6 **(a)** A geometric progression has first term 10 and sum to infinity 6.

(i) Find the common ratio of this progression. [2]

(ii) Hence find the sum of the first 7 terms, giving your answer correct to 2 decimal places. [2]

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(b) The first three terms of an arithmetic progression are $\log_x 3$, $\log_x(3^2)$, $\log_x(3^3)$.

(i) Find the common difference of this progression. [1]

(ii) Find, in terms of n and $\log_x 3$, the sum to n terms of this progression. Simplify your answer. [2]

(iii) Given that the sum to n terms is $3081 \log_x 3$, find the value of n. [2]

(iv) Hence, given that the sum to n terms is also equal to 1027, find the value of x. [2]