



QUESTION WORKBOOK

Summing series and the method of differences

Further algebra and series · Year FM

6 questions · 24 marks

PRINT EDITION

SECTION A · Warm-up

- A1** Write down the standard results for the sum of the first n positive integers and the sum of their squares. [2]

- A2** Using the standard results, show that $\sum 4r^3$ from 1 to n equals $n^2(n+1)^2$, and check the formula at $n = 3$. [3]

SECTION B · Standard

- B1** Show that $\sum r(r+2)$ from 1 to n equals $n(n+1)(2n+7)/6$. [4]

- B2** Given that $\frac{1}{((2r-1)(2r+1))} = \frac{1}{2}\left(\frac{1}{(2r-1)} - \frac{1}{(2r+1)}\right)$, find $\sum \frac{1}{((2r-1)(2r+1))}$ from 1 to n . [4]

- B3** Find $\sum r^2$ for r from $n+1$ to $2n$, simplifying your answer, and verify it at $n=2$. [4]

SECTION C · Stretch

- C1** Express $\frac{1}{(r(r+2))}$ in partial fractions. Hence show that $\sum \frac{1}{(r(r+2))}$ from $r=1$ to n is $\frac{3}{4} - \frac{(2n+3)}{(2(n+1)(n+2))}$, and state the sum to infinity. [7]