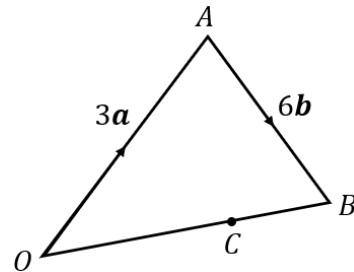


Vectors and Ratio

(a)

In the triangle OAB , $\overrightarrow{OA} = 3\mathbf{a}$ and $\overrightarrow{AB} = 6\mathbf{b}$. The point C divides the line OB in the ratio $2 : 1$.



Express the following in terms of \mathbf{a} and \mathbf{b} :

(a) $\overrightarrow{OB} = 3\mathbf{a} + 6\mathbf{b}$

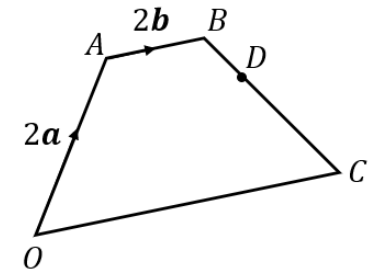
(b) $\overrightarrow{OC} = 2\mathbf{a} + 4\mathbf{b}$

(c) $\overrightarrow{BC} = -\mathbf{a} - 2\mathbf{b}$

(d) $\overrightarrow{AC} = -\mathbf{a} + 4\mathbf{b}$

(b)

$OABC$ is a trapezium, where $\overrightarrow{OA} = 2\mathbf{a}$ and $\overrightarrow{AB} = 2\mathbf{b}$. $\overrightarrow{OC} = 2\overrightarrow{AB}$ and D splits the line BC in the ratio $1 : 3$.



Express the following in terms of \mathbf{a} and \mathbf{b} :

(a) $\overrightarrow{BO} = -2\mathbf{a} - 2\mathbf{b}$

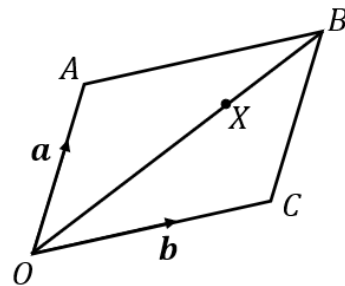
(b) $\overrightarrow{BC} = -2\mathbf{a} + 2\mathbf{b}$

(c) $\overrightarrow{BD} = -\frac{1}{2}\mathbf{a} + \frac{1}{2}\mathbf{b}$

(d) $\overrightarrow{DO} = -\frac{3}{2}\mathbf{a} - \frac{5}{2}\mathbf{b}$

(c)

In the parallelogram $OABC$, $\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OC} = \mathbf{b}$. The point X divides the line OB in the ratio $3 : 2$.



Express the following in terms of \mathbf{a} and \mathbf{b} :

(a) $\overrightarrow{AB} = \mathbf{b}$

(b) $\overrightarrow{OB} = \mathbf{a} + \mathbf{b}$

(c) $\overrightarrow{OX} = \frac{3}{5}\mathbf{a} + \frac{3}{5}\mathbf{b}$

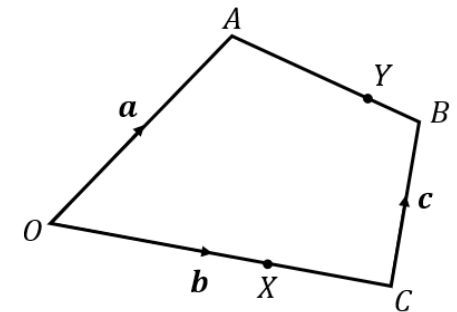
(d) $\overrightarrow{BX} = -\frac{2}{5}\mathbf{a} - \frac{2}{5}\mathbf{b}$

(e) $\overrightarrow{AX} = -\frac{2}{5}\mathbf{a} + \frac{3}{5}\mathbf{b}$

(f) $\overrightarrow{XC} = -\frac{3}{5}\mathbf{a} + \frac{2}{5}\mathbf{b}$

(d)

$OABC$ is a quadrilateral. $\overrightarrow{OA} = \mathbf{a}$, $\overrightarrow{OC} = \mathbf{b}$ and $\overrightarrow{CB} = \mathbf{c}$. The point X divides the line OC in the ratio $2 : 1$. The point Y divides the line AB in the ratio $3 : 1$.



Express the following in terms of \mathbf{a} , \mathbf{b} and \mathbf{c} :

(a) $\overrightarrow{OX} = \frac{2}{3}\mathbf{b}$

(b) $\overrightarrow{XC} = \frac{1}{3}\mathbf{b}$

(c) $\overrightarrow{AB} = -\mathbf{a} + \mathbf{b} + \mathbf{c}$

(d) $\overrightarrow{AY} = -\frac{3}{4}\mathbf{a} + \frac{3}{4}\mathbf{b} + \frac{3}{4}\mathbf{c}$

(e) $\overrightarrow{AX} = -\mathbf{a} + \frac{2}{3}\mathbf{b}$

(f) $\overrightarrow{XY} = \frac{1}{4}\mathbf{a} + \frac{1}{12}\mathbf{b} + \frac{3}{4}\mathbf{c}$