Question Number	Scheme	Marks
2.(a)	$u_2 = \frac{2}{3},\ u_3 = -4,\ u_4 = 3$	M1, A1, A1 **(3)**
(b)	$\sum_{r=1}^{100} u_r = 33\times\left(3+\frac{2}{3}+-4\right)+3$ $= -8$	M1 A1 **(2)**
		(5 marks)

(a)

M1: Attempts to use the iteration formula seen at least once. E.g. Award for $u_{1+1} = 2-\frac{4}{3} = ...$

May be implied by

- either a correct value assigned to the correct term. Condone $\frac{2}{3}$ as 0.67 for u_2
- or a correct follow through value. So if $u_2 = -\frac{2}{3}$ then $u_3 = 2-\frac{4}{-2/3}$ or 8 would score the mark

It must be a correct method. Watch for correct values attached to the wrong term

E.g $u_2 = 2-\frac{4}{2},\ u_3 = 2-\frac{4}{3}, u_4 = 2-\frac{4}{4}$ does achieve $\frac{2}{3}$ but it is M0. It is assigned to u_3

A1: Any correct value assigned to the correct term. Either $u_2 = \frac{2}{3}$ (but condone as 0.67) $u_3 = -4$ or $u_4 = 3$

A1: All 3 values correct and labelled: $u_2 = \frac{2}{3},\ u_3 = -4$ AND $u_4 = 3$. May be awarded from part (b)

(b)

M1: Establishes a correct method to find the sum of 100 terms.

Amongst other correct methods are;

$33\times\left(3+"\frac{2}{3}"+"-4"\right)+3$

$34\times\left(3+"\frac{2}{3}"+"-4"\right)-"\frac{2}{3}"-"-4"$

You may see listing but this cannot score the marks unless all terms are present or the correct result is given.

An incorrect part (a) is unlikely to score any marks as it is unlikely to be repeating every 3 terms

A1: -8. This alone scores both marks following a correct (a), as long as there is no incorrect method.

Question Number	Scheme	Marks
3 (a)	$2\tan\theta + 3\sin\theta = 0$ States or uses $\tan\theta = \dfrac{\sin\theta}{\cos\theta} \rightarrow 2\dfrac{\sin\theta}{\cos\theta} + 3\sin\theta = 0$ $\sin\theta\left(2 + 3\cos\theta\right) = 0$ $2 + 3\cos\theta = 0$ $\cos\theta = -\dfrac{2}{3} \Rightarrow \theta =$ awrt $132°$ or awrt $228°$ $\cos\theta = -\dfrac{2}{3} \Rightarrow \theta =$ awrt $131.8°$ and awrt $228.2°$ $\sin\theta = 0 \Rightarrow \theta = 180°, 360°$	M1 dM1 A1 A1 B1 **(5)**
(b)	Sets $2x + 40° =$ their $131.8° \Rightarrow x = ...$ $x =$ awrt $45.9°$	M1 A1 **(2)** **(7 marks)**

(a) Condone a lack of a degrees symbol throughout.

Condone solutions that drop θ's in parts of the working

M1: States $\tan\theta = \dfrac{\sin\theta}{\cos\theta}$ or attempts to use $\tan\theta = \dfrac{\sin\theta}{\cos\theta}$ in the given equation. Condone slips in coefficients.

dM1: Attempts to use $\tan\theta = \dfrac{\sin\theta}{\cos\theta}$ o.e., cross multiplies and either factorises or cancels to form a linear equation in $\cos\theta$

A1: Achieves $\cos\theta = -\dfrac{2}{3}$ and finds one correct θ value to the nearest degree.

Condone radian solutions for this mark so allow awrt 2.3(0) or awrt 3.98 following $\cos\theta = -\dfrac{2}{3}$

A1: Achieves $\cos\theta = -\dfrac{2}{3}$ and finds both θ values in degrees correct to one dp.

Any extra values in the range (for $\cos\theta = -\dfrac{2}{3}$) is A0

B1: Achieves $\sin\theta = 0$ followed by $\theta = 180°, 360°$ Condone 0 appearing as a solution

(b) Condone a lack of a degrees symbol

M1: Sets $2x + 40° =$ their $131.8°$ and proceeds to a value for x.

Look for correct order of operations so $2x + 40° = "131.8°" \Rightarrow x = \dfrac{"131.8°" \pm 40°}{2}$

There may be multiple attempts, which can be ignored for this mark

Follow through on their smallest value (must be greater than $40°$), from part (a)

A1: $x =$ awrt $45.9°$ following a correct equation. Do not accept multiple solutions here

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