



MATHS

NCERT - NCERT MATHEMATICS (ENGLISH)

INTRODUCTION TO THREE DIMENSIONAL GEOMETRY

Solved Examples

1. In Figure, if P is $(2, 4, 5)$, find the coordinates of F.



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2. Find the equation of the circle with center $(-3, 2)$ and radius 4



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3. Find the distance between the points $P(1, -3, 4)$ and $Q(-4, 1, 2)$.



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4. Show that the points $(-2, 3, 5)$, $(1, 2, 3)$ and $(7, 0, -1)$ are collinear.



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5. Are the points

$A(3, 6, 9)$, $B(10, 20, 30)$ and $C(25, -41, 5)$,

the vertices of a right angled triangle?



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6. Find the equation of set of points P such that $PA^2 + PB^2 = 2k^2$, where A and B are the points $(3, 4, 5)$ and $(1, 3, 7)$, respectively.



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7. Find the coordinates of the point which divides the line segment joining the points $(1, 5, 3)$ and $(-2, 3, 4)$ in the ratio $3:4$ (i) internally, and (ii) externally.



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8. Using section formula, prove that the three points $(-4, 6, 10)$, $(2, 4, 6)$ and $(14, 0, -2)$ are collinear.



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9. Find the coordinates of the centroid of the triangle whose vertices are (x_1, y_1, z_1) , (x_2, y_2, z_2) and (x_3, y_3, z_3) .



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10. Find the ratio in which the line segment joining the points $(4, 8, 10)$ and $(6, 10, -8)$ is divided by the YZ plane.



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11. The centroid of a triangle ABC is at the point $(1, 1, 1)$. If the coordinates of A and B are $(3, 5, 7)$ and $(1, 7, 6)$, respectively, find the coordinates of the point C.



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12. Find the equation of the set of the points P such that its distances from the points $A(3, 4, 5)$ and $B(2, 1, 4)$ are equal.



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13. Show that the points $(1, 2, 3)$, $(-1, -2, -1)$, $(2, 3, 2)$ and $(4, 7, 6)$ are the vertices of a parallelogram.



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Miscellaneous Exercise

1. If the origin is the centroid of the triangle PQR with vertices $P(2a, 2, 6)$, $Q(4, 3b, 10)$ and

$R(8, 14, 2c)$, then find the values of a , b and c .



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2. Find the lengths of the medians of the triangle with vertices $A(0, 0, 6)$, $B(0, 4, 0)$ and $(6, 0, 0)$.



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3. A point R with x-coordinates 4 lies on the line segment joining the points

$P(2, -3, 4)$ and $Q(8, 0, 10)$. Find the coordinates of the point R .



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4. Find the coordinates of a point on y axis which are at a distance of $5\sqrt{2}$ from the point $P(3, 2, 5)$.



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5. Find the equation of set of points P such that $PA^2 + PB^2 = 2k^2$, where A and B are the points (3, 4, 5) and (1, 3, 7), respectively.



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6. Three vertices of a parallelogram ABCD are $A(3, 1, 2)$, $B(1, 2, 4)$ and $C(1, 1, 2)$. Find the coordinates of the fourth vertex.



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Exercise 12 2

1. Find the equation of the set of points which are equidistant from the points $(1, 2, 3)$ and $(3, 2, 1)$.



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2. Find the locus of the point, the sum of whose distances from the points $A(4, 0, 0)$ and $B(-4, 0, 0)$ is equal to 10.



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3. Show that the points $(-2, 3, 5)$, $(1, 2, 3)$ and $(7, 0, -1)$ are collinear.



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4. Verify the following: (i) $(0, 7, 10)$, $(1, 6, 6)$ and $(4, 9, 6)$ are the vertices of an isosceles triangle.



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5. Find the distance between the following pairs of points: (i) $(2, 3, 5)$ and $(4, 3, 1)$ (ii) $(3, 7, 2)$ and $(2, 4, 1)$ (iii) $(1, 3, 4)$ and $(1, 3, 4)$ (iv) $(2, 1, 3)$ and $(2, 1, 3)$.



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Exercise 12.3

1. Find the coordinates of the point which divides that line segment joining the points

$(-2, -2, -2)$ and $(1, 4, 6)$ in the ratio (i) $2 : 3$ internally, (ii) $2 : 3$ externally.



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2. Find the ratio in which the YZ plane divides the line segment formed by joining the points $(2, 4, 7)$ and $(3, 5, 8)$.



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3. Given that $P(3, 2, 4)$, $Q(5, 4, 6)$ and $R(9, 8, 10)$ are collinear. Find the ratio in which Q divides PR .



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4. Find the coordinates of the points which trisect the line segment joining the points $P(4, 2, 6)$ and $Q(10, 16, 6)$.



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5. Using section formula, show that the points

$$A(2, -3, 4), B(-1, 2, 1) \text{ and } C\left(0, \frac{1}{3}, 2\right)$$

are collinear.



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Exercise 12 1

1. Fill in the blanks:(i) The x-axis and y-axis taken together determine a plane known as ____ (ii) The coordinates of points in the XY-plane are of the form ____ (iii)

Coordinate planes divide the space into ____
octants ____



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2. Name the octants in which the following points lie: $(1, 2, 3)$, $(4, -2, 3)$, $(4, -2, -5)$, $(4, 2, -5)$, $(-4, 2, -5)$, $(-4, 2, 5)$, $(-3, -1, 6)$, $(2, -4, -7)$.



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3. A point is in the XZ-plane. What can you say about its y-coordinate?



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4. If a point lies on X-axis, then what are its y and z co-ordinates ?



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