



### Exercise 16B

Question 23:

Two vertices of  $\Delta ABC$  are  $B(-3, 1)$  and  $C(0, -2)$  and third vertex be  $A(a, b)$

Then the coordinates of its centroid are

$$G\left(\frac{-3+0+a}{3}, \frac{1-2+b}{3}\right), \text{ i.e., } G\left(\frac{-3+a}{3}, \frac{-1+b}{3}\right)$$

But it is given that the centroid is  $G(0, 0)$

$$\frac{-3+a}{3} = 0 \text{ and } \frac{-1+b}{3}$$

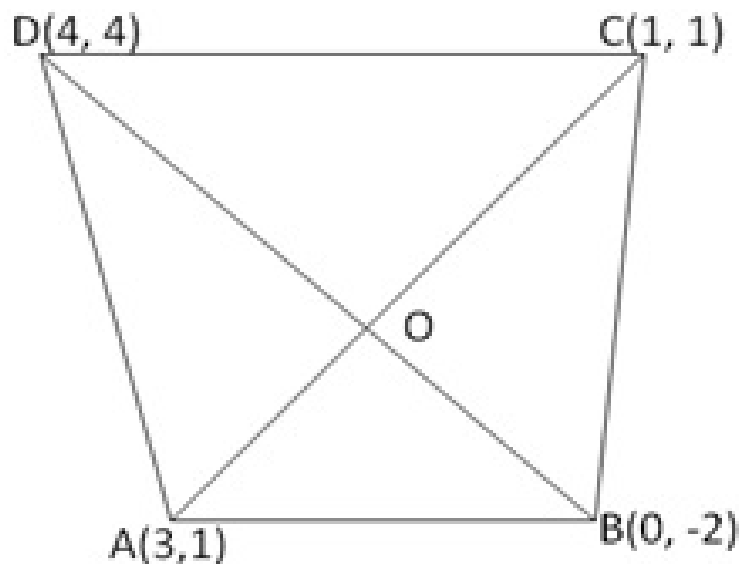
$$-3+a = 0 \text{ and } -1+b = 0$$

$$\Rightarrow a = 3 \text{ and } b = 1$$

Hence the third vertices  $A$  of  $\Delta ABC$  is  $A(3, 1)$ .

Question 24:

Let  $A(3, 1)$ ,  $B(0, -2)$ ,  $C(1, 1)$  and  $D(4, 4)$  be the vertices of quadrilateral. Join  $AC$ ,  $BD$ .  $AC$  and  $BD$  intersect other at the point  $O$ .



We know that the diagonals of a parallelogram bisect each other. Therefore,  $O$  is midpoint of  $AC$  as well as that of  $BD$ .

$$\left(\frac{3+1}{2}, \frac{1+1}{2}\right) \text{ i.e., } (2, 1)$$

Now midpoint of  $AC$  is

$$\left(\frac{0+4}{2}, \frac{-2+4}{2}\right) \text{ i.e., } (2, 1)$$

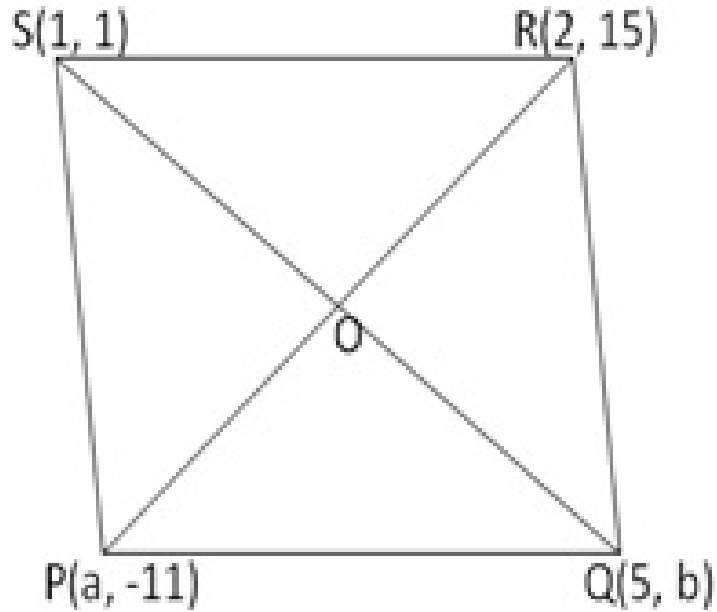
And midpoint of  $BD$  is

Mid point of  $AC$  is the same as midpoint of  $BD$ .

Hence,  $A, B, C, D$  are the vertices of a parallelogram  $ABCD$ .

Question 25:

Let  $P(a, -11)$ ,  $Q(5, b)$ ,  $R(2, 15)$  and  $S(1, 1)$  are the vertices of a parallelogram PQRS.



Join the diagonals PR and SQ.

They intersect each other at the point O. We know that the diagonals of a parallelogram bisect each other.

Therefore, O is the midpoint of PR as well as that of SQ

Now, midpoint of PR is  $\left(\frac{a+2}{2}, \frac{-11+15}{2}\right)$  i.e.,  $\left(\frac{a+2}{2}, 2\right)$

And midpoint of SQ is  $\left(\frac{5+1}{2}, \frac{b+1}{2}\right)$  i.e.,  $\left(3, \frac{b+1}{2}\right)$

$$\therefore \frac{a+2}{2} = 3 \text{ and } \frac{b+1}{2} = 2$$

$$\Rightarrow a = 4 \text{ and } b = 3$$

Hence the required values are  $a = 4$  and  $b = 3$ .

\*\*\*\*\* END \*\*\*\*\*