

QQQ – Core Pure 1 – Chapter 3 – Series (Version 2)

Total Marks: 24

(24 = Platinum, 22 = Gold, 19 = Silver, 16 = Bronze)

1. Using the formulae for $\sum_{r=1}^n r$ and $\sum_{r=1}^n r^2$, show that $\sum_{r=1}^{10} r(3r - 2) = 1045$. **[3]**

(Total 3 marks)

OCR A A2 June 2019 Paper 1 Q4

2. Find $\sum_{r=1}^n (2r^2 - 1)$, expressing your answer in fully factorised form. **[4]**

(Total 4 marks)

OCR MEI A2 June 2019 Paper 1 Q1

3. In this question you must show detailed reasoning.

Determine the sum of all cube numbers from 216 to 512 000 inclusive. **[4]**

(Total 4 marks)

OCR A A2 June 2025 Paper 2 Q4

4. You are given that $\sum_{r=1}^n (ar + b) = n^2$ for all n , where a and b are constants.

By finding $\sum_{r=1}^n (ar + b)$ in terms of a , b and n , determine the values of a and b . **[6]**

(Total 6 marks)

OCR MEI AS June 2023 Paper 1 Q4

5.

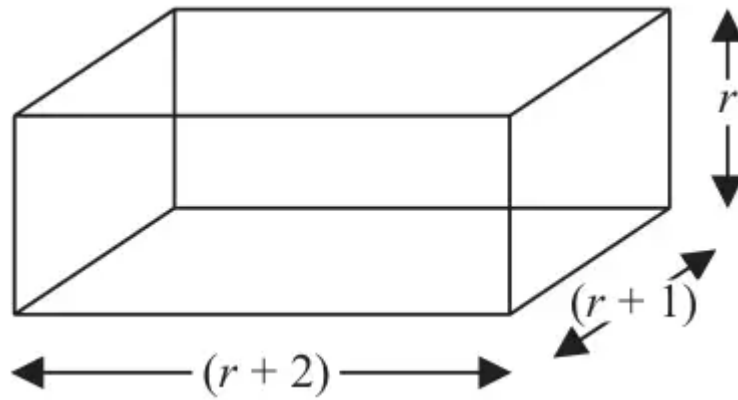


Figure 2

A block has length $(r + 2)$ cm, width $(r + 1)$ cm and height r cm, as shown in Figure 2.

In a set of n such blocks, the first block has a height of 1 cm, the second block has a height of 2 cm, the third block has a height of 3 cm and so on.

- (a) Use the standard results for $\sum_{r=1}^n r^3$, $\sum_{r=1}^n r^2$ and $\sum_{r=1}^n r$ to show that the **total** volume, V , of all n blocks in the set is given by

$$V = \frac{n}{4}(n + 1)(n + 2)(n + 3) \quad n \geq 1$$

(5)

Given that the total volume of all n blocks is

$$(n^4 + 6n^3 - 11\,710) \text{ cm}^3$$

- (b) determine how many blocks make up the set.

(2)

(Total 7 marks)