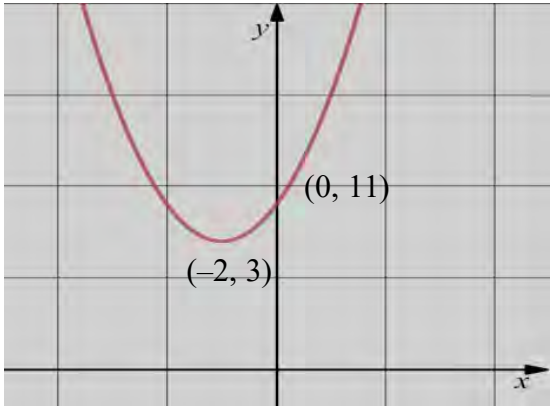
Question 5 (Total 10 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$2x^2 + 8x + 11 = 2(x + b)^2 + c$	B1	This mark is given for writing f(x) in the form $a(x + b)^2 + c$ with $a = 2$
	$2x^2 + 8x + 11 = 2(x + 2)^2 + c$	M1	This mark is given for writing f(x) in the form $a(x + b)^2 + c$ with $a = 2$ and $b = 2$
	$2x^2 + 8x + 11 = 2(x + 2)^2 + 3$	A1	This mark is given for writing f(x) in the form $a(x + b)^2 + c$ with $a = 2$, $b = 2$ and $c = 3$
(b)		B1	This mark is given for a U shaped curve in any position
		B1	This mark is given for a y-intercept shown at (0, 11)
		B1	This mark is given for a minimum shown at (–2, 3)
(c)(i)	$g(x) = 2(x – 3)^2 + 8(x – 3) + 5$	M1	This mark is given for writing g(x) in the form $a(x – b)^2 + c$ and comparing to f(x)
	Translation of $\begin{pmatrix} 3 \\ -6 \end{pmatrix}$	A1	This mark is given for deducing the translation of $y = f(x)$ to $y = g(x)$
(c)(ii)	$\frac{15}{(x+2)^2 + 3}$ Maximum value = $\frac{15}{3}$ (when $x = –2$)	M1	This mark is given for writing h(x) in the form $\frac{15}{a(x+b)^2 + c}$ and finding its maximum value
	$0 < h(x) \leq 5$	A1	This mark is given for finding the correct range of the function h(x)