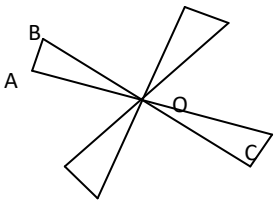


TRANSFORMATIONS

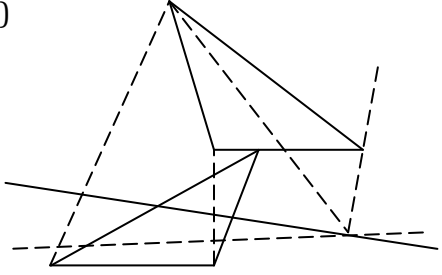
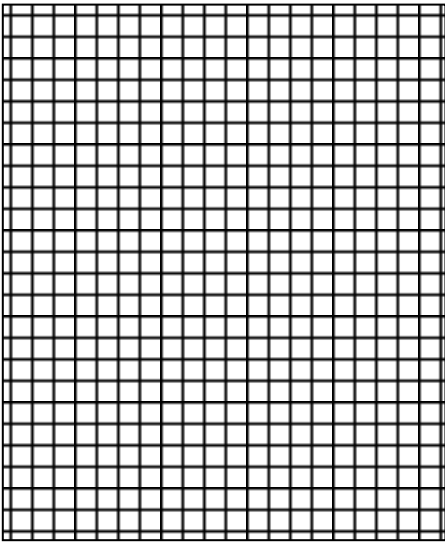
REFLECTION, ROTATION, TRANSLATION, ENLARGEMENT

MARKING SCHEME

1.	(a) Coordinates of S' are (2,5), (-1,4), (1, 8) and (-2,7) and those of S'' are (-4,3), (-1,4), (-5,6) and (-2,7) (b) (i) Translation of $\begin{pmatrix} -11 \\ 3 \end{pmatrix}$ (ii) positive quarter turn about (1,-2) or $+90^\circ$ turn about point (1,-2) 1989Q22	8M
2.	$\begin{pmatrix} 4 \\ 6 \end{pmatrix} - \begin{pmatrix} 0 \\ 2 \end{pmatrix} = \begin{pmatrix} 4 \\ 4 \end{pmatrix}$ $\frac{1}{2} \begin{pmatrix} 4 \\ 4 \end{pmatrix} = \begin{pmatrix} 2 \\ 2 \end{pmatrix}$ $\begin{pmatrix} 0 \\ 2 \end{pmatrix} - \begin{pmatrix} 2 \\ 2 \end{pmatrix} = \begin{pmatrix} -2 \\ 0 \end{pmatrix}$ Centre of enlargement = (-2, 0) 1991Q7	3M
3.	Join A to A' and bisect it Join B to B' and bisect it. Let the bisectors meet at a point O. This is the centre of rotation 1991Q15	3M
4.	Translation = $\begin{pmatrix} 3 \\ 2 \end{pmatrix} - \begin{pmatrix} 0 \\ 1 \end{pmatrix} = \begin{pmatrix} 3 \\ 1 \end{pmatrix}$ $B = \begin{pmatrix} 4 \\ -1 \end{pmatrix} - \begin{pmatrix} 3 \\ 1 \end{pmatrix}$ $= \begin{pmatrix} 1 \\ -2 \end{pmatrix} = B(1,-2)$ 1992Q3	3M
5.	Translation = $\begin{pmatrix} -2 \\ 2 \end{pmatrix} - \begin{pmatrix} 1 \\ 2 \end{pmatrix} = \begin{pmatrix} -3 \\ 0 \end{pmatrix}$ $\begin{pmatrix} -3 \\ -3 \end{pmatrix} - \begin{pmatrix} -3 \\ 0 \end{pmatrix} = \begin{pmatrix} 0 \\ -3 \end{pmatrix}$ $= (0, -3)$ 1995Q6	2M
6.	$\begin{bmatrix} -5 \\ 4 \end{bmatrix} + T \begin{bmatrix} -1 \\ 1 \end{bmatrix}$ $T = \begin{bmatrix} -1 \\ -1 \end{bmatrix} - \begin{bmatrix} -5 \\ 4 \end{bmatrix} = \begin{bmatrix} 4 \\ -5 \end{bmatrix}$ $\begin{bmatrix} -4 \\ 5 \end{bmatrix} + \begin{bmatrix} 4 \\ -5 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$ The image of (-4, 5) is (0,0) 1999Q2	M1 A1 2 mks

7.	 1999Q11													
8.	<table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>A</th> <th>B</th> <th>C</th> <th>A'</th> <th>B'</th> <th>C'</th> </tr> </thead> <tbody> <tr> <td>$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$</td> <td>$\begin{pmatrix} 2 & 4 & 1 \\ 1 & 1 & 6 \end{pmatrix}$</td> <td>$=$</td> <td>$\begin{pmatrix} 1 & 1 & 6 \\ -2 & -4 & 1 \end{pmatrix}$</td> <td></td> <td></td> </tr> </tbody> </table> Co-ordinates of image A' (1, -2), B'(1, -4), C'(1 (6, -1) 2000Q9	A	B	C	A'	B'	C'	$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$	$\begin{pmatrix} 2 & 4 & 1 \\ 1 & 1 & 6 \end{pmatrix}$	$=$	$\begin{pmatrix} 1 & 1 & 6 \\ -2 & -4 & 1 \end{pmatrix}$			M1 M1 A1
A	B	C	A'	B'	C'									
$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$	$\begin{pmatrix} 2 & 4 & 1 \\ 1 & 1 & 6 \end{pmatrix}$	$=$	$\begin{pmatrix} 1 & 1 & 6 \\ -2 & -4 & 1 \end{pmatrix}$											

9.	$\begin{bmatrix} 5 \\ -4 \end{bmatrix} - \begin{bmatrix} 3 \\ 2 \end{bmatrix} = \begin{bmatrix} 2 \\ -6 \end{bmatrix}$ $OQ = \begin{bmatrix} 2 \\ 5 \end{bmatrix} + \begin{bmatrix} 2 \\ -6 \end{bmatrix} = \begin{bmatrix} 4 \\ -1 \end{bmatrix}$ $PQ = \begin{bmatrix} 4 \\ -1 \end{bmatrix} - \begin{bmatrix} 5 \\ -4 \end{bmatrix} = \begin{bmatrix} -1 \\ 3 \end{bmatrix}$ $PQ = \sqrt{(-1)^2 + 3^2} = 10$ 2001Q7	B1 M1 A1 3 mks
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10.	<p>a)</p>  <p><= -600</p> <p>Or 3000 2003Q7</p>	<p>B1 B1 B1 3 mks</p>	<p>14. a) i) Reflection in the line PR or Er ii) Enlargement centre E Scale factor -1 iii) Rotation about pt R Through 90° C - E b) i) R - S C - A ii) R - Q clockwise 2010Q22</p>	<p>B1 B1 B1 B1 B1 B1 B1</p>
11.		3M	<p>15. $T = \begin{pmatrix} 6 \\ -2 \end{pmatrix} - \begin{pmatrix} 4 \\ 1 \end{pmatrix} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$ $OA = \begin{pmatrix} 1 \\ 2 \end{pmatrix} + \begin{pmatrix} 2 \\ -3 \end{pmatrix} = \begin{pmatrix} 3 \\ -1 \end{pmatrix}$ A (3,1) $OB = \begin{pmatrix} 3 \\ 5 \end{pmatrix} + \begin{pmatrix} 2 \\ -3 \end{pmatrix} = \begin{pmatrix} 5 \\ 2 \end{pmatrix}$ $B' = (5, 2)$ 2011Q7</p>	<p>B1 B1 3</p>
12.	<p>a). Reflection on y axis (or line x=0) b). Image of $\Delta P'Q'R'$ of Δpqr c). -ve quarter turn about (0,0) or about origin d). Image of $\Delta'''Q'''R'''$ e). Pair Δs of that are oppositely congruent ΔPQR and $\Delta P''Q''R''$ $\Delta P'Q'R'$ and $\Delta P'''Q'''R'''$ ΔPQR and $\Delta P'Q'R'$ $\Delta P''Q''R''$ and $\Delta P'''Q'''R'''$</p> <p>2006Q18</p>	<p>B2 B2 B2 B2</p>	<p>16. GRAPH</p> <p>(a) OPQR \checkmark drawn (i) O'P'Q'R' \checkmark drawn labelled Perpendicular bisectors \checkmark drawn (atleast 2)</p> <p>(ii) Centre of rotation (0, -1) Angle of rotation -90° Line of reflection x = y drawn</p> <p>(b) Quadrilateral O''P''Q''R'' Directly congruent quads: OPQR and O'P'Q'R'</p> <p>(c) (i) Oppositely congruent quads: OPQR and O''P''Q''R'' (ii) O'P'Q'R' and O''P''Q''R''</p> <p>2012Q21</p>	<p>B1 B1 B1 B1 B1 B1 10</p>
13.	 <p>2008Q21</p>	<p>B2 B2 B2 B2 B1 B1 10 marks</p>		

