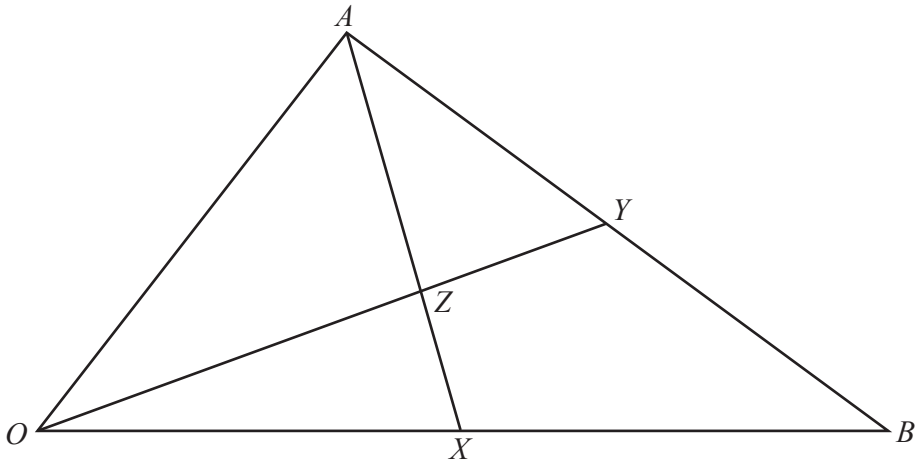
11



In the triangle OAB, $\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$. The mid-point of the line OB is X, and the mid-point of the line AB is Y. The lines OY and AX intersect at the point Z. It is given that $\overrightarrow{AZ} = \lambda\overrightarrow{AX}$ and $\overrightarrow{OZ} = \mu\overrightarrow{OY}$ where λ and μ are rational numbers.

(a) Find $\overrightarrow{OZ}$ in terms of **a**, **b** and λ. [3]

(b) Find $\overrightarrow{OZ}$ in terms of **a**, **b** and μ. [2]

© UCLES 2023

(c) Find the values of λ and μ. [3]

(d) Hence find $\overrightarrow{OZ}$ in terms of **a** and **b** only. [1]

Question 12 is printed on the next page.

12 A curve has equation $y = \frac{\sqrt{5x-2}}{x-3}$.

(a) Explain why the curve does not exist when $x < \frac{2}{5}$. [1]

(b) Show that $\frac{\mathrm{d}y}{\mathrm{d}x}$ can be written in the form $\frac{-(Ax+B)}{2(x-3)^2\sqrt{5x-2}}$, where A and B are positive integers. [5]

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge Assessment International Education Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cambridgeinternational.org after the live examination series.

Cambridge Assessment International Education is part of Cambridge Assessment. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which is a department of the University of Cambridge.

© UCLES 2023