Question Number	Scheme	Marks
5(a)	$\cos 2A = \cos^2 A - \sin^2 A,\ = \left(1-\sin^2 A\right) - \sin^2 A$	M1,M1
	$\cos 2A = 1 - 2\sin^2 A \quad 2\sin^2 A = 1 - \cos 2A$	A1 (3)
(b)	$\cos 4A = 1 - 2\sin^2 2A \qquad \sin^2 2A = \frac{1}{2}\left(1-\cos 4A\right)\ \ k = \frac{1}{2}$	B1 (1)
(c)	$\text{Volume} = \pi\int_0^{\frac{\pi}{6}} \left(3\sin 2x\right)^2 \mathrm{d}x$	M1
	$= \pi\int_0^{\frac{\pi}{6}} \frac{9}{2}\left(1-\cos 4x\right)\mathrm{d}x$	M1
	$= \frac{9\pi}{2}\left[x - \frac{1}{4}\sin 4x\right]_0^{\frac{\pi}{6}}$	M1A1ft (on k)
	$= \frac{9\pi}{2}\left[\frac{\pi}{6} - \frac{1}{4}\sin\frac{2\pi}{3}\right]$	M1
	$= 4.3414... = 4.34$	A1 (6) [10]
6		
(a)	$V = 5x^2 h$	B1
	$A = 2\left(5x^2 + 5xh + xh\right)$	
	$h = \frac{15}{5x^2} \qquad A = 10x^2 + 12x \times \frac{3}{x^2} = 10x^2 + \frac{36}{x}$ *	M1A1 (3)
(b)	$\frac{\mathrm{d}A}{\mathrm{d}x} = 20x - 36x^{-2}$	M1
	$\frac{\mathrm{d}A}{\mathrm{d}x} = 0 \qquad 20x = \frac{36}{x^2}$	M1
	$x = \sqrt[3]{\frac{36}{20}} = 1.216... = 1.22$	A1
	$\frac{\mathrm{d}^2 A}{\mathrm{d}x^2} = 20 + 72x^{-3}$	M1
	$x = 1.216 \Rightarrow \frac{\mathrm{d}^2 A}{\mathrm{d}x^2} > 0 \quad \therefore \min$	M1A1 (6)
(c)	$x = 1.216 \quad A = 10 \times 1.216^2 + \frac{36}{1.216} = 44.4$	M1A1 (2)
	(using $x = 1.22$ also gives 44.4)	[11]