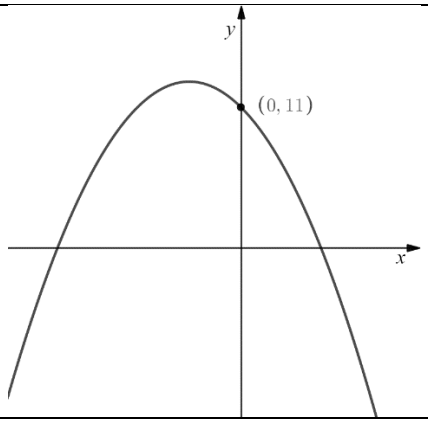
Question Number	Scheme	Marks
2(a)	$\mathrm{f}(x)=11-4x-2x^2$ $\Rightarrow ...\underline{-2}\left(2x+x^2\right)...$ or $\Rightarrow ...\underline{-2}\left(2x+x^2...\right)$	B1
	$...\left(2x+x^2\right)\Rightarrow ....\left(\left(x+1\right)^2\pm ...\right)$	M1
	$\left(\mathrm{f}(x)=\right)\ 13-2\left(x+1\right)^2$	A1
		(3)
(b)		M1
		A1
		(2)
(c)	$x=-1$	B1ft
		(1)
		Total 6
Alt(a)	$a+b(x^2+2cx+c^2)=11-4x-2x^2$ $b=-2$	B1
	$2bc=-4\Rightarrow c=...\ (=1)$	M1
	$a+bc^2=-4\Rightarrow a=...\ (=13)$ $\left(\mathrm{f}(x)=\right)\ 13-2\left(x+1\right)^2$	A1

(a)

B1: $b=-2$

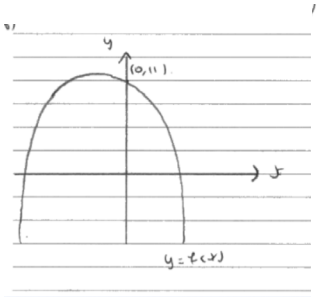
M1: Attempts to complete the square on $x^2\pm 2x$ so score for $(x\pm 1)^2\pm ...$ or alternatively attempts to compare coefficients to find a value for c.
Condone $11-4x-2x^2\Rightarrow ...-2(2x-x^2)...\Rightarrow -2(x\pm 1)^2\pm ...$

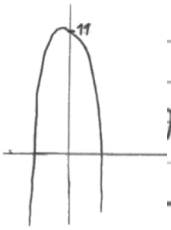
A1: $13-2\left(x+1\right)^2$. If a, b and c are stated and there is a contradiction then mark their final expression. Condone $13+-2\left(x+1\right)^2$ or just the values of a, b and c being stated.

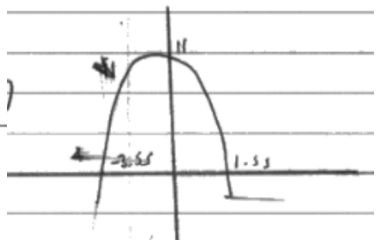
(b)

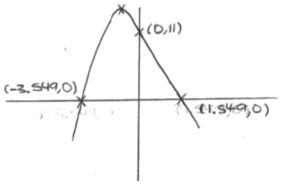
M1: ∩ shape anywhere on a set of axes Cannot be a part of other functions (eg a cubic).
See examples below

A1: Correct shape that cuts x-axis once either side of the origin, maximum in quadrant 2 and y intercept (0, 11) or 11 marked on y-axis. Condone $(11, 0)$ if the intercept is in the correct place. Do not be concerned with any labelled x-intercepts. Condone aspects of the graph which may appear linear (but not a ^ shape). Its line of symmetry must appear to the left of the origin and its curve should broadly appear symmetrical about this line. Ignore x-intercepts or the maximum stated.
The y-intercept may be stated underneath their graph instead, but if there is a contradiction between the graph and what is marked on the graph then the graph takes precedence.
Do not accept graphs which appear to be symmetrical about the y-axis.
Examples
M1A1

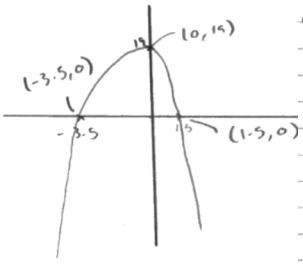


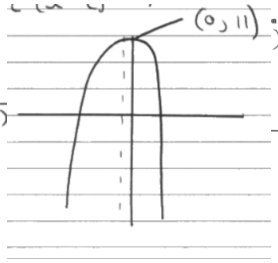


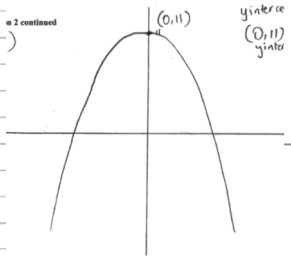


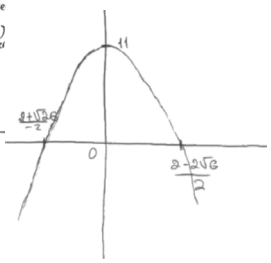


M1A0

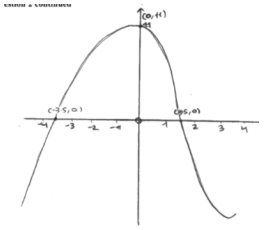








M0A0



(c)

B1ft: Correct equation seen in part (c) (follow through their numeric c so allow $x = -$ "c").

Question Number	Scheme	Marks
3(i)	$\sqrt{8}=2\sqrt{2}$ seen anywhere in the solution (see notes)	B1
	$\left(x+\sqrt{2}\right)^2+\left(3x-5\sqrt{8}\right)^2$ $=x^2+2x\sqrt{2}+2+9x^2-30x\sqrt{8}+25\times 8$	M1
	$=10x^2-58x\sqrt{2}+202$	A1
		(3)
(ii)	$\sqrt{3}\left(4y-3\sqrt{3}\right)=5y+\sqrt{3}$ $\Rightarrow 4\sqrt{3}y-9=5y+\sqrt{3}$ $\Rightarrow 4\sqrt{3}y-5y=9+\sqrt{3}$	M1
	$\Rightarrow y=...$ or $\Rightarrow ky=...$ eg $y="\frac{9+\sqrt{3}}{4\sqrt{3}-5}"$ or $"23"y="9+\sqrt{3}"$	dM1
	$y=\frac{9+\sqrt{3}}{4\sqrt{3}-5}\times\frac{4\sqrt{3}+5}{4\sqrt{3}+5}\Rightarrow y=\frac{...}{"23"}$	ddM1
	$y=\frac{57}{23}+\frac{41}{23}\sqrt{3}$ (or $y=2\frac{11}{23}+1\frac{18}{23}\sqrt{3}$)	A1
		(4)
	(ii) Alternative 1:	
	$\sqrt{3}\left(4p+4q\sqrt{3}-3\sqrt{3}\right)=5\left(p+q\sqrt{3}\right)+\sqrt{3}$ $\Rightarrow 4p\sqrt{3}+12q-9=5p+5q\sqrt{3}+\sqrt{3}$ $\Rightarrow 4p=5q+1,\ 12q-9=5p$	M1 dM1
	$\Rightarrow 4p=5q+1,\ 12q-9=5p$ $\Rightarrow p=...,\ q=...$	ddM1
	$y=\frac{57}{23}+\frac{41}{23}\sqrt{3}$ (or $y=2\frac{11}{23}+1\frac{18}{23}\sqrt{3}$)	A1
		Total 7

Note solutions relying on calculator technology are not acceptable.
(i)

B1: May be stated in the margin or seen/implied anywhere in the solution.
It does not need to be explicitly stated.

Eg. sight of $30\sqrt{8}\rightarrow 60\sqrt{2}$ is fine as is $\left(3x-5\sqrt{8}\right)^2\rightarrow ...x^2-60\sqrt{2}+...$

M1: Expands both brackets so look for:
$x^2+ax\sqrt{2}+2+bx^2-cx\sqrt{8}+d$ or $x^2+ax\sqrt{2}+2+bx^2-cx\sqrt{2}+d$
where *a*, *b*, *c* and *d* are non-zero. **The *x* terms do not need to be collected to score this mark.**

A1: $10x^2-58x\sqrt{2}+202$ or equivalent isw after a correct answer. $58\sqrt{2}x$ is acceptable