Question	Scheme	Marks	AOs
14	$x = 4\cos\left(t + \frac{\pi}{6}\right), \quad y = 2\sin t$		
	$x + y = 4\left(\cos t\cos\left(\frac{\pi}{6}\right) - \sin t\sin\left(\frac{\pi}{6}\right)\right) + 2\sin t$	M1 M1	3.1a 1.1b
	$x + y = 2\sqrt{3}\cos t$	A1	1.1b
	$\left(\frac{x+y}{2\sqrt{3}}\right)^2 + \left(\frac{y}{2}\right)^2 = 1$	M1	3.1a
	$\frac{(x+y)^2}{12} + \frac{y^2}{4} = 1$		
	$(x+y)^2 + 3y^2 = 12$	A1	2.1
		(5)	
14 **Alt 1**	$(x+y)^2 = \left(4\cos\left(t + \frac{\pi}{6}\right) + 2\sin t\right)^2$		
	$= \left(4\left(\cos t\cos\left(\frac{\pi}{6}\right) - \sin t\sin\left(\frac{\pi}{6}\right)\right) + 2\sin t\right)^2$	M1 M1	3.1a 1.1b
	$= \left(2\sqrt{3}\cos t\right)^2$ or $12\cos^2 t$	A1	1.1b
	So, $(x+y)^2 = 12(1 - \sin^2 t) = 12 - 12\sin^2 t = 12 - 12\left(\frac{y}{2}\right)^2$	M1	3.1a
	$(x+y)^2 + 3y^2 = 12$	A1	2.1
		(5)	
			(5 marks)

Question 14 Notes:

M1:	Looks ahead to the final result and uses the compound angle formula in a full attempt to write down an expression for $x + y$ which is in terms of t only.
M1:	Applies the compound angle formula on their term in x. E.g. $\cos\left(t + \frac{\pi}{6}\right) \rightarrow \cos t\cos\left(\frac{\pi}{6}\right) \pm \sin t\sin\left(\frac{\pi}{6}\right)$
A1:	Uses correct algebra to find $x + y = 2\sqrt{3}\cos t$
M1:	Complete strategy of applying $\cos^2 t + \sin^2 t = 1$ on a rearranged $x + y =$ "$2\sqrt{3}\cos t$", $y = 2\sin t$ to achieve an equation in x and y only
A1:	Correctly proves $(x+y)^2 + ay^2 = b$ with both $a = 3$, $b = 12$, and no errors seen

Question 14 Notes Continued:	
Alt 1	
M1:	Apply in the same way as in the main scheme
M1:	Apply in the same way as in the main scheme
A1:	Uses correct algebra to find $(x+y)^2 = \left(2\sqrt{3}\cos t\right)^2$ or $(x+y)^2 = 12\cos^2 t$
M1:	Complete strategy of applying $\cos^2 t + \sin^2 t = 1$ on $(x+y)^2 = \left(\text{"}2\sqrt{3}\cos t\text{"}\right)^2$ to achieve an equation in *x* and *y* only
A1:	Correctly proves $(x+y)^2 + ay^2 = b$ with both $a = 3, b = 12$, and no errors seen