

QUESTION 5 (8 marks)

(a) Use mathematical induction to prove that:

$$\frac{1}{4 \times 1^2 - 1} + \frac{1}{4 \times 2^2 - 1} + \dots + \frac{1}{4 \times n^2 - 1} = \frac{n}{2n + 1}, \text{ where } n \text{ is a positive integer.}$$



(6 marks)

(b) Hence find, in simplest rational form, the value of $\frac{1}{15} + \frac{1}{35} + \dots + \frac{1}{399}$.

A large grid for working out the solution, consisting of 20 columns and 20 rows of small squares.

(2 marks)