MATHS

BOOKS - KUMAR PRAKASHAN

COORDINATE GEOMETRY

Textual Examples

1. Do the points (3,2), (-2,-3) and (2,3) form a triangle ? If so, name the type of triangle formed.

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2. Show that the points (1,7), (4,2), (-1, -1) and (-4 4) are the vertices of a square.

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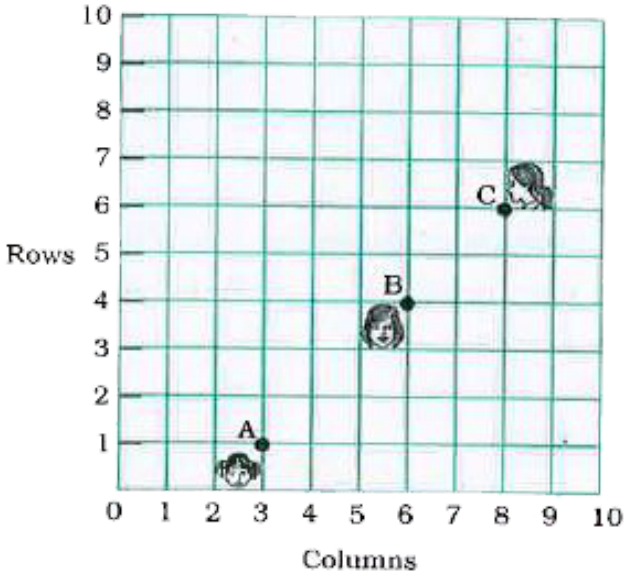
3. The given figure shows the arrangement of desks in a classroom. Ashima , Bharti and Camella are seated at A(3,1) , B(6,4) and C(8,6) respectively. Do you think they are seated in a

line ? Give reasons for your answer .



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4. Find a relation between x and y such that the point (x,y) is equidistant from the points (7,1) and (3,5)

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5. Find a point on the y-axis which is equidistant from the points A(6,5) and B (-4, 3).

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6. Find the coordinates of the point which divides the line segment joining the points (4,-3) and (8,5) in the ratio 3 : 1 internally.

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7. In what ratio does the point (-4,6) divide the line segment joining the point A (-6, 10) and B(3,-8) ?

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8. Find the coordinates of the points of trisection (i.e., points dividing in three equal parts) of the line segment joining the points A(2,-2) and B(-7,4).

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9. Find the ratio in which the y-axis divides the line segment joining the points (5,-6) and (-1, -4) . Also find the point of intersection.

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10. If the points A(6,1), B(8,2), C(9,4) and D(p,3) are the vertices of a parallelogram, taken in order, find the value of p.

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11. Find the area of a triangle whose vertices are (1,-1) ,(-4, 6) and (-3, -5).

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12. Find the area of a triangle formed by the points A(5,2), B(4,7) and C(7,-4).

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13. Find the area of the triangle formed by the points P(-1.5, 3), Q(6,-2) and R(-3, 4).

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14. Find the value of k if the points A(2,3), B(4,k) and C(6,-3) are collinear.

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15. If A(-5, 7), B(-4, -5) , C(-1, -6) and D(4,5) are the vertices of a quadrilateral, find the area of the quadrilateral ABCD

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Other Important Examples

1. Show that the point P(a, b + c), Q(b, c +a) and R(c, a + b) are collinear.

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2. Show that A(3,10) , B(6,5) , C(1,2) and D(-2, 7) are the vertices of a square

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3. Find the coordinates of the point equidistant from three given points A(5,1), B(-3,-7) and C(7,-1)

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4. Find the circumcentre of ΔABC with vertices A(5,1), B(-3,-7) and C(7,-1)

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5. In what ratio does the y-axis divide the join of (-2, 1) and (4,5) . Find the coordinates of the point of division.

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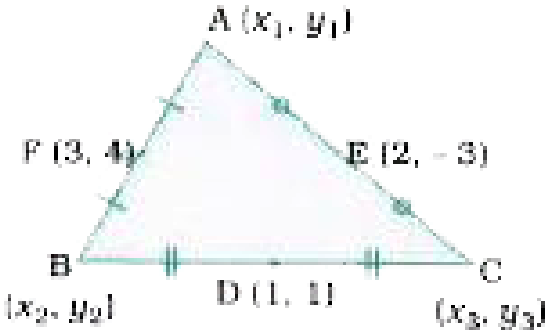
6. If the coordinates of the midpoints of the sides of ΔABC are (1,1), (2,-3) and (3,4) , find the coordinates of the vertices of ΔABC



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7. Three vertices of a parallelogram ABCD are A(1,2), B(2,4) and C(5,9) . Find the coordinates

of the fourth vertex D

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8. If the points A(x,y), B(a,0) and C(0,b) are collinear, prove that $\frac{x}{a}+\frac{y}{b}=1$

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9. If the points A(-2, k), B(3,-4) and C(7,10) are the vertices of a right angled isosceles triangle

right angled at A, find the value of k and the area of ΔABC.

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10. The area of ΔABC IS 5 sq units. Two of its vertices are A(2,1) and B(3,-2) . Third vertex C lies on the line given by y=x + 3 . Find the coordinates of C.

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Exercise 7 1

1. Find the distance between the following pairs of points :

(1) (2,3), (4,1)

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

(3) (a,b) , (-a, -b)

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2. Find the distance between the points (0,0) and (36, 15) .

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3. Determine if the points (1,5), (2,3) and (-2, -11) are collinear.

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4. Check whether (5,-2), (6,4) and (7,-2) are the vertices of an isosceles triangle.

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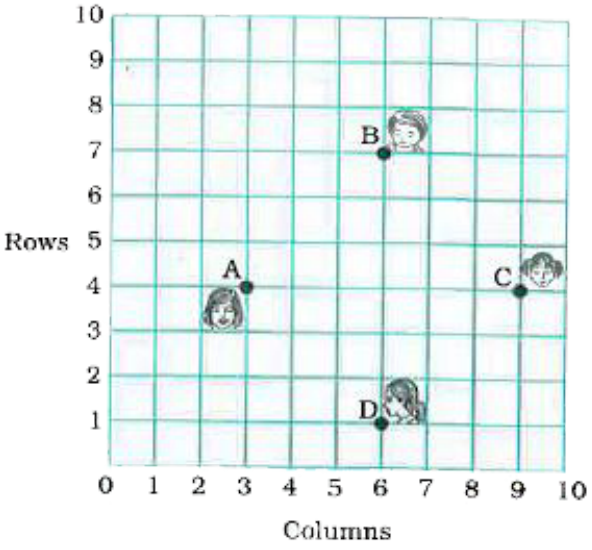
5. In a classroom, 4 friends are seated at the points A, B, C and D as shown in the given figure. Champa and Chameli walk into the class and after observing for a few minutes Champa asks Chameli , "Don't you think ABCD is a square?" Chameli disagrees. Using distance formula, find which of them is correct



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6. Name the type of quadrilateral formed, if any, by the points, and give reasons for your answer.

(4, 5), (7, 6), (4, 3), (1, 2)

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7. Find the point on the x-axis which is equidistant from (2,-5) and (-2, 9) .

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8. Find the values of y for which the distance between the points P(2,-3) and Q(10,y) is 10 units.

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9. If Q (0,1) is equidistant from P(5,-3) and R(x,6) , find the values of x. Also find the distances QR and PR.

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10. Find a relation between x and y such that the point (x,y) is equidistant from the point (3,6) and (-3, 4).

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Exercise 7 2

1. Find the coordinates of the point which divides the join of (-1, -7) and (4,-3) in the ratio

2 : 3

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2. Find the coordinates of the points of trisection of the line segment joining (4,-1) and (-2, -3)

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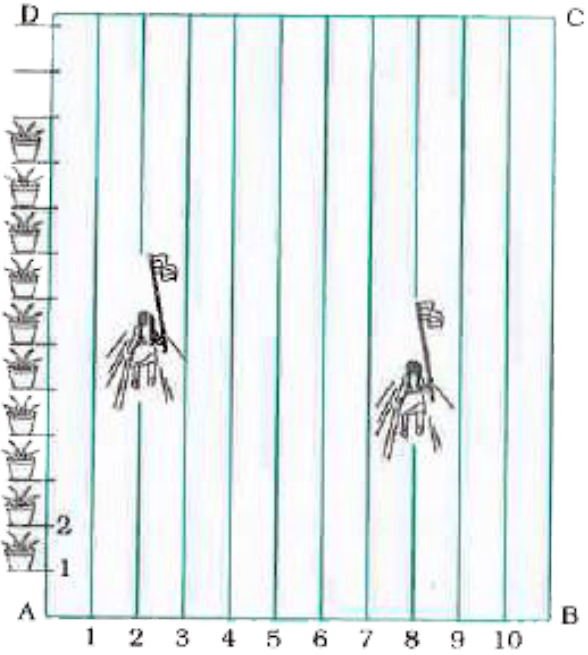
3. To conduct Sports Day activities, in your rectangular shaped school ground ABCD, lines

have been drawn with chalk powder at a distance of 1m each. 100 flower pots have been placed at a distance of 1 m from each other along AD, as shown in the given figure. Niharika runs $\frac{1}{4}$ th the distance AD on the 2nd line and posts a green flag. Preet runs $\frac{1}{5}$ th the distance AD on the eighth line and posts a red flag. What is the distance between both the flags ? If Rashmi has to post a blue flag exactly halfway between the line segment joining the two flags, where should she post

her flag ?



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4. Find the ratio in which the line segment joining the points (-3, 10) and (6,-8) is divided

by (-1, 6)

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5. Find the ratio in which the line segment joining A(1,-5) and B(-4, 5) is divided by the x-axis . Also find the coordinates of the point of division.

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6. If (1,2) , (4,y) , (x,6) and (3, 5) are the vertices of a parallelogram taken in order, find x and y.

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7. Find the coordinates of a points A, where AB is the diameter of circle whose centre is (2,-3) and B is (1, 4)

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8. If A and B are (-2, -2) and (2,-4) , respectively, find the coordinates of P such that $AP = \frac{3}{7}$ AB and P lies on the line segment AB

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9. Find the coordinates of the points which divide the line segment joining A (-2, 2) and B(2,8) into four equal parts .

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10. Find the area of a rhombus if its vertices are (3,0) , (4 , 5) , (-1, 4) and (-2, -1) taken in order.

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Exercise 7 3

1. Find the area of the triangle whose vertices are :

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

(2) (-5, -1),(3,-5), (5,2)

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2. In each of the following find the value of 'k', for which the points are collinear :

(1) (7,-2), (5,1), (3,k)

(2) (8,1), (k,-4), (2,-5)

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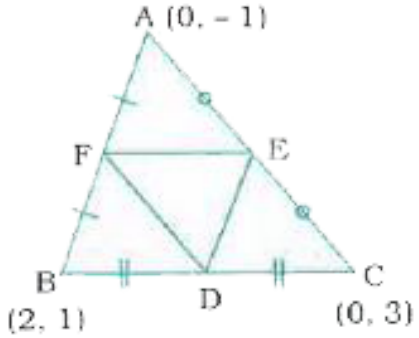
3. Find the area of the triangle formed by joining the midpoints of the sides of the triangle whose vertices are (0,-1), (2,1) and (0,3) . Find the ratio of this area to the area of the given triangle .



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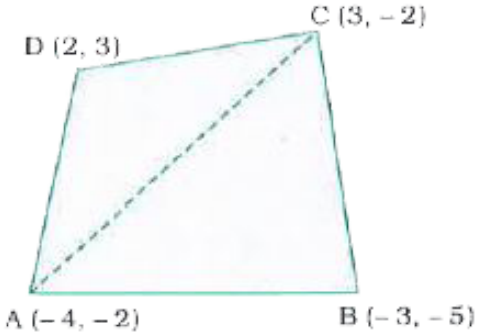
4. Find the area of the quadrilateral whose vertices, taken in order, are (-4, -2), (-3, -5), (3,-2) and (2,3)



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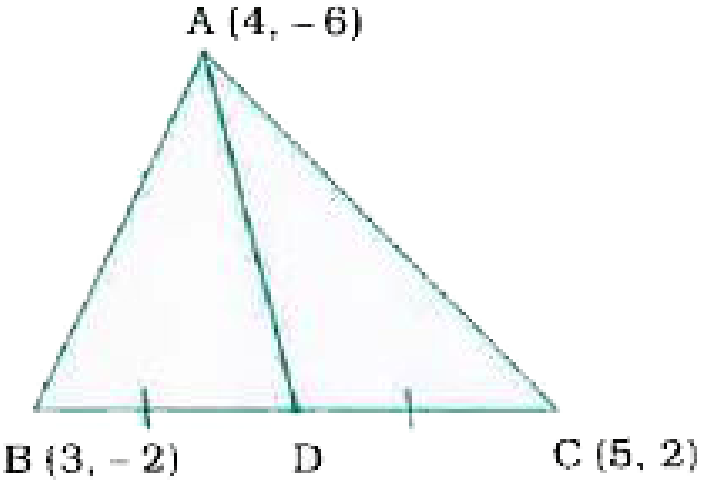
5. You have studied in Class IX, (Chapter 9, Example 3), that a median of a triangle divides

it into two triangles of equal areas. Verify this result for ΔABC whose vertices are A(4,-6), B(3,-2) and C(5,2)



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Exercise 7 4

1. Determine the ratio in which the line $2x + y - 4 = 0$ divides the line segment joining the points A(2,-2) and B(3,7).

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2. Find a relation between x and y if the points (x,y), (1,2) and (7,0) are collinear.

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3. Find the centre of the circle passing through the points (6,-6),(3,-7) and (3,3).

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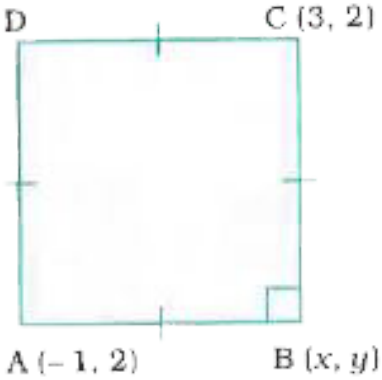
4. The two opposite vertices of a square are (-1,2) and (3,2) . Find the coordinates of the other two vertices.



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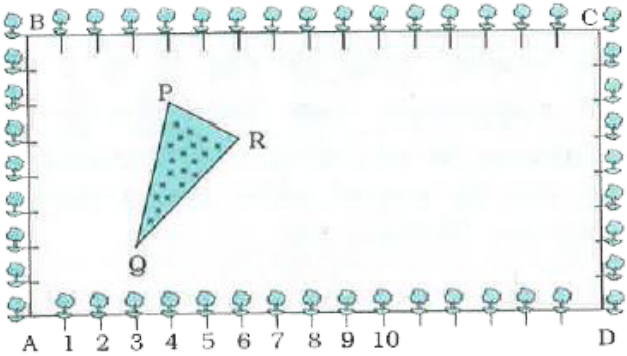
5. The Class X students of a secondary school in Krishinagar have been allotted a rectangular plot of land for their gardening activity. Sapling of Gulmohar are planted on the boundary at a distance of 1 m from each other. There is a triangular grassy lawn in the plot as shown in the given figure. The students are to sow seeds of flowering plans on the remaining area of the plot.

(1) Taking A as origin, find the coordinates of

the vertices of the triangle.

(2) What will be the coordinates of the vertices of ΔPQR if C is the origin ? Also calculate the areas of the triangles in these cases. What do you observe ?



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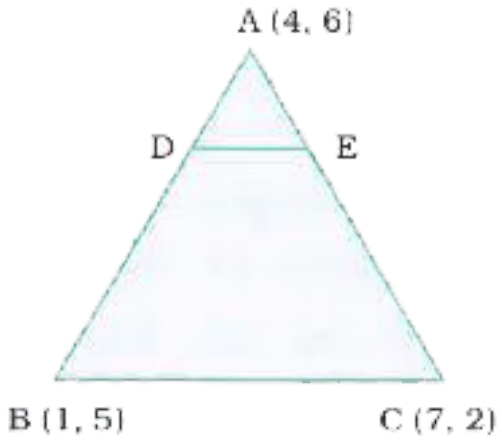
6. The vertices of a ΔABC are A(4,6), B(1,5) and C(7,2) . A line is drawn to intersect sides AB and AC at D and E respectively, such that $\frac{AD}{AB} = \frac{AE}{AC} = \frac{1}{4}$. Calculate the area of the ΔADE and compare it with the area of ΔABC . (Recall Theorem 6 . 2 and Theorem 6 . 6)



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7. Let A(4,2), B(6,5) and C(1,4) be the vertices of ΔABC

(1) The median from A meets BC at D. Find the coordinates of the points D.

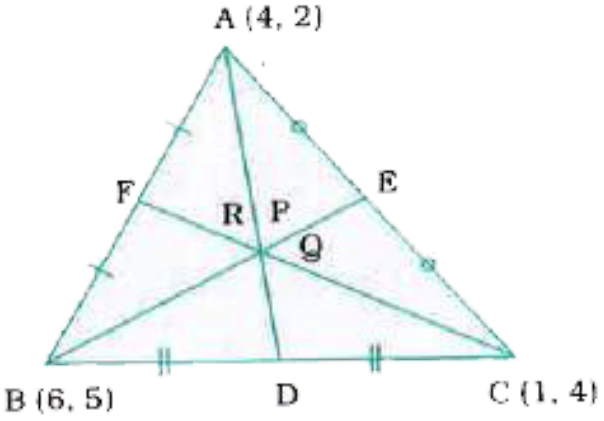
(2) Find the coordinates of the points P on AD such that AP : PD = 2 : 1

(3) Find the coordinates of points Q and R on medians BE and CF respectively such that BQ : QE = 2 : 1 and CR : RE = 2 : 1

(4) What do you observe ?

[Note : The point which is common to all the three medians is called the centroid and this point divides each median in the ratio 2 : 1]

(5) If $A(x_1, y_1), B(x_2, y_2)$ and $C(x_3, y_3)$ are the vertices of ΔABC find the coordinates of the centroid of the triangle



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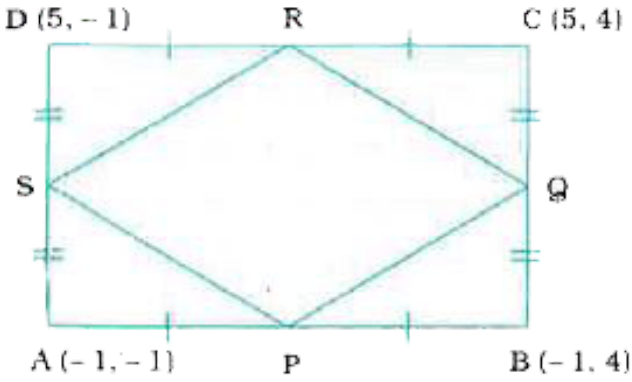
8. ABCD is a rectangle formed by the points A(-1, -1) , B(-1, 4), C(5,4) and D(5, -1) . P,Q R S are the midpoints of AB, BC, CD, and DA respectively. Is the quadrilateral PQRS a square ? a rectangle ? or a rhombus ? Justify your answer.



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Test Your Skills

1. Find a relation between x and y such that P(x,y) is equidistant from points A(6,1) and B(1,6).

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

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3. Show that the point A(a,a), B(-a,-a) and C $\left(-\sqrt{3}a, \sqrt{3}a\right)$ are the vertices of an equilateral triangle.

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4. Show that A(-1,0), B(3,1), C(2,2) and D(-2,1) are the vertices of a parallelogram ABCD.

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5. Show that the points (7,10), (-2, 5) and (3,-4) are the vertices of an isosceles right triangle

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6. Prove that the points A(0,1), B(1,4), C(4,3) and D(3,0) are the vertices of a square ABCD.

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7. A(1,7), B(2,4) and C(k,5) are the vertices of a right triangle . Find k

(1) if $\angle A = 90^\circ$

(2) if $\angle B = 90^\circ$ and

(3) if $\angle C = 90^\circ$

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8. Find the ratio in which the point (-3, p) divides the line segment joining points (-5, -4) and (-2, 3) . Hence find the value of p

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9. If A(5,-1), B(-3,-2) and C(-1, 8) are the vertices of ΔABC , find the length of median through A and the coordinates of the centroid

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10. If the midpoint of the line segment joining $A\left(\frac{x}{2}, \frac{y+1}{2}\right)$ and B(x + 1, y - 3) is c(5, - 2) find x and y

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11. Find the third vertex of a triangle , if two of its vertices are at (-3,1) and (0,-2) and the centroid is at the origin.

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12. If P(9a-2, -b) divides the join of A(3a+1, -3) and B(8a, 5) in the ratio 3 : 1 find the values of a and b.

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13. If the midpoint of the line segment joining (3,4) and (k,7) is (x,y) and $2x + 2y + 1 = 0$, find the value of k.

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14. If the point C(-1, 2) divides internally the line segment joining the points A(2,5) and B(x,y)in the ratio 3 : 4 find the value of $x^2 + y^2$.

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15. The points $A(x_1, y_1), B(x_2, y_2)$ and $C(x_3, y_3)$ are the vertices of ΔABC and AD is a median in ΔABC . Find the coordinates of a point G on median AD such that AG : GD = 2 : 1

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16. The line segment joining the points P(3,3) and Q(6,-6) is trisected by the points A and B

such that A is nearer to p. If A also lies on the line given by $2x + y + k = 0$, find the value of k.

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17. Points P, Q, R and S divide the line segment joining the points A(1,2) and B(6,7) in 5 equal parts. Find the coordinates of P,Q and R.

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18. Find the value of k if the points A(6,10), B(7,k) and C(8,-10) are collinear .

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19. The vertices of a triangle are (1,-3), (4,k) and (-9,7) . If its area is 15 sq units, find the value of k.

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20. Find the area of quadrilateral ABCD with vertices A(-4, -2), B(-3, -5), C(3,-2) and D(2,3).

21. Find the area of the triangle formed by the midpoint of the sides of the triangle with vertices (2,1), (-2, 3) and (4,-3).

22. If R(x,y) is a point on the line segment joining points P(a,b) and Q(b,a) , then prove that x + y = a + b . $(a \neq b)$

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23. Find the value of k if the points A(k,2-2k) , B(-k + 1, 2k) and C(-4-k, 6-2k) are collinear

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Practice Thoroughly

1. Name the type of triangle formed by the points A(-5, 6), B(-4, -2) and C(7,5).

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2. Find the points on the x-axis which are at a distance of $2\sqrt{5}$ from the point (7,-4). How many such points are there ?

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3. Find the coordinates of the point Q on the x-axis which lies on the perpendicular bisector of A(-5, -2) and B(4,-2) . Name the type of triangle formed by the points Q, A and B.

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4. If P(9a - 2, -b) divides line segment joining A(3a + 1, -3) and B(8a, 5) in the ratio 3 : 1. find the values of a and b.

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5. Find the ratio in which the line $2x + 3y - 5 = 0$ divides the line segment joining the points (8,-9) and (2,1) . Also find the coordinates of the point of division.

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6. If (-4, 3) and (4,3) are two vertices of an equilateral triangle , find the coordinates of the third vertex, given that the origin lies in the interior of the triangle .

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7. If the points A(1,-2) , B(2,3), C(a,2) and D(-4, -3) form a parallelogram, find the value of a and height of the parallelogram taking AB as base.

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8. In ΔABC the coordinates of vertex A are (0,-1), D(1,0) and E(0,1) are the midpoints of sides AB and AC respectively. If F is the

midpoint of side BC find the area of ΔDEF .

Also find area of ΔABC

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9. For what value of a the points (a,1), (1,-1) and (11,4) are collinear ?

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10. If the points A(-1, -4) , B(b,c) and C(5,-1) are collinear and 2b + c = 4 , find the values of b

and c.

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11. Three vertices of a parallelogram are a(6,2), L(3,9) and P(-1,4) . If the fourth vertex is X, find its coordinates. if

(1) AL is a diagonal,

(2) LP is a diagonal,

(3) AP is a diagonal .

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12. If the area of ΔABC formed by vertices A(x,y), B(1,2) and C(2,1) is 6 sq units. then prove that x + y = 15 or x + y = - 9

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13. If A(4,-6), B(3,-2) and C(5,2) are the vertices of ΔABC , then verify the fact that a median of ΔABC divides it into two triangles of equal areas.

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14. Points P divides the join of the points A(3,-5) and B(-4,8) in the ratio k : 1. If point P lies on the line x + y = 0 , find the value of k.

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15. If the coordinates of the midpoints of the sides of a triangle are (3,4), (4,6) and (5,7) , find its vertices.

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Objective Questions Fill In The Blanks

1. The distance of point (-6,8) from the origin is . . . . units.

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2. The perimeter of a triangle with vertices (0,4), (0,0) and (3,0) is . . . . units.

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3. The area of a triangle with vertices (3,0), (7,0) and (8,4) is . . . . . sq units.

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4. The point which divides the join of the points (7,-6) and (3,4) in the ratio 1 : 2 lies in the . . . . . quadrant .

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5. A(0,5), B(3,0) and C(3,5) are vertices of a/an . .

. . . triangle.

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Objective Questions Mcqs

1. If points (a,0), (0,b) and (1,1) are collinear , then $\frac{1}{a}+\frac{1}{b}$ = ...

A. 1

B. 2

C. 0

D. -1

Answer: A

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2. If the centroid of the triangle with vertices (7,x) , (y - 6) and (9, 10) is at (6, 3) , then (x , y) = ...

A. (4, 5)

B. (5, 4)

C. (-5, -2)

D. (5,2)

Answer: B

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3. The y-axis divides the line segment joining $A(a_1, b_1)$ and $B(a_2, b_2)$ in the ratio .....

A. $-a_1 : a_2$

B. $a_1 : a_2$

C. $b_1 : b_2$

D. $-b_1 : b_2$

Answer: A::B

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4. The length of a line segment is 10 units . If the coordinates of its one end point are (2,-3)

and the abscissa of the other end point is 10, then its ordinate is . . . . .

A. 9 or 6

B. 3 or -9

C. -3 or 9

D. 9 or -6

Answer: C

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5. If A(2,2) , B(-4,-4) and C(5,-8) are the vertices of ΔABC then the length of the median through C is . . . . . Units

A. $\sqrt{65}$

B. $\sqrt{117}$

C. $\sqrt{85}$

D. $\sqrt{113}$

Answer:

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6. If the point P(x,y) is equidistant from A(5,1) and B(-1, 5) , then . . . . . holds good

A. $5x = y$

B. $x = 5y$

C. $3x = 2y$

D. $2x = 3y$

Answer: B::C

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7. If (0,0), (2,0) and (0,3) are three of the vertices of a rectangle, its fourth vertex is . . . . .

A. (3,0)

B. (0,2)

C. (2,3)

D. (3,2)

Answer: B::C

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8. If the point (x,4) lies on a circle whose centre is at the origin and the radius is 5, then x = ...

A. ± 5

B. ± 3

C. 0

D. ± 4

Answer: C

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9. The coordinates of the point P dividing the line segment joining the points A(1,3) and B(4,6) in the ratio 2 : 1 are . . . . .

A. (2,4)

B. (3,5)

C. (4,2)

D. (5,3)

Answer: C

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10. If P(2,4), Q(0,3), R(3,6) and S(5,y) are the vertices of parallelogram PQRS , then y = ...

A. 7

B. 5

C. -7

D. -8

Answer:

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Objective Questions

1. What are the coordinates of the midpoint of the line segment joining A(5,-2) and B(7,10) ?

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2. How much is the area of a triangle with vertices (0,0), (5,0) and (0,12) ?

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3. State the coordinates of the centroid of the triangle with vertices at (5,18), (4,3), and (3,-3).

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4. State the distance of the point (20, 21) from the origin.

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5. In what ratio does the x-axis divide the line segment joining A(5,6) and B(2,-8) ?

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Objective Questions True Or False

1. The point (0,5), (0,-9) and (3,6) are collinear.

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2. The point A(2,7) lies on the perpendicular bisector of the line segment joining the points P(6,5) and Q(0,-4).

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3. Point P(-4, 2) lies on the line segment joining the points A(-4, 6) and B(-4, -6) .

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4. Points A(3,1), B(12, -2) and C(0,2) cannot be the vertices of a triangles.

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5. A circle has its centre at the origin and point P(5,0) lies on it. Then , the point Q(3,4) lies in the interior of the circle.

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