Question Number	Scheme	Marks
3	$\mathbf{BAB}=\mathbf{I} \qquad \mathbf{B}=\begin{pmatrix} 3 & k \\ -4 & -2k \end{pmatrix}$	
(a)	$\mathbf{B}^{-1}\mathbf{BABB}^{-1}=\mathbf{B}^{-1}\mathbf{IB}^{-1} \Rightarrow \mathbf{A}=\mathbf{B}^{-1}\mathbf{B}^{-1}$	B1*
		(1)
(b)	$\det\mathbf{B}\ (=-6k+4k)=-2k$	B1
	$\text{Adj}(\mathbf{B})=\begin{pmatrix} -2k & -k \\ 4 & 3 \end{pmatrix}$	B1
	$\mathbf{A}=\mathbf{B}^{-1}\mathbf{B}^{-1}=\left(-\frac{1}{2k}\right)\begin{pmatrix} -2k & -k \\ 4 & 3 \end{pmatrix}\left(-\frac{1}{2k}\right)\begin{pmatrix} -2k & -k \\ 4 & 3 \end{pmatrix}=\ldots$	M1
	$\frac{1}{4k^2}\begin{pmatrix} 4k^2-4k & 2k^2-3k \\ -8k+12 & -4k+9 \end{pmatrix}$ or $\begin{pmatrix} 1-\frac{1}{k} & \frac{1}{2}-\frac{3}{4k} \\ \frac{3}{k^2}-\frac{2}{k} & \frac{9}{4k^2}-\frac{1}{k} \end{pmatrix}$ oe	A1
		(4)
		Total 5

Notes

(a)

B1*: Correct proof. Minimum as shown. May be done in stages but the multiplications must be on consistent sides in such cases. The $\mathbf{B}^{-1}\mathbf{B}$ and $\mathbf{BB}^{-1}$ must be seen or explained.

(b)

B1: $\det\mathbf{B}=-2k$ must be simplifed but may be implied.

B1: Correct Adj(**B**). Ignore any incorporated determinant.

M1: Attempts $\mathbf{B}^{-1}\mathbf{B}^{-1}$ with their $\mathbf{B}^{-1}=\frac{1}{\text{their}\det\mathbf{B}}\begin{pmatrix}\text{changed}\\ \text{matrix}\end{pmatrix}$ using row by column multiplication (evidenced in at least two entries). Note they may start with this line.

A1: Correct **A** from correct work. Any equivalent and isw any incorrect simplifications. Condone missing closing bracket.

SC if $\frac{1}{\det\mathbf{B}}$ in a stated formula becomes $-2k$ in error, treat this as a correct determinant but incorrect application of the determinant for B1B1M0A0.

Alt: May find $\mathbf{B}^2$ first and then find the inverse of this. Allow B1 for correct squared matrix $\begin{pmatrix} 9-4k & 3k-2k^2 \\ -12+8k & -4k+4k^2 \end{pmatrix}$, B1ft for correct unsimpllfied determinant of their squared matrix $(9-4k)(4k^2-4k)-(12-8k)(2k^2-3k)$, M1 for correct attempt at inverse and A1 for correct answer $\frac{1}{(9-4k)(4k^2-4k)-(12-8k)(2k^2-3k)}\begin{pmatrix} -4k+4k^2 & -3k+2k^2 \\ 12-8k & 9-4k \end{pmatrix}$. May see some unsimplified discriminants this method.