Question Number	Scheme	Notes	Marks
3(a)	3	Correct value seen in (a)	B1
			(1)
(b)	$\begin{pmatrix}-2 & 5 & 0\\ 5 & 1 & -3\\ 0 & -3 & 6\end{pmatrix}\begin{pmatrix}x\\ y\\ z\end{pmatrix}=\begin{pmatrix}8x\\ 8y\\ 8z\end{pmatrix}\Rightarrow\begin{matrix}-2x+5y=8x\\ 5x+y-3z=8y\\ -3y+6z=8z\end{matrix}\Rightarrow\begin{pmatrix}x\\ y\\ z\end{pmatrix}=...$ Correct method for the eigenvector (making a variable equal to 0 is not a correct method)		M1
	$\begin{pmatrix}x\\ y\\ z\end{pmatrix}=\begin{pmatrix}1\\ 2\\ -3\end{pmatrix}$	Any correct eigenvector	A1
			(2)
(c)	$\left\|\mathbf{M}-\lambda\mathbf{I}\right\|=\begin{vmatrix}-2-\lambda & 5 & 0\\ 5 & 1-\lambda & -3\\ 0 & -3 & 6-\lambda\end{vmatrix}=0$ $\Rightarrow(-2-\lambda)\left[(1-\lambda)(6-\lambda)-9\right]-5\left[5(6-\lambda)\right]=0\Rightarrow\lambda=...$ NB CE is $\lambda^3-5\lambda^2-42\lambda+144=0$ but may only find the constant term		M1
	$\lambda=-6$	Correct third eigenvalue The work for these 2 marks may be seen in (a) – award them Correct third eigenvalue by a different method – send to review	A1
	$\mathbf{D}=\begin{pmatrix}3 & 0 & 0\\ 0 & 8 & 0\\ 0 & 0 & -6\end{pmatrix}$	Correct **D** following through their third eigenvalue	A1ft
	$\begin{pmatrix}-2 & 5 & 0\\ 5 & 1 & -3\\ 0 & -3 & 6\end{pmatrix}\begin{pmatrix}x\\ y\\ z\end{pmatrix}=\begin{pmatrix}-6x\\ -6y\\ -6z\end{pmatrix}\Rightarrow\begin{matrix}-2x+5y=-6x\\ 5x+y-3z=-6y\\ -3y+6z=-6z\end{matrix}\Rightarrow\begin{pmatrix}x\\ y\\ z\end{pmatrix}=\left(\begin{pmatrix}-5\\ 4\\ 1\end{pmatrix}\right)$ Correct strategy for 3rd eigenvector		M1
	$\mathbf{P}=\begin{pmatrix}\frac{1}{\sqrt{3}} & \frac{1}{\sqrt{14}} & -\frac{5}{\sqrt{42}}\\ \frac{1}{\sqrt{3}} & \frac{2}{\sqrt{14}} & \frac{4}{\sqrt{42}}\\ \frac{1}{\sqrt{3}} & -\frac{3}{\sqrt{14}} & \frac{1}{\sqrt{42}}\end{pmatrix}$	Fully correct matrix consistent with their **D** May have $\frac{\sqrt{3}}{3}$ etc	A1
			(5)
			Total 8