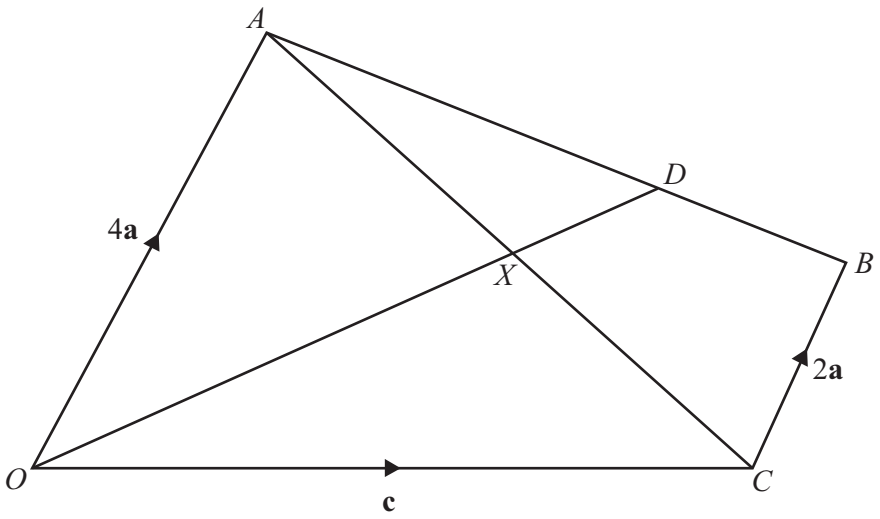
8 The straight line $y = 2x + 1$ intersects the curve $y + xy + 3x^2 = 15$ at the points A and B. The point C with coordinates $\left(\frac{21}{10}, k\right)$ lies on the perpendicular bisector of AB.

(a) Find the exact value of k. [8]

(b) The point D lies on the perpendicular bisector of AB such that its perpendicular distance from AB is twice that of the point C from AB. Find the possible coordinates of D. [4]

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The diagram shows the trapezium $OABC$, where $\overrightarrow{OA} = 4\mathbf{a}$, $\overrightarrow{OC} = \mathbf{c}$, and $\overrightarrow{CB} = 2\mathbf{a}$. The point D lies on AB such that $AD : DB = 2 : 1$. The point X is the point of intersection of the lines OD and AC. It is given that $\overrightarrow{AX} = \lambda\overrightarrow{AC}$ and $\overrightarrow{OX} = \mu\overrightarrow{OD}$.

Find in terms of **a** and **c**

(a) $\overrightarrow{AB}$ [1]

(b) $\overrightarrow{OD}$. [2]

(c) Find $\overrightarrow{OX}$ in terms of **a**, **c** and μ. [1]

(d) Find $\overrightarrow{AX}$ in terms of **a**, **c** and λ. [2]

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