3x3 Matrix Transformations Exam Questions MS

Q1, (OCR MEI Y410, Practice Paper Set 1, Q5)

(i)		$\mathbf{M}_1 = \begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	**B1** **[1]**	**1.1**
(ii)		Rotation of 180° about the x-axis	**B1** **[1]**	**1.1**
(iii)	(A)	$\det \mathbf{M}_1 = -1$ $\det \mathbf{M}_2 = 1$	**B1ft** **B1** **[2]**	**1.1** **1.1**
(iii)	(B)	Both transformations preserve volume Reflection changes orientation	**B1** **B1** **[2]**	**2.4** **2.4**
(iv)	(A)	$\mathbf{M}_1\mathbf{M}_2 = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	**B1** **[1]**	**1.1**
(iv)	(B)	Reflection in $z = 0$	**B1** **B1** **[2]**	**1.1** **1.1**

Q2, (OCR Y531/01, Practice Paper Set 2, Q5)

(i)		-1	**B1**	1.2	
			[1]		
(ii)		$a^2 = -1$	**M1**	2.2a	
		$a = \pm i$	**A1**	1.1	
			[2]		
(iii)		R lies in the x-z plane.	**E1**	2.2a	Or plane $y = 0$
			[1]		
(iv)		1	**B1**	1.2	
			[1]		
(v)		$\det \mathbf{B} = 0.6^2 + b^2 = 1$	**M1**	2.2a	
		$b = \pm 0.8$	**A1**	1.1	
			[2]		