

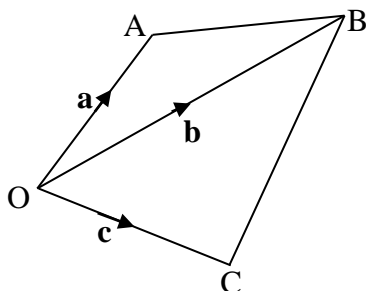
Section 1: Introduction to vectors

Exercise level 2

1. Find the unit vectors in the direction of

(i) $\mathbf{a} = \begin{pmatrix} 2 \\ 1 \end{pmatrix}$ (ii) $\mathbf{b} = \begin{pmatrix} 4 \\ -3 \end{pmatrix}$ (iii) $\mathbf{c} = \begin{pmatrix} -2 \\ 5 \end{pmatrix}$

2. In the diagram below, N is the midpoint of OB and M the midpoint of AC.



- (i) Express \overline{AB} and \overline{AC} in terms of \mathbf{a} , \mathbf{b} and \mathbf{c} .
 - (ii) Express \overline{AM} in terms of \mathbf{a} and \mathbf{c} .
 - (iii) Find the position vector of M.
 - (iv) Write \overline{NM} in terms of \mathbf{a} , \mathbf{b} and \mathbf{c} .
 - (v) If N and M coincide, write down an equation connecting \mathbf{a} , \mathbf{b} and \mathbf{c} .
3. The position vectors of A, B and C in the parallelogram ABCD are \mathbf{a} , \mathbf{b} , and \mathbf{c} respectively. Find the position vector of D.
4. Points A(2, 3), B(5, 7) and C(12, 8) are the vertices of a triangle. The midpoint of AB is L and the midpoint of BC is M.
- (i) Find the position vectors of L and M.
 - (ii) Find \overline{AC} and \overline{LM}
 - (iii) Find the lengths of AC and LM.
 - (iv) What do you notice about these two lines?