

Summations (Proof By Induction) MS (From OCR 4725)

Q1, (Jun 2007, Q2)

$(1^3 =) \frac{1}{4} \times 1^2 \times 2^2$	B1		Show result true for $n = 1$
$\frac{1}{4} n^2(n + 1)^2 + (n + 1)^3$	M1 M1(indep) A1 A1	5	Add next term to given sum formula Attempt to factorise and simplify Correct expression obtained convincingly
$\frac{1}{4} (n + 1)^2(n + 2)^2$			Specific statement of induction conclusion
		5	

Q2, (Jun 2010, Q1)

B1	Establish result true for $n = 1$ or $n = 2$
M1	Add next term to given sum formula
M1	Attempt to factorise or expand and simplify to correct expression
A1	Correct expression obtained
A1	5 Specific statement of induction conclusion
	5

Q3, (Jun 2011, Q2)

B1	Establish result true for $n = 1$ or 2
M1*	Add next term to given sum formula
DM1	Combine with correct denominator
A1	Obtain correct expression convincingly
A1	5 Specific statement of induction conclusion, provided 1 st 4 marks earned
	5

Q4, (Jun 2012, Q5)

B1	Verify result true when $n = 1$
M1*	Add next term in series
DepM1	Attempt to obtain 3^{k+1} correctly
A1	Show sufficient working to justify correct expression
B1	Clear statements of Induction processes, but 1 st 4 marks must all be earned.
	[5]

Q5, (Jun 2017, Q4)

$$\frac{n}{2n+1} + \frac{1}{(2n+1)(2n+3)}$$

$$\frac{n(2n+3)+1}{(2n+1)(2n+3)}$$

$$\frac{n+1}{2n+3}$$

B1	Show clearly that result is true when $n = 1$
M1*	Add correct $(n + 1)$ th term to given result
DM1	Express as a single fraction with a correct denominator
A1	Show correct factorisation and obtain correct simplified answer
B1 [5]	Clear statement of induction conclusion, previous 4 marks must be earned. Must include somewhere “true for $n = 1$ ”, “true for n implies true for $n + 1$ ”, “true for all n ”