Question Number	Scheme		Marks
3(a)	$8+4x+x^2=(x+2)^2+4$	Correct completion of the square	B1
	$\int \frac{1}{(x+2)^2+4}\,\mathrm{d}x=\frac{1}{2}\arctan\frac{x+2}{2}\ (+c)$ M1: For obtaining $k\arctan \mathrm{f}(x)$ Accept other notation for arctan e.g. artan, $\tan^{-1}$ etc. A1: Correct result oe e.g. $\frac{1}{2}\arctan\left(\frac{x}{2}+1\right)(+c)$ **(must see brackets in this case)** The constant of integration is **not** required		M1A1
	May see substitution e.g. $x+2=2\tan u \Rightarrow \int \frac{1}{(x+2)^2+4}\,\mathrm{d}x=\int \frac{1}{4\tan^2 u+4}2\sec^2 u\,\mathrm{d}u$ $=\frac{1}{2}\int \mathrm{d}u=\frac{1}{2}u(+c)=\frac{1}{2}\arctan\left(\frac{x+2}{2}\right)(+c)$ For M1 this requires a complete method using a **correct substitution** and including the reversal of the substitution and A1 as already defined Accept other notation for arctan e.g. artan, $\tan^{-1}$ etc.		
			(3)

(b)	$8-4x-x^2=12-(x+2)^2$	For an attempt to complete the square. Allow $8-4x-x^2=\alpha-(\pm x\pm 2)^2$ **Where $\alpha > 0$**	M1
		$12-(x+2)^2$	A1
	$\int \frac{1}{\sqrt{\left\{12-(x+2)^2\right\}}}\,dx=\arcsin\frac{x+2}{\sqrt{12}}\ (+c)$ M1: For obtaining $\alpha\arcsin g(x)$ Accept other notation for arcsin e.g. arsin, $\sin^{-1}$ etc. A1: Correct result oe e.g. $\arcsin\frac{x+2}{2\sqrt{3}}\ (+c)$ The constant of integration is **not** required Accept other notation for arcsin e.g. arsin, $\sin^{-1}$ etc.		M1A1
	May see substitution e.g. $x+2=\sqrt{12}\sin u\Rightarrow\int\frac{1}{\sqrt{12-(x+2)^2}}\,dx=\int\frac{1}{\sqrt{12-12\sin^2 u}}\sqrt{12}\cos u\,du$ $=\int du=u(+c)=\arcsin\left(\frac{x+2}{\sqrt{12}}\right)(+c)$ For M1 this requires a complete method using a **correct substitution** and including the reversal of the substitution and A1 as already defined		
	May see substitution e.g. $x+2=\sqrt{12}\cos u\Rightarrow\int\frac{1}{\sqrt{12-(x+2)^2}}\,dx=\int\frac{-1}{\sqrt{12-12\cos^2 u}}\sqrt{12}\sin u\,du$ $=-\int du=u(+c)=-\arccos\left(\frac{x+2}{\sqrt{12}}\right)(+c)$ For M1 this requires a complete method using a correct substitution and including the reversal of the substitution and A1 as already defined Accept other notation for arccos e.g. arcos, $\cos^{-1}$ etc.		
			(4)
			[Total 7]