b) 2

c) 3

d) $1/6$

A. a, b, c, d

B. b, a, d, c

C. c, b, d, a

D. b, c, d, a

Answer: C

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3. Match the following

Points

I. $(-3, 3, 2), (9, 5, 4)$

II. $(2, 0, 6), (-6, 2, 4)$

III. $(0, 0, 0), (4, 6, 2)$

IV. $(1, 3, 4), (-3, 5, 2)$

Perpendicular bisecting plane

a) $2x - y + z + 3 = 0$

b) $6x + y + z - 25 = 0$

c) $4x - y + z + 4 = 0$

d) $2x + 3y - z - 14 = 0$

A. a, b, c, d

B. b, a, d, c

C. c, b, d, a

D. b, c, d, a

Answer: D



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4. Match the following

Point and plane

I. $(1, 3, 4), 2x - y + z + 3 = 0$

II. $(7, 14, 5), 2x + 4y - z = 2$

III. $(0, 0, 0), 3x + 4y - 6z = 0$

IV. $(0, 0, 0), 3x - 5y + 8z + 98 = 0$

Perpendicular distance

a) $\sqrt{6}$

b) $3\sqrt{21}$

c) 0

d) $7\sqrt{2}$

A. a, b, c, d

B. b, a, d, c

C. c, b, d, a

D. b, c, d, a

Answer: A



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1. A: The equation of the plane passing through the point $(-1, 2, 4)$ and parallel to the plane $2x + 3y - 5z + 6 = 0$ is $2x + 3y - 5z + 16 = 0$.

R: The equation of the plane passing through the point (x_1, y_1, z_1) and parallel to the plane $ax + by + cz + d = 0$ is $a(x - x_1) + b(y - y_1) + c(z - z_1) = 0$

- A. both A and R are true and R is the correct explanation of A
- B. both A and R are 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: A



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2. A: The area of the triangle formed by $\frac{x}{4} + \frac{y}{3} - \frac{z}{2} = 1$ with x-axis and y-axis is 6.

R: The area of the triangle formed by $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$ with x-axis and y-axis is $\frac{1}{2}|bc|$

- A. both A and R are true and R is the correct explanation of A
- B. both A and R are 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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3. A: The plane $2x + 3y + 5 = 0$ is parallel to x-axis.

R: The plane $ax + by + cz + d = 0$ is parallel to x-axis if $a = 0$.

- A. both A and R are true and R is the correct explanation of A
- B. both A and R are 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: D

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4. Statement-I : The point $A(3, 1, 6)$ is the mirror image of the point $B(1, 3, 4)$ in the plane $x - y + z = 5$.

Statement-II : The plane $x - y + z = 5$ bisects the line segment joining $A(3, 1, 6)$ and $B(1, 3, 4)$

A. Statement-1 is true, statement-2 is true, statement-2 is a correct explanation for statement-1

B. Statement-1 is true, statement-2 is true, statement-2 is not a correct explanation for statement-1

C. Statement-1 is true, statement-2 is false.

D. Statement-1 is false, statement-2 is true.

Answer: B



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