4. (a) Express $\dfrac{r+4}{r(r+1)(r+2)}$ in partial fractions.

(4)

(b) Hence, using the method of differences, show that

$$\sum_{r=1}^{n} \frac{r+4}{r(r+1)(r+2)} = \frac{n(Pn+Q)}{2(n+R)(n+S)}$$

where P, Q, R and S are integers to be found.

(5)

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Question 4 continued

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Question 4 continued

(Total for Question 4 is 9 marks)