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Three Dimensional Geometry

- The coordinates of the point in which the line joining the points $(3, 5, -7)$ and $(-2, 1, 8)$ is intersected by the plane yz are given by
 (A) $\left(0, \frac{-13}{5}, -2\right)$ (B) $\left(0, \frac{-13}{5}, -\frac{2}{5}\right)$
 (C) $\left(0, \frac{13}{5}, \frac{2}{5}\right)$ (D) $\left(0, \frac{13}{5}, 2\right)$
- The direction cosines of the normal to the plane $x + 2y - 3z + 4 = 0$ are
 (A) $-\frac{1}{\sqrt{14}}, -\frac{2}{\sqrt{14}}, -\frac{3}{\sqrt{14}}$
 (B) $\frac{1}{\sqrt{14}}, \frac{2}{\sqrt{14}}, \frac{3}{\sqrt{14}}$
 (C) $-\frac{1}{\sqrt{14}}, \frac{2}{\sqrt{14}}, \frac{3}{\sqrt{14}}$
 (D) $\frac{1}{\sqrt{14}}, \frac{2}{\sqrt{14}}, -\frac{3}{\sqrt{14}}$
- The angle between the straight lines $\frac{x+1}{2} = \frac{y-2}{5} = \frac{z+3}{4}$ and $\frac{x-1}{1} = \frac{y+2}{2} = \frac{z-3}{-3}$ is
 (A) 45° (B) 30°
 (C) 60° (D) 90°
- The length of the perpendicular from the origin to the plane $3x + 4y + 12z = 52$ is
 (A) 3 (B) -4
 (C) 5 (D) None of these
- What is the locus of points of intersection of a sphere and a plane?
 (A) Circle (B) Ellipse
 (C) Parabola (D) Hyperbola
- The intercepts of the plane $5x - 3y + 6z = 60$ on the coordinate axes are
 (A) $(10, 20, -10)$ (B) $(10, -20, 12)$
 (C) $(12, -20, 10)$ (D) $(12, 20, -10)$
- The direction cosines of the line joining the points $(4, 3, -5)$ and $(-2, 1, -8)$ are
 (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
- 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) $l = m = n = \pm \frac{1}{\sqrt{2}}$
- What is the acute angle between the planes $x + y + 2z = 3$ and $-2x + y - z = 11$?
 (A) $\frac{\pi}{5}$ (B) $\frac{\pi}{4}$
 (C) $\frac{\pi}{6}$ (D) $\frac{\pi}{3}$
- If α, β, γ be the angles, which a line makes with coordinate 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) $\cos^2\alpha + \cos^2\beta + \sin^2\gamma = 1$
- If a line makes the angles α, β and γ with the axes, then what is the value of $1 + \cos 2\alpha + \cos 2\beta + \cos 2\gamma$?
 (A) -1 (B) 0
 (C) 1 (D) 2

12. The two planes $ax + by + cz + d = 0$ and $ax + by + cz + d_1 = 0$, 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
13. The equation to the straight line passing through the points $(4, -5, -2)$ and $(-1, 5, 3)$ is
 (A) $\frac{x-4}{1} = \frac{y+5}{-2} = \frac{z+2}{-1}$
 (B) $\frac{x+1}{1} = \frac{y-5}{2} = \frac{z-3}{-1}$
 (C) $\frac{x}{-1} = \frac{y}{5} = \frac{z}{3}$
 (D) $\frac{x}{4} = \frac{y}{-5} = \frac{z}{-2}$
14. Let $O(0, 0, 0)$, $P(3, 4, 5)$, $Q(m, n, r)$ and $R(1, 1, 1)$ be the vertices of a parallelogram taken in order. What is the value of $m + n + r$?
 (A) 6 (B) 12
 (C) 15 (D) More than 15
15. The xy -plane divides the line joining the points $(-1, 3, 4)$ and $(2, -5, 6)$
 (A) internally in the ratio 2 : 3
 (B) internally in the ratio 3 : 2
 (C) externally in the ratio 2 : 3
 (D) externally in the ratio 3 : 2
16. The projection of the line joining the points $(3, 4, 5)$ and $(4, 6, 3)$ on the line joining the points $(-1, 2, 4)$ and $(1, 0, 5)$ is
 (A) $\frac{4}{3}$ (B) $\frac{2}{3}$
 (C) $-\frac{4}{3}$ (D) $\frac{1}{2}$
17. 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) $x - y \tan \theta = 0$
18. 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
19. The point of intersection of the line joining the points $(-3, 4, -8)$ and $(5, -6, 4)$ with the xy -plane is
 (A) $(7/3, -8/3, 0)$ (B) $(-7/3, -8/3, 0)$
 (C) $(-7/3, 8/3, 0)$ (D) $(7/3, 8/3, 0)$
20. If the angle between the lines, whose direction ratios are $(2, -1, 2)$ and $(x, 3, 5)$ is $\frac{\pi}{4}$, then the smallest value of x is
 (A) 52 (B) 4
 (C) 2 (D) 1
21. The equation of the sphere, whose centre is $(1, 1, 1)$ and which passes through $(3, 3, 2)$, is
 (A) $x^2 + y^2 + z^2 + 2x + 2y + 2z = 6$
 (B) $x^2 + y^2 + z^2 - 2x - 2y - 2z = 0$
 (C) $x^2 + y^2 + z^2 - 2x - 2y - 2z = 6$
 (D) $x^2 + y^2 + z^2 + 2x + 2y + 2z = 38$
22. 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
23. Under what condition does the equation $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$ 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) $u^2 + v^2 + w^2 < d^2$
24. If the points $(5, -1, 1)$, $(-1, -3, 4)$ and $(1, -6, 10)$ are the three vertices of a rhombus taken in order, then which one of the following is the fourth vertex?
 (A) $(7, -4, 11)$ (B) $\left(3, -\frac{7}{2}, \frac{11}{2}\right)$
 (C) $(7, -4, 7)$ (D) $(7, 4, 11)$
25. The equation $by + cz + d = 0$ represents a plane parallel to which one of the following?
 (A) x -axis (B) y -axis
 (C) z -axis (D) None of these