

STEP II, 2003, Q5

- 5 The position vectors of the points A , B and P with respect to an origin O are $a\mathbf{i}$, $b\mathbf{j}$ and $l\mathbf{i} + m\mathbf{j} + n\mathbf{k}$, respectively, where a , b , and n are all non-zero. The points E , F , G and H are the midpoints of OA , BP , OB and AP , respectively. Show that the lines EF and GH intersect.

Let D be the point with position vector $d\mathbf{k}$, where d is non-zero, and let S be the point of intersection of EF and GH . The point T is such that the mid-point of DT is S . Find the position vector of T and hence find d in terms of n if T lies in the plane OAB .



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