1. (a) Show that $\sum_{r=1}^{n}(r+1)(r+5) = \frac{1}{6}n(n+7)(2n+7)$.

(4)

(b) Hence calculate the value of $\sum_{r=10}^{40}(r+1)(r+5)$

(2)
(Total 6 marks)

1. (a) Expand brackets and attempt to use appropriate formulae.

$\Sigma r^2 + 6r + 5 = \frac{n}{6}(n + 1)(2n + 1) + 6\frac{n}{2}(n + 1) + 5n$ A1

$= \frac{n}{6}[2n^2 + 3n + 1 + 18n + 18 + 30]$

$= \frac{n}{6}[2n^2 + 21n + 49] = \frac{n}{6}(n + 7)(2n + 7)$ (*) A1 4

(b) Use S(40) – S(9) = $\frac{40}{9} \times 47 \times 87 - \frac{9}{6} \times 16 \times 25$

= 26660 A1 2

[6]

1. (a) On the whole, candidates were able to expand (r+1)(r+5) accurately and were able to substitute correctly for Σr^2, Σr and to deal with $\Sigma 5$ correctly – the provision of the answer helped many to check the accuracy of their subsequent expansions, collection of terms and factorisation! A small group of candidates attempted Mathematical Induction, but rarely correctly, most being daunted by the algebra involved.

(b) For those not working out S(40) –S(9), the most common mistake was to use S(40) - S(10), although some returned to using (r+1)(r+5) with r = 40, and 9 or 10; some just calculated S(40), totally ignoring the starting value of r.