

Introduction to Three Dimensional Geometry — CBSE Pattern Test 1

Class 11 Maths · 90 minutes · 40 marks · Sections A–D with answer key · Narayan Gurukul Academy

Test 1 — CBSE Pattern (90 minutes, 40 marks)

Class 11 Maths · Introduction to 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)

1. In three-dimensional space, the number of coordinate planes is

- (A) 3
- (B) 2
- (C) 1
- (D) 6

2. The coordinates of the origin in space are

- (A) (0, 0, 0)
- (B) (1, 1, 1)
- (C) (0, 0)
- (D) (1, 0, 0)

3. The distance between the points (x_1, y_1, z_1) and (x_2, y_2, z_2) is

- (A) $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$
- (B) $\sqrt{(x_2 + x_1)^2 + (y_2 + y_1)^2 + (z_2 + z_1)^2}$
- (C) $(x_2 - x_1) + (y_2 - y_1) + (z_2 - z_1)$
- (D) $x_2 - x_1$

4. The midpoint of the join of (2, 4, 6) and (4, 8, 10) is

- (A) (3, 6, 8)
- (B) (6, 12, 16)
- (C) (2, 4, 4)
- (D) (1, 2, 2)

5. If l, m, n are the direction cosines of a line, then

- (A) $l^2 + m^2 + n^2 = 1$
- (B) $l + m + n = 1$
- (C) $l^2 + m^2 = n^2$
- (D) $lmn = 1$

6. The direction cosines of the x-axis are

- (A) (1, 0, 0)
- (B) (0, 1, 0)
- (C) (0, 0, 1)
- (D) (1, 1, 1)

7. Two lines are perpendicular if

- (A) $l_1 l_2 + m_1 m_2 + n_1 n_2 = 0$

- (B) $l_1 = l_2$
 (C) $l_1l_2 + m_1m_2 + n_1n_2 = 1$
 (D) $m_1 = m_2$
8. Three points A, B, C are collinear if
 (A) $AB + BC = AC$
 (B) $AB = BC$
 (C) $AB \cdot BC = 0$
 (D) $AB - BC = AC$
9. Write the coordinates of a general point on the x-axis.
 10. Write the distance formula for two points in space.

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

11. How many coordinate planes are there in space?
 12. Find the distance of (3, 4, 12) from the origin.
 13. Write the section formula for internal division in space.
 14. Write the formula for the angle between two lines.

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

15. Find the distance between the points (2, 3, 4) and (1, 0, 5).
 16. Find the midpoint of the join of (2, 4, 6) and (4, 8, 10).
 17. Find the direction cosines of the line with direction ratios (2, 3, 6).
 18. Find the angle between the lines with direction ratios (1, 1, 2) and (2, -1, 1).

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

19. Show that the points A(1, 2, 3), B(-1, -2, -1), C(2, 3, 2) and D(4, 7, 6) are the vertices of a parallelogram.
 20. Find the coordinates of the point which divides the join of A(2, 1, 4) and B(4, 3, 2) externally in the ratio 3 : 2. Find the direction cosines of the line joining A(2, 3, 4) and B(4, 5, 8).

Answer Key (Marking Scheme)

- Q1 — (A) 3. Q2 — (A) (0, 0, 0). Q3 — (A) $\sqrt{[(x_2-x_1)^2 + (y_2-y_1)^2 + (z_2-z_1)^2]}$. Q4 — (A) (3, 6, 8).
 Q5 — (A) $l^2 + m^2 + n^2 = 1$. Q6 — (A) (1, 0, 0). Q7 — (A) $l_1l_2 + m_1m_2 + n_1n_2 = 0$. Q8 — (A) $AB + BC = AC$.
 Q9 — (x, 0, 0).
 Q10 — $\sqrt{[(x_2-x_1)^2 + (y_2-y_1)^2 + (z_2-z_1)^2]}$.
 Q11 — 3.
 Q12 — 13.
 Q13 — $((mx_2 + nx_1)/(m + n), (my_2 + ny_1)/(m + n), (mz_2 + nz_1)/(m + n))$.
 Q14 — $\cos \theta = l_1l_2 + m_1m_2 + n_1n_2$.
 Q15 — $\sqrt{11}$.
 Q16 — (3, 6, 8).
 Q17 — (2/7, 3/7, 6/7).
 Q18 — 60° .

Q19 — $AB = DC$ and $AD = BC$.

Q20 — $(8, 7, -2)$; direction cosines $(1/\sqrt{6}, 1/\sqrt{6}, 2/\sqrt{6})$.