1. Use the standard results for $\sum_{r=1}^{n} r^2$ and $\sum_{r=1}^{n} r^3$ to show that, for all positive integers n

$$\sum_{r=1}^{n} r^2 (r + 2) = \frac{1}{12} n(n + 1)(an^2 + bn + c)$$

where a, b and c are integers to be determined.

(4)

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Question 1 continued

(Total for Question 1 is 4 marks)