MATHS

BOOKS - KUMAR PRAKASHAN KENDRA

MATHS (GUJRATI ENGLISH)

INTRODUCTION TO THREE DIMENSIONAL GEOMETRY

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 XZ-plane. What can you say about its y coordinate ?

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3. 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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4. The X-axis and Y-axis taken together determine a plane known as ____

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5. The coordinates of points in the XY-plane are of the form _____

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6. Coordinate planes divide the space into _____ octants.

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Exercise 12 2

1. Find distance between following pair of points :

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

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2. Find distance between following pair of points :

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

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3. Find distance between following pair of points :

(-1, 3, -4) and (1, -3, 4)

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4. Find distance between following pair of points :

(2, -1, 3) and (-2, 1, 3)

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

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6. Verify the following :

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

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7. Verify the following :

(0, 7, 10), (-1, 6, 6) and (-4, 9, 6) are the vertices of a right angled triangle.

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8. Verify the following :

(-1, 2, 1), (1, -2, 5), (4, -7, 8) and (2, -3, 4) are the vertices of a parallelogram.

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

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Exercise 12 3

1. Find the coordinates of the point which divides the line segment joining the points (-2, 3, 5) and (1, -4, 6) in the ratio (i) 2 : 3 internally, (ii) 2 : 3 externally.

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2. 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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3. 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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4. Using section formula, show that the points A(2, -3, 4), B(-1, 2, 1) and $C\left(0, \frac{1}{3}, 2\right)$ are collinear.

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5. 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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Miscellaneous Exercise 12

1. 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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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. 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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4. Find the co-ordinates 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. A point R with x-coordinate 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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6. 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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Textbook Based Mcqs

1. In _____ ratio YZ plane divides line segment joining points (2, 4, 5) and (3, 5, -9).

A. $2:3$

B. $3:2$

C. $-2:3$

D. $4:\ -3$

Answer: C

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2. In _____ ratio XY plane divides line segment joining points (a, b, c) and (-a, -c, -b).

A. $a:b$

B. $b:c$

C. $c:a$

D. $c:b$

Answer: D

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3. If P(0, 1, 2), Q(4, -2, 1) and O(0, 0, 0) are distinct points the $m\angle POQ$ = _____.

A. $\frac{\pi}{6}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{2}$

Answer: D

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4. End points of the diagonal of square are (1, -2, 3) and (2, -3, 5). Then lengh of its side is _____

A. $\sqrt{6}$

B. $\sqrt{3}$

C. $\sqrt{5}$

D. $\sqrt{7}$

Answer: B

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5. Points

$(5, -4, 2), (4, -3, 1), (7, 6, 4)$ and $(8, 7, 5)$

represents _____ in plane.

A. Rectangle

B. Square

C. Parallelogram

D. None of these

Answer: A

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6. In R^3 plane equation $x^2 - 5x + 6 = 0$ represents _____ .

A. Points

B. Planes

C. Curves

D. Family of lines

Answer: B

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7. Radius of the sphere is _____ if its end points of diameter are (3, 4, -1) and (-1, 2, 3).

A. 2

B. 3

C. 6

D. 7

Answer: B

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8. In ____ ratio XOZ plane divides line segment joining (2, 3, 1) and (6, 7, 1).

A. $3:7$

B. $2:7$

C. $-3:7$

D. $-2:7$

Answer: C

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9. Centroid of the triangle with verticies P(1, -2, 1), Q(2, 3, -1) and R(1, -1, -1) is _____ .

A. (1, 2, 1)

B. $\left(\frac{4}{3}, 0, -\frac{1}{3}\right)$

C. $\left(\frac{3}{2}, \frac{1}{2}, 0\right)$

D. $\left(-\frac{4}{3}, -\frac{4}{3}, -\frac{1}{3}\right)$

Answer: B

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10. The centroid of the triangle with verticies A(1, 1, 1), B(2, 1, 2) and C(x, y, z) is O(0, 0, 0) then (x, y, z) = _____ .

A. (3, 2, 3)

B. (0, 0, 0)

C. (-3, -2, -3)

D. (1, -1, 1)

Answer: C

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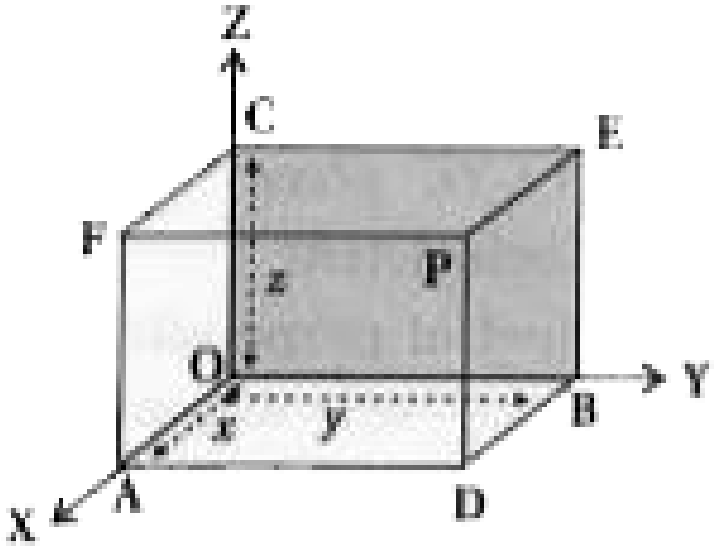
Textbook Illustrations For Practice Work

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



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2. Find the octant in which the point (-3, 1, 2) and (-3, 1, -2) lie.

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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 P(-2, 3, 5), Q(1, 2, 3) and R(7, 0, -1) are collinear.

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5. Are the points A(3, 6, 9), Q(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, -2, 3) and (3, 4, -5) in the ratio 2 : 3 (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. 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 ABCD but it is not a rectangle

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

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13. 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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Solution Of Ncert Exemplar Problems Short Answer Type Questions

1. Locate the following points :

(i) (1, -1, 3)

(ii) (-1, 2, 4)

(iii) (-2, -4, -7)

(iv) (-4, 2, -5)

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2. Name the octant in which each of 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) (-3, -1, 6)

(vii) (2, -4, -7)

(viii) (-4, 2, -5)

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3. Let A, B, C be the feet of perpendiculars from a point P on the X, Y, Z - axis respectively. Find the coordinates of A, B and C in each of the following where the point P is :

(i) P(3, 4, 2)

(ii) P(-5, 3, 7)

(iii) P(4, -3, -5)

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4. Let A, B, C be the feet of perpendiculars from a point P on the X, Y, Z - axis respectively. Find the coordinates of A, B and C in each of the following where the point P is :

(i) P(3, 4, 2)

(ii) P(-5, 3, 7)

(iii) P(4, -3, -5)

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5. How far apart are the points (2, 0, 0) and (-3, 0, 0) ?

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6. Find the distance from the origin to A(6, 6, 7).

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

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8. Show that the point A(1, -1, 3), B(2, -4, 5) and C(5, -13, 11) are collinear.

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9. 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 vertex.

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10. Show that the triangle ABC with vertices A(0, 4, 1), B(2, 3, -1) and C(4, 5, 0) is right angled.

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11. Find the centroid of the triangle whose vertices are (3, -5), (-7, 4) and (10, -2).

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12. Find the centroid of a triangle, the mid-point of whose sides are D(1, 2, -3), E(3, 0, 1) and F(-1, 1, -4).

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13. The mid-points of the sides of a triangle are (5, 7, 11), (0, 8, 5) and (2, 3, -1). Find its vertices.

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14. 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 vertex.

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15. Find the coordinate of the points which trisect the line segment joining the points A(2, 1, -3) and B(5, -8, 3).

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16. If the origin is the centroid of a triangle ABC having vertices A(a, 1, 3), B(-2, b, -5) and C(4, 7, c), Find the values of a, b, c.

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17. If A(2, 2, -3), B(5, 6, 9) and C(2, 7, 9) be the vertices of a triangle. The internal bisector of the angle A meets BC at the point D. Find the coordinates of D.

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Solution Of Ncert Exemplar Problems Long Answer Type Questions

1. Show that the three points A(2, 3, 4), B(-1, 2, -3) and C(-4, 1, -10) are collinear and find the

ratio in which C divides $\overline{AB}$.

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2. 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 centriod of the triangle.

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3. Prove that the points (0, -1, -7), (2, 1, -9) and (6, 5, -13) are collinear. Find the ratio in which

the first point divides the join of the other two.

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

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Solution Of Ncert Exemplar Problems Objective Type Questions

1. The distance of point P(3, 4, 5) from the YZ-plane is ____ .

A. 3 unit

B. 4 unit

C. 5 unit

D. 5.50 unit

Answer: A

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2. What is the length of foot of perpendicular drawn from the point P(3, 4, 5) on Y-axis ?

A. $\sqrt{41}$

B. $\sqrt{34}$

C. 5

D. None of these

Answer: B

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3. Distance of the point (3, 4, 5) from the origin (0, 0, 0) is

A. $\sqrt{50}$

B. 3

C. 4

D. 5

Answer: A

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4. If the distance between the points (a, 0, 1) and (0, 1, 2) is $\sqrt{27}$, then the value of a is _____ .

A. 5

B. ± 5

C. ± 3

D. None of these

Answer: B

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5. X-axis is the intersection of two planes ____

A. XY and XZ

B. YZ and ZX

C. XY and YZ

D. None of these

Answer: A

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6. Equation of Y-axis is considered as _____

A. $x = 0$ and $y = 0$

B. $y = 0$ and $z = 0$

C. $x = 0$ and $z = 0$

D. None of these

Answer: C

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7. The point (-2, -3, -4) lies in the _____

A. First octant

B. Seventh octant

C. Second octant

D. Eighth octant

Answer: B

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8. A plane is parallel to YZ-plane so it is perpendicular to

A. X-axis

B. Y-axis

C. Z-axis

D. None of these

Answer: A

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9. The locus of a point for which y = 0, z = 0 is

_____

A. Equation of X-axis

B. Equation of Y-axis

C. Equation at Z-axis

D. None of these

Answer: A

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10. The locus of a point for which x = 0 is ____ .

A. XY-plane

B. YZ-plane

C. ZX-plane

D. None of these

Answer: B

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11. If a parallelopiped is formed by planes drawn through the points (5, 8, 10) and (3, 6, 8) parallel to the coordinate planes, then the length of diagonal of the parallelopiped is ____ .

A. $2\sqrt{3}$

B. $3\sqrt{2}$

C. $\sqrt{2}$

D. $\sqrt{3}$

Answer: A

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12. L is the foot of the perpendicular drawn from a point P(3, 4, 5) on the XY-plane. The coordinates of point L are ____ .

A. (3, 0, 0)

B. (0, 4, 5)

C. (3, 0, 5)

D. None of these

Answer: D

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13. L is the foot of the perpendicular drawn from a point (3, 4, 5) on X-axis. The coordinates of L are ____ .

A. (3, 0, 0)

B. (0, 4, 0)

C. (0, 0, 5)

D. None of these

Answer: A

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Solution Of Ncert Exemplar Problems Fillers

1. The three axes $\overleftrightarrow{OX}, \overleftrightarrow{OY}, \overleftrightarrow{OZ}$ determine _____ .

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2. The three planes determine a rectangular parallelopiped which has _____ of rectangular

faces.

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3. The coordinates of a point are the perpendicular distance from the ____ on the respectives axes.

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4. The three coordinate planes divide the space into ____ parts.

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5. If a point P lies in YZ - plane, then the coordinates of a point on YZ-plane is of the form _____ .

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6. The equation of YZ-plane is _____ .

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7. If the point P lies on Z-axis, then coordinates of P are of the form _____ .

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8. The equation of Z-axis, are _____

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9. A line is parallel to XY-plane if all the points on the line have equal _____ .

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10. A line is parallel to X-axis if all the points on the line have equal _____ .

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11. x = a represent a plane parallel to _____ .

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12. The plane parallel to YZ-plane is perpendicular to _____ .

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13. The length of the longest piece of a string that can be stretched straight in a rectangular room whose dimensions are 10, 13 and 8 units are _____ .

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14. If the distance between the points (a, 2, 1) and (1, -1, 1) is 5, then a ____ .

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15. If the mid-points of the sides of a triangle AB, BC, CA are D(1, 2, -3), E(3, 0, 1) and F(-1, 1, -4), then the centriod of the triangle ABC is ____ .

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16. Match each item given under the column - I to its correct answer given under Column-II.

	Column - I		Column - II
(i)	In XY -plane	(a)	First octant
(ii)	Point (2, 3, 4) lies in the	(b)	YZ -plane
(iii)	Locus of the points having x coordinate 0 is	(c)	z coordinate is zero
(iv)	A line is parallel to X -axis if and only	(d)	Z -axis
(v)	If $x = 0$, $y = 0$ taken together will represent the	(e)	plane parallel to XY -plane
(vi)	$z = c$ represent the plane	(f)	if all the points on the line have equal y and z coordinates.
(vii)	Planes $x = a$, $y = b$ represent the line	(g)	from the point on the respective
(viii)	Coordinates of a point are the distances from the origin to the feet of perpendiculars	(h)	parallel to Z -axis.
(ix)	A ball is the solid region in the space enclosed by a	(i)	disc
(x)	Region in the plane enclosed by a circle is known as a	(j)	sphere

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Practice Work

1. Points (-3, 1, 2), (3, -1, 2) and (-3, 1, -2) are in which octants ?

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2. A, B and C are foot of perpendicular from point P(-5, 3, 7) on XY, YZ, ZX planes. Then write coordinates of the point A, B and C.

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3. Give the coordinate of point A, B and C if it denotes the perpendiculars from point P (3, 4, 5) on X, Y and Z.

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4. A variable plane makes with the co-ordinates plane, tetrahedron of contant volume $64k^3$ Then the locus of the centroid of tetrahedron is the surface.

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5. If the distance between the points (x, -8, 4) and (3, -5, 4) is 5 unit find x.

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

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

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8. Find distance of the point (3, 4, 5) from Y-axis.

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9. Find coordinates of the point which of the equidistance from O(0, 0, 0), A(l, 0, 0), B(0, m,

0) and C(0, 0, n).

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10. Find co-ordinates of the point which divides line segment joining points (2, -1, 4) and (4, 3, 2) in ratio 2 : 3 Internally.

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11. Find co-ordinates of the point which divides line segement joining points (2, -1, 4) and (4, 3,

2) in ratio 2 : 3.

Externally

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12. In which ratio XY plane divides line segment joining points (2, 4, -3) and (-3, 5, 4).

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13. Show that the points P(-2, 3, 5), Q(1, 2, 3) and R(7, 0, -1) are collinear.

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14. Find the centroid of a triangle, the mid-point of whose sides are D(1, 2, -3), E(3, 0, 1) and F(-1, 1, -4).

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15. A(3, 2, -4), B(9, 8, -10) and C(5, 4, -6) are given points. In which ratio point C divides $\overline{AB}$?

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16. In which ratio the plane x + y + z = 5 divides line segment joining points (2, -1, 3) and (-1, 2, 1) ?

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17. A(1, 2, 3), B(0, 4, 1) and C(-1, -1, -3) are verticies of ΔABC. Find point on $\overline{BC}$ at which bisector of $\angle BAC$ intersects.

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18. Mid points of sides at ΔABC are (-2, 3, 5), (4, -1, 7) and (6, 5, 3). Then find coordinates of the verticies A, B and C.

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Question Of Module Knowledge Test

1. Point P(0, 3, 5) and Q(1, 3, 0) are in which planes ?

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2. Following points lies in which octants ?

$(-2, 1, 3), (-3, -4, 0), (1, -2, 3)$

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3. Find point of Z-axis of the distance $\sqrt{14}$ from point (-2, 1, 3).

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4. Points (4, 7, 8), (2, 3, 4), (-1, -2, -1) and (1, 2, 3) represents which quadrilateral ?

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5. Find locus of the point which lies on X-axis and at the equidistance from points A(2, 3, 4) and B(-1, 5, 3).

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6. Find distance from point P(2, -4, 5) to XZ plane.

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7. Obtain the coordinates of point which devides $\overline{AB}$ joining points A(1, 2, 1) and B(2, 1, -3) in ratio -1 : 2 from A.

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8. In R^3 equation $x^2 + y^2 = 0$ represents ____ .

A. XY plane

B. X-axis

C. Y-axis

D. Z-axis

Answer:

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9. Find the point of Z-axis at the distance $2\sqrt{3}$ from point P(3, -2, 5).

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10. P is the point on line segment AB joining A(3, 4, -5) and B(-2, 1, 4). If y co-ordinate of P is 2 then find z co-ordinate.

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11. The point which divides $\overline{AB}$ joining A(-1, 3, 5) and B(k, 2, 5) in ratio 2 : 1 is on line x = 2. Find value of k.

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12. A (1, -1, -3), B(2, 1, -2) and C(-5, 2, -6) are the verticies of ΔABC. Find co-ordinates of point D, if bisector of $\angle A$ intersects $\overline{BC}$ at point D.

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