## Step-1

a) Area of parallelogram with edges $v = (3, 2)$ and $w = (1, 4)$ is

$$\begin{vmatrix} u \\ v \end{vmatrix} = \begin{vmatrix} 3 & 2 \\ 1 & 4 \end{vmatrix}$$
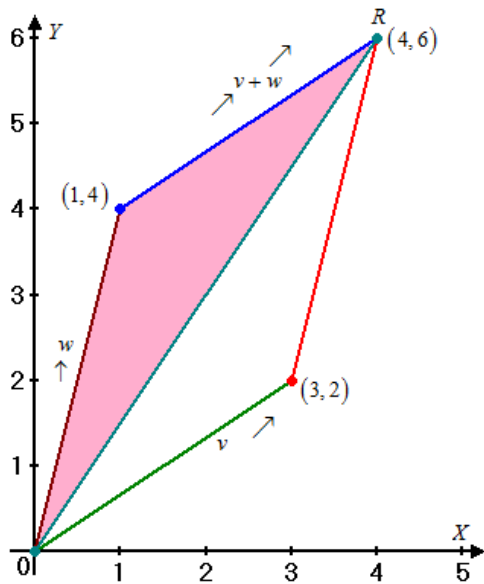
$$= 12 - 2$$
$$= 10 \text{ sq.units}$$

## Step-2

(b) The area of the triangle with sides $v, w, v + w$ is half the area of the parallelogram with the adjacent edges $v, w$

$$= \frac{10}{2}$$
$$= 5 \text{ sq.units}$$

We draw the vectors $v = (3, 2)$ and $w = (1, 4)$ starting from the origin $(0, 0)$.

We extend a line from $v$ parallel to $w$ whose length is equal to that of $w$ in the positive direction of $w$ with the end point $R$.
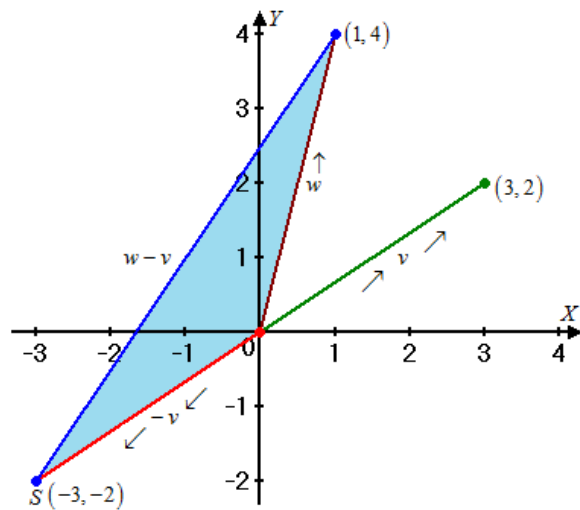
We join $OR$ to get the vector $v + w$.



## Step-3

c) Observe that - v is the vector in the negative direction of v and with the same magnitude that of v.

Also, the vector w – v is a vector that joins OS where S is the end point of the vector drawn from w in the negative direction of v and is parallel to v of magnitude v.



## Step-4

The area of the triangle with sides $v, w, w-v$ is also equal to half the area of the parallelogram with adjacent edges v and w.

Therefore, the required area is 5 sq.units