Question Number	Scheme	Marks
6(a)	$\frac{\mathrm{d}u}{\mathrm{d}x}=2$ or $\frac{\mathrm{d}x}{\mathrm{d}u}=\frac{1}{2}$	B1
	$\int \frac{(3x+2)^2}{2x-1}\mathrm{d}x=\int \frac{\left(3\frac{u+1}{2}+2\right)^2}{u}\frac{1}{2}\mathrm{d}u$	M1
	$=\frac{1}{8}\int\left(9u+42+\frac{49}{u}\right)\mathrm{d}u$	dM1
	$=\frac{1}{8}\left[\frac{9u^2}{2}+42u+49\ln u\right]$	A1
	$=\frac{1}{8}\left[\frac{9(9)^2}{2}+42(9)+49\ln(9)-\left(\frac{9(3)^2}{2}+42(3)+49\ln(3)\right)\right]$	M1
	$72+\frac{49}{8}\ln 3$ *	A1*
		(6)
(b)	$V=\pi\int\left(\frac{3x+2}{2\sqrt{2x-1}}\right)^2\mathrm{d}x=\frac{\pi}{4}\int\frac{(3x+2)^2}{2x-1}\mathrm{d}x$	M1
	$=\pi\left(18+\frac{49}{32}\ln 3\right)$	A1
		(2)
		Total 8

(a) Note if no algebraic integration is seen then max score B1M1dM1A0M0A0*
Correct answer with no working scores 0 marks

You may see other credit-worth methods e.g. partial fractions followed by substitution – send to review

B1: $\frac{\mathrm{d}u}{\mathrm{d}x}=2$ o.e such as $\frac{\mathrm{d}x}{\mathrm{d}u}=\frac{1}{2}$ or $\mathrm{d}u=2\mathrm{d}x$

M1: An attempt at a complete substitution in terms of u Look for $A\int\frac{(\text{linear expression in } u)^2}{u}(\mathrm{d}u)$ $A\neq 0$

Condone slips. The du may be implied by further work.

dM1: Proceeds to the form $\int\left(\alpha u+\beta+\frac{\gamma}{u}\right)(\mathrm{d}u)$ oe which may be unsimplified $\alpha,\ \beta,\ \gamma\neq 0$. It is dependent on the previous method mark.

A1: $\frac{1}{8}\left[\frac{9u^2}{2}+42u+49\ln u\right]$ oe (note may see e.g. $\frac{49}{8}\ln 8u$ for $\frac{49}{8}\ln u$) May be unsimplified

M1: Correct use of changed limits (3 and 9) within their integrand in 'u' of the form $pu^2+qu+r\ln ku$ or $x=2$ and $x=5$ within the integral of this form where 'u' has been changed back to $2x-1$