Question	Answer	Marks	Partial Marks
6(a)	4cos75**i** + 4sin75**j** or 4sin15**i** + 4cos15**j** or 4sin15**i** + 4sin75**j** or 4cos75**i** + 4cos15**j** oe, isw	**B2**	**B1** for $x = 4\cos 75$ or $x = 4\sin 15$ oe, soi or $y = 4\sin 75$ or $y = 4\cos 15$ oe, soi or **B1** for a correct pair of implicit statements for x and y e.g. **both** $\frac{x}{4} = \sin 15$ **and** $\frac{y}{4} = \cos 15$ oe or **both** $\frac{x}{4} = \cos 75$ **and** $\frac{y}{4} = \sin 75$ oe If 0 scored, **SC1** for a correct expression with missing brackets such as $\sqrt{6} - \sqrt{2}\mathbf{i} + \sqrt{6} + \sqrt{2}\mathbf{j}$ or for $\begin{pmatrix} 1.04 \\ 3.86 \end{pmatrix}$ oe

Question	Answer	Marks	Partial Marks
6(b)	$(-6\cos30-2\cos40)\mathbf{i}+(6\sin30-2\sin40)\mathbf{j}$ or $(-6\sin60-2\sin50)\mathbf{i}+(6\sin30-2\sin40)\mathbf{j}$ or $(-6\cos30-2\cos40)\mathbf{i}+(6\cos60-2\cos50)\mathbf{j}$ or $(-3\sqrt{3}-1.532...)\mathbf{i}+(3-1.285...)\mathbf{j}$ oe, soi	**B1**	
	$\left[r^2=\right](-6.7282...)^2+(1.7144...)^2$	**M1**	**FT** *their* (–6.728… **i** + 1.714…**j**)
	$[r=]$ 6.94 or 6.9432329... rot to 4 or more sf	**A1**	**dep** on **B1**
	$\alpha=\tan^{-1}\left(\frac{6.7282...}{1.7144...}\right)$ or awrt 75.7 or $\beta=\tan^{-1}\left(\frac{1.7144...}{6.7282...}\right)$ or awrt 14.3	**M1**	**FT** *their* (–6.728… **i** + 1.714…**j**)
	284 or 284.2[95…] rot to 4 or more sf	**A1**	**dep** on **B1**
	Alternative method $[r^2=]2^2+6^2-2\times2\times6\times\cos(their110)$	**(M1)**	
	$[r=]$ 6.94 or 6.9432329... rot to 4 or more sf	**(A1)**	
	$\frac{\sin\theta}{2}=\frac{\sin(their110)}{their6.943...}$ oe or $\frac{\sin\phi}{6}=\frac{\sin(their110)}{their6.943...}$ oe	**(M1)**	$\cos\theta=\frac{2^2-their6.943...^2-6^2}{-2(their6.943...)(6)}$ or $\cos\phi=\frac{6^2-their6.943...^2-2^2}{-2(their6.943...)(2)}$
	$[\theta=]$ awrt 15.7 oe or $[\phi=]$ awrt 54.3	**(A1)**	
	284 or 284.2[95…] rot to 4 or more sf	**(A1)**	

Question	Answer	Marks	Partial Marks
7	$\frac{\mathrm{d}}{\mathrm{d}x}(\mathrm{e}^{4x}) = 4\mathrm{e}^{4x}$ soi	**B1**	
	$4\mathrm{e}^{4x}\tan x + \mathrm{e}^{4x}\sec^2 x$	**M1**	**FT** *their* $4\mathrm{e}^{4x}$
	$\dfrac{(\ln x)(4\mathrm{e}^{4x}\tan x + \mathrm{e}^{4x}\sec^2 x) - \frac{1}{x}\mathrm{e}^{4x}\tan x}{(\ln x)^2}$	**M1**	**FT** *their* $4\mathrm{e}^{4x}\tan x + \mathrm{e}^{4x}\sec^2 x$
	Fully correct derivative, isw	**A1**	
	Alternative method for final two marks Applies correct product rule to $y = (\mathrm{e}^{4x}\tan x)(\ln x)^{-1}$ $\left(4\mathrm{e}^{4x}\tan x + \mathrm{e}^{4x}\sec^2 x\right)(\ln x)^{-1}$ $+\left(-(\ln x)^{-2}\left(\frac{1}{x}\right)\right)\left(\mathrm{e}^{4x}\tan x\right)$	**(M1)**	**FT** *their* $4\mathrm{e}^{4x}\tan x + \mathrm{e}^{4x}\sec^2 x$
	Fully correct derivative, isw	**(A1)**	
8(a)	$3(2\sin x\cos x) - (-2\sin x) \quad [=0]$ or better	**B2**	**B1** for the correct derivative for either term; may be unsimplified
	Factors out $\sin x$ and equates to 0: $[2](\sin x)(3\cos x + 1) = 0$ oe	**B1**	**FT** an expression of the form $a\sin x\cos x + b\sin x$ for non-zero constants a and b
	$\sin x = 0 \quad [\textit{theira}\cos x = -\textit{theirb}]$	**M1**	**FT** an expression of the form $a\sin x\cos x + b\sin x$ for non-zero constants a and b; **dep** on previous **B1**
	$x = \pi$ as only solution	**A1**	**dep** on all previous marks awarded If **B2 B0 M0** then **SC1** for dividing by $\sin x$ and using $\cos^{-1}\left(-\frac{1}{3}\right)$ to find $x = 1.91$ and 4.37 and clearly reject them.