Question	Scheme	Marks	AOs
1(a)	$\{f'(x)=\}\ldots x^2+\ldots x+\ldots \Rightarrow \{f''(x)=\}\ldots x+\ldots$	**M1**	1.1b
	$\{f'(x)=\}3x^2+4x-8 \Rightarrow \{f''(x)=\}6x+4$	**A1cso**	1.1b
		(2)	
(b)(i)	$"6x+4"=0 \Rightarrow x="-\frac{2}{3}"$	**B1ft**	1.1b
(ii)	x „ $"-\frac{2}{3}"$ or $x<"-\frac{2}{3}"$	**B1ft**	2.2a
		(2)	
			(4 marks)

Notes

(a)

M1: For attempting to differentiate twice.

It can be scored for any of: $x^3 \to \ldots x^2 \to \ldots x$ or $2x^2 \to \ldots x \to k$ or $-8x \to k \to 0$ where … are constants.

You can ignore the lhs so do not be concerned what they call the first and/or second derivative, just look for their expressions.

The indices do not need to be processed for this mark so allow for e.g. $x^3 \to \ldots x^{3-1} \to \ldots x^{3-1-1}$

A1cso: $(f''(x)=)\ 6x+4$ Correct second derivative from fully correct work. The $"f''(x)="$ is not required.

Allow $6x^1$ for $6x$ but not $4x^0$ for 4 unless the $4x^0$ becomes 4 later, e.g. in part (b).

Do **not** apply isw so mark their final answer. E.g. if $6x + 4$ becomes $3x + 2$ score A0

(b)

(i)

B1ft: $ax+b=0 \Rightarrow (x=)-\frac{b}{a}$. This mark is for obtaining $x=-\frac{2}{3}$ **or** $x=-\frac{b}{a}$ which has come from solving an equation of the form $ax+b,\ a,b\neq 0$ where $ax + b$ is their attempt to differentiate twice in part (a)

Allow equivalent fractions e.g. $x=-\frac{4}{6}$ or equivalents for their $x=-\frac{b}{a}$ or an exact decimal and isw.

(ii)

B1ft: Deduces x „ $-\frac{2}{3}$ **or** follow through their single value of x from part (i) obtained from their attempt to solve an equation of the form $ax+b=0,\ a,b\neq 0$ where $ax + b$ was their attempt to differentiate twice in part (a) . Do not isw and mark their final answer.

If 2 inequalities are given e.g. $x<"-\frac{2}{3}",\ x>"-\frac{2}{3}"$ without indicating which is their answer score B0

Condone $<$ for „ and allow equivalent inequalities e.g. $-\frac{2}{3}>x$

Allow equivalent fractions e.g. $x=-\frac{4}{6}$ or equivalents for their $x=-\frac{b}{a}$

Allow equivalent notation so these are all acceptable:

x „ $"-\frac{2}{3}",\ x<"-\frac{2}{3}",\ \left(-\infty,"-\frac{2}{3}"\right],\ \left(-\infty,"-\frac{2}{3}"\right),\ \left\{x:x\ \text{„}\ "-\frac{2}{3}"\right\},\ \left\{x:x<"-\frac{2}{3}"\right\}$

Ignore any reference to values of y.

Allow ft decimal answers from (i) which may be inexact.

Correct answers in part (b) with no working in (a) can score 0011.