Question Number	Scheme	Marks
8. (a)	Uses $S_{10}=360\Rightarrow\frac{10}{2}\{2\times a+9\times 4\}=360$	M1
	$\Rightarrow 2a+36=72\Rightarrow a=18$	A1
		(2)
(b)	Uses $S_n=2146\Rightarrow\frac{n}{2}\{2\times"18"+(n-1)\times 4\}=2146$	M1
	$\Rightarrow n\{16+2n\}=2146$	
	$\Rightarrow n^2+8n-1073=0$ *	A1*
		(2)
(c)	(i) States 29	B1
	(ii) Attempts $"18"+("29"-1)\times 4=130$	M1, A1
		(3)
		(7 marks)

(a)

M1: Uses $S_{10}=360$ with a correct formula to set up a linear equation in "a". E.g. $\frac{10}{2}\{2\times a+9\times 4\}=360$

Alternatively uses the sum of all 10 terms

$a+(a+4)+(a+8)+(a+12)+(a+16)+(a+20)+(a+24)+(a+28)+(a+32)+(a+36)=360$

A1: $a=18$ following a correct equation

(b)

M1: Attempts to use $S_n=2146\Rightarrow\frac{n}{2}\{2\times"18"+(n-1)\times 4\}=2146$ following through on their value of "a"

A1*: Proceeds to $n^2+8n-1073=0$ showing sufficient working, which in most circumstances should be regarded as one correct simplified intermediate line. (See main scheme)

(c)(i)

B1: States 29.

The -37 if written down must be deleted/crossed out, or the 29 chosen by being "ringed" or underlined

(c)(ii)

M1: Attempts $a+(n-1)\times 4$ with their values of a and n. E.g. $"18"+("29"-1)\times 4$

Alternatively uses $2146\Rightarrow\frac{29}{2}\{"18"+l\}\Rightarrow l=...$

A1: Maximum number of seats $=130$ which may be labelled $l=130$

This alone scores both marks (but only if they had a = 18 and n =29 earlier)

Question Number	Scheme	Marks
9 (a)	$y=\frac{2}{3}x^{2}-9\sqrt{x}+13$ $\frac{\mathrm{d}y}{\mathrm{d}x}=\frac{4}{3}x-\frac{9}{2\sqrt{x}}$ Attempts to solve $\frac{\mathrm{d}y}{\mathrm{d}x}>0\Rightarrow x^{\frac{3}{2}}>\frac{27}{8}\Rightarrow x>\frac{9}{4}$	M1, A1 dM1, A1 **(4)**
(b)	$\int\frac{2}{3}x^{2}-9\sqrt{x}+13\,\mathrm{d}x=\frac{2}{9}x^{3}-6x^{\frac{3}{2}}+13x\quad(+c)$ Area $=\left[\frac{2}{9}x^{3}-6x^{\frac{3}{2}}+13x\right]_{0}^{9}=117$ Substitutes $x=9$ into $\frac{\mathrm{d}y}{\mathrm{d}x}=\frac{4}{3}x-\frac{9}{2\sqrt{x}}\Rightarrow\frac{\mathrm{d}y}{\mathrm{d}x}=\left(\frac{21}{2}\right)$ Finds where tangent meets x-axis $0-40=\frac{21}{2}(x-9)\Rightarrow x=\frac{109}{21}$ Area of $R=\left[\frac{2}{9}x^{3}-6x^{\frac{3}{2}}+13x\right]_{0}^{9}-\frac{1}{2}\times40\times\left(9-\frac{109}{21}\right)$ $=117-\frac{1600}{21}=\frac{857}{21}$	M1 dM1, A1 M1 dM1 A1 ddM1 A1 **(8)** **(12 marks)**

There are no marks for integrating in part (a) or differentiating in (b). This is a problem-solving question and candidates should be awarded these marks only for work in the correct part.

(a)

M1: Attempts $\frac{\mathrm{d}y}{\mathrm{d}x}$ with one index correct. Allow for $x^{2}\rightarrow x^{1}$ or $\sqrt{x}\rightarrow x^{-\frac{1}{2}}$

A1: $\frac{\mathrm{d}y}{\mathrm{d}x}=\frac{4}{3}x-\frac{9}{2\sqrt{x}}$ o.e which may be left un simplified. The LHS is not required

dM1: Attempts to find where $\frac{\mathrm{d}y}{\mathrm{d}x}>0$ and proceeds to $x^{\frac{3}{2}}>k$ or $x^{3}>k$ following correct squaring

Also allow $\frac{\mathrm{d}y}{\mathrm{d}x}\geqslant 0$ and proceeds to $x^{\frac{3}{2}}\geqslant k$ but also condone $\frac{\mathrm{d}y}{\mathrm{d}x}=0$ leading to $x^{\frac{3}{2}}=k$

If a candidate has a correct derivative, then condone $\frac{4}{3}x-\frac{9}{2\sqrt{x}}...0\Rightarrow x...\frac{9}{4}$ where ... is =, > or $\geqslant$

A1: States $x>\frac{9}{4}$ or $x\geqslant\frac{9}{4}$ o.e. following the award of both M's. Do not accept other ranges such as $x<0$