Question number	Scheme	Marks
9 (a)	$(2x+3)^{\frac{1}{2}}=\frac{x}{2}+\frac{3}{2}\Rightarrow 4(2x+3)=(x+3)^2,\Rightarrow 0=x^2-2x-3$ oe	M1,A1
	$x^2-2x-3=(x-3)(x+1)=0\Rightarrow x=3,-1$	M1A1
	$y=1,3$ so coordinates are $(-1,1)$ and $(3,3)$	A1 (5)
(b)	Vol = $\pi\int_{-1}^{3}(2x+3)\ \mathrm{d}x-\pi\int_{-1}^{3}\left(\frac{x}{2}+\frac{3}{2}\right)^2\ \mathrm{d}x$	M1
	$\pi\int_{-1}^{3}(2x+3)\ \mathrm{d}x-\pi\int_{-1}^{3}\left(\frac{x}{2}+\frac{3}{2}\right)^2\ \mathrm{d}x=\frac{\pi}{4}\int_{-1}^{3}3+2x-x^2\ \mathrm{d}x=\frac{\pi}{4}\left[3x+x^2-\frac{x^3}{3}\right]_{-1}^{3}$	M1A1
	$\Rightarrow\frac{\pi}{4}\left[(9+9-9)-\left(-3+1+\frac{1}{3}\right)\right]=\frac{8}{3}\pi$	dM1A1
	For separate integrals:	cao (5) [10]
	$\pi\int_{-1}^{3}(2x+3)\ \mathrm{d}x-\pi\int_{-1}^{3}\left(\frac{x}{2}+\frac{3}{2}\right)^2\ \mathrm{d}x=\pi\left[x^2+3x\right]_{-1}^{3}-\pi\left[\frac{x^3}{12}+\frac{3x^2}{4}+\frac{9x}{4}\right]_{-1}^{3}$	
	$=\ldots$	
	ALT:	
	Vol $=\pi\int_{-1}^{3}(2x+3)\ \mathrm{d}x-$ vol of truncated cone	M1
	Vol $=\pi\left[x^2+3x\right]_{-1}^{3}-\left(\frac{1}{3}\pi 3^2\times 6-\frac{1}{3}\pi 1^2\times 2\right)$	M1A1
	$=\pi(9+9-(1-3))-\frac{52\pi}{3}=\frac{8}{3}\pi$	dM1A1

(a)	
M1	Eliminate y and obtain a quadratic in x. Need not be simplified. Allow if $(x+3)^2\rightarrow x^2+9$
A1	Correct 3TQ, as shown or equivalent.
M1	Solve their 3TQ by factorising, formula or completing the square (see general guidance)
A1	Two correct values for x
A1	Corresponding y coordinates. No need to write in coordinate brackets but pairing must be clear.
	If one x and its corresponding y are correct, award A1A0, provided M mark has been gained
ALT:	Elimination of x gives $y^2=2(2y-3)+3\Rightarrow y^2-4y+3=0\Rightarrow(y-1)(y-3)=0$ etc

(b)	
M1	Correct expression for volume. If the integrals are evaluated separately or π omitted here award only when the correct difference has been obtained (and π included). Limits not needed.
M1	Attempt all the required integration (ie volume for the curve and volume for the line or a combination of these as on the mark scheme), π and limits not needed – ignore any shown
A1	Correct integration (can be one or 2 integrals); ignore limits, π may be missing
dM1	Substitute their x coordinates in their integrated expression(s). Depends on the second M mark. Substitution must be shown for both limits.
A1cao	Correct final answer. All 3 M marks needed
ALT	
M1	Correct expression for the volume including some attempt at the truncated cone. π needed for the cone but may appear later for the integral/
M1	Attempt the integration - π and limits not needed – ignore any shown – and attempt the vol of the truncated cone.
A1	Correct integration and correct difference of 2 cones
dM1	Substitute their x coordinates in their integrated expression. Depends on the second M mark. Substitution must be shown for both limits.
A1cao	Correct final answer. All 3 M marks needed