

Three Dimensional Geometry — CBSE Pattern Test 1

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

Test 1 — 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 cosines l, m, n satisfy
 - $l^2 + m^2 + n^2 = 1$
 - $l + m + n = 1$
 - $lm + mn + nl = 1$
 - $l^2 + m^2 + n^2 = 0$
- The vector equation of a line through a with direction b is
 - $r = a + \lambda b$
 - $r = a \times b$
 - $r = a \cdot b$
 - $r = a/\lambda$
- Two lines are perpendicular if
 - $a_1a_2 + b_1b_2 + c_1c_2 = 0$
 - $a_1a_2 + b_1b_2 + c_1c_2 = 1$
 - $a_1/a_2 = b_1/b_2 = c_1/c_2$
 - $a_1 + a_2 = 0$
- The general equation of a plane is
 - $ax + by + cz + d = 0$
 - $ax + by = 0$
 - $ax^2 + by^2 = 0$
 - $ax + by + cz^2 = 0$
- The normal to the plane $ax + by + cz + d = 0$ is
 - $a\hat{i} + b\hat{j} + c\hat{k}$
 - $a + b + c$
 - d
 - $x\hat{i} + y\hat{j} + z\hat{k}$
- The distance of the plane $ax + by + cz + d = 0$ from the origin is
 - $|d|/\sqrt{a^2 + b^2 + c^2}$
 - $|d|$
 - $d/\sqrt{a + b + c}$
 - $\sqrt{a^2 + b^2 + c^2}$
- The angle between two planes is the angle between their
 - normals

- (B) direction ratios
 (C) intercepts
 (D) centroids
8. The distance of point (x_1, y_1, z_1) from plane $ax + by + cz + d = 0$ is
 (A) $|ax_1 + by_1 + cz_1 + d|/\sqrt{a^2 + b^2 + c^2}$
 (B) $ax_1 + by_1 + cz_1$
 (C) $|d|/\sqrt{a^2 + b^2 + c^2}$
 (D) $\sqrt{a^2 + b^2 + c^2}$
9. Write the relation satisfied by direction cosines.
10. Write the vector equation of a line.

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

11. What are direction ratios of a line?
12. Write the condition for two lines to be perpendicular.
13. Write the normal to the plane $ax + by + cz + d = 0$.
14. Write the formula for the distance of a point from a plane.

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

15. Find the direction cosines of a line whose direction ratios are 1, 2, 2.
16. Find the equation of the line through (1, 2, 3) with direction ratios 2, 3, 4.
17. Find the intercepts of the plane $2x + 3y + 4z = 12$.
18. Find the angle between the planes $x + y + z = 1$ and $x - y + z = 1$.

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

19. Find the equation of the plane passing through the points (1, 0, 0), (0, 1, 0) and (0, 0, 1).
20. Find the distance of the point (2, 5, -3) from the plane $\vec{r} \cdot (6\hat{i} - 3\hat{j} + 2\hat{k}) = 4$. Find the equation of the line passing through (1, 0, -1) and (2, 1, 3).

Answer Key (Marking Scheme)

- Q1 — (A) $l^2 + m^2 + n^2 = 1$. Q2 — (A) $\vec{r} = \vec{a} + \lambda\vec{b}$. Q3 — (A) $a_1a_2 + b_1b_2 + c_1c_2 = 0$. Q4 — (A) $ax + by + cz + d = 0$.
 Q5 — (A) $a\hat{i} + b\hat{j} + c\hat{k}$. Q6 — (A) $|d|/\sqrt{a^2 + b^2 + c^2}$. Q7 — (A) normals. Q8 — (A) $|ax_1 + by_1 + cz_1 + d|/\sqrt{a^2 + b^2 + c^2}$.
 Q9 — $l^2 + m^2 + n^2 = 1$.
 Q10 — $\vec{r} = \vec{a} + \lambda\vec{b}$.
 Q11 — Numbers proportional to the direction cosines.
 Q12 — When $a_1a_2 + b_1b_2 + c_1c_2 = 0$.
 Q13 — $a\hat{i} + b\hat{j} + c\hat{k}$.
 Q14 — $|ax_1 + by_1 + cz_1 + d|/\sqrt{a^2 + b^2 + c^2}$.
 Q15 — $1/3, 2/3, 2/3$.
 Q16 — $(x-1)/2 = (y-2)/3 = (z-3)/4$.
 Q17 — 6, 4, 3.
 Q18 — $\cos \theta = 1/3$.

Q19 — $x + y + z = 1$.

Q20 — $7; (x-1)/1 = y/1 = (z+1)/4$.