Step-1

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

$$\left|\begin{matrix} u \\ v \end{matrix}\right| = \begin{vmatrix} 3 & 2 \\ 1 & 4 \end{vmatrix}$$

$$= 12-2$$

$$= 10 \text{ sq.units}$$

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

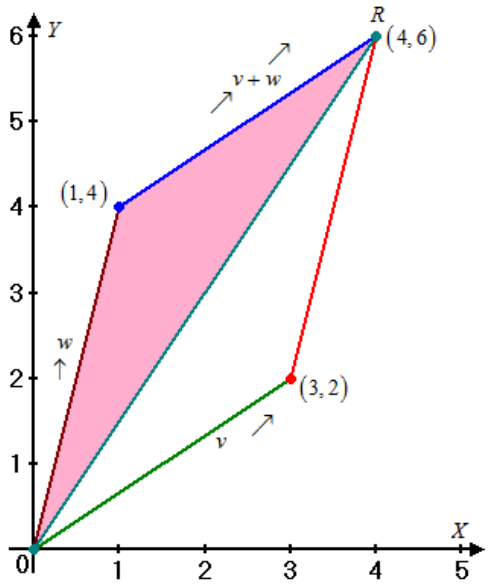
$$= \frac{10}{2}$$

$$= 5 \text{ sq.units}$$

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.

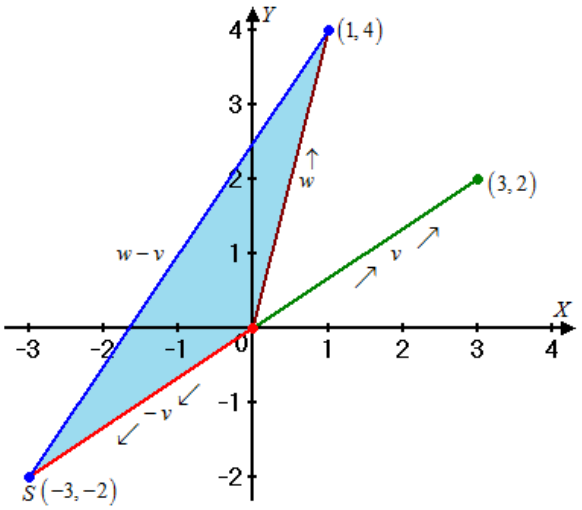
We join OR to get the vector $v + w$.



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 â€“ 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