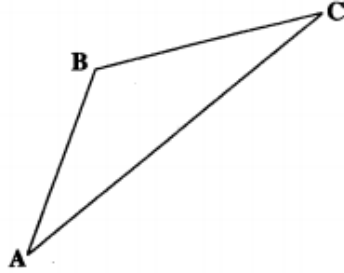


Question1

- (a) In triangle ABC , not drawn to scale, P and Q are the mid-points of AB and BC respectively.



- (i) Make a sketch of the diagram and show the points P and Q . (1 mark)
- (ii) Given that $\vec{AB} = 2\mathbf{x}$ and $\vec{BC} = 3\mathbf{y}$, write, in terms of \mathbf{x} and \mathbf{y} , an expression for
- a) \vec{AC} (1 mark)
- b) \vec{PQ} (2 marks)
- (iii) Hence show that $\vec{PQ} = \frac{1}{2}\vec{AC}$ (2 marks)

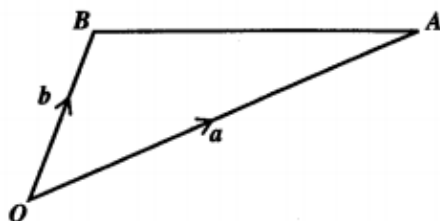
- (b) The position vectors of the points R , S and T relative to the origin are

$$\vec{OR} = \begin{pmatrix} 3 \\ 4 \end{pmatrix} \quad \vec{OS} = \begin{pmatrix} -1 \\ 6 \end{pmatrix} \quad \vec{OT} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$$

- (i) Express in the form $\begin{pmatrix} a \\ b \end{pmatrix}$ the vectors
- a) \vec{RT}
- b) \vec{SR} (4 marks)
- (ii) a) The point F is such that $RF = FT$. Use a vector method to determine the position vector of F .
- b) Hence, state the coordinates of F . (5 marks)

Question 2

The position vectors of A and B relative to the origin are \mathbf{a} and \mathbf{b} respectively.



The point P is on OA such that $OP = 2PA$.

The point M is on BA such that $BM = MA$.

(a) Copy the diagram and complete it to show the points of P and M . (2 marks

(b) OB is produced to N such that $OB = BN$.

(i) Show the position of N on your diagram. (1 mark

(ii) Express in terms of \mathbf{a} and \mathbf{b} the vectors \vec{AB} , \vec{PA} and \vec{PM} . (5 marks

(c) Use a vector method to prove that P , M and N are collinear. (4 marks

(d) Calculate the length of AN if

$$\mathbf{a} = \begin{pmatrix} 6 \\ 2 \end{pmatrix} \text{ and } \mathbf{b} = \begin{pmatrix} 1 \\ 2 \end{pmatrix} \quad (3 \text{ marks})$$