Question	Scheme	Marks	AOs
11 (a)	Attempts $\int y\frac{\mathrm{d}x}{\mathrm{d}t}\,\mathrm{d}t = \int 2\tan t \times -6\sin 2t\,\mathrm{d}t$	M1 A1	1.2 1.1b
	Uses $\sin 2t = 2\sin t\cos t$ and $\tan t = \frac{\sin t}{\cos t} \Rightarrow \; -\int 24\sin^2 t\,\mathrm{d}t$	M1	2.1
	Area $R = \int_0^3 y\,\mathrm{d}x = -\int_{\frac{\pi}{4}}^0 24\sin^2 t\,\mathrm{d}t = (+)\int_0^{\frac{\pi}{4}} 24\sin^2 t\,\mathrm{d}t$ *	A1*	2.1
		(4)	
(b)	Uses $\cos 2t = 1-2\sin^2 t$ $\int 24\sin^2 t\,\mathrm{d}t = \int (12\cos 2t - 12)\,\mathrm{d}t$	M1	2.1
	Integrates to form $= 6\sin 2t - 12t$ AND Uses the limits $t = 0$ and $t = \frac{\pi}{4}$ either way around	M1	1.1b
	$= 3\pi - 6$	A1	2.1
		(7)	
			(7 marks)

Notes:

(a)

M1: Attempts $\int y\frac{\mathrm{d}x}{\mathrm{d}t}\,\mathrm{d}t = \pm A\int \tan t \times \sin 2t\,\mathrm{d}t$

A1: Correct expression for $\int y\frac{\mathrm{d}x}{\mathrm{d}t}\,\mathrm{d}t = \int 2\tan t \times -6\sin 2t\,\mathrm{d}t$

M1: Uses both $\sin 2t = 2\sin t\cos t$ and $\tan t = \frac{\sin t}{\cos t} \Rightarrow \; \pm\int C\sin^2 t\,\mathrm{d}t$

A1*: Rigorous proof with all aspects correct including the idea of the limits

(b)

M1: Attempts to use $\cos 2t = 1-2\sin^2 t \Rightarrow \int 24\sin^2 t\,\mathrm{d}t = \int \frac{C}{2}\cos 2t + \frac{C}{2}\,\mathrm{d}t$

M1: Integrates to the form $P\sin 2t + Qt$ **AND** uses limits $t = 0$ and $t = \frac{\pi}{4}$ either way around

A1: Proceeds with rigorous and clear reasoning to $3\pi - 6$ or $3(\pi - 2)$