Question	Scheme	Marks
1	$(1-4x)^{-3} = 1 \underline{\pm} 3\times 4x \pm \frac{-3\times -4}{2}(...x)^2 \pm \frac{-3\times -4\times -5}{6}(...x)^3 + ...$	**M1**
	$(1-4x)^{-3} = 1+3\times 4x+\frac{-3\times -4}{2}(-4x)^2+\frac{-3\times -4\times -5}{6}(-4x)^3+...$	**A1**
	$=1+12x+96x^2+640x^3+...$	**A1A1**
		(4)
		(4 marks)

Notes:

M1: Attempts the binomial expansion of $(1-4x)^{-3}$ with correct attempts at the (unsimplified, and may be in terms of factorials) binomial coefficients for **at least two** of the x, x^2, x^3 terms. The "–4" may be missing or have incorrect sign and allow for missing brackets. (May be scored if the x^3 term is omitted.)

A1: For a correct unsimplified expansion. (May be in terms of factorials.)

A1: Any two terms correct and simplified (of the four, so includes the 1). The M must have been scored.

A1: Fully correct and all terms simplified. Ignore any higher order terms. ISW after a correct simplified.

Note M1A0A1A0 is possible e.g. if the x and x^3 terms have the wrong signs.

Note: listing terms can score maximum of M1A1A1A0.

Question	Scheme	Marks
2(a)	$\dfrac{3x+4}{(x-2)(2x+1)^2}=\dfrac{A}{x-2}+\dfrac{B}{2x+1}+\dfrac{C}{(2x+1)^2}$	
	$3x+4=A(2x+1)^2+B(x-2)(2x+1)+C(x-2)$ E.g. $x=2\rightarrow 10=A\times 25\Rightarrow A=...$ or $x=-\dfrac{1}{2}\rightarrow \dfrac{5}{2}=C\times-\dfrac{5}{2}\Rightarrow C=...$ or $x^2:0=4A+2B, x:3=4A-3B+C, x^0:4=A-2B-2C\rightarrow A=...$	**M1**
	One of $A=\dfrac{2}{5}, B=-\dfrac{4}{5}, C=-1$	**A1**
	$\Rightarrow A=..., B=...$ and $C=...$	**M1**
	$\dfrac{3x+4}{(x-2)(2x+1)^2}=\dfrac{2}{5(x-2)}-\dfrac{4}{5(2x+1)}-\dfrac{1}{(2x+1)^2}$ or $A=\dfrac{2}{5}, B=-\dfrac{4}{5}, C=-1$	**A1**
		(4)
(b)	$\int\dfrac{p}{x-2}\,\mathrm{d}x=\alpha\ln(x-2)$ or $\int\dfrac{q}{2x+1}\,\mathrm{d}x=\beta\ln(2x+1)$ Alt: $\int\dfrac{8x+9}{(2x+1)^2}\,\mathrm{d}x=\int\dfrac{8x+4}{(2x+1)^2}+\dfrac{5}{(2x+1)^2}\,\mathrm{d}x=\gamma\ln(2x+1)^2+...$	**M1**
	$\int\dfrac{k}{(2x+1)^2}\,\mathrm{d}x=\dfrac{K}{2x+1}$	**M1**
	$\int_7^{12}\dfrac{3x+4}{(x-2)(2x+1)^2}\,\mathrm{d}x=\left[\text{"}\dfrac{2}{5}\text{"}\ln(x-2)-\text{"}\dfrac{4}{5}\text{"}\times\dfrac{1}{2}\ln(2x+1)+\dfrac{\text{"1"}}{4x+2}\right]_7^{12}$	**A1ft**
	$=\left(\dfrac{2}{5}\ln(10)-\dfrac{2}{5}\ln(25)+\dfrac{1}{50}\right)-\left(\dfrac{2}{5}\ln(5)-\dfrac{2}{5}\ln(15)+\dfrac{1}{30}\right)=...$	**DM1**
	$=\dfrac{2}{5}\ln\dfrac{10}{25}+\dfrac{1}{50}-\dfrac{2}{5}\ln\dfrac{5}{15}-\dfrac{1}{30}=\dfrac{2}{5}\ln\dfrac{10\times15}{25\times5}+...$	**M1**
	$\dfrac{2}{5}\ln\dfrac{6}{5}-\dfrac{1}{75}$ (oe)	**A1**
		(6)
		(10 marks)