Question	Scheme	Marks	AOs
2	$\frac{8x-12}{(2x^2+3)(x+1)} = \frac{Ax+B}{2x^2+3} + \frac{C}{x+1}$	M1	3.1a
	$8x-12 = (Ax+B)(x+1) + C(2x^2+3)$ E.g. $x=-1 \Rightarrow C=-4, x=0 \Rightarrow B=0, x=1 \Rightarrow A=8$ Or Compares coefficients and solves $(A+2C=0 \quad A+B=8 \quad B+3C=-12)$ $\Rightarrow A=\ldots, B=\ldots, C=\ldots$	dM1	1.1b
	$A=8 \quad B=0 \quad C=-4$	A1	1.1b
	$\int\left(\frac{8x}{2x^2+3} - \frac{4}{x+1}\right)dx = 2\ln(2x^2+3) - 4\ln(x+1)$	A1ft	1.1b
	$2\ln(2x^2+3) - 4\ln(x+1) = \ln\left(\frac{(2x^2+3)^2}{(x+1)^4}\right)$ or $2\ln(2x^2+3) - 4\ln(x+1) = 2\ln\left(\frac{(2x^2+3)}{(x+1)^2}\right)$	M1	2.1
	$\lim_{x\to\infty}\left\{\ln\frac{(2x^2+3)^2}{(x+1)^4}\right\} = \ln 4$ or $\lim_{x\to\infty}\left\{2\ln\frac{(2x^2+3)}{(x+1)^2}\right\} = 2\ln 2$	B1	2.2a
	$\Rightarrow \int_0^\infty \frac{8x-12}{(2x^2+3)(x+1)}dx = \ln\frac{4}{9}$ **cao**	A1	1.1b
		(7)	
			(7 marks)

Notes

M1: Selects the correct form for partial fractions.
dM1: Full method for finding values for all three constants. Dependent on having the correct form for the partial fractions. Allow slips as long as the intention is clear.
A1: Correct constants or partial fractions.

A1ft: Integrates $\int \frac{px}{2x^2+3} - \frac{q}{x+1}\,\mathrm{d}x = \frac{p}{4}\ln\left(2x^2+3\right) - q\ln\left(x+1\right)$ and no extra terms

M1: Combines two algebraic log terms correctly.

B1: Correct upper limit for $x \rightarrow \infty$ by recognising the dominant terms. (Simply replacing x with ∞ scores B0). This can be implied.

A1: Deduces the correct value for the improper integral in the correct form, cao A0 for $2\ln\frac{2}{3}$

Correct answer with no working seen is no marks.

Note: Incorrect partial fraction form,

$\frac{A}{2x^2+3} + \frac{B}{x+1}$ or $\frac{Ax}{2x^2+3} + \frac{B}{x+1}$ the maximum it can score is M0M0A0A0M1B1A0