Turn on the Light 3

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	1024 megabytes

Prof. Chen is currently teaching at Pigetown University. Pigetown University has a total of n lights labeled $1, 2, \ldots, n$, as well as n switches labeled $1, 2, \ldots, n$. The lighting control system at Pigetown University is quite peculiar: pressing the switch labeled d will turn on all lights whose labels are multiples of d. Since the system lacks a turn-off function, if pressing a switch does not change any light from off to on, the control system will issue a warning.

Initially, all lights are off. Prof. Chen presses the switches m times, with the i-th operation being the switch labeled a_i. Your task is to simulate the lighting control system, outputting the number of newly turned-on lights after each operation or issuing an alarm if no new lights are turned on.

Input

The input contains multiple test cases. The first line contains an integer T ($1 \leq T \leq 2 \cdot 10^5$), denoting the number of test cases.

For each test case, the first line contains two integers n, m ($1 \leq n, m \leq 2 \cdot 10^5$), denoting the number of lights and the number of times Prof. Chen presses the switches.

The following line contains m integers, the i-th integer a_i ($1 \leq a_i \leq n$) denotes the switch Prof. Chen presses with the i-th operation.

It is guaranteed that the sum of n does not exceed $2 \cdot 10^5$, and the sum of m does not exceed $2 \cdot 10^5$.

Output

For each test case, print m lines. For the i-th line, if the newly turned on lights in the i-th operation are not zero, output the number of lights that are newly turned on. Otherwise, output "`the lights are already on!`".

Example

standard input	standard output
2 5 3 2 4 1 100 2 100 100	2 the lights are already on! 3 1 the lights are already on!