Question Number	Scheme	Marks
7(a)	$4\times-2\times-9=72$ $p="72"-50$	M1
	$(p=)\ 22$	A1
		(2)
(b)	$(q=)-4,\ 2,\ 4.5$	B1B1
		(2)
(c)	$\mathrm{f}(x)=(x+4)(x-2)(2x-9)$ $\mathrm{f}(x)=(x^2+2x-8)(2x-9)=...x^3\pm...x^2\pm...x\ (\pm...)$	M1
	$=2x^3-5x^2-34x\quad(+72)$	A1
	$(\mathrm{f}'(x)=)\ 6x^2-10x-34$	M1A1
		(4)
(d)	$"6x^2-10x-34"=-18$ $"6x^2-10x-16"=0\Rightarrow x=...\left(-1,\ \frac{8}{3}\right)$	M1
	$-1<x<\frac{8}{3}$	dM1A1
		(3)
		Total 11

(a)

M1: Correct method for *p*. Condone sign slips in finding the product of $4\times-2\times-9$
Alternatively multiplies out to achieve a cubic (eg $.....\pm72$) and subtracts 50 from their constant. $50-72\ (=-22)$ is M0.

A1: 22 cao (22 with no working is M1A1) In the alternative method they must identify *p* as 22.
Check for answer next to question. If there is a contradiction then the answer in the main body of working takes precedence.
Accept $y=\mathrm{f}(x)-22$ but do not accept contradictions such as $\mathrm{f}(x)-22\Rightarrow p=-22$ (M1A0)

(b) Check next to the question (ignore any references to *x*)

B1: Any 1 correct value of $-4,\ 2,\ 4.5$ in their final answer. If they proceed to changing the sign on the value then B0.

B1: $-4,\ 2,\ 4.5$ cao but if they exclude any of these then withhold this mark. If there is a contradiction, then the answer in the main body of working takes precedence and if they state the correct values followed by $4,\ -2,\ -4.5$ then withhold this mark.

(c) The expansion may be seen in (a) or (b) which is acceptable to score the first two marks.

M1: Correct method used to expand and achieve a cubic $ax^3 + bx^2 + cx\ (+d)$ where *a*, *b*, *c* are all non zero. Terms do not need to be collected.

A1: $2x^3 - 5x^2 - 34x$ (simplified or unsimplified). Do not be concerned with the value of *d*

M1: $x^n \to x^{n-1}$ on at least one term for their cubic.

A1: $6x^2 - 10x - 34$ following a correct expansion of the cubic (+72 may be omitted). If the constant term is incorrect (not just omitted) then A0
isw eg $6x^2 - 10x - 34 = 0$ can still score A1.

(d)

M1: Sets their f′(*x*) = ± 18, collects terms and attempts to solve their 3TQ by factorising, quadratic formula or completing the square. They may just write down their critical values which is acceptable, but you may need to check these on your calculator. Condone slips in their rearrangement.

dM1: Attempts "inside" region for their values. Do not be concerned as to whether the inequalities are $<$ or $\leqslant$ for this mark. It is dependent on the previous method mark.

A1: $-1 < x < \frac{8}{3}$ or other equivalent expressions such as $\left\{x \in \mathbb{R} : -1 < x < \frac{8}{3}\right\}$ $x > -1 \cap x < \frac{8}{3}$ or $x > -1$ and $x < \frac{8}{3}$, $\frac{8}{3} > x > -1$ or $x > -1,\ x < \frac{8}{3}$. Some minimal working must be seen.
Condone other attempts at set notation where there is the same intention.
Do not accept "$x > -1$ or $x < \frac{8}{3}$" or "$x > -1 \cup x < \frac{8}{3}$"

Question Number	Scheme	Marks
8(a)	$\frac{2}{5}$ or decimal equivalent	B1
		(1)
(b)	$m_N = -1 \div "\frac{2}{5}"$	M1
	$y+2="-\frac{5}{2}"(x-6)$	M1
	$y=-\frac{5}{2}x+13$	A1
		(3)
(c)	$"-\frac{5}{2}x+13"="\frac{2}{5}x+\frac{7}{5}" \Rightarrow "\frac{29}{10}x"="\frac{58}{5}" \Rightarrow x=...(=4)$ or $"\frac{5}{2}y-\frac{7}{2}"="-\frac{2}{5}y+\frac{26}{5}" \Rightarrow "\frac{29}{10}y"="\frac{87}{10}" \Rightarrow y=...(=3)$	M1
	$x="4" \Rightarrow y=...$ or $y="3" \Rightarrow x=...$	dM1
	$(4,3)$	A1
		(3)
(d)	$(2,8)$	B1B1
		(2)
		Total 9

(a)

B1: $\frac{2}{5}$ or decimal equivalent. It must be identified so do not just extract it from a rearranged equation into the form $y=\frac{2}{5}x+...$ and do not allow $\frac{2}{5}x$. Must be seen in (a). Do not be concerned with the working to achieve $\frac{2}{5}$. Do not accept $\frac{-2}{-5}$

(b)

M1: Correct application of the perpendicular gradient rule

M1: Correct straight-line method with their "changed" gradient. Eg $(y+2)="-\frac{5}{2}"(x-6)$. Allow one sign slip in the brackets. If they use $y=mx+c$ they must proceed as far as $c=...$

A1: $y=-\frac{5}{2}x+13$ oe

(c) Coordinates found with no algebraic working scores 0

M1: A correct method to solve for *x* or *y* for their l_1 and l_2. Do not be concerned by the mechanics of their rearrangement. Do not penalise if decimals appear in their working.