

STEP II, 2018, Q7

- 7 The points O , A and B are the vertices of an acute-angled triangle. The points M and N lie on the sides OA and OB respectively, and the lines AN and BM intersect at Q . The position vector of A with respect to O is \mathbf{a} , and the position vectors of the other points are labelled similarly.

Given that $|MQ| = \mu|QB|$, and that $|NQ| = \nu|QA|$, where μ and ν are positive and $\mu\nu < 1$, show that

$$\mathbf{m} = \frac{(1 + \mu)\nu}{1 + \nu} \mathbf{a}.$$

The point L lies on the side OB , and $|OL| = \lambda|OB|$. Given that ML is parallel to AN , express λ in terms of μ and ν .

What is the geometrical significance of the condition $\mu\nu < 1$?



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