FP1 Series Questions

3 Show that

$$\sum_{r=1}^{n}(r^2 - r) = kn(n+1)(n-1)$$

where k is a rational number. *(4 marks)*

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6 (a) (i) Expand $(2r-1)^2$. *(1 mark)*

(ii) Hence show that

$$\sum_{r=1}^{n}(2r-1)^2 = \frac{1}{3}n(4n^2-1)$$ *(5 marks)*

(b) Hence find the sum of the squares of the odd numbers between 100 and 200. *(4 marks)*

FP1 Series Answers

3	$\Sigma(r^2 - r) = \Sigma r^2 - \Sigma r$	M1		
	At least one linear factor found	m1		
	$\Sigma(r^2 - r) = \frac{1}{6}n(n+1)(2n+1-3)$	m1		OE
	$\ldots = \frac{1}{3}n(n+1)(n-1)$	A1	4	
	Total		**4**	

6(a)(i)	$(2r-1)^2 = 4r^2 - 4r + 1$	B1	1	
(ii)	$\sum(2r-1)^2 = 4\sum r^2 - 4\sum r + \sum 1$	M1		
	$\ldots = \frac{4}{3}n^3 - \frac{4}{3}n + \sum 1$	m1A1		
	$\sum 1 = n$	B1		
	Result convincingly shown	A1	5	**AG**
(b)	Sum = f (100) – f (50)	M1A1		M1 for 100 ± 1 and 50 ± 1
	$\ldots = 1166\ 650$	A2	4	**SC** f(100) – f(51) = 1 156 449: 3/4
	Total		**10**	