Question	Scheme	Marks	AOs
4(a)	$-4k+2+20-21+7k$ or $3+3k-2$ or $7k-4-19+24-4k$ or $3k+1$	M1	1.1b
	$\{1+3k=3k+c\}$ $\Rightarrow c=1$	A1	1.1b
		(2)	
(b)	$3k+1=0\Rightarrow k=\ldots$ Or Attempts the determinant and sets = 0 leading to a value for k	M1	1.1b
	$\Rightarrow k=-\frac{1}{3}$	A1ft	1.1b
		(2)	
(c)	$\left\{\mathbf{A}^{-1}\right\}=\frac{1}{3k+1}\begin{pmatrix}4k-2 & 1 & 7k-4\\ -10 & 3 & -19\\ 3-k & -1 & 6-k\end{pmatrix}$	B1ft	2.2a
		(1)	
(d)	$\begin{pmatrix}x\\y\\z\end{pmatrix}=\frac{1}{3k+1}\begin{pmatrix}4k-2 & 1 & 7k-4\\ -10 & 3 & -19\\ 3-k & -1 & 6-k\end{pmatrix}\begin{pmatrix}10\\3\\1\end{pmatrix}=\ldots$	M1	1.2
	$\left(\frac{47k-21}{3k+1},\ -\frac{110}{3k+1},\ \frac{33-11k}{3k+1}\right)$	A1 A1	1.1b 1.1b
		(3)	
			(8 marks)

Notes

(a)

M1: Calculates one of the elements of the leading diagonal of **AB**, condone sign slips

A1: Sets diagonal = $3k + c$ and deduces the correct value for c. Award for sight of $3k + 1$

(b)

M1: Attempts to solve $3k+"1"=0$ or attempts the determinant, condone sign slips in the minors, and sets = 0 leading to a value for k

A1ft: Correct value or follow through their value for c so allow for $k=-\frac{c}{3}$

(c)

B1ft: Deduces the correct inverse matrix. Follow through their c so allow for $\frac{1}{3k+c}\mathbf{B}$ or if found determinant $\frac{1}{\text{their det}}\mathbf{B}$

(d)

M1: Complete method to find the values of x, y and z using their inverse matrix

A1: At least one correct coordinate simplified or unsimplified.
A1: All coordinates correct and simplified. Condone as a column vector. Does not need to be written as a coordinate.

SC If candidate writes $\frac{1}{3k+1}\begin{pmatrix} 4k-2 & 1 & 7k-4 \\ -10 & 3 & -19 \\ 3-k & -1 & 6-k \end{pmatrix}\begin{pmatrix} 10 \\ 3 \\ 1 \end{pmatrix}$ but ends up with **at least one of**

$x = 47k - 21$, $y = -110$, $z = 33 - 11k$ scores M1 A1 A0