Exercise 16B

Question 23:
Two vertices of ΔABC 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 $G(0,0)$

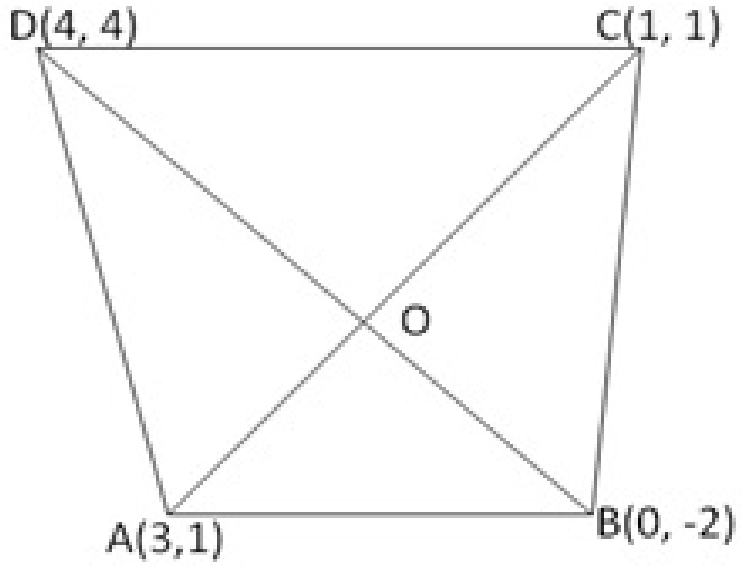
$$\frac{-3+a}{3} = 0 \text{ and } \frac{-1+b}{3}$$

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

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

Hence the third vertices A of Δ 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

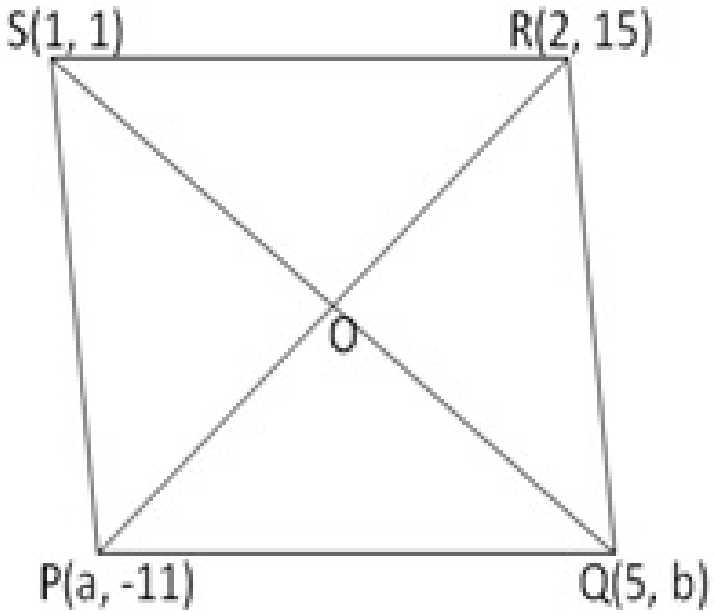
Now midpoint of AC is $\left(\frac{3+1}{2}, \frac{1+1}{2}\right)$ i.e., (2, 1)

And midpoint of BD is $\left(\frac{0+4}{2}, \frac{-2+4}{2}\right)$ i.e., (2, 1)

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., $\left(3, \frac{b+1}{2}\right)$

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

$\Rightarrow a = 4$ and $b = 3$

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

********** END **********