MATHS

BOOKS - MODERN PUBLISHERS MATHS (HINGLISH)

INTRODUCTION TO THREE DIMENSIONAL GEOMETRY

Examples

1. In the figure if P is (a,b,c) find the cordinates of A,B,C and D,E,F

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2. In the figure of Ex 1 if p is (2,4,5) find the co- ordinates of E

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3. reflection of the point (α, β, γ) in the XY-plane is :

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4. Name the octant in which the following points lies (i) (1,2,3) (ii) 4,-2,3) (iii)(4,-2,-5) (iv)(4,2,-5) (v)(-4,2,-5) (vi)(-4,2,5)(vii) (-3,-1,6)(viii)(2,-4,-7)

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5. Find the value of 'x' so that the point (6,5,-3) is at a distance of 13 units from the point (x,-7,0)

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6. Find the point on $y - a\xi s$ which is equidistant from the points $(3, 1, 2) and (5, 5, 2)$.

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7. Using distance formula show that the points A(-3,2,4),B(-1,5,9) and C(1,8,14) are collinear

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8. Show that the triangle with vertices (6,10,10),(1,0,-5) and (6,-10,0) is a right angled triangle

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9. Show that the points $A(0, 1, 2), B(2, -1, 3) and C(1, -3, 1)$ are vertices of an isosceles right-angled triangle.

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10. Prove that the points $(5, -1, 1), (7, -4, 7), (1, -6, 10)$ and $(-1, -3, 40$ are the vertices ofa rhombus.

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11. Find the point which equisdistant from points $O(0, 0, 0), A(a, 0, 0)B(0, b, 0)$ and $(0, 0, c)$

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

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13. Find the co -ordinates of the point which divides the line segment joining the points (5,4,2) and (-1,-2,4) in the ratio

(i) 2:3

(ii) -2:3

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14. Find the coordinates of the point R which divides PQ externally in the ratio 2:1 and verify that Q is the mid point of PR.

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15. Find the ratio in which the plane $3x + 4y - 5z = 1$ divides the line segment joinin $(-2, 4, -6)$ and $(3, -5, 8)$.

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

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17. Let $A(3, 2, 0), B(5, 3, 2)C(-9, 6, -3)$ be three points forming atriangle. AD, the bisector of $\angle BAC$, meets BC in D. Find thecoordinates of the point D.

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18. Show that the points (3,-1,-1),(5,-4,0),(2,3,-2) and (0,6,-3) are the vertices of a parallelogram

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19. Two vertices of triangle ABC are A(2,-4,3) and B(3,-1,-2) and its centroid is (1,0,3). Find its third vertex C.

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20. The lines joining the vertices of a tetrahedron to the centroids of opposite faces are concurrent.

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21. If a parallelepiped is formed by the planes drawn through the points (2,3,50 and (5,9,7) parallel to the coordinate

planes, then write the lengths of edges of the parallelopiped and length of the diagonal.

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22. Write the coordinates of the point P which is five sixth of the way from $A(-2, 0, 6) \rightarrow B(10, -6, -12)$.

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23. Show that , if $x^2 + y^2 = 1$, then the point $\left(x, y, \sqrt{1 - x^2 - y^2}\right)$ is at is distance 1 unit form the origin.

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Exercise 12 A Short Answer Type Questions

1. find the reflection of P(x,y,z) in the

(i) XY plane

(ii) YZ plane

(iii) ZX plane

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2. Find the octant in which the following points lie

(i) (-3,1,-2)

(ii) (3,1,-2)

(iii) (-3,1,-2)

(iv) (-3,-1,-2)

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3. Write down the perpendicular distances of the pont (x, y, z) from the three coordinates planes

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4. The coordinates of a point are (1,-2,7). Write down the coordinates of seven points, whose absolute values are the same as those of the coordinates of the given point.

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5. Write the co- ordinate fo the feet of perpendicualrs form the point (a,b,c) on the co- ordinate axes

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6. Find the image of the point in the specified plane

(i) (5,4,-3) in the xy plane

(ii) (-2,0,0) in the xy plna e

(iii) (-3,4,7) in the yz plane

(iv) (-7,2,-1) in the zx plane

(iv) (-4,0,1) in the zx plane

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7. Find the perpendicualr distances of the point P(a,b,c) form the co - ordinate axes

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8. Planes are drawn parallel to the coordinate planes through the points (3,0,-1) and (-2,5,4). Find the lengths of the edges of he parallelepiped so formed.

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Exercise 12 B Short Answer Type Questions

1. Find the distance between the points

(i) (9,-12,-8) and (0,0,0)

(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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2. Find the locus of the points which are equidistant from the points (1,2,3) and (3,2,11).

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3. Find the locus of a point which moves so that its distance from (1,2,3) is four times its distance from YZ plane

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4. (i) Find the ponts on the X axis which are at a distance of $2\sqrt{6}$ units from the point (1,-2,3)

(ii) Find the co ordinates of the points on the y axis which are at a distance of $5\sqrt{2}$ from the point (3,-2,5)

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5. Find 'k' so that the distance between the points (7,1,-3) and (4,5,k) be 13 units

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Exercise 12 B Long Answer Type Questions I

1. Show that the following points are collinear :

(i) (0,7,-7), (1,4,-5), (-1, 10,-9)

(ii) (3,-5,1), (-1,0,8), (7,-10,-6)

(iii) (-2,3,5),(7,0,-1),(1,2,3)

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2. Verify that the points (3,-2,4),(1,0,-2) and (-1,2,-8) are collinear

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3. (a) show that the triangle with vetices (0,7,10) (-1,6,6) and (-4,9,6) is right angled (b) 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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4. Show that the points $(a, b, c), (b, c, a), (c, a, b)$ are the vertices of an equilateral triangle.

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5. Examine whether the coplanar points (-2,6,-2),(0,4,-1),(-2,3,1) and (-4,5,0)` are the vertices of a square.

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6. Show that the coplanar points $(-1, -6, 100), (1, -3, 4), (-5, -1, 1)$ and $(-7, -4, 7)$ are the vertices of a rhombus.

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7. If A and B be the points $(3, 4, 5)$and $(1, 3, 7)$, respectively, find the equation of the set of points P such that $PA^2 + PB^2 = k^2$, where k is a constant.

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8. Find the co ordinates of point P which is equaidsistant from the four ponts A(0,0,0) ,B(1,0,0) C(0,2,0) D(0,0,3)

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9. Find the co ordinates of the point equidistant form the four points with ordinates (2,0,0) ,(0,-1,0) ,(0,0,5) and (0,0,0) find also the distance of the point from the four points

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10. 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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11. Show that $(-1, 4, -3)$ is the circumcentre of the triangle formed by the points $(3, 2, -5), (-3, 8, -5)$ and $(-3, 2, 1)$

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12. Determine the point in XY plane which is equidistant from the point $A(1, -1, 0), B(2, 1, 2)$ and $C(3, 2, -1)$

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Exercise

1. Three consecutive vertices of a parallelogram ABCD are $A(6, 2, 4), B(2, 4, -8), C(-2, 2, 4)$. Find the coordinates of the fourth vertices

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2. Find the third vertex of triangle whose centroid is origin and two vertices are (1,2,3) and (0,-2,-5)

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3. The mid point of the sides of a triangle are (1,5,-1) (0,4,-2) and (2,3,4) find its vertices also find the centroid of the triangle

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4. Whhat are the coordinates of the vertices of a cube whose edge is 2 units, one of whose vertices coincides with the origin and the thrre edges passing thorugh the origin, coincides with the positive direction of the axes through the origin ?

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Objective Type Questions True False Questions

1. The point (-3,1,6) lies in V quadrat

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2. The image of (4,5,-3) in the X-Y plane is (4,5,3)

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3. The Three coordiantes planes divide the space into ..... Parts.

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4. The point Y axis which is equidistant from the points (3,1,2) and (5,5,2) is (0,5,0)

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5. In a parallelogram the diagonals are equal in length

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Objective Type Questions Very Short Answer Type Questions

1. Find the distance between the points (-3,7,2) and (2,4,-1)

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2. Find the locus of a point which is equidistant from the points (-1,2,3) and (3,2,1)

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3. Are the points (-1,4,-2),(2,-2,1) and (0,2,-1) collinear

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4. Centroid of a Triangle

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5. Whether the points (-1,-6,10) , (1,-3,4) , (-5,-1,1) and (-7,-4,7) form a rhombus

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6. Find the co -ordinates of the mid point of the join of the points A(3,5,7) and B(-3,-3,1)

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7. Whether the points (0,7,10),(1,6,-6) and (4,9,-6) from an isosceles triangle

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8. Using section formula, show that the points $A(2, -3, 4), B(-1, 2, 1)$ *and* $C(0, 1/3, 2)$ are collinear.

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9. Find the third verted of a triangle whose centroid is origin and two vertices are (2,4,6) and (-2,-2,1)

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10. Find the co- ordinates of the centroid of the tetrahedron whose vertices are (0,0,0) ,(a,0,0),(0,b,0) and (0,0,c)

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Ncert File Exercise 12 1

1. A point is on the x axis what are its y coordinate and z coordinates

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2. A point is in the XZplane. What can you say about its ycoordinate?

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3. Name the octant 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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4. Fill in the blanks: (i) The xaxis and yaxis taken together determine a plane known as___ (ii) The coordinates of points in the XYplane are of the form____ (iii) Coordinate planes divide the space into ___ octants___

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Ncert File Exercise 12 2

1. Find the distance between the following pairs of points

(i) (2,3,5) and (4,3,1)

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

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3. Verifty the following

(i) (0,7,-10) ,(1,6,-6)and (4,9,-6) are the vertices of an isosceles triangle

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4. 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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5. Find the equation of the set of points P, the sum of whose distances from $A(4, 0, 0)$and $B(4, 0, 0)$is equal to 10.

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Revision Exercise

1. Planes are drawn through the points (5,0,2) and(3,2,-5) parallel to the coordinate planes find the lengths of the edges of the rectangular prallelopiped so formed.

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2. The lines joining the vertices of a tetrahedron to the centroids of opposite faces are concurrent.

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3. Find the lengths of the edges of the rectangular parallelepiped formed by planes drawn throgh points (1,2,3) and (4,7,6) parallel to the co ordinate planes

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4. Show that the points

$(0, 7, -10), (1, 6, -6), (4, 9, -6)$form an isosceles right angled triangle

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5. Show that the points

$(4, 7, 8), (2, 3, 4), (-1, -2, 1), (1, 2, 5)$ are the vertices of a parallelogram,but not a rectangle.

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6. Show that the points

$(-3, 2), (-5, -5), (2, -3)$ and $(4, 4)$ are the vertices of rhombus also find its area.

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

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8. Find the co ordinates of the point equidistant from the points : $(2, 0, 0), (0, 3, 0), (0, 0, 8)$and $(0, 0, 0)$

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Check Your Understanding

1. Find the octant in which the following points lie:

(i) $(-2, 1, 3)$ (ii) $(2, 1, -3)$ (iii) $(-2, 1, -3)$ (iv) $(-2, -1, -3)$

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2. Find the equation of :

(i) XY plane (ii) YZ plane (iii) ZXplane

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3. Find the equation of the line which pass through the point $(0, 0, 0)$,and parallel to the following plane: (i) X axis (ii) Y axis (iii) Z axis

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4. Find the image of (x,y,z) in XY plane

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5. Find the distance between the points $P(x_1, y_1, z_1)$ and $Q(x_2, y_2, z_2)$

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6. Find the co ordinates of the point which bisects the line segment joininng the points (x_1, y_1, z_1) and (x_2, y_2, z_2)

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7. Centroid of a Triangle

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8. 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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9. What is the test for a parallelogram

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10. Find the co oridinate of the centroid of the tetrahedron whose vertices are $(x_1, y_1, z_1), (x_2, y_2, z_2), (x_3, y_3, z_3)$ and (x_4, y_4, z_4)

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Chapter Test

1. Distance of the points (a,b,c) for the y axis is

(a) $\sqrt{b^2+c^2}$ (b) $\sqrt{c^2+a^2}$ (c) $\sqrt{a^2+b^2}$ (d) $\sqrt{a^2+b^2+c^2}$

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2. The ratio in which the plane $3x+4y-5z=1$ divided the join of $(-2,4,-6)$ and $(3,-5,6)$ is

(a)12:13 (b) 13:12 (c)13:14 (d)14:13

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3. The equation of the set of points which are equidistant the points $(1,-2,3)$ and $(3,-2,-1)$ is .....

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4. Write the perpendicular distannce of the point (x,y,z) form three co ordinate planes (x,y,z being positive)

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5. Find the co ordinates of the feet of perpendiuclars from the point (a,b,c) on the co ordinate axes

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6. Show that the points A(1,1,1) ,B(1,2,3) and C(2,-1,1) are vertices of an isosceles triangle

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7. Find the equation of the set of points p such that its distance from the points A(3,4,-5) and B(-2,1,4) are equal

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8. Examine whether following points are collinear or not $(3, -2, 4), (1, 0, -2), (-1, 2, -8)$

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9. Show that the points (3,-1,-1),(5,-4,0) ,(2,3,-2) and (0,6,-3) are the vertices of a parallelogram

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10. Find the point on y-axis which is at a distance of $\sqrt{10}$ units from the point(1,2,3).

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11. Let $A(3, 2, 0), B(5, 3, 2)C(-9, 6, -3)$ be three points forming atriangle. AD, the bisector of $\angle BAC$, meets BC in D. Find thecoordinates of the point D.

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12. The lines joining the vertices of a tetrahedron to the centroids of opposite faces are concurrent.

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