Question Number	Scheme	Marks
1.		

a	*b*	*c*	*abc*
1	**10**	**4**	**40**
2	**6**	**7**	**84**
3	**2**	**10**	**60**
All values of *abc* are multiples of 4			

One correct set *a*, *b* & *c* — B1

Two correct rows — M1

Fully correct + statement — A1

(3 marks)

Main method: Numerical solution finding all known solutions

B1: Any correct set of values for *a*, *b* and *c*. You can ignore any attempt at the product *abc*

M1: Any two fully correct rows including the correct calculations for the products.
Condone extra/ incorrect rows

A1: Fully correct. The solution must have

- the three correct rows with correct calculations for *abc*
- any extra (or incorrect) rows must be deleted or somehow excluded
- a minimal statement showing that they are aware that 40, 84 and 60 are multiples of 4. E.g they are all divisible by 4, use of a tick ✓, prove, QED, calculations such as $\frac{40}{4}=10$. They can be divided by 4 (on its own) is insufficient without further clarification such as "to give whole numbers"
- no incorrect calculations. E.g if their attempt to prove that 60 being a multiple of 4 includes $\frac{60}{4}=16$ then it is A0

Alt 1: Via deduction

B1: Either

Solves $a + b + c = 15$ with $c = 3a + 1$ to conclude that $4a + b = 14$ o.e. **and** states that *b* is even

Or

Uses $c=3a+1$ to state that if *a* is odd then *c* is even and if *a* is even then *c* is odd

M1: Attempts to generalise and offers one of the two possibilities for the product *abc*.

Either

states then when *a* is odd, *b* is even and *c* is even, therefore $abc = odd \times even \times even =$ multiple of 4

Or

states then when *a* is even, *b* is even and *c* is odd, therefore $abc = even \times even \times odd =$ multiple of 4

A1: Fully correct. The solution must have

- the two possible "calculations" for *abc*.
- no incorrect "calculations". E.g. if they state that $even \times even$ is a multiple of 4 because $2n \times 2n = 4n^2$ it is A0. It must be along the lines of $2m \times 2n = 4mn$ with different variables.

You may see a hybrid solution that can be marked along similar lines. Mark positively.
If you see a tabular solution and one via deduction, award marks for the better one.
Please use review if you are uncertain.

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.