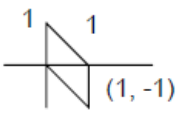
Topic X1 Matrices (Post-TT B) [40] MARKSCHEME

1.

3	(i)		$\frac{1}{2}\begin{pmatrix}1 & -a\\ 0 & 2\end{pmatrix}$ or equivalent	B1 B1 [2]	Both diagonals correct Divide by correct determinant	
3	(ii)	*Either*	$\mathbf{P} = \mathbf{BA}^{-1}$ $\begin{pmatrix}1 & 0\\ 2 & 1-2a\end{pmatrix}$	B1 M1 A1ft [3]	State or use correct expression for **P** Multiplication attempt, 2 elements correct for any pair of matrices Obtain correct answer a.e.f. ft for their **(i)**	
		Or	Using **PA** = **B**	B1 M1 A1	State or find correct 1st column of **P** Multiplication attempt to find "$1 - 2a$" Obtain completely correct answer	

2.

(i) 	M1 A1	 2	For 2 other correct vertices seen, correct direction of shear seen For completely correct diagram, must include scales
(ii) $\begin{pmatrix}1 & 0\\ -1 & 1\end{pmatrix}$	B1 B1	2 **4**	 Each column correct

3.

$\mathbf{A}^2$	B1 M1 A1cao 3 $\boxed{3}$	$(\mathbf{A}^{-1})^{-1} = \mathbf{A}$ seen or implied Use product inverse correctly Obtain correct answer

4.

(i) $a = -6$	M1 A1	 2	Use det **A** = 0 Obtain correct answer
(ii) $\mathbf{A}^{-1} = \frac{1}{a+6}\begin{pmatrix}1 & -3\\ 2 & a\end{pmatrix}$	B1 B1ft		Both diagonals correct Divide by det **A**
$x = \frac{4}{a+6}, y = \frac{2-a}{a+6}$	M1 A1ft A1ft	 5 **7**	Premultiply column by $\mathbf{A}^{-1}$, no other method Obtain correct answers from their $\mathbf{A}^{-1}$

5.

(i) *Either* *Or*	B1 DB1 B1 DB1	2	Reflection, in x-axis Stretch parallel to y-axis, s.f. -1
(ii)	B1 DB1	2	Reflection, in $y = -x$
(iii) $\begin{pmatrix}0 & 1\\ -1 & 0\end{pmatrix}$	B1 B1	2	Each column correct
(iv)	B1B1B1	3 **9**	Rotation, 90°, clockwise about O **S.C. If (iii) incorrect, B1 for identifying their transformation, B1 all details correct**

6.

(i)		$a = -3$ $a + 3$	M1 M1 A1 M1 A1FT [5]	Show correct expansion process for 3×3 Correct evaluation of any 2×2 Obtain correct answer Use det **A** = 0 Obtain correct answer from their det **A**
(ii)		$\frac{1}{a+3}\begin{pmatrix}1 & -1 & 1\\ 7 & a-4 & 1-2a\\ -11 & 8-a & 3a-2\end{pmatrix}$ $\frac{1}{a+3}\begin{pmatrix}2 & 1\\ 2-4a & 7a-1\\ 2 & a+3\end{pmatrix}$	M1 A1 A1 B1 M1 A2 [7]	Show correct processes for adjoint entries Obtain at least 4 correct entries in adjoint Obtain completely correct adjoint Divide adjoint by their det **A** Pre-multiply column matrix by their $\mathbf{A}^{-1}$ Obtain correct answer, A1 for 1 element correct