Question	Scheme	Marks	AOs
6(a)	$f(x) = \dfrac{x+2}{x^2+9} = \dfrac{x}{x^2+9} + \dfrac{2}{x^2+9}$	B1	3.1a
	$\displaystyle\int \dfrac{x}{x^2+9}\,dx = k\ln(x^2+9)(+c)$	M1	1.1b
	$\displaystyle\int \dfrac{2}{x^2+9}\,dx = k\arctan\left(\dfrac{x}{3}\right)(+c)$	M1	1.1b
	$\displaystyle\int \dfrac{x+2}{x^2+9}\,dx = \dfrac{1}{2}\ln(x^2+9) + \dfrac{2}{3}\arctan\left(\dfrac{x}{3}\right) + c$	A1	1.1b
		(4)	
(b)	$\displaystyle\int_0^3 f(x)\,dx = \left[\dfrac{1}{2}\ln(x^2+9) + \dfrac{2}{3}\arctan\left(\dfrac{x}{3}\right)\right]_0^3$		
	$= \dfrac{1}{2}\ln 18 + \dfrac{2}{3}\arctan\left(\dfrac{3}{3}\right) - \left(\dfrac{1}{2}\ln 9 + \dfrac{2}{3}\arctan(0)\right)$ $= \dfrac{1}{2}\ln\dfrac{18}{9} + \dfrac{2}{3}\arctan\left(\dfrac{3}{3}\right)$	M1	1.1b
	Mean value $= \dfrac{1}{3-0}\left(\dfrac{1}{2}\ln 2 + \dfrac{\pi}{6}\right)$	M1	2.1
	$\dfrac{1}{6}\ln 2 + \dfrac{1}{18}\pi$ *	A1*	2.2a
		(3)	
(c)	$\dfrac{1}{6}\ln 2 + \dfrac{1}{18}\pi + \ln k$	M1	2.2a
	$\dfrac{1}{6}\ln 2k^6 + \dfrac{1}{18}\pi$	A1	1.1b
		(2)	
		(9 marks)	

Notes:

(a)
B1: Splits the fraction into two correct separate expressions
M1: Recognises the required form for the first integration
M1: Recognises the required form for the second integration
A1: Both expressions integrated correctly and added together with constant of integration included

(b)
M1: Uses limits correctly and combines logarithmic terms
M1: Correctly applies the method for the mean value for their integration
A1*: Correct work leading to the given answer

(c)
M1: Realises that the effect of the transformation is to increase the mean value by $\ln k$
A1: Combines ln's correctly to obtain the correct expression