Question Number	Scheme	Marks
2 (a)	$u_2 = 2-\frac{4}{3}=\frac{2}{3}, \quad u_3 = 2-\frac{4}{"\frac{2}{3}"}=-4, \quad u_4 = 2-\frac{4}{"-4"}=3$	M1 A1 A1 **(3)**
(b)	$\{u_{61} =\}\ 3$	B1 **(1)**
(c)	$\left\{\sum_{i=1}^{99} u_i =\right\}\ \frac{99}{3}\times\left(3+"\frac{2}{3}"+"-4"\right)$ $=-11$	M1 A1 **(2)**
		(6 marks)

(a)

M1: Attempts to use the formula correctly using **values** at least once which may be implied by $u_2 = \frac{2}{3}$

or

e.g. by $u_2 = 5, u_3 = \frac{6}{5}$ where their u_3 follows from their u_2 Not scored for e.g. just $u_2 = 2-\frac{4}{u_1}$

A1: 2 correct answers. Do not allow e.g. 0.66 or 0.66… for $\frac{2}{3}$ but allow $0.\dot{6}$

A1: All 3 correct. If the terms are not labelled, then the order must be clear to score this mark.

(b)

B1: cao. Must be clearly identified as their answer to part (b) or labelled as u_{61}

They do not need to show that they have used a period of 3 in their answer, but if they have **clearly** used a period of e.g. 4 in part (b), withhold the mark.

(c)

M1: Uses a valid method. Note that $3+\frac{2}{3}-4=-\frac{1}{3}$ and you might see $99+22-132=-11$

A1: cao. Answer only scores both marks.

Question Number	Scheme	Marks
3 (a)	"Strip width" or $h = 2$	B1
	Area $\approx \frac{"h"}{2}(\{0+\}\ 2.8284+2\times(1.4142+2+2.4495))$	M1
	= awrt 14.556	A1
		(3)
(b)	$\left\{\int_{-2}^{6}\left(2x+\sqrt{4x+8}\right)\mathrm{d}x=\right\}\ \left[x^2\right]_{-2}^{6}+2\times"14.556"$	M1
	$=6^2-(-2)^2+2\times"14.556"$	dM1
	= awrt 61.1S	A1
		(3)
		(6 marks)

(a) **Note: Algebraic integration in part (a) scores 000. They can go on to score 110 in part (b).**

B1: Uses a strip width of 2 units. This may be embedded in the (correct) trapezium rule or seen as $h = 2$.

M1: Uses the correct form of the trapezium rule.

Look for $\frac{\cdots}{2}(2.8284+2\times(1.4142+2+2.4495))$ condoning transcription errors but they must be using the y values in the correct places.

Just $2.8284+2\times(1.4142+2+2.4495)$ scores B1M1 (and the A1 is available if they get awrt 14.556)

Note that $\frac{2}{2}(0+2.8284)+2\times(1.4142+2+2.4495)$ is acceptable unless it follows an incorrect formula e.g. $\frac{h}{2}(y_0+y_4)+2\times(y_1+y_2+y_3)$

A1: awrt 14.556. Note the unrounded value is 14.5558 and scores full marks.
Calculator integration achieves 15.085 (to 3 d.p.) and scores no marks unless a valid attempt is seen.
Ignore any units or e.g. u^2 if seen.

(b)

M1: For an attempt to split up the integral and achieve an expression of one of the below forms:
Look for e.g. $\left[x^2\right]_{-2}^{6}+k\times"14.556"$ **or** $32+k\times"14.556"$ **or** $\left[\alpha x^n\right]_{-2}^{6}+2\times"14.556"$ with $n\neq 1$ but allow $k = 1$ for this mark. They may attempt the two parts separately but must combine for M1.
The $\left[x^2\right]_{-2}^{6}$ might be seen as e.g. $\frac{1}{2}\times6\times12-\frac{1}{2}\times2\times4$ or $\frac{1}{2}\times6\times12+\frac{1}{2}\times2\times(-4)$ if they treat it as the area of two triangles or they might apply the trapezium rule to $2x$ only (which should give the correct 32).
Condone slips in the base and/or height of the triangles if the other aspect $2\times"14.556"$ is correct.

dM1: Full and correct **method** using their answer to part (a) to find a value.