Sums of series

AS Core Pure Mathematics | Edexcel 8FM0 | 12 questions, 62 marks

Further Maths topic practice

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Name: _____ **Date:** _____ **Score:** _____ **/ 62**

1 Use the standard results to find the value of

a. $\sum_{r=1}^{40} r^2$

b. $\sum_{r=1}^{15} r^3$

(3 marks)

Answer _____

2 Find the value of $\sum_{r=1}^{12} (2r^2 - 5)$

(3 marks)

Answer _____

3 Find the value of $\sum_{r=11}^{30} r^3$

(3 marks)

Answer _____

4 Show that $\sum_{r=1}^{n} r(r+3) = \frac{1}{3}n(n+1)(n+5)$

(4 marks)

Answer _____

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5

a. Show that $\sum_{r=1}^{n} (3r-1)^2 = \frac{1}{2}n(6n^2+3n-1)$

b. Hence find the value of $\sum_{r=1}^{20} (3r-1)^2$

(5 marks)

Answer

6

a. Show that $\sum_{r=1}^{n} (r-1)r(r+1) = \frac{1}{4}(n-1)n(n+1)(n+2)$

b. Hence find the value of $\sum_{r=11}^{30} (r-1)r(r+1)$

(6 marks)

Answer

7

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

b. Hence find the value of $11^2 + 12^2 + 13^2 + \ldots + 20^2$

(5 marks)

Answer

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8 Given that $\sum_{r=1}^{n} r^3 = 44\,100$, find the value of n

(4 marks)

Answer

9 Given that $\sum_{r=1}^{n} (r^2 + kr) = \frac{1}{6}n(n+1)(2n+7)$ for all positive integers n, where k is a constant,

a. find the value of k

b. hence find the value of $\sum_{r=10}^{25} (r^2 + kr)$

(6 marks)

Answer

10 a. Use the standard results to show that $\sum_{r=1}^{n} (4r^3 - 6r^2 + 4r - 1) = n^4$

b. Hence find the least value of n for which $\sum_{r=1}^{n} (4r^3 - 6r^2 + 4r - 1) > 1\,000\,000$

(7 marks)

Answer

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11 A supermarket builds a display of tins in triangular layers. The top layer is 1 tin, and layer r from the top contains $\frac{1}{2}r(r + 1)$ tins.

a. Show that a display with n layers contains $\frac{1}{6}n(n + 1)(n + 2)$ tins.

b. Find the number of tins in a display with 20 layers.

c. The supermarket has 1000 tins. Find the greatest number of complete layers it can build, and the number of tins left over.

(8 marks)

Answer

12

a. Show that $\sum_{r = 1}^{n} r(3r + 1) = n(n + 1)^2$

b. Hence show that $\sum_{r = n + 1}^{3n} r(3r + 1) = 2n(13n^2 + 8n + 1)$

c. Given that $\sum_{r = n + 1}^{3n} r(3r + 1) = 3660$, find the value of n

(8 marks)

Answer

End of questions | Total 62 marks

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