Question	Scheme	Marks
6(a)	$2x^2 = \frac{1}{4x} \Rightarrow x^3 = \frac{1}{8} \Rightarrow x = \frac{1}{2}$ $y = 2\times\left(\frac{1}{2}\right)^2 = \frac{1}{2} \Rightarrow \left(\frac{1}{2}, \frac{1}{2}\right)$	M1A1 B1 [3]
(b)	$y = 2x^2 \Rightarrow x^2 = \frac{y}{2}$, $y = \frac{1}{4x} \Rightarrow x^2 = \frac{y^{-2}}{16}$ or $\left(\frac{1}{4y}\right)^2$ o.e. $V = \pi\int_{0.5}^{4}\left(\frac{y}{2}\right)\mathrm{d}y - \pi\int_{0.5}^{4}\left(\frac{y^{-2}}{16}\right)\mathrm{d}y$ $V = \pi\left[\frac{y^2}{4}\right]_{0.5}^{4} - \pi\left[\frac{y^{-1}}{-16}\right]_{0.5}^{4}$ $V = \frac{\pi}{4}\left(4^2 - \left(\frac{1}{2}\right)^2\right) + \frac{\pi}{16}\left(\frac{1}{4} - \frac{1}{0.5}\right) = \frac{245\pi}{64}$ [The decimal equivalent of the area is 12.0264….]	B1,B1 M1 M1A1 M1A1 [7]
		Total 10 marks

Part	Mark	Notes
(a)	M1	For setting the two equations together and attempting to find a value for x A minimally acceptable attempt is reaching at least. $x^3 = \frac{1}{8}$
	A1	For $x = \frac{1}{2}$
	B1	For the correct y coordinate $y = \frac{1}{2}$
(b)	B1	For rearranging the equation for S to $x^2 = \frac{y}{2}$ seen explicitly or embedded
	B1	For rearranging the equation for C to $x^2 = \frac{y^{-2}}{16}$ or $\frac{1}{16y^2}$ or $\left(\frac{1}{4y}\right)^2$ Seen explicitly or embedded
	M1	For a correct expression for the volume with the correct limits [ft their y coord of $\frac{1}{2}$] and π Accept the **[correct only]** expressions either way around. You may see π added in at the end. That is fine and please award this mark if that is the case. Ignore poor notation as long as the intention is clear. For example, ignore missing dy
	M1	For an attempt to integrate at least one of their two only expressions. Ignore limits and π for this mark. See General Guidance.
	A1	For a fully correct integrated expression for the volume.

		Ignore limits and π
	M1	For substituting their limits the correct way around into their integrated expression. You must see this if their integrated expression is incorrect, or their limits are incorrect. If the integration and limits are all correct, the correct volume seen (either in exact or in decimal form i.e. 12.0….) scores this mark. Accept partly processed, for example $\frac{\pi}{4}\left(16-\frac{1}{4}\right)+\frac{\pi}{16}\left(\frac{1}{4}-\frac{1}{0.5}\right)$ as long as you can see **four** calculations/terms as above. Ignore π for this mark.
	A1	For $\frac{245\pi}{64}$
	SC rotates around the *x* axis. Maximum score is B0B0M1M1A0M1A0	
	B0B0	Not available
	M1	For a correct expression for the volume with the correct calculated limits for x $\left(\sqrt{2}\text{ and }\frac{1}{16}\right)$ and π Accept the [**correct only]** expressions either way around. You may see π added in at the end. That is fine and please award this mark if that is the case. $V=\pi\int_{\frac{1}{16}}^{\sqrt{2}}\left(\frac{x^{-1}}{4}\right)^2\,\mathrm{d}x-\pi\int_{\frac{1}{16}}^{\sqrt{2}}\left(2x^2\right)^2\,\mathrm{d}x$
	M1	For an attempt to integrate one of their two only expressions. $V=\pi\left[-\frac{x^{-1}}{16}-\frac{4x^5}{5}\right]_{\frac{1}{16}}^{\sqrt{2}}$ Ignore π and limits for this mark
	A0	Not available
	M1	For substituting their values into the integrated expression correctly the correct way around. $V=\pi\left[\left(-\frac{\left(\sqrt{2}\right)^{-1}}{16}-\frac{4\left(\sqrt{2}\right)^5}{5}\right)-\left(-\frac{\left(\frac{1}{16}\right)^{-1}}{16}-\frac{4\left(\frac{1}{16}\right)^5}{5}\right)\right]$
	A0	Not available