Chapter 6

Vectors and transformations

01. 0607_s23_qp_21 Q: 3

(a) Work out $\begin{pmatrix}1\\2\end{pmatrix}-\begin{pmatrix}-5\\3\end{pmatrix}$.

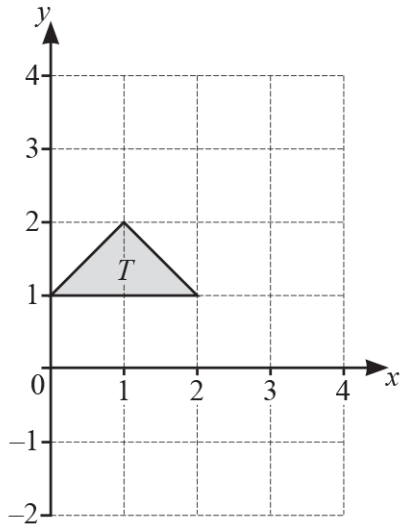
$\begin{pmatrix}\quad\\\quad\end{pmatrix}$ [1]

(b) P is the point $(-3, 6)$.
Q is the point $(0, 2)$.

Find the translation vector that maps the point P onto the point Q.

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

02. 0607_s23_qp_21 Q: 6



Rotate triangle T 90° clockwise about the point (2, 1). [2]

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03. 0607_m22_qp_22 Q: 4

(a) Work out $2\begin{pmatrix}2\\3\end{pmatrix}-\begin{pmatrix}-3\\5\end{pmatrix}$.

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

(b) F is the point (5, 7).
The vector that maps F onto the point G is $\begin{pmatrix}-1\\3\end{pmatrix}$.

Find the coordinates of G.

(..... , ...) [1]

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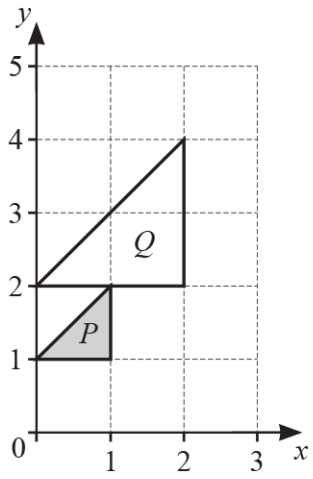
04. 0607_m22_qp_22 Q: 12

(a)

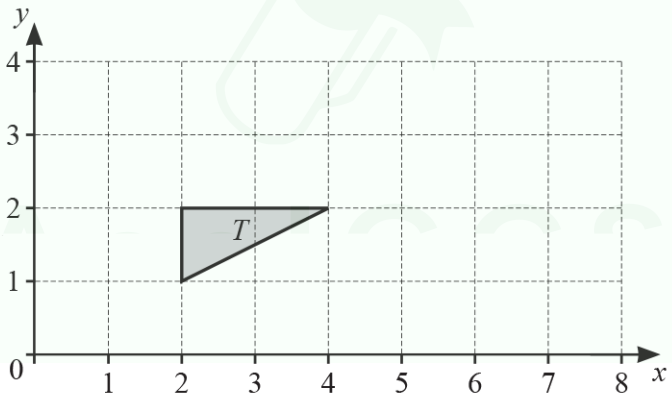


Describe fully the **single** transformation that maps triangle P onto triangle Q.

.....

..... [3]

(b)



Stretch triangle T by a factor of 2 with invariant line $x = 1$. [2]

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05. 0607_s22_qp_21 Q: 2

Work out $4 \times \begin{pmatrix} 6 \\ -2 \end{pmatrix}$.

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

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06. 0607_s22_qp_21 Q: 10

Find the magnitude of the vector $\begin{pmatrix} 2 \\ 6 \end{pmatrix}$.

Give your answer in simplest surd form.

..... [2]

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07. 0607_w22_qp_22 Q: 7

Describe **fully** the inverse of each transformation.

(a) Translation by $\begin{pmatrix} -2 \\ 5 \end{pmatrix}$.

..... [2]

(b) Enlargement with centre (2, 3) and scale factor 2.

.....

..... [2]

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08. 0607_m21_qp_22 Q: 2

Point A (7, 5) is translated to point B (2, 2).

Find the vector that represents this translation.

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

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09. 0607_s21_qp_21 Q: 8

(a) Work out $\begin{pmatrix}12\\-5\end{pmatrix}-5\begin{pmatrix}4\\-1\end{pmatrix}$.

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

(b) Work out the magnitude of $\begin{pmatrix}3\\-4\end{pmatrix}$.

..... [2]

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10. 0607_s20_qp_21 Q: 2

$\mathbf{p}=\begin{pmatrix}3\\-1\end{pmatrix}$ $\mathbf{q}=\begin{pmatrix}1\\-2\end{pmatrix}$

(a) Find $\mathbf{p}+\mathbf{q}$.

$\begin{pmatrix}\quad\\\quad\end{pmatrix}$ [1]

(b) A is the point (2, 7).
The point A is translated to the point B by the vector $\mathbf{p}+\mathbf{q}$.

Find the coordinates of B.

(....., ...) [2]

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11. 0607_w20_qp_21 Q: 8

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

(a) Find $\mathbf{a} - 3\mathbf{b}$.

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

(b) Find the magnitude of $\begin{pmatrix} -4 \\ -3 \end{pmatrix}$.

..... [2]

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12. 0607_s19_qp_22 Q: 3

A is the point (1, 5) and B is the point (6, 2).

Find the column vector $\overrightarrow{AB}$.

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

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13. 0607_s19_qp_23 Q: 10

$\mathbf{a} = \begin{pmatrix} 6 \\ 8 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 2 \\ -8 \end{pmatrix}$

(a) Find $\mathbf{a} - 3\mathbf{b}$.

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

(b) Work out $|\mathbf{a}|$.

..... [2]

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14. 0607_w19_qp_21 Q: 9

$\mathbf{p} = \begin{pmatrix} 12 \\ -5 \end{pmatrix}$

Find

(a) $2\mathbf{p}$,

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(b) $|\mathbf{p}|$.

..... [2]

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15. 0607_w18_qp_22 Q: 4

$\mathbf{p} = \begin{pmatrix} -3 \\ 5 \end{pmatrix}$

(a) Find the column vector $3\mathbf{p}$.

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(b) Find $|\mathbf{p}|$, giving your answer in surd form.

..... [2]

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16. 0607_s17_qp_21 Q: 10

$p = \begin{pmatrix} 6 \\ 3 \end{pmatrix}$

Find $|p|$, giving your answer in the form $3\sqrt{a}$.

..... [2]

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01. 0607_s23_ms_21 Q: 3

Question	Answer	Marks	Partial Marks
(a)	$\begin{pmatrix} 6 \\ -1 \end{pmatrix}$	**1**	
(b)	$\begin{pmatrix} 3 \\ -4 \end{pmatrix}$	**2**	**B1** for $\begin{pmatrix} 3 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ -4 \end{pmatrix}$ If 0 scored, **SC1** for $(3, -4)$

02. 0607_s23_ms_21 Q: 6

Question	Answer	Marks	Partial Marks
	Image at (2, 1), (3, 2), (2, 3)	**2**	**B1** for correct orientation wrong position or for rotation 90° anticlockwise about (2, 1)

03. 0607_m22_ms_22 Q: 4

Question	Answer	Marks	Partial Marks
(a)	$\begin{pmatrix} 7 \\ 1 \end{pmatrix}$	**2**	**B1** for $\begin{pmatrix} 4 \\ 6 \end{pmatrix}$ or $\begin{pmatrix} 7 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ 1 \end{pmatrix}$
(b)	(4, 10)	**1**	

04. 0607_m22_ms_22 Q: 12

Question	Answer	Marks	Partial Marks
(a)	Enlargement [factor] 2 (0, 0) oe	**3**	**B1** for each
(b)	Image at (3, 1), (3, 2), (7, 2)	**2**	**B1** for stretch factor 2 with invariant line $x = k$ or $y = 1$ if 0 scored, **SC1** (3, 1), (3, 2), $(k, 2)$, $k > 4$

05. 0607_s22_ms_21 Q: 2

Question	Answer	Marks	Partial Marks
	$\begin{pmatrix} 24 \\ -8 \end{pmatrix}$	**1**	

06. 0607_s22_ms_21 Q: 10

Question	Answer	Marks	Partial Marks
	$2\sqrt{10}$	**2**	**M1** for $\sqrt{6^2 + 2^2}$ or $\sqrt{40}$

07. 0607_w22_ms_22 Q: 7

Question	Answer	Marks	Partial Marks
(a)	Translation $\begin{pmatrix} 2 \\ -5 \end{pmatrix}$	**2**	**B1** for each
(b)	Enlargement or reduction and centre (2, 3)	**1**	
	Scale factor $\frac{1}{2}$	**1**	

08. 0607_m21_ms_22 Q: 2

Question	Answer	Marks	Partial Marks
	$\begin{pmatrix} -5 \\ -3 \end{pmatrix}$	**2**	**B1** for $\begin{pmatrix} -5 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ -3 \end{pmatrix}$ If 0 scored **SC1** for $\begin{pmatrix} 5 \\ 3 \end{pmatrix}$

09. 0607_s21_ms_21 Q: 8

Question	Answer	Marks	Partial Marks
(a)	$\begin{pmatrix} -8 \\ 0 \end{pmatrix}$	**2**	**B1** for each
(b)	5	**2**	**M1** for $3^2 + (-4)^2$ oe

10. 0607_s20_ms_21 Q: 2

Question	Answer	Marks	Partial Marks
(a)	$\begin{pmatrix} 4 \\ -3 \end{pmatrix}$	**1**	
(b)	(6, 4)	**2**	**FT** *their*(a) **B1** for each coordinate

11. 0607_w20_ms_21 Q: 8

Question	Answer	Marks	Partial Marks
(a)	$\begin{pmatrix}-10\\0\end{pmatrix}$	2	**B1** for each
(b)	5	2	**M1** for $(-4)^2+(-3)^2$ SOI by 25 If 0 scored, **SC1** for –5

12. 0607_s19_ms_22 Q: 3

Question	Answer	Marks	Partial Marks
	$\begin{pmatrix}5\\-3\end{pmatrix}$	2	**B1** for each If 0 scored, **SC1** for $\begin{pmatrix}-3\\5\end{pmatrix}$

13. 0607_s19_ms_23 Q: 10

Question	Answer	Marks	Partial Marks
(a)	$\begin{pmatrix}0\\32\end{pmatrix}$	2	**B1** for $\begin{pmatrix}0\\k\end{pmatrix}$ or $\begin{pmatrix}k\\32\end{pmatrix}$
(b)	10	2	**M1** for 6^2+8^2 soi by 100

14. 0607_w19_ms_21 Q: 9

Question	Answer	Marks	Partial Marks
(a)	$\begin{pmatrix}24\\-10\end{pmatrix}$	1	
(b)	13	2	**M1** for $12^2+(-5)^2$ oe

15. 0607_w18_ms_22 Q: 4

Question	Answer	Marks	Partial Marks
(a)	$\begin{pmatrix}-9\\15\end{pmatrix}$	1	
(b)	$\sqrt{34}$	2	**M1** for $(-3)^2+5^2$ oe

16. 0607_s17_ms_21 Q: 10

Question	Answer	Marks	Part Marks
	$3\sqrt{5}$	2	**M1** for $\sqrt{6^2+3^2}$ or better or **M1** for $a=5$