COLORED MUTANTS

COURSE WORK #07

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PROBLEM STATEMENT

You have **N** ($0<=N<=10^5$) colored mutants. Each color is defined as a number less than 10^9+7. You need to count mutants for each color.

Input. The first string contains a single number **N** ($0<=N<=10^5$). The second string contains **N** positive integer numbers less than 10^9+7 divided by spaces — the mutants' colors. The third string contains a number **M** ($1<=M<=100000$) — amount of queries to your program. The next string contains **M** positive integer numbers less than 10^9+7 — colors for which you need to count mutants.

Output. The **M** numbers are divided by space — the result of each query.

PROBLEM STATEMENT

Example. **N** = 10 and **M** = 5

Input:

10

18 1 3 5 7 9 18 57 1 3

5

57 3 9 1 179

Output: 1 2 1 2 0

THE PROBLEM SOLVING

The simplest method to solve this problem is to define an array with size 10^9+7 (for each different color) and increase the value for each mutant color on input. Then we have **O**(1) time to answer any query.

However, the memory consumption for this approach is almost 3,7 GB. So, this is a simple way but not efficient in space usage.

Thus, we need to use another approach to solve this problem.

THE PROBLEM SOLVING

Input Animals Colors	Sorted Animals Colors	Array of Colors	Array of Answers	Queries	Result
A[0]=18	A[0]=1	C[0]=1	R[0]=2	57	1
A[1]=1	A[1]=1	C[1]=3	R[1]=2	3	2
A[2]=3	A[2]=3	C[2]=5	R[2]=1	9	1
A[3]=5	A[3]=3	C[3]=7	R[3]=1	1	2
A[4]=7	A[4]=5	C[4]=9	R[4]=1	179	0
A[5]=9	A[5]=7	C[5]=18	R[5]=2		
A[6]=18	A[6]=9	C[6]=57	R[6]=1		
A[7]=57	A[7]=18				
A[8]=1	A[8]=18				
A[9]=3	A[9]=57				

THE PROBLEM SOLVING

The algorithm to solve this problem.

1. Create a 1D array of **N** size and push the color for each mutant.
2. Sort the array in ascending order.
3. Traverse the array and count mutants for each color. Color push in the additional color array and the count push in the answer array.
4. For each query do the binary search in the color array, pick up the index, and print the answer stored in the answer array with the same index.

THANK YOU!