

Question			Answer	Mark	AO	Guidance	
NB Answers must be correct to 3 sf, except where otherwise indicated. If correct answer seen (to ≥ 3 sf), ignore later rounding.							
1						Ignore incorrect \int or dx in all parts	
1	(a)	(i)	$\frac{(2x+1) \times 2x - x^2 \times 2}{(2x+1)^2}$ oe (eg = $\frac{2x^2 + 2x}{(2x+1)^2}$ or $\frac{2x(x+1)}{(2x+1)^2}$ oe) Alternative method $x^2(-2)(2x+1)^{-2} + 2x(2x+1)^{-1}$ oe	B1 B1 B1	1.1a 1.1 1.1	$2x(2x+1)$ or $-2x^2$ oe in numerator B1 Correct denominator B1 Correct numerator B1 No need to see this $\pm 2x^2(2x+1)^{-2}$ oe B1 $+ 2x(2x+1)^{-1}$ oe B1 All correct B1	Condone missing brackets 1st B1 Allow correct equivalent forms ISW for further "simplifications" Allow correct equivalent forms ISW for further "simplifications"
1	(a)	(ii)	$(2x-3)\sec^2(x^2-3x)$ oe	B1 B1	1.1a 1.1	B1 for $\sec^2(x^2-3x)$ B1 for all correct	Condone missing brackets 1st B1 Condone $\sec^2(x^2-3x)(2x-3)$ ISW for further "simplifications"
Allow without mod in both parts (b) and (c)							
1	(b)		$x = (u+1)^2, \frac{dx}{du} = 2(u+1)$ oe or $\frac{du}{dx} = 0.5x^{-0.5}$ oe $2\int \frac{(u+1)}{u} du$ or $2\int \left(1 + \frac{1}{u}\right) du$ oe $= 2(u + \ln u)$ (+c) $= 2(\sqrt{x}-1 + \ln \sqrt{x}-1) + c$ oe or $2(\sqrt{x} + \ln \sqrt{x}-1) + c$ oe or $2\sqrt{x} + \ln(\sqrt{x}-1)^2 + c$ oe	M1 A1 A1 A1	1.1a 2.5 2.1 1.1	<u>EITHER</u> attempt x in terms of u & diff <u>OR</u> attempt $\frac{du}{dx}$ & obtain $kx^{-0.5}$ oe Allow $k\int \frac{(u+1)}{u} du$ or $k\int \left(1 + \frac{1}{u}\right) du$ Allow without $+c$ here All correct incl $+c$	Allow in form $dx = \dots$ or $du = \dots$ or $\int \frac{(ku+j)}{u} du$ or $\int \left(k + \frac{j}{u}\right) du$ Not penalise $+c$ in both (b) & (c) ISW for further "simplifications" Integration by parts: Use same scheme.
				[3]	[2]		
				[4]			

1	(c)	$\ln 2x^2 - 8x - 1 $ or $\ln \frac{1}{2}x^2 - 2x - \frac{1}{4} $ seen $\frac{1}{4} \ln 2x^2 - 8x - 1 + c$ or $\frac{1}{4} \ln \frac{1}{2}x^2 - 2x - \frac{1}{4} + c$	M1 A1 [2]	1.2 1.1 or $u = 2x^2 - 8x - 1$ and $\ln u $ seen All correct including $+c$ Correct answer seen: M1A1 even if eg $(x - 2) \frac{\ln 2x^2 - 8x - 1 }{4x - 8} = \frac{1}{4} \ln 2x^2 - 8x - 1 $	or $u = x - 2$ and $\ln 2u^2 - 9 $ seen Not penalise $+c$ in both (b) & (c) ISW for further "simplifications"
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