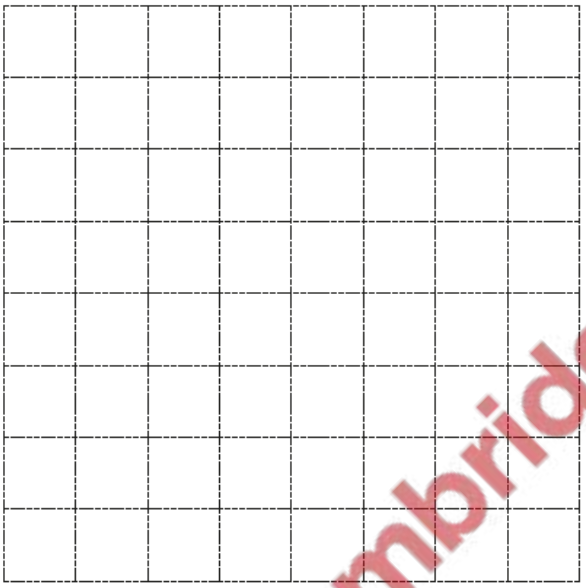
Vectors in two dimensions – 2022 O Level Math D

1. June/2022/Paper_11/No.16

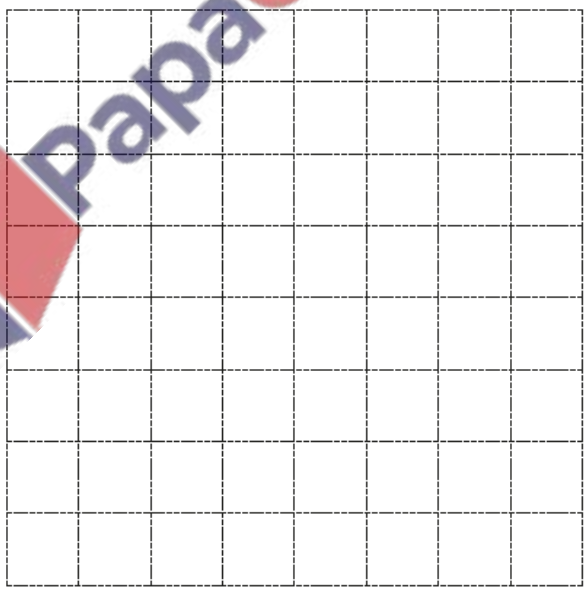
$$\mathbf{p} = \begin{pmatrix} 2 \\ 3 \end{pmatrix} \qquad \mathbf{q} = \begin{pmatrix} -3 \\ 2 \end{pmatrix}$$

(a) On the unit grid below, draw and label vector **p**.



[1]

(b) On the unit grid below, draw and label vector **2q**.



[1]

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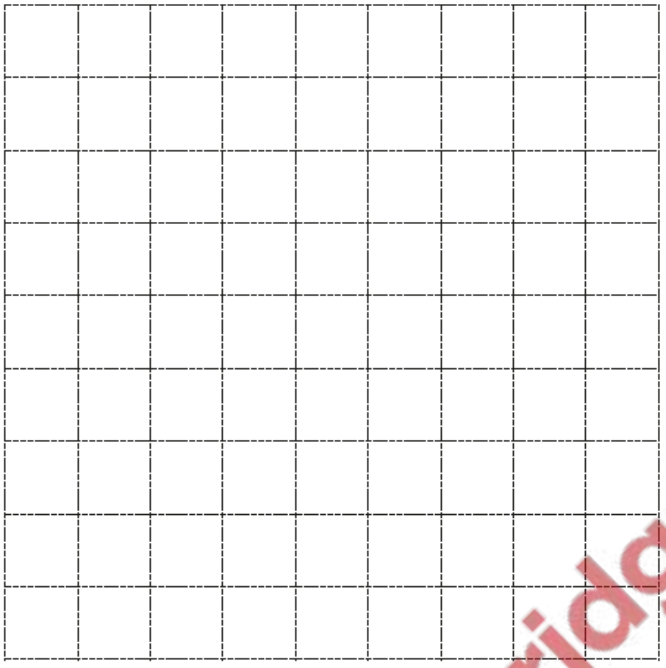
(c) On the unit grid below, draw and label vector $\mathbf{p} - \mathbf{q}$.



[2]

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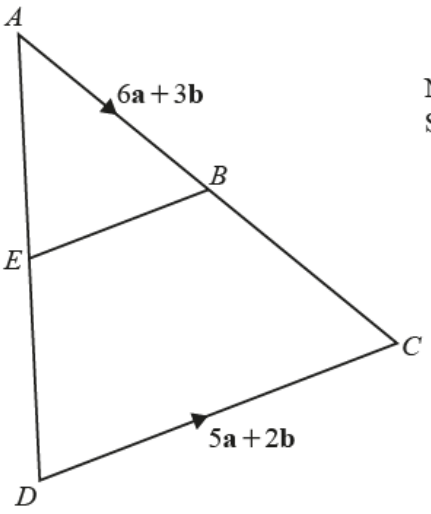
2. June/2022/Paper_11/No.25



NOT TO SCALE

In triangle ACD, B is the midpoint of AC and E is the midpoint of AD.
$\overrightarrow{AB} = 6\mathbf{a} + 3\mathbf{b}$ and $\overrightarrow{DC} = 5\mathbf{a} + 2\mathbf{b}$.

(a) Express, as simply as possible, in terms of **a** and **b**.

(i) $\overrightarrow{AC}$

$\overrightarrow{AC}$ = ... [1]

(ii) $\overrightarrow{AD}$

$\overrightarrow{AD}$ = ... [2]

(b) Show that $\overrightarrow{EB}$ is parallel to $\overrightarrow{DC}$.

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..... [3]

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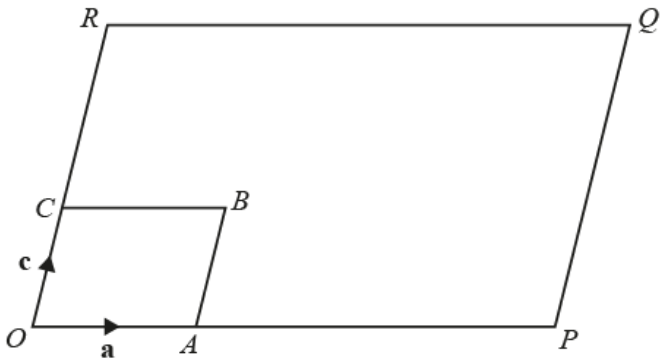
3. June/2022/Paper_12/No.25



NOT TO SCALE

$OABC$ and $OPQR$ are parallelograms.
A is a point on OP and C is a point on OR.
$\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OC} = \mathbf{c}$.
$OA : OP = 1 : 4$ and $OC : CR = 2 : 3$.

(a) Find $\overrightarrow{OR}$ in terms of $\mathbf{c}$.

$\overrightarrow{OR}$ = ... [1]

(b) Find $\overrightarrow{CQ}$, as simply as possible, in terms of $\mathbf{a}$ and $\mathbf{c}$.

$\overrightarrow{CQ}$ = ... [2]

(c) Find the ratio area $OABC$: area $OPQR$.

..... : ..... [1]

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