Question	Scheme	Marks	AOs
5(a)	$$\int \frac{1}{\sqrt{x^2 + 2x + 10}}\,dx = \int \frac{1}{\sqrt{(x+1)^2 + 9}}\,dx$$	M1	3.1a
	$$= k\sinh^{-1}\left(\frac{x+a}{b}\right)$$	M1	1.1b
	$$= \sinh^{-1}\left(\frac{x+1}{3}\right)(+c)$$	A1	1.1b
		(3)	
(b)	$$\int_2^{20} \frac{1}{\sqrt{x^2 + 2x + 10}}\,dx = \sinh^{-1}\left(\frac{20+1}{3}\right) - \sinh^{-1}\left(\frac{2+1}{3}\right)$$ $$= \ln\left(7 + \sqrt{50}\right) - \ln\left(1 + \sqrt{2}\right) = \ln\frac{7 + \sqrt{50}}{1 + \sqrt{2}}$$	M1	1.1b
	$$= \frac{1}{(20-2)} \ln\frac{7 + \sqrt{50}}{1 + \sqrt{2}}$$	M1	2.1
	$$\frac{1}{18}\ln\left(3 + 2\sqrt{2}\right) \text{ or e.g. } \frac{1}{9}\ln\left(1 + \sqrt{2}\right)$$	A1	2.2a
		(3)	
		(6 marks)	
Notes			

(a)

M1: Recognises the need to and attempts to complete the square

A1: Integrates to obtain an expression of the required form

A1: Correct answer with or without $+ c$

(b)

M1: Correct use of limits and combines ln terms

M1: Correct applies the method for the mean value for their integration

A1: Deduces a correct expression