

Three Dimensional Geometry — CBSE Pattern Test 2

Class 12 Maths · 90 minutes · 40 marks · Sections A–D with answer key · Narayan Gurukul Academy

Test 2 — CBSE Pattern (90 minutes, 40 marks)

Class 12 Maths · Three Dimensional Geometry · Narayan Gurukul Academy (ClassApna)

General Instructions: (1) This paper has four sections — Section A (1×10), Section B (2×4), Section C (3×4) and Section D (5×2) — total 40 marks. Time allowed: 90 minutes.

(2) All questions are compulsory. No overall choice is given; internal choice, where allowed, is clearly marked.

(3) For MCQ questions choose the single correct option; for VSA answers write a single line.

(4) Take $g = 10 \text{ m/s}^2$. All symbols carry their usual meaning. Use of a calculator is not permitted.

Section A — MCQ & VSA ($10 \times 1 = 10$ marks)

- Direction ratios are proportional to the
 - direction cosines
 - coordinates
 - magnitudes
 - angles
- If a line makes angles α, β, γ with the axes, then $\cos^2\alpha + \cos^2\beta + \cos^2\gamma =$
 - 1
 - 0
 - 3
 - 2
- The direction ratios of the line joining (x_1, y_1, z_1) and (x_2, y_2, z_2) are
 - $x_2 - x_1, y_2 - y_1, z_2 - z_1$
 - x_1, y_1, z_1
 - x_2, y_2, z_2
 - sum of coordinates
- The Cartesian form of a line through (x_1, y_1, z_1) with direction ratios a, b, c is
 - $(x - x_1)/a = (y - y_1)/b = (z - z_1)/c$
 - $(x + x_1)/a = \dots$
 - $x/a = y/b = z/c$
 - $(x - x_1) = (y - y_1) = (z - z_1)$
- Two lines are parallel if their direction ratios are
 - proportional
 - equal to zero
 - perpendicular
 - additive
- The plane with intercepts a, b, c has equation
 - $x/a + y/b + z/c = 1$
 - $x + y + z = abc$
 - $ax + by + cz = 0$
 - $x/a + y/b + z/c = 0$
- The angle θ between planes with normals n_1, n_2 satisfies
 - $\cos \theta = |n_1 \cdot n_2|/(|n_1||n_2|)$

(B) $\cos \theta = |n_1 \times n_2|$

(C) $\sin \theta = n_1 \cdot n_2$

(D) $\theta = 0$

8. The angle between a line and a plane uses the line direction and plane

(A) normal

(B) intercept

(C) origin

(D) centroid

9. Find the direction cosines of the x-axis.

10. Write the condition for two planes to be perpendicular.

Section B — Short Answer I ($4 \times 2 = 8$ marks)

11. Find the direction ratios of the line joining A(1, 2, 3) and B(4, 5, 6).

12. When are two lines parallel?

13. Write the intercept form of a plane.

14. The angle between two planes is the angle between what?

Section C — Short Answer II ($4 \times 3 = 12$ marks)

15. Find the direction cosines of the line joining P(2, 3, 4) and Q(4, 5, 6).

16. Find the vector equation of the line through $\hat{i} + \hat{j} + \hat{k}$ with direction $2\hat{i} - \hat{j} + \hat{k}$.

17. Find the equation of the plane with normal $2\hat{i} + 3\hat{j} - \hat{k}$ passing through the origin.

18. Find the distance of the point (1, 2, 3) from the plane $x + y + z = 0$.

Section D — Long Answers ($2 \times 5 = 10$ marks)

19. If a line makes angles 90° , 60° and γ with the axes, find γ . Show that the lines with direction ratios (1, 2, 3) and (2, 4, 6) are parallel.

20. Find the angle between the line $(x-1)/2 = (y-2)/3 = (z-3)/4$ and the plane $2x + y - z = 5$. Find the distance of the plane $2x + 3y + 6z = 14$ from the origin.

Answer Key (Marking Scheme)

Q1 — (A) direction cosines. Q2 — (A) 1. Q3 — (A) $x_2 - x_1, y_2 - y_1, z_2 - z_1$. Q4 — (A) $(x - x_1)/a = (y - y_1)/b = (z - z_1)/c$.

Q5 — (A) proportional. Q6 — (A) $x/a + y/b + z/c = 1$. Q7 — (A) $\cos \theta = |n_1 \cdot n_2|/(|n_1||n_2|)$. Q8 — (A) normal.

Q9 — 1, 0, 0.

Q10 — When $a_1a_2 + b_1b_2 + c_1c_2 = 0$.

Q11 — 3, 3, 3.

Q12 — When direction ratios are proportional.

Q13 — $x/a + y/b + z/c = 1$.

Q14 — Their normals.

Q15 — $1/\sqrt{3}, 1/\sqrt{3}, 1/\sqrt{3}$.

Q16 — $r = (\hat{i} + \hat{j} + \hat{k}) + \lambda(2\hat{i} - \hat{j} + \hat{k})$.

Q17 — $2x + 3y - z = 0$.

Q18 — $\sqrt{3}$.

Q19 — $\gamma = 30^\circ$; direction ratios proportional.

Q20 — $\sin \theta = 1/\sqrt{14}$, $\theta = \sin^{-1}(1/\sqrt{14})$; 2.