Marked example 1

Paper 1 style · No calculator

1 7 marks AHL 1.11 ●●○ Typical

Let $f(x) = \dfrac{x+7}{(x+1)(2x-1)}$, for $x > \frac{1}{2}$.

(a) Express $f(x)$ in partial fractions. **[3]**

(b) Hence show that $\displaystyle\int_1^2 f(x)\,\mathrm{d}x = \ln\left(4\sqrt{3}\right)$. **[4]**

MARKSCHEME (a)

$x+7 = A(2x-1) + B(x+1)$ **M1**

$x=-1:\ A=-2;\ x=\frac{1}{2}:\ B=5,\ \text{so } f(x) = -\dfrac{2}{x+1} + \dfrac{5}{2x-1}$ **A1A1**

Total 3 marks

MARKSCHEME (b)

$\left[-2\ln(x+1) + \frac{5}{2}\ln(2x-1)\right]_1^2$ **M1A1**

$= -2\ln 3 + \frac{5}{2}\ln 3 + 2\ln 2 - 0$ **A1**

$= \frac{1}{2}\ln 3 + 2\ln 2 = \ln\left(4\sqrt{3}\right)$ **A1**

Total 4 marks

Note M1 for logarithms, A1 for the factor $\frac{5}{2}$.

Note AG: the last step written.

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