Problem J. Creative Snap

Time limit 1000 ms
Mem limit 262144 kB

Thanos wants to destroy the avengers base, but he needs to destroy the avengers along with their base.

Let we represent their base with an array, where each position can be occupied by many avengers, but one avenger can occupy only one position. Length of their base is a perfect power of 2. Thanos wants to destroy the base using minimum power. He starts with the whole base and in one step he can do either of following:

- if the current length is at least 2, divide the base into 2 equal halves and destroy them separately, or
- burn the current base. If it contains no avenger in it, it takes A amount of power, otherwise it takes his $B \cdot n_a \cdot l$ amount of power, where n_a is the number of avengers and l is the length of the current base.

Output the minimum power needed by Thanos to destroy the avengers' base.

Input

The first line contains four integers n, k, A and B ($1 \le n \le 30$, $1 \le k \le 10^5$, $1 \le A, B \le 10^4$), where 2^n is the length of the base, k is the number of avengers and A and B are the constants explained in the question.

The second line contains k integers $a_1, a_2, a_3, \ldots, a_k$ ($1 \le a_i \le 2^n$), where a_i represents the position of avenger in the base.

Output

Output one integer — the minimum power needed to destroy the avengers base.

Sample 1

Input	Output
2 2 1 2 1 3	6

Sample 2

Input	Output
3 2 1 2 1 7	8

Note

Consider the first example.

One option for Thanos is to burn the whole base $1-4$ with power $2 \cdot 2 \cdot 4 = 16$.

Otherwise he can divide the base into two parts $1-2$ and $3-4$.

For base $1-2$, he can either burn it with power $2 \cdot 1 \cdot 2 = 4$ or divide it into 2 parts $1-1$ and $2-2$.

For base $1-1$, he can burn it with power $2 \cdot 1 \cdot 1 = 2$. For $2-2$, he can destroy it with power 1, as there are no avengers. So, the total power for destroying $1-2$ is $2+1 = 3$, which is less than 4.

Similarly, he needs 3 power to destroy $3-4$. The total minimum power needed is 6.