Question	Scheme	Marks
10(a)	$\cos(A-B)=\cos A\cos B+\sin A\sin B$ $\cos(A+B)=\cos A\cos B-\sin A\sin B$ $\cos(A-B)-\cos(A+B)=\sin A\sin B-(-\sin A\sin B)=2\sin A\sin B$ *	M1A1cso [2]
(b)	$[A-B=5\theta,\ \ A+B=9\theta\Rightarrow A=7\theta,\ B=2\theta]$ $\cos 5\theta-\cos 9\theta=2\sin 7\theta\sin 2\theta$ *	B1 cso [1]
(c)	$\sqrt{3}\sin 7\theta=2\sin 7\theta\sin 2\theta\Rightarrow 0=2\sin 7\theta\sin 2\theta-\sqrt{3}\sin 7\theta$ $0=\sin 7\theta\left(2\sin 2\theta-\sqrt{3}\right)\Rightarrow \sin 7\theta=0,\ 2\sin 2\theta-\sqrt{3}=0$ $\sin 7\theta=0\Rightarrow 7\theta=0,\ \pi,\ 2\pi\Rightarrow\theta=\frac{\pi}{7},\ \frac{2\pi}{7}$ $2\sin 2\theta-\sqrt{3}=0\Rightarrow\sin 2\theta=\frac{\sqrt{3}}{2}\Rightarrow 2\theta=\frac{\pi}{3},\ \frac{2\pi}{3}\Rightarrow\theta=\frac{\pi}{6},\ \frac{\pi}{3}$	M1A1 M1 M1A1 M1A1 [7]
(d)	$\tan 2x=\frac{\sin 2x}{\cos 2x}\Rightarrow\tan 2x\cos 2x=\sin 2x$ $\int_0^{\frac{\pi}{7}}8\sin 7x\sin 2x\ \mathrm{d}x=\left[\int_0^{\frac{\pi}{7}}4\times(2\sin 7x\sin 2x)\ \mathrm{d}x\right]$ $\int_0^{\frac{\pi}{7}}4(\cos 5x-\cos 9x)\ \mathrm{d}x=4\left[\frac{\sin 5x}{5}-\frac{\sin 9x}{9}\right]_0^{\frac{\pi}{7}}$ $4\left[\frac{\sin 5x}{5}-\frac{\sin 9x}{9}\right]_0^{\frac{\pi}{7}}=4\left[\left(\frac{\sin 5\times\frac{\pi}{7}}{5}-\frac{\sin 9\times\frac{\pi}{7}}{9}\right)-\left(\frac{\sin 0}{5}-\frac{\sin 0}{9}\right)\right]$# $=0.9729\ldots\approx 0.973$	M1 M1 M1M1 M1A1 [6]
		Total 16 marks

Question	Notes	Marks
10(a)	From the formula sheet $\cos(A-B)=\cos A\cos B+\sin A\sin B$ $\cos(A+B)=\cos A\cos B-\sin A\sin B$ Subtracts the two equations to give: $\cos(A-B)-\cos(A+B)=\sin A\sin B-(-\sin A\sin B)$	M1
	For the correct identity as shown with no errors, $\cos(A-B)-\cos(A+B)=2\sin A\sin B$ *	A1 cso [2]
(b)	For finding the value of A and the value of B $A-B=5\theta,\quad A+B=9\theta$ $\Rightarrow A=7\theta,\ B=2\theta$ Or as a minimum: $\cos(7\theta-2\theta)-\cos(7\theta+2\theta)=2\sin 7\theta\sin 2\theta$ *	B1cso [1]
(c)	Sets $\sqrt{3}\sin 7\theta=2\sin 7\theta\sin 2\theta$	M1
	Achieves the correct equation allow the terms in any order. $0=2\sin 7\theta\sin 2\theta-\sqrt{3}\sin 7\theta$	A1
	Factorises their equation $0=\sin 7\theta\left(2\sin 2\theta-\sqrt{3}\right)\Rightarrow \sin 7\theta=0,\ 2\sin 2\theta-\sqrt{3}=0$	M1
	For finding at least **one** correct value for θ using $\sin 7\theta=0$ $\sin 7\theta=0\Rightarrow 7\theta=0,\ \pi,\ 2\pi\Rightarrow\theta=\frac{\pi}{7},\ \frac{2\pi}{7}$	M1
	For both correct values $\theta=\frac{\pi}{7},\ \frac{2\pi}{7}$	A1
	For finding **one** correct value of θ using $2\sin 2\theta-\sqrt{3}=0$ $2\sin 2\theta-\sqrt{3}=0\Rightarrow\sin 2\theta=\frac{\sqrt{3}}{2}\Rightarrow 2\theta=\frac{\pi}{3},\ \frac{2\pi}{3}\Rightarrow\theta=\frac{\pi}{6},\ \frac{\pi}{3}$	M1
	For both correct values $\theta=\frac{\pi}{6},\ \frac{\pi}{3}$	A1 [7]
(d)	Uses the identity for $\tan 2x=\frac{\sin 2x}{\cos 2x}\Rightarrow\tan 2x\cos 2x=\sin 2x$	M1
	Substitutes the above into $8\sin 7x\cos 2x\tan 2x$ to give $\int_0^{\frac{\pi}{7}}8\sin 7x\sin 2x\,\mathrm{d}x=\left[\int_0^{\frac{\pi}{7}}4\times(2\sin 7x\sin 2x)\,\mathrm{d}x\right]$ Ignore integral sign and limits for this mark.	M1
	For substituting $\cos 5x-\cos 9x$ for $2\sin 7x\sin 2x$ to give $\int_0^{\frac{\pi}{7}}4(\cos 5x-\cos 9x)\,\mathrm{d}x$ Ignore integral sign and limits for this mark.	M1

	Integrates $\int_0^{\frac{\pi}{7}} 4(\cos 5x - \cos 9x)\, \mathrm{d}x = 4\left[\frac{\sin 5x}{5} - \frac{\sin 9x}{9}\right]_0^{\frac{\pi}{7}}$ Ignore limits for this mark. As a minimum they must obtain: $\left(\pm\frac{\sin 5x}{5} \pm \frac{\sin 9x}{9}\right)$ for the integration.	M1
	Substitutes the limits the correct way around $4\left[\frac{\sin 5x}{5} - \frac{\sin 9x}{9}\right]_0^{\frac{\pi}{7}} = 4\left[\left(\frac{\sin 5\times\frac{\pi}{7}}{5} - \frac{\sin 9\times\frac{\pi}{7}}{9}\right) - \left(\frac{\sin 0}{5} - \frac{\sin 0}{9}\right)\right]$ $= (0.9729...)$	M1
	For the correct value of $\int_0^{\frac{\pi}{7}} 8\sin 7x \cos 2x \tan 2x\, \mathrm{d}x = 0.973$	A1 [6]
		Total 16 marks

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