Vectors

Question Paper 8

Level	IGCSE
Subject	Maths (0580)
Exam Board	Cambridge International Examinations (CIE)
Paper Type	Extended
Topic	Matrices and Transformations
Sub-Topic	Vectors
Booklet	Question Paper 8

Time Allowed: **40 minutes**

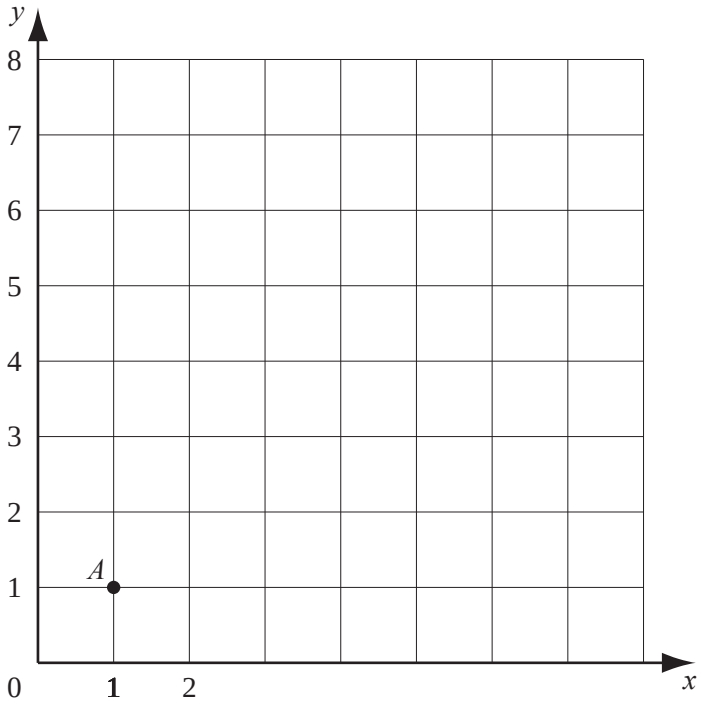
Score: **/33**

Percentage: **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	75%	60%	45%	35%	25%	<25%

1



(a) Using a scale of 1cm to represent 1 unit, draw the vectors

$\overrightarrow{AB} = \begin{pmatrix} 3 \\ 5 \end{pmatrix}$ and $\overrightarrow{BC} = \begin{pmatrix} 4 \\ 0 \end{pmatrix}$ on the grid above. [2]

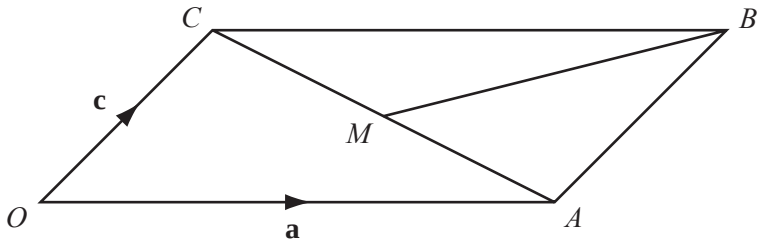
(b) *ABCD* is a parallelogram.
Write down the coordinates of *D*.

Answer(b) (.....,.....) [2]

(c) Calculate $|\overrightarrow{AB}|$.

Answer(c) ..... [2]

2



$OABC$ is a parallelogram. $\overrightarrow{OA}$ = **a**, $\overrightarrow{OC}$ = **c** and M is the mid-point of CA.
Find in terms of **a** and **c**

(a) $\overrightarrow{OB}$,

Answer(a) ..... [1]

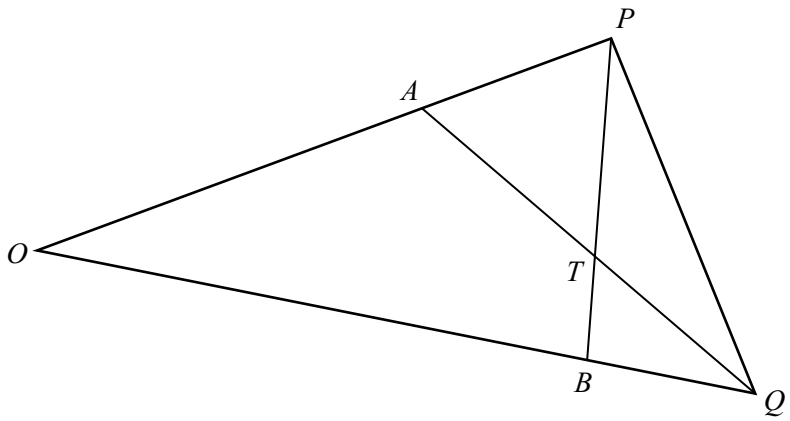
(b) $\overrightarrow{CA}$,

Answer(b) ..... [1]

(c) $\overrightarrow{BM}$.

Answer(c) ..... [2]

3



NOT TO SCALE

In the diagram $OA = \frac{2}{3}OP$ and $OB = \frac{3}{4}OQ$.
$\overrightarrow{OP} = \mathbf{p}$ and $\overrightarrow{OQ} = \mathbf{q}$.

(a) Find in terms of **p** and **q**

(i) $\overrightarrow{AQ}$,

Answer (*a*)(i) $\overrightarrow{AQ}$ = ... [2]

(ii) $\overrightarrow{BP}$.

Answer (*a*)(ii) $\overrightarrow{BP}$ =..... [2]

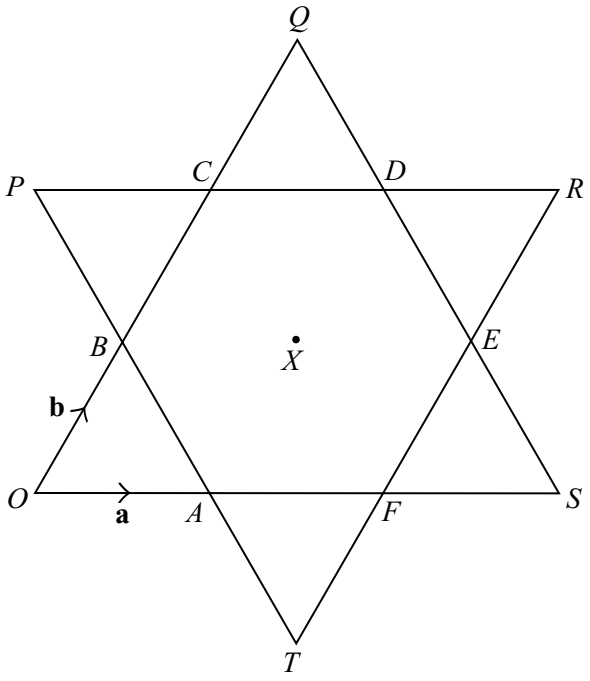
(b) AQ and BP intersect at T.
$BT = \frac{1}{3}BP$.
Find $\overrightarrow{QT}$ in terms of **p** and **q**, in its simplest form.

Answer (*b*) $\overrightarrow{QT}$ = ... [2]

4 $\mathbf{a} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} 5 \\ -1 \end{pmatrix}$ Find $3\mathbf{a} - 2\mathbf{b}$.

Answer $\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [2]

5



A star is made up of a regular hexagon, centre X, surrounded by 6 equilateral triangles.
$\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$.

(a) Write the following vectors in terms of **a** and/or **b**, giving your answers in their simplest form.

(i) $\overrightarrow{OS}$, [1]

(ii) $\overrightarrow{AB}$, [1]

(iii) $\overrightarrow{CD}$, [1]

(iv) $\overrightarrow{OR}$, [2]

(v) $\overrightarrow{CF}$. [2]

(b) When $|\mathbf{a}| = 5$, write down the value of

(i) $|\mathbf{b}|$, [1]

(ii) $|\mathbf{a} - \mathbf{b}|$. [1]

(c) Describe fully a single transformation which maps

(i) triangle OBA onto triangle OQS, [2]

(ii) triangle OBA onto triangle RDE, with O mapped onto R and B mapped onto D. [2]

(d) **(i)** How many lines of symmetry does the star have? [1]

(ii) When triangle OQS is rotated clockwise about X, it lies on triangle PRT, with O on P. Write down the angle of rotation. [1]