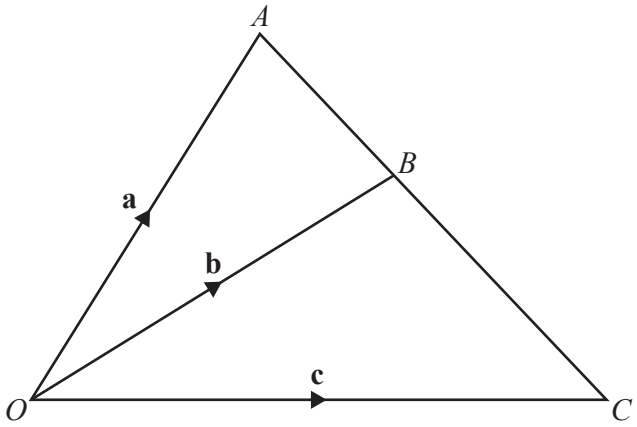
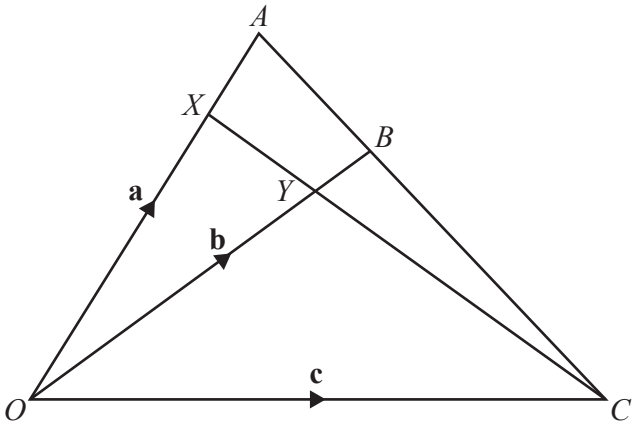
11



The diagram shows a triangle OAC. The point B lies on AC such that $AB : AC = 2 : 5$. It is given that $\overrightarrow{OA} = \mathbf{a}$, $\overrightarrow{OB} = \mathbf{b}$ and $\overrightarrow{OC} = \mathbf{c}$.

(a) Show that $5\mathbf{b} - 3\mathbf{a} = 2\mathbf{c}$. [4]



The diagram now includes points X and Y, such that $\overrightarrow{OX} = \frac{3}{4}\overrightarrow{OA}$ and $\overrightarrow{OY} = m\overrightarrow{OB}$, where m is a constant. It is also given that $XY : XC = \lambda : 1$, where λ is a constant.

(b) Using **part (a)**, find $\overrightarrow{XC}$ in terms of **a** and **b**. [2]

(c) Hence find the values of m and λ. [4]

12 **(a)** Show that $\frac{1}{\text{cosec}\,\theta - 1} + \frac{1}{\text{cosec}\,\theta + 1} = 2\sin\theta\sec^2\theta$. [3]

(b) Hence solve the equation $\frac{1}{\text{cosec}\,2\phi - 1} + \frac{1}{\text{cosec}\,2\phi + 1} = 4\sin 2\phi$, for $-90° \leqslant \phi \leqslant 90°$. [6]

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