SRI VIDYA ARADHANA ACADEMY, LATUR

Three Dimensional Geometry

Subject: Mathematics | **Mentor:** Chetan Sir

SANKALP 2026
Refining the Edge

"Focus on the process, and the result will follow."

Session: Practice Test #02 | **Start Time:** _________ **End Time:** _________ **Target Score:** ______ / 100

SECTION A: MULTIPLE CHOICE QUESTIONS

1. Each of the angles β and γ that a given line makes with the positive y and z -axes, respectively, is half of the angle α that this line makes with the positive x -axes. Then the sum of all possible values of the angle α is:

(1) $\frac{3\pi}{4}$ (2) π (3) $\frac{\pi}{2}$ (4) $\frac{3\pi}{2}$

2. The projection of the line segment joining the point $(1,-1,3)$ and $(2,-4,11)$ on the line joining the points $(-1,2,3)$ and $(3,-2,10)$ is:

(1) 4 (2) 3 (3) 8 (4) 6

3. The angle between the straight lines, whose direction cosines l, m, n are given by the equations $2l+2m-n=0$ and $mn+nl+lm=0$, is:

(1) $\frac{\pi}{3}$ (2) $\frac{\pi}{2}$ (3) $cos^{-1}(\frac{8}{9})$ (4) $\pi - cos^{-1}(\frac{4}{9})$

4. The lines $x=ay-1=z-2$ and $x=3y-2=bz-2$, $(ab\neq 0)$ are coplanar, if:

(1) $b=1, a\in R-\{0\}$ (2) $a=1, b\in R-\{0\}$ (3) $a=2, b=2$ (4) $a=2, b=3$

5. Consider a line L passing through the points $P(1,2,1)$ and $Q(2,1,-1)$. If the mirror image of the point $A(2,2,2)$ in the line L is (α,β,γ), then $\alpha+\beta+6\gamma$ is equal to:

(1) 4 (2) 5 (3) 6 (4) 3

6. If the lines $\frac{x-1}{2}=\frac{2-y}{-3}=\frac{z-3}{\alpha}$ and $\frac{x-4}{5}=\frac{y-1}{2}=\frac{z}{\beta}$ intersect, then the magnitude of the minimum value of $8\alpha\beta$ is:

(1) 16 (2) 28 (3) 10 (4) 18

7. The distance of the line $\frac{x-2}{2}=\frac{y-6}{3}=\frac{z-3}{4}$ from the point (1,4,0) along the line $\frac{x}{1}=\frac{y-2}{2}=\frac{z+3}{3}$ is:

(1) $\sqrt{17}$ (2) $\sqrt{15}$ (3) $\sqrt{14}$ (4) $\sqrt{13}$

8. The length of the perpendicular from the point (2, -1, 4) on the straight line $\frac{x+3}{10}=\frac{y-2}{-7}=\frac{z}{1}$ is:

(1) >3 but <4 (2) >4 (3) <2 (4) >2 but <3

9. Let $L_1:\frac{x-1}{1}=\frac{y-2}{-1}=\frac{z-1}{2}$ and $L_2:\frac{x+1}{-1}=\frac{y-2}{2}=\frac{z}{1}$ be two lines. Let L_3 be a line passing through the point (α,β,γ) and be perpendicular to both L_1 and L_2. If L_3 intersects L_1, then $|5\alpha-11\beta-8\gamma|$ equals:

(1) 20 (2) 18 (3) 25 (4) 16

10. Let $L_2:\frac{x-2}{2}=\frac{y}{0}=\frac{z+4}{\alpha}$, $\alpha\in R$ be two lines, which intersect at the point B. If P is the foot of perpendicular from the point $A(1,1,-1)$ on L_2 then the value of $26\alpha(PB)^2$ is:

(1) 206 (2) 216 (3) 226 (4) 200

11. If two straight lines whose direction cosines are given by the relations $l+m-n=0$; $3l^2+m^2+cnl=0$ are parallel, then the positive value of c is:

(1) 6 (2) 4 (3) 3 (4) 2

12. The square of the distance of the point $(\frac{15}{7}, \frac{32}{7}, 7)$ from the line $\frac{x+1}{3} = \frac{y+3}{5} = \frac{z+5}{7}$ in the direction of the vector $\hat{i} + 4\hat{j} + 7\hat{k}$ is:

(1) 54 (2) 44 (3) 41 (4) 66

13. The lines $\vec{r} = (\hat{i} - \hat{j}) + l(2\hat{i} + \hat{k})$ and $\vec{r} = (2\hat{i} - \hat{j}) + m(\hat{i} + \hat{j} - \hat{k})$:

(1) Do not intersect for any values of l and m
(2) Intersect for all values of l and m
(3) Intersect when $l = 2$ and $m = 1/2$
(4) Intersect when $l = 1$ and $m = 2$

14. Let the line L pass through (1, 1, 1) and intersect the lines $\frac{x-1}{2} = \frac{y+1}{3} = \frac{z-1}{4}$ and $\frac{x-3}{1} = \frac{y-4}{2} = \frac{z}{1}$. Then, which of the following points lies on the line L?

(1) (4, 22, 7) (2) (5, 4, 3) (3) (10, 29, -50) (4) (7, 15, 13)

15. The lines $\frac{x-2}{2} = \frac{y}{-2} = \frac{z-7}{16}$ and $\frac{x+3}{4} = \frac{y+2}{3} = \frac{z+2}{1}$ intersect at the point P. If the distance of P from the line $\frac{x+1}{2} = \frac{y-1}{3} = \frac{z-1}{1}$ is l, then $14l^2$ is equal to:

(1) 100 (2) 108 (3) 112 (4) 120

16. Let the position vectors of the vertices A, B and C of a triangle be $2\hat{i} + 2\hat{j} + \hat{k}$, $\hat{i} + 2\hat{j} + 2\hat{k}$ and $2\hat{i} + \hat{j} + 2\hat{k}$ respectively. Let l_1, l_2 and l_3 be the lengths of perpendiculars drawn from the ortho centre of the triangle on the sides AB, BC and CA respectively, then $l_1^2 + l_2^2 + l_3^2$ equals:

(1) $\frac{1}{5}$ (2) $\frac{1}{2}$ (3) $\frac{1}{4}$ (4) $\frac{1}{3}$

17. Consider the lines $L_1 : \frac{x-1}{2} = \frac{y-3}{1} = \frac{z-2}{2}$ and $L_2 : \frac{x-2}{1} = \frac{y-2}{2} = \frac{z-3}{3}$. A line L_3 having direction ratios 1, -1, -2, intersects L_1 and L_2 at the points P and Q respectively. Then the length of line segment PQ is:

(1) $2\sqrt{6}$ (2) $3\sqrt{2}$ (3) $4\sqrt{3}$ (4) 4

18. Let the line passing through the points $(-1, 2, 1)$ and parallel to the line $\frac{x-1}{2} = \frac{y+1}{3} = \frac{z}{4}$ intersect the line $\frac{x+2}{3} = \frac{y-3}{2} = \frac{z-4}{1}$ at the point P. Then the distance of P from the point $Q(4, -5, 1)$ is:

(1) 5 (2) $5\sqrt{5}$ (3) $5\sqrt{6}$ (4) 10

19. Let $P(3, 2, 3)$ $Q(4, 6, 2)$ and $R(7, 3, 2)$ be the vertices of ΔPQR. Then, the angle $\angle QPR$ is:

(1) $\frac{\pi}{6}$ (2) $cos^{-1}(\frac{7}{18})$ (3) $cos^{-1}(\frac{1}{18})$ (4) $\frac{\pi}{3}$

20. If the shortest distance between the lines $L_1 : \vec{r} = (2 + \lambda)\hat{i} + (1 - 3\lambda)\hat{j} + (3 + 4\lambda)\hat{k}$, and $L_2 : \vec{r} = 2(1 + \mu)\hat{i} + 3(1 + \mu)\hat{j} + (5 + \mu)\hat{k}$, is $\frac{m}{\sqrt{n}}$, where gcd(m,n)=1, then the value of $m + n$ equals:

(1) 390 (2) 384 (3) 377 (4) 387

SECTION B: NUMERICAL VALUE TYPE

21. Let (α, β, γ) be mirror image of the point (2, 3, 5) in the line $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$. Then $2\alpha + 3\beta + 4\gamma$ is equal to ______.

22. If the length of the perpendicular from the point $(\beta, 0, \beta)$, $(\beta \neq 0)$ to the line, $\frac{x}{1} = \frac{y-1}{0} = \frac{z+1}{-1}$ is $\sqrt{\frac{3}{2}}$, then $-\beta$ is equal to ______.

23. If the square of the shortest distance between the lines $\frac{x-2}{1} = \frac{y-1}{2} = \frac{z+3}{-3}$ and $\frac{x+1}{2} = \frac{y+3}{4} = \frac{z+5}{-5}$ is $\frac{m}{n}$ where m, n are coprime numbers, then $m + n$ is equal to ______.

24. Consider the lines $L_1 : x - 1 = y - 2 = z$ and $L_2 : x - 2 = y = z - 1$. Let the feet of the perpendiculars from the point $P(5, 1, -3)$ on the lines L_1 and L_2 be Q and R respectively. If the area of the triangle PQR is A, then $4\,A^2$ is equal to ______.

25. Let P be the image of the point $Q(7, -2, 5)$ in the line $L : \frac{x-1}{2} = \frac{y+1}{3} = \frac{z}{4}$ and $R(5, p, q)$ be a point on L. Then the square of the area of $\triangle PQR$ is ______.