Question Number	Scheme	Notes	Marks
2	$\mathbf{P}=\begin{pmatrix}0 & 1\\ -1 & 0\end{pmatrix}$ $\mathbf{Q}=\begin{pmatrix}5 & 0\\ 0 & 5\end{pmatrix}$ Condone any brackets (or missing brackets) for matrices throughout		
(a)	Rotation...	Identifies the transformation as a rotation. Allow any reasonable attempt at this word e.g., "rotate". M0 for a combination of transformations or if any different types of transformation are given as alternatives. Note that giving an angle does not imply "rotation".	M1
	...(anti-clockwise) of $\frac{3\pi}{2}$ $(270°)$ or **clockwise** of $\frac{\pi}{2}$ $(90°)$ about/around/from (etc.) O Correct full description for the rotation, including angle & direction (if no direction is stated then assume anticlockwise is meant) and **any** mention of origin or O or (0, 0). Condone "original" for "origin". Accept in degrees (symbol not required) or exact radians. {Note also that $-\frac{\pi}{2}$ $(-90°)$ or $-\frac{3\pi}{2}$ $(-270°)$ **clockwise** are acceptable}		A1
			(2)
(b)	Enlargement...	Identifies the transformation as an enlargement. Allow any reasonable attempt at this word e.g., "inlarge", "large". **Nothing else** so e.g. "stretch" is M0. M0 for a combination of transformations or if any different types of transformation are given as alternatives.	M1
	...of scale factor/factor/scale/size 5, centre/from (etc.) O	Correct full description for the enlargement including scale factor and centre. Allow **any** mention of "5" and **any** mention of origin, O or (0, 0) Condone "original" for "origin".	A1
			(2)
(c)	$\{\mathbf{R}=\}\begin{pmatrix}0 & -1\\ -1 & 0\end{pmatrix}$	Correct matrix	B1
			(1)
(d)	$\left\{\begin{pmatrix}0 & -1\\ -1 & 0\end{pmatrix}\begin{pmatrix}4\\ 3\end{pmatrix}=\right\}$ $(-3,-4)$	Correct coordinates for A. Brackets may be missing. May be stated as $x = \ldots, y = \ldots$ Condone answer given as a vector. Isw if necessary. Score B0 if an incorrect **R** has clearly been used in this part. Allow if correct answer comes from multiplying the wrong way round. No ft.	B1
			(1)

Question Number	Scheme	Notes	Marks
2(e)	$\mathbf{P}=\begin{pmatrix}0 & 1\\ -1 & 0\end{pmatrix}$ $\mathbf{Q}=\begin{pmatrix}5 & 0\\ 0 & 5\end{pmatrix}$		
	For either mark there must be no clear evidence of use of an incorrect method or matrix in this part e.g., using their matrix **R** for the reflection in part (c), i.e, sight of their $\begin{pmatrix}0 & -1\\ -1 & 0\end{pmatrix}$ even if this is labelled as **P**. **Do not allow confusion between their** $A(-3,-4)$ **and the given point** (4, 3) **and there are no marks if a matrix or point has been miscopied/misread even if it is restated in this part. This also applies if there is an incorrect** A **in (d) but it is miscopied into the correct** $(-3,-4)$**.** Both marks can be scored from minimal or no working.		
	$\left(\frac{4}{5},...\right)$ or $(0.8,...)$ or $\left(...,-\frac{3}{5}\right)$ or $(...,-0.6)$ or $\left(-\frac{"-4"[y]}{5},\frac{"-3"[x]}{5}\right)$ For **one** correct coordinate or ft non-zero coordinate on their $A(-3,-4)$ but must not use (4, 3) even if that is their answer for A from part (d). Examples of follow throughs are: $(-4,-3)\to\left(\frac{3}{5},-\frac{4}{5}\right)$ $(-4,3)\to\left(-\frac{3}{5},-\frac{4}{5}\right)$ $(4,-3)\to\left(\frac{3}{5},\frac{4}{5}\right)$ $(-3,4)\to\left(-\frac{4}{5},-\frac{3}{5}\right)$ $(3,-4)\to\left(\frac{4}{5},\frac{3}{5}\right)$ $(3,4)\to\left(-\frac{4}{5},\frac{3}{5}\right)$ May be stated as $x=\ldots$ / $y=\ldots$ and condone if given without brackets or as a vector but do not condone a correct value seen within e.g., a 2 x 2 matrix		M1
	$\{B:\}\left(\frac{4}{5},-\frac{3}{5}\right)$ or $(0.8,-0.6)$ only Both correct coordinates. Not ft. May be stated as $x=\ldots$, $y=\ldots$ and condone if given without brackets or as a vector. Isw if necessary.		A1
	Examples of working: Do not allow confusion between their $A(-3,-4)$ and the given point (4, 3) Using matrices (Note that the matrices can be applied in either order with these two transformations): $\begin{pmatrix}5 & 0\\ 0 & 5\end{pmatrix}\begin{pmatrix}0 & 1\\ -1 & 0\end{pmatrix}\begin{pmatrix}x\\ y\end{pmatrix}=\begin{pmatrix}0 & 5\\ -5 & 0\end{pmatrix}\begin{pmatrix}x\\ y\end{pmatrix}=\begin{pmatrix}-3\\ -4\end{pmatrix}$ or $\begin{pmatrix}5 & 0\\ 0 & 5\end{pmatrix}\begin{pmatrix}y\\ -x\end{pmatrix}=\begin{pmatrix}-3\\ -4\end{pmatrix}\Rightarrow 5y=-3,\ -5x=-4\Rightarrow\left(\frac{4}{5},-\frac{3}{5}\right)$ $\begin{pmatrix}0 & 1\\ -1 & 0\end{pmatrix}\begin{pmatrix}5 & 0\\ 0 & 5\end{pmatrix}\begin{pmatrix}x\\ y\end{pmatrix}=\begin{pmatrix}0 & 5\\ -5 & 0\end{pmatrix}\begin{pmatrix}x\\ y\end{pmatrix}=\begin{pmatrix}-3\\ -4\end{pmatrix}$ or $\begin{pmatrix}0 & 1\\ -1 & 0\end{pmatrix}\begin{pmatrix}5x\\ 5y\end{pmatrix}=\begin{pmatrix}-3\\ -4\end{pmatrix}\Rightarrow 5y=-3,\ -5x=-4\Rightarrow\left(\frac{4}{5},-\frac{3}{5}\right)$ Using inverse: $\begin{pmatrix}x\\ y\end{pmatrix}=\begin{pmatrix}0 & 5\\ -5 & 0\end{pmatrix}^{-1}\begin{pmatrix}-3\\ -4\end{pmatrix}=\frac{1}{25}\begin{pmatrix}0 & -5\\ 5 & 0\end{pmatrix}\begin{pmatrix}-3\\ -4\end{pmatrix}$ or $\begin{pmatrix}0 & -\frac{1}{5}\\ \frac{1}{5} & 0\end{pmatrix}\begin{pmatrix}-3\\ -4\end{pmatrix}\Rightarrow\left(\frac{4}{5},-\frac{3}{5}\right)$ Using the actual transformations: $(-3,-4)\Rightarrow\left(-\frac{3}{5},-\frac{4}{5}\right)\Rightarrow\left(\frac{4}{5},-\frac{3}{5}\right)$ or $(-3,-4)\Rightarrow(4,-3)\Rightarrow\left(\frac{4}{5},-\frac{3}{5}\right)$		
			(2)
			Total 8