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F. Coffee Varieties (easy version)

time limit per test: 1 second

memory limit per test: 256 megabytes

input: standard input

output: standard output

This is the easy version of the problem. You can find the hard version in the Div. 1 contest. Both versions only differ in the number of times you can ask your friend to taste coffee.

This is an interactive problem.

You're considering moving to another city, where one of your friends already lives. There are n cafés in this city, where n is a power of two. The i -th café produces a single variety of coffee a_i .

As you're a coffee-lover, before deciding to move or not, **you want to know the number d of distinct varieties of coffees** produced in this city.

You don't know the values a_1, \dots, a_n . Fortunately, your friend has a memory of size k , where k is a power of two.

Once per day, you can ask him to taste a cup of coffee produced by the café c , and he will tell you if he tasted a similar coffee during the last k days.

You can also ask him to take a medication that will reset his memory. He will forget all previous cups of coffee tasted. You can reset his memory at most 30 000 times.

More formally, the memory of your friend is a queue S . Doing a query on café c will:

Codeforces Round #616 (Div. 2)

Finished

→ Practice?

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→ Virtual participation

Virtual contest is a way to take part in past contest, as close as possible to participation on time. It is supported only ICPC mode for virtual contests. If you've seen these problems, a virtual contest is not for you - solve these problems in the archive. If you just want to solve some problem from a contest, a virtual contest is not for you - solve this problem in the archive. Never use someone else's code, read the tutorials or communicate with other person during a virtual contest.

[Start virtual contest](#)

- Tell you if a_c is in S ;
- Add a_c at the back of S ;
- If $|S| > k$, pop the front element of S .

Doing a reset request will pop all elements out of S .

Your friend can taste at most $\frac{2n^2}{k}$ cups of coffee in total. Find the diversity d (number of distinct values in the array a).

Note that asking your friend to reset his memory **does not count** towards the number of times you ask your friend to taste a cup of coffee.

In some test cases the behavior of the interactor **is adaptive**. It means that the array a may be **not fixed** before the start of the interaction and may **depend on your queries**. It is guaranteed that at any moment of the interaction, there is at least one array a consistent with all the answers given so far.

Input

The first line contains two integers n and k ($1 \leq k \leq n \leq 1024$, k and n are powers of two).

It is guaranteed that $\frac{2n^2}{k} \leq 20\,000$.

Interaction

You begin the interaction by reading n and k .

- To ask your friend to taste a cup of coffee produced by the café c , in a separate line output
? c

Where c must satisfy $1 \leq c \leq n$. Don't forget to flush, to get the answer.

In response, you will receive a single letter Y (yes) or N (no), telling you if variety a_c is one of the last k varieties of coffee in his memory.

- To reset the memory of your friend, in a separate line output the single letter R **in upper case**. You can do this operation at most 30 000 times.
- When you determine the number d of different coffee varieties, output
! d

In case your query is invalid, you asked more than $\frac{2n^2}{k}$ queries of type ? or you asked more than 30 000 queries of type R , the program will print the letter E and will finish interaction. You will receive a **Wrong Answer** verdict. Make sure to

→ Problem tags



graphs

interactive

*2700

No tag edit access

→ Contest materials

- Announcement (en) 
- Tutorial (en) 

exit immediately to avoid getting other verdicts.

After printing a query do not forget to output end of line and flush the output. Otherwise, you will get **Idleness limit exceeded**. To do this, use:

- `fflush(stdout)` or `cout.flush()` in C++;
- `System.out.flush()` in Java;
- `flush(output)` in Pascal;
- `stdout.flush()` in Python;
- see documentation for other languages.

Hack format

The first line should contain the word `fixed`

The second line should contain two integers n and k , separated by space ($1 \leq k \leq n \leq 1024$, k and n are powers of two).

It must hold that $\frac{2n^2}{k} \leq 20\,000$.

The third line should contain n integers a_1, a_2, \dots, a_n , separated by spaces ($1 \leq a_i \leq n$).

Examples

input	<div>Copy</div>
<pre>4 2 N N Y N N N N</pre>	
output	<div>Copy</div>
<pre>? 1 ? 2 ? 3 ? 4 R ? 4 ? 1 ? 2 ! 3</pre>	

input	Copy
8 8 N N N N Y Y	
output	Copy
? 2 ? 6 ? 4 ? 5 ? 2 ? 5 ! 6	

Note

In the first example, the array is $a = [1, 4, 1, 3]$. The city produces 3 different varieties of coffee (1, 3 and 4).

The successive varieties of coffee tasted by your friend are 1, 4, **1**, 3, 3, 1, 4 (bold answers correspond to Y answers).

Note that between the two ? 4 asks, there is a reset memory request R, so the answer to the second ? 4 ask is N.

Had there been no reset memory request, the answer to the second ? 4 ask is Y.

In the second example, the array is $a = [1, 2, 3, 4, 5, 6, 6, 6]$. The city produces 6 different varieties of coffee.

The successive varieties of coffee tasted by your friend are 2, 6, 4, 5, **2**, **5**.

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