Catastrophe

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

For anyone who has fostered stray cats before, this phenomena is definitely familiar to you. You started with one cat, then two, then they had kids and now you have 4 then 8 and soon, you realize you're on your way to becoming a crazy cat lady. Being a crazy cat lady isn't that bad. But something more sinister is about to unfold.

The evil cat wizard Meowchoir has created a spell that can turn cats radiocative. The Cat Physics Society has concluded that having a number of cats more than the critical mass C would lead to cat-astrophic consequences if Meowchoir were to cast his spell. Fortunately for us, Meowchoir can only cast his spell on the 1st of every month as he requires resources from a cronjob that runs at that time.

As cats are just lovely innocent creatures that did no wrong, we can't just kill the cats to save ourselves. The Cat Physics Society decides that they will take charge in controlling the cat population to prevent a catastrophe.

Every month, the number of cats, d at any one house increases by a factor 2.718 floored to $\lfloor 2.718d \rfloor$.

If a house has more than the critical mass of cats, C, they will move $\lfloor d/2 \rfloor$ cats to a new house. They will keep repeating this until the number of cats at any one house is less than C.

Help the Cat Physics Society by calculating how many houses would be required to house all the cats in the months to come.

Input

The first line of input contains two integers, $N, C (1 \leq N \leq 10^6, 1 \leq C \leq 1000)$, the number of houses in Month 0 and the critical mass identified by the Cat Physics Society.

The second line contains N space-separated integers $d_1, d_2, d_3, \ldots, d_N$ $(0 \leq d_i \leq 100)$ where d_i denotes the number of cats in house i in Month 0.

The third line contains one integer, $M (1 \leq M \leq 255)$, the number of months you are required to forecast.

Output

Output M lines where line i contains a single integer, the number of houses needed in Month i.

Examples

standard input	standard output
6 1 1 1 1 1 1 1 4	12 24 48 96
6 2 1 2 1 2 1 2 4	12 30 72 174