Question Number	Scheme	Marks
8(a)	$3x^2+6x+9=3(x\pm...)^2\pm...\qquad a=3$	B1
	$3x^2+6x+9=3(x+1)^2\pm...\qquad a=3\ \&\ b=1$	M1
	$3x^2+6x+9=3(x+1)^2+6$	A1
		(3)
(b)	$(-1,\ 6)$	B1ft
		(1)
(c)	$y=\alpha(x+4)(x+2)(x-3)$	B1
	$6=\alpha(-1+4)(-1+2)(-1-3)$	M1
	$\alpha=-\frac{1}{2}$	A1
	$y="-\frac{1}{2}"(x+4)(x+2)(x-3)\Rightarrow y=...x^3+...x^2+...x+...$	M1
	$A=-\frac{1}{2},\ B=-\frac{3}{2},\ C=5,\ D=12$	A1
		(5)
Alt (c)	$-64A+16B-4C+D=0$ $-8A+4B-2C+D=0$ $27A+9B+3C+D=0$	B1
	$-A+B-C+D=6$	M1
	One of $A=-\frac{1}{2},\ B=-\frac{3}{2},\ C=5,\ D=12$	A1
	Fully solves their simultaneous equations	M1
	$A=-\frac{1}{2},\ B=-\frac{3}{2},\ C=5,\ D=12$	A1
		(9 marks)

(a)

B1 Achieves $3x^2+6x+9=3(x\pm...)^2\pm...$ or states that $a=3$

M1 Deals correctly with the first two terms of $3x^2+6x+9$
Scored for $3x^2+6x+9=3(x+1)^2\pm...$ or states that $a=3$ & $b=1$

A1 $3x^2+6x+9=3(x+1)^2+6$

This may be done by equating coefficients using the expanded form
$a(x+b)^2+c=ax^2+2abx+ab^2+c$

(b)

B1ft $(-1,6)$ or follow through their $(-b,c)$ from (a). Condone lack of brackets and accept eg $x=-1, y=6$

(c)

B1 Identifies that three factors of the cubic equation are $(x+4)(x+2)(x-3)$

M1 A correct method to find the scale factor by using the minimum point found in part (c). Look for the minimum point to be substituted into their equation for the cubic

A1 Scale factor = $-\frac{1}{2}$

M1 Attempts to multiply $(x\pm4)(x\pm2)(x\pm3)$ to achieve $x^3+.....\pm24$. This may have been multiplied by their scale factor so look for $\alpha(x^3+.....\pm24)$

A1 $A=-\frac{1}{2},\ B=-\frac{3}{2},\ C=5,\ D=12$. Accept $y=-\frac{1}{2}x^3-\frac{3}{2}x^2+5x+12$

In the alternative method using simultaneous equations

B1 Three correct equations formed using $x=-4,-2$ and 3 with $y=0$ in each case.

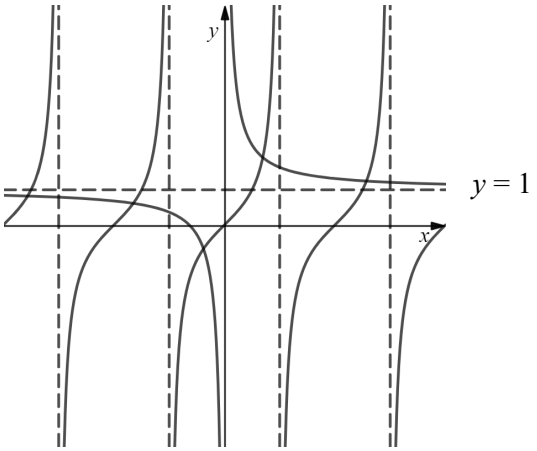
M1 Forms four simultaneous equations using the three intercepts and their point *P*

A1 One of $A=-\frac{1}{2},\ B=-\frac{3}{2},\ C=5,\ D=12$

M1 Fully solves their simultaneous equations either using matrices or elimination. This may be done on a calculator which is acceptable.

Eg. Using matrices $\begin{pmatrix}-64&16&-4&1\\-8&4&-2&1\\27&9&3&1\\-1&1&-1&1\end{pmatrix}^{-1}\begin{pmatrix}0\\0\\0\\6\end{pmatrix}=\begin{pmatrix}A\\B\\C\\D\end{pmatrix}\Rightarrow\begin{pmatrix}A\\B\\C\\D\end{pmatrix}=...$

A1 $A=-\frac{1}{2},\ B=-\frac{3}{2},\ C=5,\ D=12$. Accept $y=-\frac{1}{2}x^3-\frac{3}{2}x^2+5x+12$

Question Number	Scheme	Marks
9(a)	$x = \frac{3\pi}{2}$ oe	B1
		(1)
(b)(i)		B1B1
(ii)	5 (solutions) Number of solutions are the number of points of intersections between the graphs	B1 B1
		(4)
(c) **(i)**	(Number of solutions) $= 40$	B1ft
(ii)	(Number of solutions) $= 14$	B1
		(2)
		(7 marks)

(a)

B1 $x = \frac{3\pi}{2}$ oe and no others. Do not accept in degrees. It may be labelled on the graph, but it must be an equation. If multiple answers are given then $x = \frac{3\pi}{2}$ oe must be identified (eg may be circled)

(b)(i)