



In the diagram, $OABCDEFG$ is a cuboid in which $OA = 2$ units, $OC = 4$ units and $OG = 2$ units. Unit vectors \mathbf{i} , \mathbf{j} and \mathbf{k} are parallel to OA , OC and OG respectively. The point M is the midpoint of DF . The point N on AB is such that $AN = 3NB$.

- (a) Express the vectors \overrightarrow{OM} and \overrightarrow{MN} in terms of \mathbf{i} , \mathbf{j} and \mathbf{k} . [3]

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- (b) Find a vector equation for the line through M and N . [2]

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