



Attempt all questions before checking the answer key. Use ordered triples (x, y, z) . Focus on coordinate planes, octants and distance formula.

A. Very short answers - 1 mark each

1. State the coordinates of the origin.
2. Which coordinate is zero for every point in the xy -plane?
3. In which coordinate plane does $(0, -3, 4)$ lie?
4. Find the distance of $(2, -5, 7)$ from the yz -plane.

B. Short answers / practice - 2 marks each

5. Find the distance between $(1, 2, 3)$ and $(4, 6, 3)$.
6. State the signs of coordinates of a point in the octant where $x > 0, y < 0, z < 0$, and give an example.
7. Find the distances of $(-2, 3, -6)$ from all three coordinate planes.
8. Find the distance of $(3, 4, 12)$ from the origin and from the z -axis.
9. Find distance between $(0,0,0)$ and $(1,2,2)$.
10. Which plane contains every point with $y=0$?
11. Find distance of $(-4,3,2)$ from yz -plane.
12. Find distance of $(3,4,5)$ from x -axis.
13. Is $(0,0,4)$ on the z -axis?
14. Find distance between $(1,1,1)$ and $(-1,-1,-1)$.
15. Find all points on x -axis at distance 3 from origin.
16. State signs in the first octant.
17. Find distance of $(5,-2,7)$ from xy -plane.
18. Can a point belong to two coordinate planes? Give an example.
19. Find distance between $(2,3,4)$ and $(2,3,-4)$.
20. Find x if distance of $(x,0,0)$ from $(0,3,4)$ is $\sqrt{41}$.
21. Show that points $(1,0,0), (0,1,0), (-1,0,0)$ form a right triangle.
22. Find points on y -axis at distance $\sqrt{10}$ from $(1,0,0)$.

C. Short answers - 3 marks each

23. Find the point on the x -axis equidistant from $A(2, 3, 4)$ and $B(-2, 1, 2)$.
24. Show that $A(0, 0, 0), B(1, 2, 2)$ and $C(2, 4, 4)$ are collinear by comparing distances.
25. Determine whether $A(1, 0, 0), B(0, 1, 0), C(0, 0, 1)$ form an equilateral triangle; find its side length.
26. Find all points on the z -axis at distance 5 from $(3, 0, 1)$.

D. Long answers - 5 marks each

27. Derive the distance formula between two points in three dimensions using the Pythagorean theorem twice. Use it to find the length of the space diagonal of a $3 \times 4 \times 12$ cuboid.
28. For $A(1, 2, 3), B(5, 2, 3), C(5, 5, 3)$, prove the triangle is right-angled, identify the right angle and find its perimeter and area.
29. Find the relation among x, y, z when $P(x, y, z)$ is equidistant from $A(1, 2, 3)$ and $B(3, 2, 1)$. Find two points satisfying it and verify the distances.
30. A drone moves from $A(2, -1, 3)$ to $B(8, 7, 3)$, then to $C(8, 7, 15)$. Find lengths of both paths, the direct distance AC and the distance saved by travelling directly.

ANSWER KEY - Numerical / short answers

1) $(0,0,0)$. 2) z . 3) yz -plane. 4) 2. 5) 5. 6) $(+, -, -)$, e.g. $(1, -1, -1)$. 7) xy : 6; yz : 2; xz : 3. 8) 13 and 5. 9) 3. 10) xz -plane. 11) 4. 12) $\sqrt{41}$. 13) Yes. 14) $2\sqrt{3}$. 15) $(\pm 3, 0, 0)$. 16) $(+, +, +)$. 17) 7. 18) Yes; $(2, 0, 0)$ belongs to xy and xz planes. 19) 8. 20) $x = \pm 4$. 21) $(0, \pm 3, 0)$. 22) $(5/2, 0, 0)$. 23) $AB=3, BC=3, AC=6$. 24) Yes; $\sqrt{2}$. 25) $(0, 0, 5), (0, 0, -3)$. 26) 13. 27) Right angle at B ; perimeter 12; area 6. 28) $x=z$; e.g. origin and $(1, 0, 1)$. 29) $AB=10; BC=12; AC=2\sqrt{61}$; saved $22 - 2\sqrt{61} \approx 6.38$.