



MATHS

BOOKS - KC SINHA MATHS (HINGLISH)

INTRODCTION TO 3D GEOMETRY

Solved Examples

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

(3,-1,-2)

2. Name the octants in which the following points lie : (-3,-1,-2)



4. The coordinates of a point asre e(-5, -3, 2). Write down the coordinates of seven points whose absolute values are the same as those of the coordinates of the given point.

5. Let A,B,C be the feet of perpendiculars drawn from a point

P to x, y aned z-axses respectively. Find the coordinates of

A,B,C if coordinates of P are: (3,1,2)

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6. Let A,B,C be the feet of perpendiculars drawn from a point

P to x, y aned z-axses respectively. Find the coordinates of

A,B,C if coordinates of P are: (3,-6,2)



7. In the adoining figure if the coordinates of point P are

(a, b, c) write the coordinates of A,B,C,D,E and F.



the positive direction of x-axis and lies in the XY plane find

the coordinates of P.



10. Find the reflection of the point (α, β, γ) in the XY-plane,

YZ-plane and ZX plane.



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

13. A cube of side 3 units has one vertex at point (1,1,1) and the three edges from this vertex are respectively parallel to positive x-axis and negative y and z-axes. Find the coordinates of other vertices of the cube.



15. Find the value of a if the distance between points P(a, -8, 4) and Q(-3, -5, 4) is 5.

16. Show that the points (0, 7, 10), (-1, 6, 6) and (-4, 9, 6) form a right angled isosceles triangle.

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17. Show by using distane formula that the points (4,5,-5),

(0,-11,3) and (2,-3,-1)` are collinear.



18. Show
 that
 the
 coplanar
 points

 (0, 4, 1), (2, 3, -1), (4, 5, 0) and 92, 6, 2) are the vertices



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

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20. Find the locus of a pont which mioves such that the sum

of the of its distances from points $A(0, 0 - \alpha)$ and $B(0, 0, \alpha)$ is constant.

21. Find the coordinates of a point which divides the join of

points (3,3,7) and (8,3,2)` internally in the ratio 2:3.





23. Find the ponts of trisectioin of the line segment joinint

the points (2, -2, 7) and (5, 1, -5)



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

collinear. Also find the ratio in which C divides AB.

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25. Determine the values of a and b so thast the points (a, b, 3), (2, 0, 1) and (1, -1, -3) are colinear.

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26. The vertices of a triangle are A(5, 4, 6), B(1, -1, 3) and (4, 3, 2). The internal bisector of $\angle BAC$ meets BC in D. Find AD.





28. Find the ratio in which the line joining the points (4, 4, -10) and (-2, 2, 4) is divided by the XY-plane.



29. If the points P,Q,R,S are (4,7,8),(-1,-2,1),(2,3,4) and (1,2,5)` respectively show that PQ and RS intersect. Also find the point of intersection.

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30. Find the coordinates of the centroid of a triangle having

vertices $P(x_1, y_1, z_1), Q(x_2, y_2, z_2)$ and $R(x_3, y_3, z_3)$

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31. Prove that the medians of a triangle are concurrent and

find the position vector of the point of concurrency (that is,

the centroid of the triangle)



32. Two vertices of a triangle are A(3, 4, 2) and B(1, 3, 2). The medians of the triangle intersect at (2,4,3). Find the remaining vertex C of the triangle.

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33. The mid points of the sides of a triangles are `(1,5,-1),

(0,4,-2) and (2,3,4). Find its vertices.





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

5. Name the octants in which the points lie: (-3, -1, 2)





12. Name the octants in which the points lie: (-4, 2, -5)



15. A point lies on the x-axis. Find its y and z-cordinates

16. Let P(2, 4, 5) be a point and F be the foot of perpendicular drawn from P to Xz-plane. Find the coordinates of F.

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17. The coordinates of as point P are (1,2,3). Find the coordinates fothe seven pints such that the absolute vaues of their coordinates are the same as those of coordinates of

P.

18. 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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19. Find the image of the point in the specified plane: (0, 0, -4) in xy-plane.

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20. Find the image of the point in the specified plane:

(-3,4,7) in YZ-plane.



21. Find the image of the point in the specified plane: (5, 4, -3) in xy-plane.

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22. Find the image of the point in the specified plane: (-7, 2, -1) in zx-plane.

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23. Find the image of the point in the specified plane: (-4, 0, 1) in zx-plane.

24. Find the image of the point in the specified plane: (-2, 0, 0) in xy-plane.



25. Let A,B,C be the feet of perpendicular drawn from a point

P to x,y and z-axes respectively. Find the coordinates of A,B,C

if coordinates of P are : (4, -3, -7)

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26. Let A,B,C be the feet of perpendicular drawn from a point

P to x,y and z-axes respectively. Find the coordinates of A,B,C

if coordinates of P are : (3, 4, 2)





27. Let A,B,C be the feet of perpendicular drawn from a point P to x,y and z-axes respectively. Find the coordinates of A,B,C

if coordinates of P are $:(3,\ -5,1)$



28. Let A,B,C be the feet of perpendicular drawn from a point

P to x,y and z-axes respectively. Find the coordinates of A,B,C

if coordinates of P are : (4, -2, -6)



29. Find the length of perpendicular from point (1, -2, -5) to the coordinate planes.



30. Find the distance of point $(\,-1,\,-3,\,4)$ from x,y and z-

axes.

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31. Planes are drawn through points (1, -3, 4) and (4, 7, -2) parallel to coordinate planes. Find the lengths of the edges of the rectangular parallelopiped so formed.



32. Planes are drawn parallel to the coordinates planes through the points (3, 0, -1) and (-2, 5, 4). Find the lengths of the edges of the parallelopiped so formed.



33. A rectangular parallelopiped is formed by drawing planes through the points (1, 2, 5) and (-1, -1, -1) parallel to the coordinate planes. Find the length of the diagnol of the parallelopiped.



34. Find the distance of the following pair of point: (1, -3, 4), (-4, 1, 2)

35. Find the distance of the following pair of point: (-1, 3, -4), (1, -3, 4)

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36. Find the distance of the following pair of point: (2, 3, 4), (-1, 2, 3)

37. Find the distance of the following pair of point: (2, 3, 5), (4, 3, 1)



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39. Find the distance of the following pair of point: (2, -1, 3), (-2, -1, 3)



41. find the coordinates of the points on y-axis which are at a distance of $5\sqrt{2}$ form the point P(3, -2, 5).

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

43. Prove that the points (5, 3, 2), (3, 2, 5) and (2, 5, 3) are

the vertices of an equilateral triangle.





48. Examine whether following points are collinear or not

$$(3,\ -2,4),\,(1,0,\ -2),\,(\ -1,2,\ -8)$$

49. Examine whether following points are collinear or not

$$(-3, 7, -2)(2, 4, -1)$$
 and $(12, -2, -7)$

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51. 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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53. Find the radius of the sphere through the points (0, 5, 0), (4, 3, 0), (4, 0, 3) and (0, 4, 3)

54. Find the distance a from orign of the foot of perpendicular of point (a, b, c) on xy-plane.





are the vertices of a rhombus.



57. Show that the coplanar points (1, 5, 2), (3, 4, 0), (5, 6, 1) and (3, 7, 3) are the vertices of a square.



58. Examine whether the coplanar points (-2,6,-2),(0,4,-1),

(-2,3,1) and (-4,5,0)` are the vertices of a square.



59. Find the point on y-axis which is equidistant from the ponts (5, 5, 2) and (3, 1, 2).



points (0, 0, 0), (2, 0, 0), (0, 4, 0) and (0, 0, 6)



61. 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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62. Using distance formula, calculate the cosine of ngle A of

the

vertices



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63. Find the locus of a point which moves so that its distances from the points (3, 4, -5) and (-2, 1, 4) are equal.

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

65. If P(-2, 2, 3) and Q(13, -3, 13) are two points. Find

the locus of point R which moves such that 3PR=2QR



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67. Find the equation of the set of points P which moves so

that its distances from the points A(3, 4, -5) and B(-2, 1, 4) are equal.



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

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69. If A(3, 1, -2) and B(1, -3, -1) be two points find

the coordinates coordinates of the point which divides the line segment AB. Internally in the ratio 1:3



70. If A(3, 1, -2) and B(1, -3, -1) be two points find

the coordinates coordinates of the point which divides the

line segment AB. Externally in the ratio 3:1



71. Find the coordinates of the point which divides the join

of (-2, 3, 5) and (1, -4, -6) in the ratio: 2:3 internally

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72. Find the coordinates of the point which divides the join

of (-2, 3, 5) and (1, -4, -6) in the ratio: 2:3 externally



73. 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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74. Find the coordinates of the point R which divides the join of P(0, 0, 0) and Q(4, -1, -2) in the ratio 1:2 externally and verify that P is the mid point of RQ.

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75. Using section formula show that the points are collinear:

$$(\,-2,3,5),\,(1,2,3),\,(7,0,\,-1)$$



76. Using section formula show that the points are collinear:

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

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77. Using section formula show that the points are collinear:

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

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78. Find the coordinates of the points which trisect the line segment PQ formed by joining the points P(4, 2, -6) and Q(10, -16, 6)



80. Find the ratio in which the YZ plane divides the line segment joining the following pair of points: (4,8,10) and (6,10,-8)`



81. Find the ratio in which the YZ plane divides the line segment joining the following pair of points: (-2,7,4) and (3,-5,8)`

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82. A(3, 2, 0), B(5, 3, 2), (-9, 6, -3) are the vertices of

riangle ABC and AD is the bisector of $\angle BAC$ which meets at D.

Find the coordinates of D,

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83. Show that the points (4, 7, 8), (2, 3, 4), (-1, -2, 1), (1, 2, 5) are the vertices

of a paralelogram.





are the vertices of arhombus.



86. If three consecutive vertices of a parallelogram be (3,4,1),

(7,10,-3) and (8,1,9), find the fourth vertex.

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87. Threevertices of a parallelograsm ABCDasre A(3, -1, 2), B(1, 2, -4) and C(-1, 1, 2). Find the

coordinastes of the fourth vertex.

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





90. A point R with x-coordinate 4 lies on the line segment join the points P(2,-3,4) and Q(8,0,10)[°]. Find the coordinates of R.



91. Two vertives of a triangle are
$$(4, -6, 3)$$
 and $(2, -2, 1)$ and its centroid is $\left(\frac{8}{3}, -1, 2\right)$. Find the third vertex.

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



93. The origin is the centroid of $\triangle ABC$ with the vertices $A(\alpha, 1, 3), B(-2, \beta, -5)$ and $C(4, 7, \gamma)$ find the values of α, β, γ .



94. The origin is the centroid of a triangle ABC is at the point G(1, 1, 1). If the coordinates of A and B are (3,-5,7) an (-1,7,-6)` respectively, then find the coordinates of the point C.



95. Find the centroid of the triangle mid points of whose sides are (1, 2, -3), (3, 0, 1) and (-1, 1, 4)

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96. for every point (x, y, z) on the y-axis: (A) x = 0, y = 0

(B)
$$x=0, z=0$$
 (C) $y=0, z=0$ (D) $y
eq 0, x=0, z=0$



98. The graph of the equation $x^2 + y^2 = 0$ in the three dimensional space is (A) x-axis (B) y-axis (C) z-axis (D) xy-plane

99. The distance of the point (x, y, z) from xy-plne is (A) x (B) |y| (C) z (D) |z|



100. A point (x, y, z) moves parallel to xy-plane. Which of the three variables x, y, z remains fixed? (A) x (B) y (C) z (D) xand y



101. A point (x, y, z) moves parallel to x axis. Which of the three variables x, y, z remains fixed? (A)x and y(B)y and z(C)z and x(D) none of these



102. The distance of the point (3, 4, 5) from x-axis is (A) 3 (B)

5 (C) $\sqrt{34}$ (D) $\sqrt{41}$

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103. The shortest distance of the point (a, b, c) from x-axis (A) $\sqrt{a^2 + b^2}$ (B) $\sqrt{b^2 + c^2}$ (C) $\sqrt{c^2 + a^2}$ (D) $\sqrt{a^2 + b^2 + c^2}$

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104. The number of values of as for which the distance between point `(3,-5,4) and 9a,-8,4) is 5 is (A) 1 (B) 2 (C) 3 (D) infinitely many



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106. The points P(0, 7, 10), Q(-1, 6, 6), R(-4, 9, 6) are the vertices of (A) an equilaterla triangle (B) an isosceles rilghat angled triangle (C) a scalene triangle (D) an isosceles triangle which is not righat angled



107. Area of the quadrilateral having vertices (0,4,1),(2,3,-1) (4,5,0),(2,6,2)` is (A) 27 sq. units (B) 9 sq. units (C) 81 sq. units (D) none of these



108. A parallelopiped is formed by planes drawn through the points (1,2,3) and (9,8,5) parallel to the coordinate planes. Then which of the following is not the length of an edge of the rectangular parallelopiped (A) 2 (B) 4 (C) 6 (D) 8



109. A parallelopiped is formed by planes drawn through the points (1,2,3) and (9,8,5) parallel to the coordinate planes.

The length of its diagonal is (A) $2\sqrt{14}$ units (B) $2\sqrt{26}$ units

(C) $6\sqrt{3}$ units (D) $2\sqrt{21}$ units

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110. The xy-plane divides the line segment joining (1,2,3) and (-3,4,-5) (A) internally in the ratio 3:4 (B) externally in the ratio 5:3 (C) internally in the ratio 3:5 (D) none of these

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111. The coordinates of the point where the line joining P(3, 4, 1) and Q(5, 1, 6) crosses the XYPLANE (A) $\left(-\frac{13}{5}, -\frac{23}{5}, 0\right)$ (B) $\left(\frac{13}{5}, \frac{23}{5}, 0\right)$ (C) $\left(\frac{13}{5}, -\frac{23}{5}, 0\right)$ (D) $\left(-\frac{13}{5}, \frac{23}{5}, 0\right)$

112. The point equidistant from the point (0, 0, 0), (1, 0, 0,), (0, 2, 0) and (0, 0, 3) is (A) $\left(\frac{1}{3}, \frac{2}{3}, 2\right)$ (B) (1,0,2)e(C)(1/2, 1, 3/20(D)(-1, 2, 1/2))





114. The coordinates of the point which divides the line segment joining the points (5, 4, 20 and (-1, -2, 4) in the ratio 2:3 externally is (A) $\left(\frac{13}{5}, \frac{8}{5}, \frac{14}{5}\right)$ (B) $\left(\frac{17}{5}, \frac{16}{5}, -\frac{2}{5}\right)$ (C) (17, 16, -2 -) (D) none of these

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115. The ratio in which the line joinng (2, 4, 5), (3, 5, -4) is

divided by the zyplane is (A) 2:3 (B) 3:2 (C) -2:3 (D) 4:3