9	**(i)**		$f(x) = c + 16 - (x - 4)^2$	**M1***	**3.1a**	Attempt to identify maximum point	Full attempt to complete the square Could differentiate, equate to 0 and solve to get $8 - 2x = 0$, so $x = 4$
			$c + 16 = 19$	**M1d***	**1.1a**	Link maximum point to 19	Link the constant term of their completed square to 19 – must involve c Allow equation or inequality (including incorrect inequality) If using differentiation then link f(their $x = 4$) to 19

Question			Answer	Marks	AO	Guidance	
			$c = 3$	**A1**	**1.1**	Solve to obtain $c = 3$	A0 if given as inequality unless subsequently corrected Must come from fully correct working, so $f(x) = c + 16 - (x + 4)^2$, leading to $c + 16 = 19$ hence $c = 3$ is M1 M1 A0
				[3]			**OR** M1* Attempt to use $b^2 - 4ac = 0$ on their attempt at $f(x) - 19 = 0$ M1d* Attempt to solve their $64 - 4(-1)(c - 19) = 0$ A1 Obtain $c = 3$
	(ii)		$f(2) = c + 12$	**B1**	**1.1**	Correct f(2)	Stated or implied by being used in later method
			$f(c + 12) = c + 8(c + 12) - (c + 12)^2$	**M1***	**1.2**	Attempt correct composition of ff	Must be attempt at composition of functions so M0 for $\{f(2)\}^2$
			$-48 - 15c - c^2 = 8$ $c^2 + 15c + 56 = 0$	**M1d***	**1.1a**	Equate to 8 and rearrange to useable form	Expand and rearrange to a three term quadratic Could be implied by the two correct roots
			$c = -7,\ c = -8$	**A1**	**2.1**	Both correct values for c	**BC**

Question			Answer	Marks	AO	Guidance	
				[4]			**OR** for the first two marks **M1*** Attempt $ff(x)$ ie attempt at $ff(x) = c + 8(c + 8x - x^2) - (c + 8x - x^2)^2$ **M1d*** Attempt $ff(2)$ using their $ff(x)$, which may no longer be correct