MATHS

BOOKS - CHHAYA PUBLICATION MATHS (BENGALI ENGLISH)

INTRODUCTION TO THREE-DIMENSIONAL COORDINATE GEOMETRY

Example

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

(2 , 3 , 4)

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2. Find the octants in which the following points lie :

(2 , 3 , - 4)

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3. Find the octants in which the following points lie :

(- 1 , -2 , 3)

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4. Find the octants in which the following points lie :

(- 3 , - 4 , - 5)

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5. Find the octants in which the following points lie :

(- 1 , 2 , 5)

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6. Find the octants in which the following points lie :

(2 , - 1 , - 3)

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7. Find the octants in which the following points lie :

(1 , - 3 , 4)

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8. Find the octants in which the following points lie :

(- 2 , -3 , 5)

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9. Let P (a, b , c) be any point in space , state the signs of a , b and c if P lies on octant OXY ' Z'

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10. Let P (a, b , c) be any point in space , state the signs of a , b and c if P lies on octant OX 'YZ

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11. Let P (a, b , c) be any point in space , state the signs of a , b and c if P lies on octant OX ' Y' Z '

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12. Let P (a, b , c) be any point in space , state the signs of a , b and c if P lies on octant OXYZ

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13. Let P (a, b , c) be any point in space , state the signs of a , b and c if P lies on octant OX ' Y ' Z

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14. Let P (a, b , c) be any point in space , state the signs of a , b and c if P lies on octant OXY ' Z

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15. Where do the following points lie ?

(0 , - 2 ,- 3)

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16. Where do the following points lie ?

(0 , 0 , -3)

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17. Where do the following points lie ?

(2 , 1 , 0)

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18. Where do the following points lie ?

(2 , 0 , 0)

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19. Where do the following points lie ?

(3 , 0 , -4)

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20. find the distance of the point (2 , 3 , -4) from the origin. Unsing the same digits state the coordinates of the points having the same distance from the origin .

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21. If the distance between the points (- 1 , -3 , c) and (2 , 1 , - 2) is $5\sqrt{2}$ unit, find c .

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22. Find the points on the z-axis which are at a distance of $\sqrt{29}$ unit from the point (2, -3 , -2) .

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23. Show that the points (p , q , r) , (q , r , p) and (r , p , q) are the vertices of an equilateral triangle.

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24. Show that the points A (4 , 7 , -6) , B (2 , 5 , -4) and C (1 , 4 , -3) are collinear.

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25. Find the equation to the locus of a moving point which is always equidistant from the points (3 , 4 , -5) and (- 2, 1 , 4)

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26. Prove that the points (1 , -3 , 1) , (0 , 1 , 2) and (2 , -1 , 3) are the vertices of a right angled isosceles triangle.

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27. Find the perpendicular distances of the point (2 ,3 , 4) from the z coordinate axes .

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28. Find the point in yz-plane which is equidistant from the points (2 , 0 , 3) , (3 , 2 , 0) and (1 , 0 , 2) .

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29. Find the point on the x-axis which is equidistant from the points (2 , -1 , 3) and (-3 , 2 , -4) .

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30. The sum of the distances of a moving point from the points (5 , 0 , 0) and (- 5 , 0 , 0) is always 20 unit . Find the equation to the locus of the moving point .

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31. Find the coordinates of the point equidistant from the four points (2 ,1 , 2) ,(-1 , 1, 3) ,(0 , 5 , 6) and (3 , 2 , 2) .

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32. Show that the pointsO (0 , 0, 0) ,P (a , a, 0) Q (a , 0 , a) and R (0 , a , a) from regular tetrahedron .

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33. Prove that the points A(-5 , 1 , 1) , B(1 , 3 , 4) , C (- 1 , 6 , 10) and D (-7 , 4, 7) taken in order are the vertices of a rhombus .

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34. Find the coordinates of the point which divides the line- segment joining A (2 , -1 , 3) and B (-3 , 1 , 4) (i) internally in the ratio 2 : 3 (ii) externally in the ratio 4 : 3

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35. Find the ratio in which the line -segment joining the points (2 , 0 , -4) and (- 4 2 , 6) is divided by the xy - plane. . Also find the coordinates of the point of division .

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36. Find the coordinates of the point of trisection of the line-segment joining the points (0,2 ,1) and (2 , -1, 5) that is nearer to (0 , 2 , 1) .

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37. Two vertces of a parallelogram are (2 , 5 , -3) and (3 , 7 , -5) , it its diagonals meet at (4 , 3 , 3) , find the coordinates of the other two vertices .

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38. If (2 , -3 , 1) is the centroid of the triangle ABC with vertices A (-3 , p , 2) , B (2 , -4 , q) and

C (r , 3 , 5) , find the values of p , q , r .

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39. Two vertices of triangle are (4 , 3 , -6) , (3 , -4 , 4) and the coordinates of its centroid are (2 , - 2 , 1) , find the coordinates of the third vertex of the triangle.

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40. Three vertices of triangle ABC are A (3 , 2 , -1) B (- 1 , -1 , -1) and C (1, 5, 5) , if the internal bisector of $\angle BAC$ meets the opposite side $\overline{BC}$ at D , then find the coordinates of D .

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41. Find the ratio in which the line-segment joining the points (2, 1 , 3) and (1 , -3 , -4) is divided by the plane 3 x - 2y - 3z = 3 . Also find the coordinates of the point of division.

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42. Find the image of the point

(3 , 2 , - 4) in the xy-plane

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43. Find the image of the point

(3 , 2 , -4) in the yz - plane

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44. Find the image of the point

(3 , 2 , - 4) in the zx- plane .

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45. The coordinates of the mid-points of the sides of a triangle are (4 , 3, 4) , (1, 5 , -1) and (0 , 4 , - 2) , find the coordinates of the vertices of the triangle .

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46. A point with y-coordinate 5 lies on the line-segment joining the points (1 , 4 , -3) and (4 , 7 , - 6) , find the coordinates of the point .

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47. Applying section formulae show that the points A(4 , 7 , -6) , B (2, 5 , - 4) and C (1 , 4 , -3) are collinear .

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Multiple Choice Questions

1. The equation of zx - plane is _

A. $x = 0$

B. $y = 0$

C. $z = 0$

D. none of these

Answer: B

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2. $x = 0, y = 0$ represent the equation of _

A. x - axis

B. y - axis

C. z - axis

D. none of these

Answer: C

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3. The coordinates of any point in yz - plane are of the form_

A. $(x, 0, z)$

B. $(x, y, 0)$

C. $(0, y, z)$

D. none of these

Answer: C

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4. y = b and z = c represent the equation of a line parallel to _

A. x - axis

B. y - axis

C. z - axis

D. none of these

Answer: A

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5. x = a represents the equation of a plane parallel to _

A. xz - plane

B. xy-plane

C. yz-plane

D. none of these

Answer: C

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6. (0 , a , 0) are the coordinates of any point on

_

A. x-axis

B. y - axis

C. z - axis

D. none of these

Answer: B

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7. The points (5 , 2 , 4) , (6 , - 1 , 2) and (8 , - 7 , k) are collinear if k=

A. 3

B. -3

C. 2

D. -2

Answer: D

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8. If the distance between the points (- 1, 1, c) and (2, 1 , 1) is 3 , then the value of C is _

A. 3

B. 2

C. 1

D. -1

Answer: C

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9. The equation of xy-plane is _

A. $x = 0$

B. $y = 0$

C. $z = 0$

D. none of these

Answer: C

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10. The coordinates of any point on the line-segment joining the points (x_1, y_1, z_1) and (x_2, y_2, z_2) are $\left(\frac{x_1 + kx_2}{k+1}, \frac{y_1 + ky_2}{k+1}, \frac{z_1 + kz_2}{k+1}\right)$, then the value of k will be _

A. Positive integers

B. negative integers

C. real numbers

D. imaginary numbers

Answer: C

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11. The ratio in which the line-segment joining the points (2 , - 3, 4) and (3 , 4 , - 1) is divided by the zx-plane is _

A. $3:4$

B. $4:3$

C. $-2:3$

D. $1:4$

Answer: A

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12. If the coordinates of two extremities of a diagonal of a square are (4 , 4 , 7) and (0 , 6 , 3) , then the length of a side is _

A. 3 unit

B. 4 unit

C. $3\sqrt{2}$ unit

D. $2\sqrt{6}$ unit

Answer: C

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13. The equation of z-axis in three-dimensional space is _

A. $y = 0, z = 0$

B. $x = 0, y = 0$

C. $x = 0, z = 0$

D. none of these

Answer: B

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14. YOZ-plane divides the line-segment joining the points (3 , -2 , -4) and (2 , 4 , -3) in the ratio

-

A. $1:2$

B. $-4:3$

C. $-2:3$

D. $-3:2$

Answer: D

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15. XOY-plane divides the join of (x , y , z) and (- y , - z , - x) in the ratio_

A. $x : z$

B. $z : x$

C. $y : z$

D. $y : x$

Answer: B

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16. The coordinates of the vertices of a triangle are (4 , 6 , 0) ,(0 , - 3 , 7) and (- 4 , 0 , -1) , then the coordinates of the centroid of the triangle are _

A. $(0, 1, 2)$

B. $(-1, 1, 2)$

C. $(0, 2, 1)$

D. none of these

Answer: A

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17. The equation of yz-plane is _

A. $y + z = 0$

B. $yz = 0$

C. $y = 0$

D. $x = 0$

Answer: D

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18. The equation of a plane parallel to xy - plane is _

A. $xy = a$

B. $x + y = a$

C. $z = c$

D. none of these

Answer: C

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Very Short Answer Type Questions

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

(3 , 4 , - 5)

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2. Find the octants in which the following points lie :

(- 2 , 1 , 5)

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3. Find the octants in which the following points lie :

(- 5 , - 3 , 4)

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4. Find the octants in which the following points lie :

(1 , - 3 , 2)

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5. Find the octants in which the following points lie :

(2 , 2 , 2)

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6. Find the octants in which the following points lie :

(- 3 , - 3 , -2)

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7. Find the octants in which the following points lie :

(- 2 , - 3 , 1)

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8. Find the octants in which the following points lie :

(2 , - 1 , - 2)

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9. Find the octants in which the following points lie :

(- 3 , 2 , - 1)

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10. Let P (x , y , z) be any point in three-dimensional space, state the signs of x , y and zif P lies on octant

OX ' YZ '

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11. Let P (x , y , z) be any point in three-dimensional space, state the signs of x , y and zif P lies on octant

OX ' Y ' Z

Watch Video Solution

12. Let P (x , y , z) be any point in three-dimensional space, state the signs of x , y and zif P lies on octant

OX ' YZ

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13. Let P (x , y , z) be any point in three-dimensional space, state the signs of x , y and z if P lies on octant

OXYZ

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14. Let P (x , y , z) be any point in three-dimensional space, state the signs of x , y and

zif P lies on octant

OXY ' Z '

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15. Let P (x , y , z) be any point in three-dimensional space, state the signs of x , y and z if P lies on octant

OX ' Y ' Z '

Watch Video Solution

16. Let P (x , y , z) be any point in three-dimensional space, state the signs of x , y and zif P lies on octant

OXYZ'

Watch Video Solution

17. Let P (x , y , z) be any point in three-dimensional space, state the signs of x , y and zif P lies on octant

OXY ' Z

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18. Where do the following points lie ?

(3 , 0 , 0)

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19. Where do the following points lie ?

(0 , - 2 , - 3)

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20. Where do the following points lie ?

(2 , 1 , 0)

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21. Where do the following points lie ?

(0 , - 4 , 0)

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22. Where do the following points lie ?

(3 , 0 , 4)

Watch Video Solution

23. Where do the following points lie ?

(0 , 0 , - 5)

Watch Video Solution

24. Where do the following points lie ?

(- 4 , 0 , 0)

Watch Video Solution

25. Where do the following points lie ?

(0 , 0 , 6)

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26. Find the distance of the point (- 6 , 2 , - 3) from the origin. State the coordinates of the points with same numerical values of x , y and z-coordinates.

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27. Find the distance between the points

$(-1, 2, 4), (-1, -1, -2)$.

28. Find the distance between the points

$(-4, 3, 7)$ and $(-1, -2, 3)$

29. Find the perpendicular distance of the point $(1, -2, -3)$ from the coordinates axes .

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30. Prove that the triangle formed by joining the points

$(2, 3, 4), (3, 4, 2), (4, 2, 3)$ is an equilateral triangle.

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31. Prove that the triangle formed by joining the points

(2 , 3 , - 1) , (4 , 5 , 0) , (2 , 6 , 2) is and isosceles triangle .

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32. Prove that the triangle formed by joining the points

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

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33. Prove that the triangle formed by joining the points

(1 , - 3, 1) , (0 , 1 , 2) , (2 , - 1, 3) is a right angled triangle.

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34. Prove that the points (4 , 7 , - 6) , (2 , 5 , -4) and (1 , 4 , - 3) are collinear .

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35. Find the coordiantes of the point in the xy-plane which is equiistant from the points A (0 , 0 , 1) , B (2 , 0 , 3) and C (0 , 3 , 2) .

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36. If the distance between the points (x , - 1 , 2) and (- 4 , 1 , 5) is 7 unit , then find the value of x .

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37. Show that the points A (3 , 2 , -4) , B (5 , 4 , -6) and C (9 , 8 , -10) are collinear. Also find the ratio in which C divides the line-segment $\overline{AB}$.

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38. Find the coordinates of the points on y - axis which are at a distance $\sqrt{41}$ unit from the point (3 , 2 , -4) .

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39. Find the coordinates of the point in xy-plane which is equidistant from the points (1 , - 2 , - 3) , (3 , 0 , 3) and (0 , - 2 , -4) .

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40. Find the coordinates of points on z-axis which are at a distance of 7 unit from the point (- 3 , - 2 , 2) .

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41. Determined the equation to the locus of the point which is equidistant from the points (2 , - 2 , - 4) and (- 3 , 1 , 2) .

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42. Find the coordinates of the point which is equidistant from the points (0 , 0 ,0) , (6 , 0 ,0) , (0 , - 4 , 0) and (0 , 0 , -2) .

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43. Find the equation to the locus of the point whose distance from the point (- 2 , -3, 2) is 6 unit .

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44. Find the perimeter of the triangle whose vertices are (0 , 1 , 2) , (2 , 0 , 4) and (- 4 , - 2 , 7) .

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45. Find the images of the point (3 , -4 , 6) with respect to

yz-plane

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46. Find the images of the point (3, - 4 , 6) with respect to

zx-plane

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47. Find the images of the point (3, - 4 , 6) with respect to

xy - plane

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48. Prove that the points (4 , 7 , 6) , (2 , 3 , 2) , (- 1, -2, -1) and (1, 2 , 3) taken in order are the vertices of a parallelogram . Is the the parallelogram a rectangle?

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49. Three consecutive vertices of a parallelogram are (1 , 2, - 4) , (-1 , 1, 2) , (1 , - 2 , 8) , find the coordinates of fourth vertex .

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50. Two vertices of the parallelogram ABCD are A(8 , 14 , 12) and B(4 , 6 , 4) and its diagonals intersect at (3 , 5 , 5) , find the coorinates of vertices C and D .

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51. If $(x_1, y_1, z_1), (x_2, y_2, z_2), (x_3, y_3, z_3)$ and (x_4, y_4, z_4) be the consecutive vertices of a parallelogram, show that $x_1 + x_3 = x_2 + x_4, y_1 + y_3 = y_2 + y_4$ and $z_1 + z_3 = z_2 + z_4$.

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52. Determine the coordinates of the point which is equiistant from the points (0 , 0 0) , (a , 0 ,0) and (0 , b , 0) and (0 , 0 , c) .

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53. Find the distance of the point (2 , 4 , 3) from the x-axis and from the XOY plane .

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54. Find the equation to the locus of a point the sum of the squares of whose distances from the points (0 , - 4 , 3) and (0 , 4 , - 3) is equal to 60 unit .

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55. Prove that the four points (1 , 1 , 1) , (-2 , 4 , 1) , (-1 , 5 , 5) and (2 , 2, 5) are the vertices of a square.

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56. Prove that the points (2 , 3, 5) , (- 4 , 7 , - 7) , (- 2 , 1 , -10) and (4 , - 3 , 2) are the vertices of a rectangle .

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57. Show that the points (0 ,0,0) , (- 2 , 0, 0) , (0 , 2 , 0) and (0 , 0 , 4) lie on a sphere whose centre is (- 1, 1, 2).

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58. Find the coordinates of the points of trisection of the line-segment joining the points (2 , 1 , - 3) and (5 , - 8 , 3) that is nearer to (2 , 1 , -3) .

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

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60. The coordinates of the points A , B , C and D are (1 , 1 , 1) , (-2 , 4 , 1) , (- 1 , 5 , 5) and (2 , 2 , 5) , prove that ABCD is a square .

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Short Answer Type Questions

1. Find the coordinates of the point which divides the join of (2 , - 3 , 5) and (3 , - 2 , 4) in the ratio 3 : 4

internally

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2. Find the coordinates of the point which divides the join of (2 , - 3 , 5) and (3 , - 2 , 4) in the ratio 3 : 4

externally

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3. The straight line joining the points (3 , 4 , 3) and (2 , 1 , 5) intersects the plane 2 x + 2y - 2z = 1 at P , find the coordinates of P .

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4. Find the ratios in which the line-segment joining the points (4 , 3 , 2) and (1 , 2 , -3) is divided by the coordinate planes .

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5. If a line is perpendicular to z-axis and makes an angle 40° with y-axis then find the angle it makes with x - axis .

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6. The coordinates of the mid-points of the sides of a triangle are (3 , - 1 , -1) , (1 , 3 , - 4) and (0 , 1 , - 2) , find the coordinates of the vertices .

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7. Find the ratio in which the line segment joining A (2 , 4 , 5) and B (3 , 5 , 4) divided by the yz - plane .

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8. Let A (2 , - 4 , - 3) and B (- 4 , 2 , 3) be two given points if the points C and D trisect the line-segment $\overline{AB}$, then find the coordinates of C and D .

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9. Find the coordinates of the point in zx-plane which is equidistant from the points (- 1 , 1 , 2) , (1 , - 3 , - 8) and (- 3 , 3 , - 2) .

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10. Find the coordinates of the points on z-axis which are at a distance $\sqrt{29}$ unit from the point (2 , - 3 , - 1) .

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11. A (1 , 3 , 0) , B (2 , 2 , 1) and C (5 , - 1 , 4) are the vertices of the triangle ABC , if the bisector of $\angle BAC$ meets its side $\overline{BC}$ at D , then find the coordinates of D .

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12. IF the z-coordinates of a point C on the line - segment joining the points A(2 , 2 , 1) and B (5 , 1 , - 2) is -10 , then find the x - coordinate of C .

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13. If A (1 , y , z) lies on the line through the points b (3 , 2 , - 1) and c (- 4 , 6 , 3) , then find the values of y and z .

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14. Find the coordinates of the centriod of the triangle whose vertices are $(a_1, b_1, c_1), (a_2, b_2, c_2)$ and (a_3, b_3, c_3).

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15. Using section formula, show that the points A (3 , 2 , -4) , b (5 , 4 , -6) and C (9 , 8 ,

-10) are collinear . Also find the ratio in which the point B divides the line-segment $\overline{AC}$.

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16. The line-segment joining the points A (1 , 2 , 3) and b (- 3 , 4 , -5) intersects the xy- plane at P , find the value of $\overline{AP}:\overline{PB}$.

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17. Prove that the xy-plane divides the line-segment joining the points A(2 , 1 , 3) and B (1, - 3, -4) in the ratio 3 : 4 at the point $\left(\frac{11}{7}, -\frac{5}{7}, 0\right)$

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18. If (- 4 , 7 , 5) , (2 , - 6 , - 3) and (8 , 2 , - 5) are the coordinates of the mid-points of the sides of a triangle, then find the coordinates of the centroid of the triangle.

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19. Find the consine of the angle B of the triangle formed by joining the points A(6 , 11, 2) , B (1 , - 1, 2) and C (1 , 2, 6) .

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20. If the point C(x , y , -14) lies on the line-segment $\overline{AB}$ produced where the coordinates of A and B are (2 , - 3 , 4) and (3 , 1 , -2) respectively , then find te values of x and y .

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21. Prove that the plane ax + by + cz + d = 0 divides the line-segment joining the points (x_1, y_1, z_1) and (x_2, y_2, z_2) in the ratio $-\frac{ax_1 + by_1 + cz_1 + d}{ax_2 + by_2 + cz_2 + d}$

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22. The coordinates of the centroid of the triangle ABC are (1 , 1, 1) , if the coordinates of

B and C are (1 , 1, 2) and (-1 , 7 , -6) respectively , then find the coordiantes of the vertex A .

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23. The coordinates of the vertex A of the triangle ABC are (- 3 , -4, -2) , if the coordinates of its centroid are (1 , - 2 , 2) , then find the coordinates of the mid - point of the side $\overline{BC}$

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24. Using section formula show tht the points A (9 , 8 , -10) , B (3 , 2 , -4) and C (5 , 4 , -6) are collinear .

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25. The coordinates of the centroid of the triangle formed by joining the points (x , -1, -2) , (- 2 , y , 8) and (2 , - 4 , z) are (1 , 0 , 30 , find the values of x , y and z .

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26. Prove that the plane ax - by + cz + d = 0 divides the line-segment joining the points $A(x_1, y_1, z_1)$ and $B(x_2, y_2, z_2)$ in the ratio $-\frac{ax_1 + by_1 + cz_1 + d}{ax_2 = by_2 + cz_2 + d}$.

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Sample Questions For Competitive Exams A M C Q

1. If OABC be a regular tetrahedron such that $OA^2 + BC^2 = OB^2 + CA^2 = OC^2 + AB^2$ then _

A. OA is perpendicular on BC

B. OB is perpendicular on CA

C. OC is perpendicular on AB

D. AB is perpendicular on BC

Answer: A::B::C

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2. The ratio in which the line segment joining the points (1 , - 2 , 3) and (4 , 2 , - 1) is divided by the XOY plane is _

A. $1:3$

B. $3:1$

C. line segment is bisected by the plane

D. $4:1$

Answer: B::C

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3. If $A(2, \beta, 3), B(\alpha, -5, 1)$ and C(- 1 , 11 , 9) are coolinear then which of the following is/are ture?

A. $\alpha = 3$

B. $\beta = 3$

C. $\alpha = -1$

D. $\beta = -1$

Answer: A::D

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4. E is the mid point of side OB of triangle OAB . D is a point on AB such that AD : DB = 2 : 1 . If OD and AE intersect at P , then -

A. $OP : PD = 3 : 2$

B. $OP : PD = 2 : 5$

C. P intersects OD internally

D. P intersects OD externally

Answer: A::C

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5. P divides the line segment joining the points A(1 , 2 , 5) and B(6 , 7 , -5) in ratio 2 : 3 . If Q be the mid point of line segment AB then the coordinates of P and Q will be _

A. $(3, 4, 9)$

B. $\left(\frac{7}{2}, \frac{9}{2}, 0\right)$

C. $\left(\frac{7}{2}, \frac{9}{2}, 1\right)$

D. $(3, 4, 0)$

Answer: A::B

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Sample Questions For Competitive Exams B Integer Answer Type

1. The coordinates of the vertices of a regular tetrahedred are (3 , 2 , 3) , (0 , 3 , 4) , (6 , 1 , 4) and (6 , 3 , 2) , the area (sq. units) of the tetrahedron is _

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2. $(-1, \lambda, -3)$ is the coordinate of centroid of the triangle formed by the points $(3, 2, -5), (-3, 8, -5)$ and $(-3, 2, 1)$. Then the value of λ is

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3. The least distance of the point (2 soin t , 2 cos t , 3t) from the origin is _

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4. If the projection of a triangle formed by the points A(- 1 , 1, 1) , B(1 , - 1 , -1) and C(1 , 1 , -1) on the xy plane then the area of projected triangle on xy plane is _

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5. The z-coordinate of a point equidistant from the points (0 , 0 ,0) , (2 , 0 , 0) , (0 , 4 , 0) and (0 , 0, 6) is _

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Sample Questions For Competitive Exams C Matrix Match Type

1. The point (3,7,5) lies on which octant ?

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2. The point (-2,-6,7) lies on which octant ?

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Sample Questions For Competitive Exams D Comprehension Type

1. The point (2,3,4) lies on octant

A. OXYZ'

B. OXY'Z

C. OXYZ

D. OX'Y'Z

Answer: C

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2. The point (- 1 , - 4 , -3) lies on octant

A. OXY'Z

B. OX'YZ

C. OX'Y'Z

D. OX'Y'Z'

Answer:

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3. The point (2 , -1,5) lies on octant

A. OXYZ'

B. OXYZ

C. OXY'Z

D. OX'YZ

Answer: C

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4. The point (- 3 , - 4, - 5) lies on octant

A. OXYZ'

B. OX'YZ'

C. OX'YZ

D. OX'Y'Z'

Answer: D

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