

Proof By Induction (Divisibility) Exam Questions (From OCR 4725 unless otherwise stated)

Q1, (Jan 2007, Q6)

(i)	$u_{n+1} - u_n = 2n + 4$	B1	3	Correct expression for u_{n+1}
		M1		Attempt to expand and simplify
		A1		Obtain given answer correctly
(ii)		B1	5	State $u_1 = 4$ (or $u_2 = 10$)and is divisible by 2
		M1		State induction hypothesis true for
		M1		u_n
		A1		Attempt to use result in (ii)
		A1		Correct conclusion reached for u_{n+1}
			8	Clear, explicit statement of induction conclusion

Q2, (Jan 2009, Q7)

(i)	$13^n + 6^{n-1} + 13^{n+1} + 6^n$	B1	3	Correct expression seen
(ii)		M1		Attempt to factorise both terms in (i)
		A1		Obtain correct expression
		B1		Check that result is true for $n = 1$ (or 2)
		B1		Recognise that (i) is divisible by 7
		B1	Deduce that u_{n+1} is divisible by 7	
		B1	4	Clear statement of Induction conclusion
			7	

Q3, (Jun 2014, Q10)

(i)	6 27 129	B1	[2]	Obtain correct values
		B1		Obtain 3 rd correct value
(ii)	3	B1ft	[1]	State a correct value
(iii)	$5^{n+1} + 2^n$	B1	[5]	Correct expression for u_{n+1} seen
		M1		Attempt to factorise $u_{n+1} + u_n$
		A1		Obtain correct simplified answer
		A1		Clear explanation why u_{n+1} is divisible by 3
		B1		Clear statement of induction process