Chapter 26. Co-ordinate Geometry

Exercise 26(A)

Solution 1:

(i) $y=\frac{4}{3}x-7$

Dependent variable is y

Independent variable is x

(ii) $x=9y+4$

Dependent variable is x

Independent variable is y

(iii) $x=\frac{5y+3}{2}$

Dependent variable is x

Independent variable is y

(iv) $y=\frac{1}{7}(6x+5)$

Dependent variable is y

Independent variable is x

Solution 2:

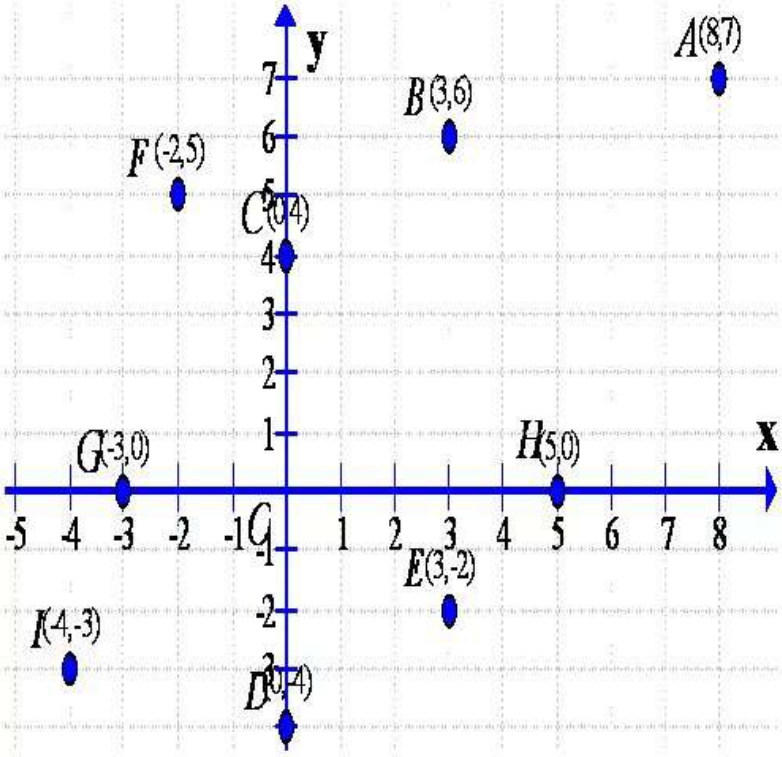
Let us take the point as

$A(8,7), B(3,6), C(0,4), D(0,-4), E(3,-2), F(-2,5), G(-3,0), H(5,0), I(-4,-3)$

On the graph paper, let us draw the co-ordinate axes XOX' and YOY' intersecting at the origin O. With proper scale, mark the numbers on the two co-ordinate axes.
Now for the point A(8,7)
Step I
Starting from origin O, move 8 units along the positive direction of X axis, to the right of the origin O
Step II
Now from there, move 7 units up and place a dot at the point reached. Label this point as A(8,7)

Similarly plotting the other points

$B(3,6), C(0,4), D(0,-4), E(3,-2), F(-2,5), G(-3,0), H(5,0), I(-4,-3)$



Solution 3:

Two ordered pairs are equal.

$\Rightarrow$Therefore their first components are equal and their second components too are separately equal.

(i) $(x-1, y+3) = (4,4)$

$(x-1, y+3) = (4,4)$

$x-1=4$ and $y+3=4$

$x=5$ and $y=1$

(ii) $(3x+1, 2y-7) = (9,-9)$

$(3x+1, 2y-7) = (9,-9)$

$3x+1=9$ and $2y-7=-9$

$3x=8$ and $2y=-2$

$x=\frac{8}{3}$ and $y=-1$

(iii) $(5x-3y, y-3x) = (4,-4)$

$(5x-3y, y-3x) = (4,-4)$

$5x-3y=4$..... (A) and $y-3x=-4$..... (B)

Now multiplying the equation (B) by 3, we get

$3y-9x=-12$..... (C)

Now adding both the equations (A) and (C) , we get

$(5x-3y)+(3y-9x)=(4+(-12))$

$-4x=-8$

$x=2$

Putting the value of x in the equation (B), we get

$y-3x=-4$

$\Rightarrow y=3x-4$

$\Rightarrow y=3(2)-4$

$\Rightarrow y=2$

Therefore we get,

x = 2, y = 2

Solution 4:

(i) The abscissa is 2

Now using the given graph the co-ordinate of the given point A is given by (2,2)

(ii) The ordinate is 0

Now using the given graph the co-ordinate of the given point B is given by (5,0)

(iii) The ordinate is 3

Now using the given graph the co-ordinate of the given point C and E is given by (-4,3)& (6,3)

(iv) The ordinate is -4

Now using the given graph the co-ordinate of the given point D is given by (2,-4)

(v) The abscissa is 5

Now using the given graph the co-ordinate of the given point H, B and G is given by (5,5) ,(5,0) & (5,-3)

(vi)The abscissa is equal to the ordinate.

Now using the given graph the co-ordinate of the given point I,A & H is given by (4,4),(2,2) & (5,5)

(vii)The ordinate is half of the abscissa

Now using the given graph the co-ordinate of the given point E is given by (6,3)

Solution 5:

(i) The ordinate of a point is its x-co-ordinate.
False.
(ii) The origin is in the first quadrant.
False.
(iii) The y-axis is the vertical number line.
True.
(iv) Every point is located in one of the four quadrants.
True.
(v) If the ordinate of a point is equal to its abscissa; the point lies either in the first quadrant or in the second quadrant.
False.
(vi) The origin (0,0) lies on the x-axis.
True.
(vii) The point (a,b) lies on the y-axis if b=0.
False

Solution 6:

(i) $3-2x=7;\ 2y+1=10-2\frac{1}{2}y$

Now

$$3-2x=7$$
$$3-7=2x$$
$$-4=2x$$
$$-2=x$$

Again

$$2y+1=10-2\frac{1}{2}y$$
$$2y+1=10-\frac{5}{2}y$$
$$4y+2=20-5y$$
$$4y+5y=20-2$$
$$9y=18$$
$$y=2$$

$\therefore$ The co-ordinates of the point $(-2,2)$

(ii) $\frac{2a}{3}-1=\frac{a}{2},\ \frac{15-4b}{7}=\frac{2b-1}{3}$

Now

$$\frac{2a}{3}-1=\frac{a}{2}$$
$$\frac{2a}{3}-\frac{a}{2}=1$$
$$\frac{4a-3a}{6}=1$$
$$a=6$$

Again

$$\frac{15-4b}{7}=\frac{2b-1}{3}$$

$$45-12b=14b-7$$

$$45+7=14b+12b$$

$$52=26b$$

$$2=b$$

$\therefore$ The co-ordinates of the point $(6,2)$

(iii) $5x-(5-x)=\frac{1}{2}(3-x);\ 4-3y=\frac{4+y}{3}$

Now

$$5x-(5-x)=\frac{1}{2}(3-x)$$

$$(5x+x)-5=\frac{1}{2}(3-x)$$

$$12x-10=3-x$$

$$12x+x=3+10$$

$$13x=13$$

$$x=1$$

Again

$$4-3y=\frac{4+y}{3}$$

$$12-9y=4+y$$

$$12-4=y+9y$$

$$8=10y$$

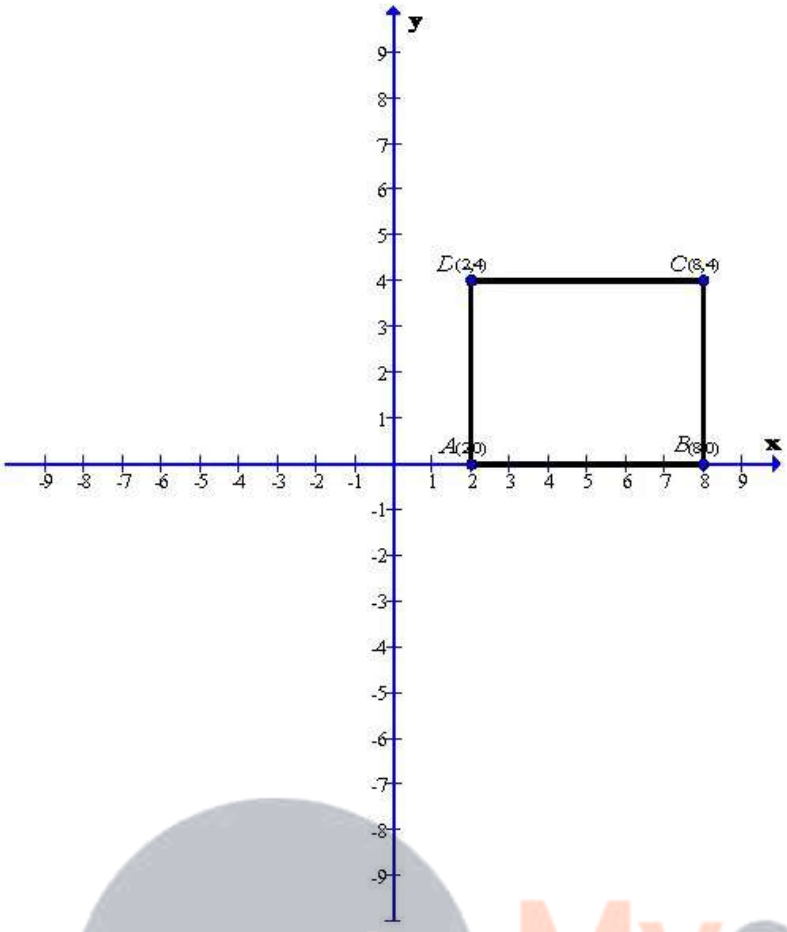
$$\frac{8}{10}=y$$

$$\frac{4}{5}=y$$

$\therefore$ The co-ordinates of the point $\left(1,\frac{4}{5}\right)$

Solution 7:

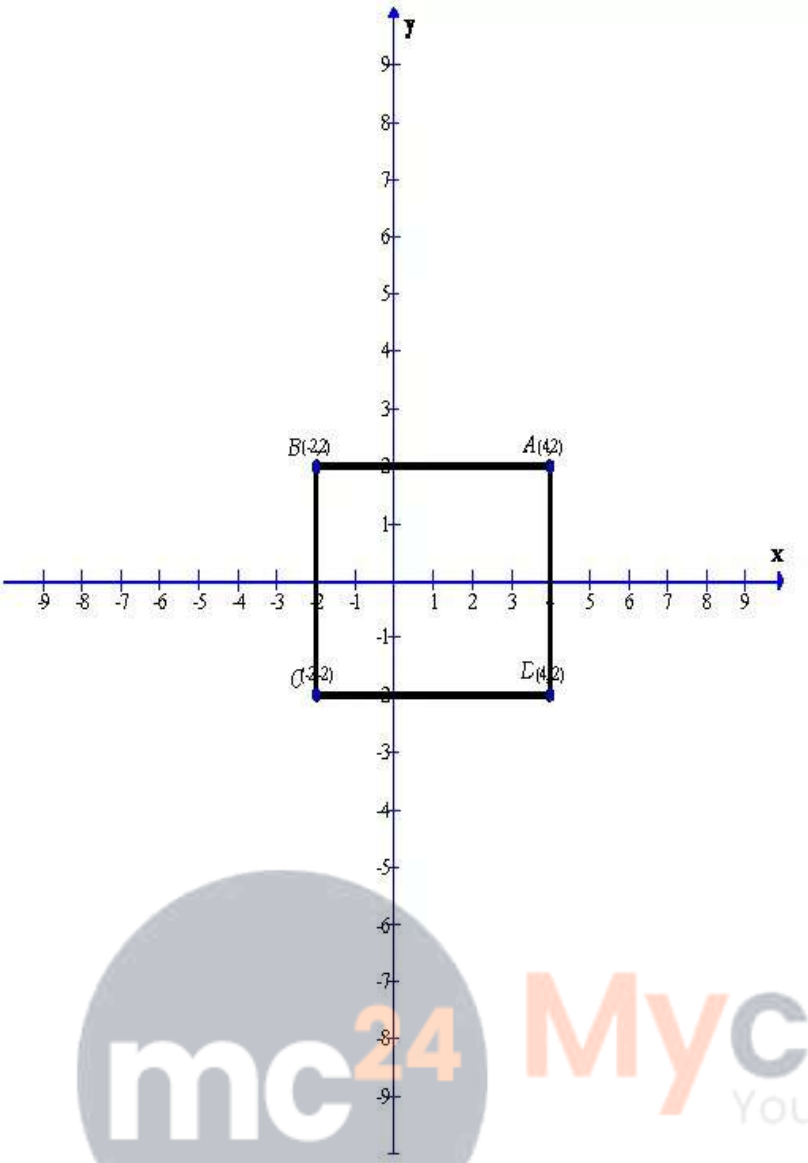
(i) $A(2,0)$, $B(8,0)$ and $C(8,4)$



After plotting the given points A(2,0), B(8,0) and C(8,4) on a graph paper; joining A with B and B with C. From the graph it is clear that the vertical distance between the points B(8,0) and C(8,4) is 4 units, therefore the vertical distance between the points A(2,0) and D must be 4 units. Now complete the rectangle ABCD

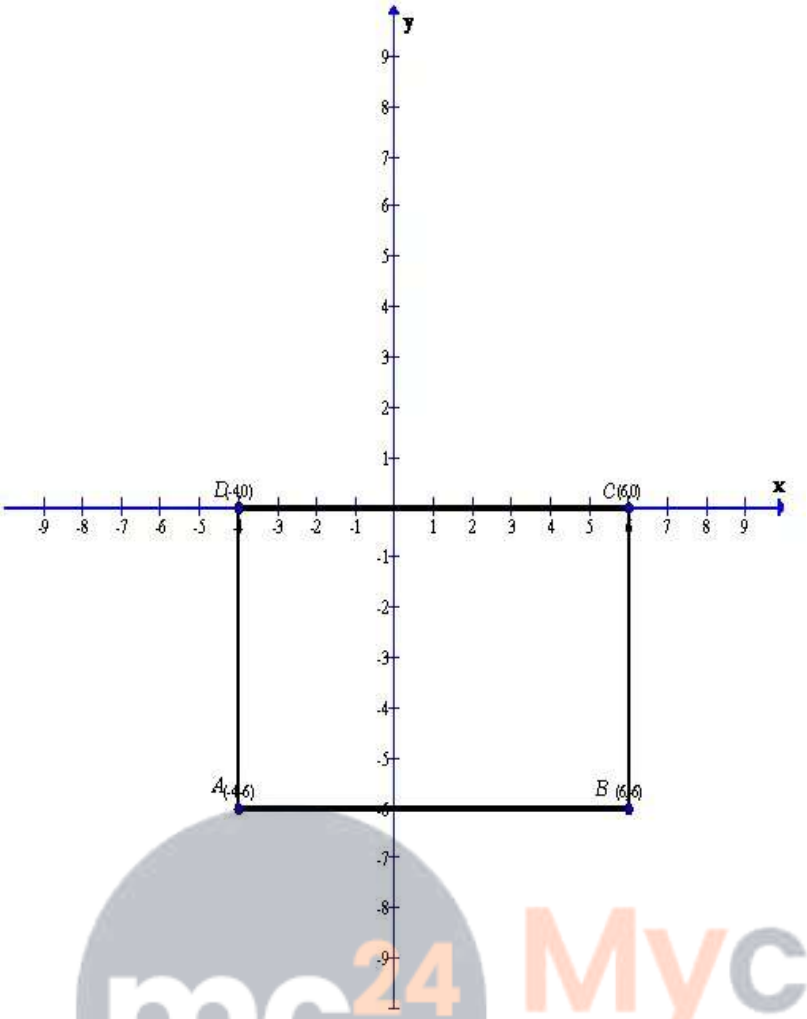
As is clear from the graph D(2,4)

(ii)A(4,2), B(-2,-2) and D(4,-2)



After plotting the given points A(4,2), B(-2,2) and D(4,-2) on a graph paper; joining A with B and A with D. From the graph it is clear that the vertical distance between the points A(4,2) and D(4,-2) is 4 units and the horizontal distance between the points A(4,2) and B(-2,2) is 6 units , therefore the vertical distance between the points B(-2,2)and C must be 4 units and the horizontal distance between the points B(-2,2) and C must be 6 units. Now complete the rectangle ABCD
As is clear from the graph C(-2,2)

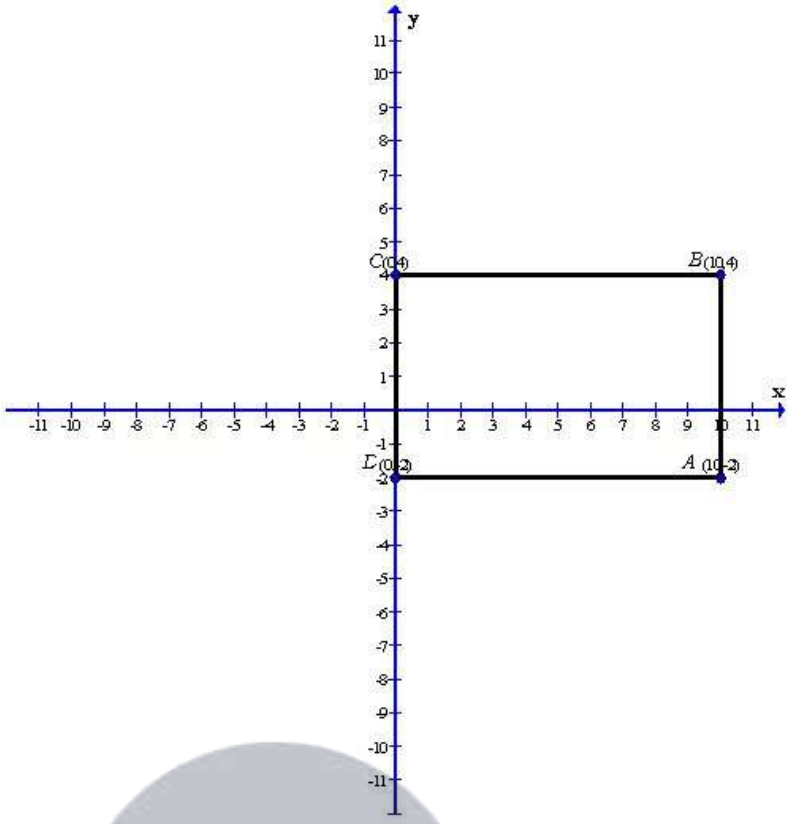
(iii) $A(-4,-6)$, $C(6,0)$ and $D(-4,0)$



After plotting the given points $A(-4,-6)$, $C(6,0)$ and $D(-4,0)$ on a graph paper; joining D with A and D with C. From the graph it is clear that the vertical distance between the points $D(-4,0)$ and $A(-4,-6)$ is 6 units and the horizontal distance between the points $D(-4,0)$ and $C(6,0)$ is 10 units, therefore the vertical distance between the points $C(6,0)$ and B must be 6 units and the horizontal distance between the points $A(-4,-6)$ and B must be 10 units. Now complete the rectangle $ABCD$

As is clear from the graph $B(6,-6)$

(iv) $B(10,4)$, $C(0,4)$ and $D(0,-2)$

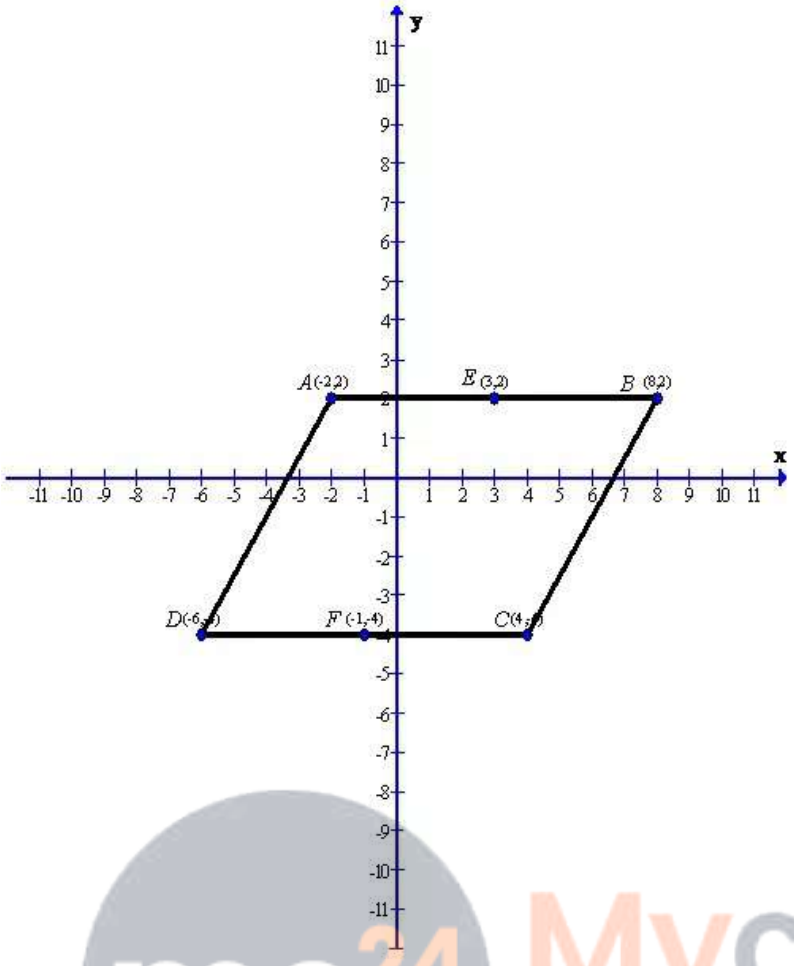


After plotting the given points $B(10,4)$, $C(0,4)$ and $D(0,-2)$ on a graph paper; joining C with B and C with D. From the graph it is clear that the vertical distance between the points $C(0,4)$ and $D(0,-2)$ is 6 units and the horizontal distance between the points $C(0,4)$ and $B(10,4)$ is 10 units , therefore the vertical distance between the points $B(10,4)$ and A must be 6 units and the horizontal distance between the points $D(0,-2)$ and A must be 10 units. Now complete the rectangle $ABCD$

As is clear from the graph $A(10,-2)$

Solution 8:

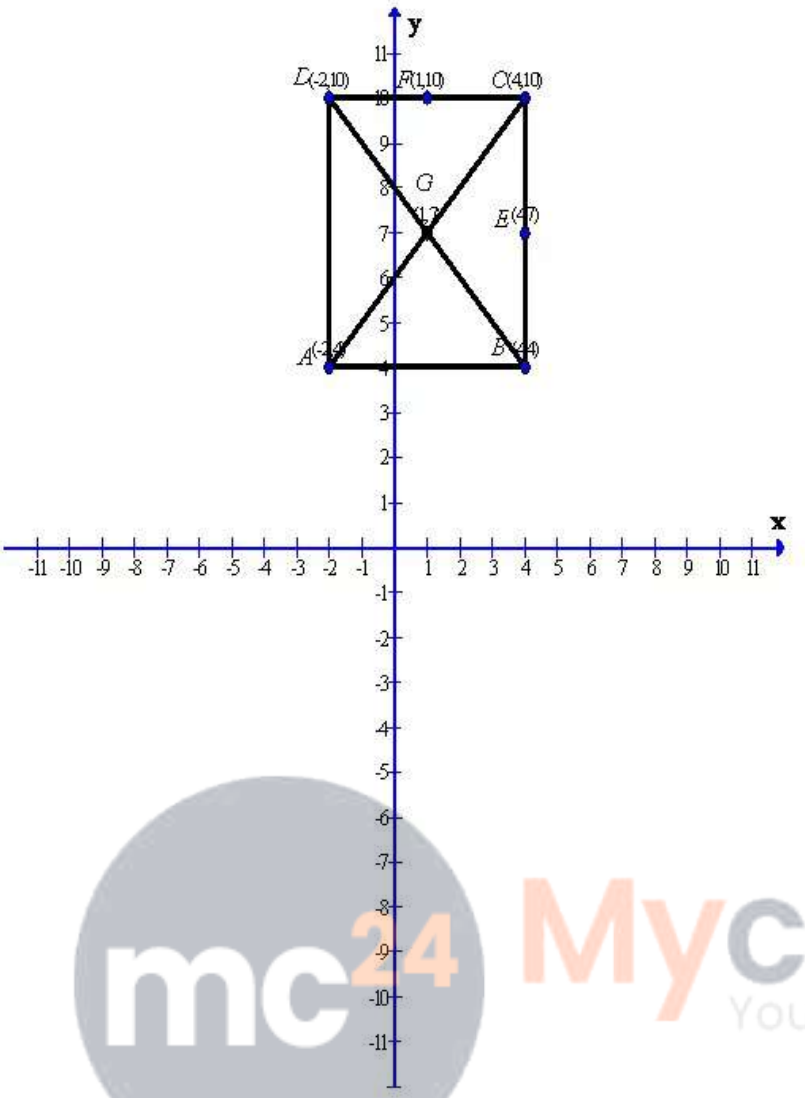
Given A(2,-2), B(8,2) and C(4,-4) are the vertices of the parallelogram ABCD



After plotting the given points A(2,-2), B(8,2) and C(4,-4) on a graph paper; joining B with C and B with A . Now complete the parallelogram ABCD.
As is clear from the graph D(-6,4)
Now from the graph we can find the mid points of the sides AB and CD.
Therefore the co-ordinates of the mid-point of AB is E(3,2) and the co-ordinates of the mid-point of CD is F(-1,-4)

Solution 9:

Given $A(-2,4)$, $C(4,10)$ and $D(-2,10)$ are the vertices of a square $ABCD$



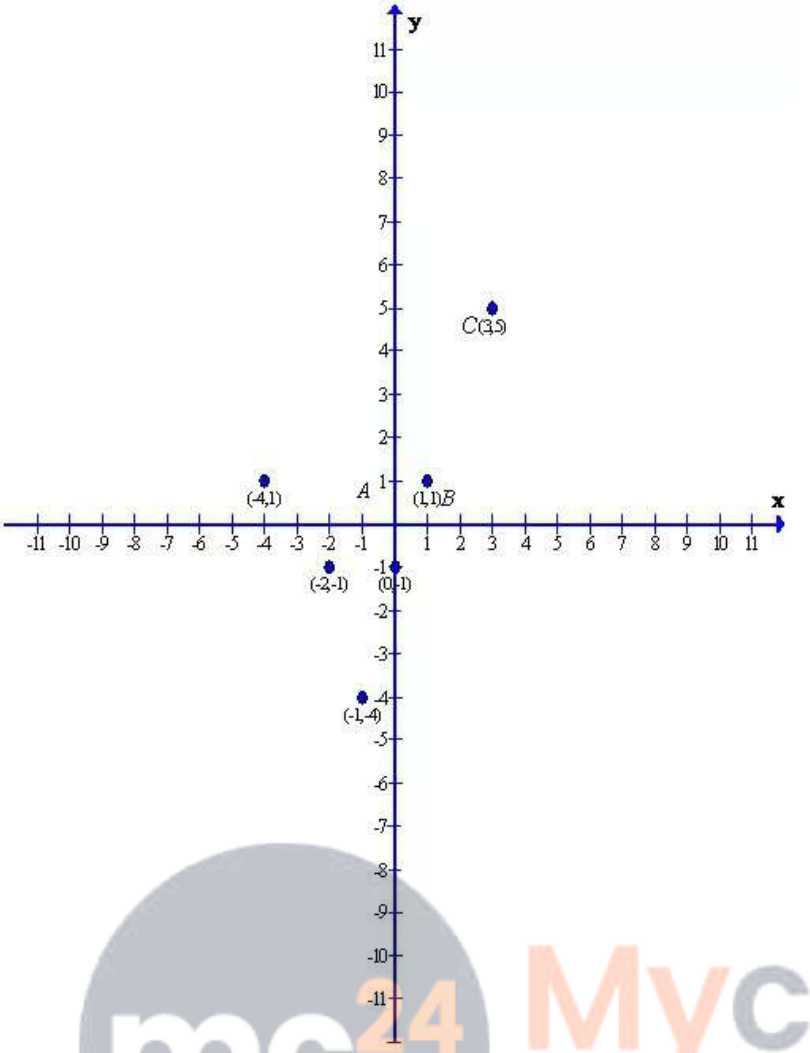
After plotting the given points $A(-2,4)$, $C(4,10)$ and $D(-2,10)$ on a graph paper; joining D with A and D with C. Now complete the square $ABCD$

As is clear from the graph $B(4,4)$

Now from the graph we can find the mid points of the sides BC and CD and the co-ordinates of the diagonals of the square.

Therefore the co-ordinates of the mid-point of BC is $E(4,7)$ and the co-ordinates of the mid-point of CD is $F(1,10)$ and the co-ordinates of the diagonals of the square is $G(1,7)$

Solution 10:



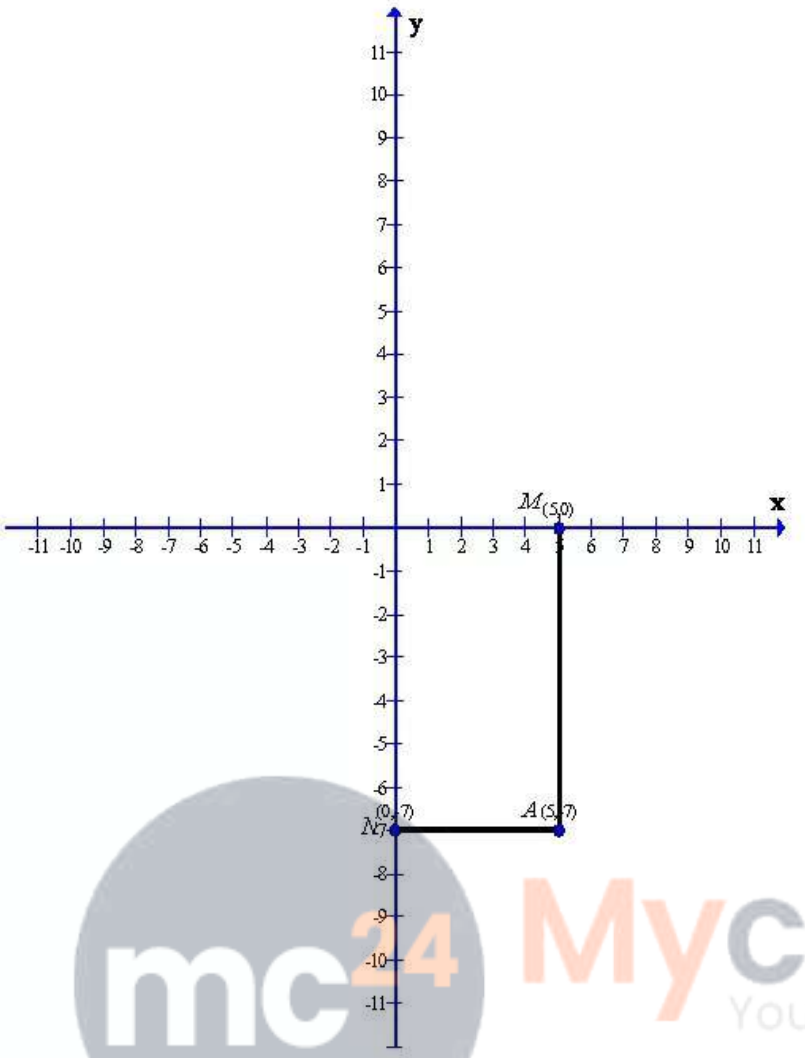
After plotting the given points, we have clearly seen from the graph that

(i) $A(3,5)$, $B(1,1)$ and $C(0,-1)$ are collinear.

(ii) $P(-2,-1)$, $Q(-1,-4)$ and $R(-4,1)$ are non-collinear.

Solution 11:

Given $A(5,-7)$



After plotting the given point $A(5,-7)$ on a graph paper. Now let us draw a perpendicular AM from the point $A(5,-7)$ on the x-axis and a perpendicular AN from the point $A(5,-7)$ on the y-axis.

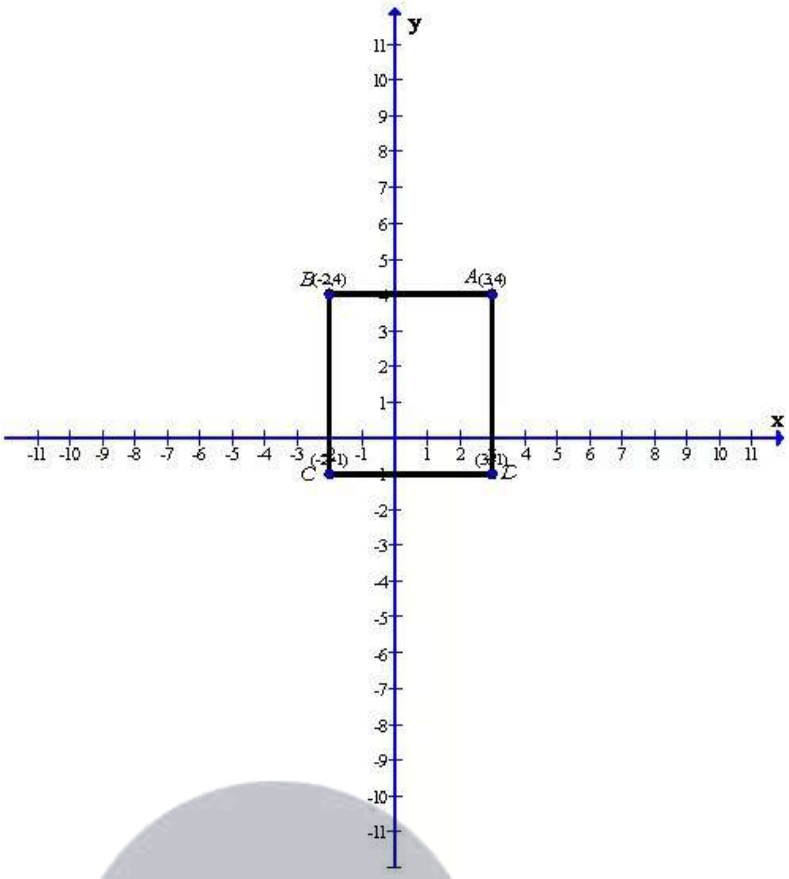
As from the graph clearly we get the co-ordinates of the points M and N

Co-ordinate of the point M is $(5,0)$

Co-ordinate of the point N is $(0,-7)$

Solution 12:

Given that in square $ABCD$: $A(3,4)$, $B(-2,4)$ and $C(-2,-1)$



Solution 13:

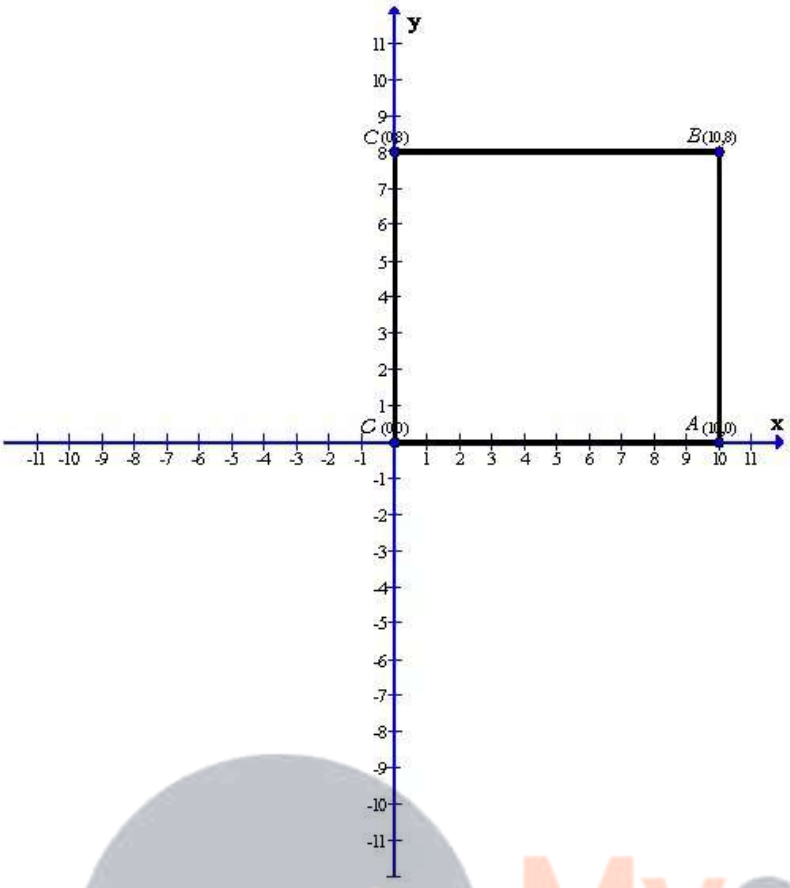
After plotting the given points $A(3,4)$, $B(-2,4)$ and $C(-2,-1)$ on a graph paper; joining B with C and B with A. From the graph it is clear that the vertical distance between the points $B(-2,4)$ and $C(-2,-1)$ is 5 units and the horizontal distance between the points $B(-2,4)$ and $A(3,4)$ is 5 units, therefore the vertical distance between the points $A(3,4)$ and D must be 5 units and the horizontal distance between the points $C(-2,-1)$ and D must be 5 units. Now complete the square $ABCD$

As is clear from the graph $D(3,-1)$

Now the area of the square $ABCD$ is given by

$\text{area of } ABCD = (\text{side})^2 = (5)^2 = 25 \text{ units}$

Given that in rectangle $OABC$; point O is origin and $OA = 10$ units along x-axis therefore we get $O(0,0)$ and $A(10,0)$. Also it is given that $AB = 8$ units. Therefore we get $B(10,8)$ and $C(0,8)$



After plotting the points $O(0,0)$, $A(10,0)$, $B(10,8)$ and $C(0,8)$ on a graph paper; we get the above rectangle $OABC$ and the required co-ordinates of the vertices are $A(10,0)$, $B(10,8)$ and $C(0,8)$