Question	Scheme	Marks	AOs
6	f(*k* + 1) – f(*k*)		
	When $n = 1$, $6^{2n-1} + 8^{n+1} = 6 + 64 = 70$ so the statement is true for $n = 1$	B1	2.2a
	Assume true for $n = k$ so $6^{2k-1} + 8^{k+1}$ is divisible by 7	M1	2.4
	$f(k+1) - f(k) = 6^{2(k+1)-1} + 8^{k+1+1} - 6^{2k-1} - 8^{k+1}$	M1	2.1
	$= 36 \times 6^{2k-1} + 8 \times 8^{k+1} - 6^{2k-1} - 8^{k+1}$		
	$= 7f(k) + 28 \times 6^{2k-1}$ or e.g. $= 35f(k) - 28 \times 8^{k+1}$	A1	1.1b
	$f(k+1) = 8f(k) + 28 \times 6^{2k-1}$ or e.g. $f(k+1) = 36f(k) - 28 \times 8^{k+1}$	A1	1.1b
	If true for $n = k$ then true for $n = k + 1$, true for $n = 1$ so true for all (positive integers) n (Allow "for all values")	A1	2.4
		(6)	
ALT 1	f(*k* + 1)		
	When $n = 1$, $6^{2n-1} + 8^{n+1} = 6 + 64 = 70$ so the statement is true for $n = 1$	B1	2.2a
	Assume true for $n = k$ so $6^{2k-1} + 8^{k+1}$ is divisible by 7	M1	2.4
	$f(k+1) = 6^{(2k+1)-1} + 8^{k+1+1}$	M1	2.1
	$f(k+1) = 36 \times 6^{2k-1} + 8 \times 8^{k+1}$ $= 28 \times 6^{2k-1} + 8 \times 6^{2k-1} + 8 \times 8^{k+1}$ $f(k+1) = 8f(k) + 28 \times 6^{2k-1}$	A1 A1	1.1b 1.1b
	If true for $n = k$ then true for $n = k + 1$, true for $n = 1$ so true for all (positive integers) n (Allow "for all values")	A1	2.4
		(6)	
ALT 2	f(*k* + 1) – *m*f(*k*)		
	When $n = 1$, $6^{2n-1} + 8^{n+1} = 6 + 64 = 70$ so the statement is true for $n = 1$	B1	2.2a
	Assume true for $n = k$ so $6^{2k-1} + 8^{k+1}$ is divisible by 7	M1	2.4
	$f(k+1) - mf(k) = 6^{2k+1} + 8^{k+2} - m(6^{2k-1} + 8^{k+1})$	M1	2.1
	$= (8-m)8^{k+1} + 6^{2k+1} - m \times 6^{2k-1}$ $= (8-m)(8^{k+1} + 6^{2k-1}) + 28 \times 6^{2k-1}$	A1	1.1b
	$f(k) = (8-m)(8^{k+1} + 6^{2k-1}) + 28 \times 6^{2k-1} + mf(k)$	A1	1.1b
	If true for $n = k$ then true for $n = k + 1$, true for $n = 1$ so true for all (positive integers) n (Allow "for all values")	A1	2.4
		(6)	
ALT 3	f(*k*) = 7*M*		
	When $n = 1$, $6^{2n-1} + 8^{n+1} = 6 + 64 = 70$ so the statement is true for $n = 1$	B1	2.2a
	Assume true for $n = k$ so $6^{2k-1} + 8^{k+1} = 7M$	M1	2.4
	$f(k+1) = 6^{2(k+1)-1} + 8^{k+1+1}$	M1	2.1
	$f(k+1) = 8 \times 8^{k+1} + 6^{2k+1} = 8(7M - 6^{2k-1}) + 6^{2k+1}$ $f(k+1) = 56M + 28 \times 6^{2k-1}$	A1 A1	1.1b 1.1b

	If true for $n = k$ then true for $n = k + 1$, true for $n = 1$ so true for all (positive integers) n (Allow "for all values")	A1	2.4
		(6)	
			6 marks)

Notes

B1: Shows that f(1) = 70
M1: Makes a statement that assumes the result is true for some value of n (Assume (true for) $n = k$ is sufficient – note that this may be recovered in their conclusion if they say e.g. if true for $n = k$ then … etc.)
M1: Attempts $f(k + 1) – f(k)$ or equivalent work.
A1: Achieves a correct expression for $f(k + 1) – f(k)$ in terms of $f(k)$.
A1: Reaches a correct expression for $f(k + 1)$ in terms of $f(k)$.
A1: Correct conclusion. This mark is dependent on all previous marks apart from the B mark. It is gained by conveying the ideas of **all** four underlined points **either** at the end of their solution **or** as a narrative in their solution.

ALT 1
B1: Shows that f(1) = 70
M1: Makes a statement that assumes the result is true for some value of n (Assume (true for) $n = k$ is sufficient – note that this may be recovered in their conclusion if they say e.g. if true for $n = k$ then … etc.)
M1: Attempts $f(k + 1)$
A1: Correctly obtains $8f(k)$ **or** $28 \times 6^{2k-1}$
A1: Reaches a correct expression for $f(k + 1)$ in terms of $f(k)$.
A1: Correct conclusion. This mark is dependent on all previous marks apart from the B mark. It is gained by conveying the ideas of **all** four underlined points **either** at the end of their solution **or** as a narrative in their solution.

ALT 2
B1: Shows that f(1) = 70
M1: Makes a statement that assumes the result is true for some value of n (Assume (true for) $n = k$ is sufficient – note that this may be recovered in their conclusion if they say e.g. if true for $n = k$ then … etc.)
M1: Attempts $f(k + 1) – mf(k)$
A1: Achieves a correct expression for $f(k + 1) – mf(k)$ in terms of $f(k)$.
A1: Reaches a correct expression for $f(k + 1)$ in terms of $f(k)$.
A1: Correct conclusion. This mark is dependent on all previous marks apart from the B mark. It is gained by conveying the ideas of **all** four underlined points **either** at the end of their solution **or** as a narrative in their solution.

ALT 3
B1: Shows that f(1) = 70
M1: Makes a statement that assumes the result is true for some value of n (Assume (true for) $n = k$ is sufficient – note that this may be recovered in their conclusion if they say e.g. if true for $n = k$ then … etc.)
M1: Attempts $f(k + 1)$

A1: Correctly obtains $56M$ **or** $28 \times 6^{2k-1}$

A1: Reaches a correct expression for $f(k+1)$ in terms of M and 6^{2k-1}

A1: Correct conclusion. This mark is dependent on all previous marks apart from the B mark. It is gained by conveying the ideas of **all** four underlined points **either** at the end of their solution **or** as a narrative in their solution.