Question Number	Scheme	Marks
10	$u_1 = 8 \quad u_2 = 10 \quad u_{n+2} = u_{n+1} + 2u_n \quad n \in \mathbb{Z}^+ \quad u_n = 3\times 2^n - 2\times(-1)^n$	
	$n=1 \Rightarrow u_1 = 3\times 2^1 - 2\times(-1)^1 = 8$ $n=2 \Rightarrow u_2 = 3\times 2^2 - 2\times(-1)^2 = 10$	B1
	$u_k = 3\times 2^k - 2\times(-1)^k \qquad u_{k+1} = 3\times 2^{k+1} - 2\times(-1)^{k+1}$ $u_{k+2} = u_{k+1} + 2u_k = 3\times 2^{k+1} - 2\times(-1)^{k+1} + 2\left(3\times 2^k - 2\times(-1)^k\right)$	M1 A1
	$= 3\times 2^{k+1} - 2\times(-1)^{k+1} + 6\times 2^k - 4\times(-1)^k$ $= 3\times 2^{k+1} + 2\times(-1)^{k+2} + 3\times 2^{k+1} - 4\times(-1)^{k+2}$ $= 6\times 2^{k+1} - 2\times(-1)^{k+2}$	M1
	$= 3\times 2^{k+2} - 2\times(-1)^{k+2}$	A1
	True for $n=1$ and $n=2$, true for $n=k+2$ when assumed true for $n=k$ and $n=k+1$, true for all $n \in \mathbb{Z}^+$	A1
		(6)
		Total 6

Notes

B1: Uses general formula to obtain $u_1 = 8$ and $u_2 = 10$ with substitution seen, as a minimum accept $u_1 = 3\times 2 - 2\times -1 = 8$ and $u_2 = 3\times 4 - 2\times 1 = 10$. No need to state true for $n = 1$ and $n = 2$ here, but if it is stated it can count as part of the conclusion. Ignore attempts at further terms.

M1: Begins the inductive step by attempting the recurrence relation with expressions from the formula for u_k and u_{k+1}. No required to state the assumption. They may work from k to $k - 2$ rather than $k + 2$ to k, or even $k + 1$ to $k - 1$ and accept if they are working in n instead of k. Allow slips as long at they are trying to substitute in the correct places.

A1: Correct expression for u_{k+2} or their appropriate term in terms of k (or n) only, condoning for this mark if they have e.g. (-1^k) instead of $(-1)^k$ as slip.

M1: Combines terms to $p\times 2^{\cdots} + q\times(-1)^{\cdots}$ where ... are functions of k (or n) by *matching the powers* before the target expression. The indices need not be the required ones at this stage e.g. reaching $6\times 2^{k+1} - 2\times(-1)^k$ is fine. Not dependent on the previous M but some attempt at the using the recurrence relation must have been made.

A1: Correct expression from fully correct work. Must have the correct powers, $k + 2$ or appropriate for their step. Bracketing around the (-1)'s must have been correct.

A1: Requires all previous marks. Correct conclusion given, which may be in stages. E.g. "True for $n = 1$ and $n = 2$" may have been given at the start, but the "if true for $n = k + 1$ and $n = k$ then shown true for $n = k + 2$" and "true for all n" must be given in the final conclusion. Must have both preceding cases including, though strong induction may be used (ie "if true for all $k < n$ then true for n"). The logic in the conclusion must be correct, so stating "true for $n = k$, $k + 1$ and $k + 2$" or similar without the "if.. then" connotation is A0.