XXV Spain Olympiad in Informatics
Final, day 1
`factorial`

Guess the factorial

Ana and Beto are playing a game called "Guess the factorial". Beto thinks of a positive integer n and Ana has to guess it. Ana can make queries of the type:

Is $n! + a$ divisible by b?

Where a and b are positive integers less than or equal to 10^9. Help Ana guess n.

Input and output

This is an interactive problem. You must flush the output (`cout << endl` or `cout << flush` in C++, `System.out.flush()` in Java, `stdout.flush()` in Python).

For making a query to Beto, you must write one line with format `? a b`, where $1 \leq a, b \leq 10^9$. After that, you must read from standard input the answer, which will be one line with the word `SI` if $n! + a$ is divisible by b or with the word `NO` otherwise. If you make a invalid question or exceed the query limit, you will read the word `ERROR` and your program should terminate immediately.

Once you have guessed the number n, you must write one line with the format `! n`. After that your program must terminate.

Samples

Sample 1

Input:

```
SI
SI
NO
```

Output:

```
? 2 2
? 2 4
? 1 7
! 2
```

Sample 2

Input:

```
SI
```

Output:

```
? 1 2
! 1
```

Constraints

$1 \leq n \leq 40000$

No more than 100 queries can be made. (Giving the value of n does not count as a query).

Note: the interactor is adaptive.

Subtasks

1. (10 points) $n \leq 10$.
2. (20 points) $n \leq 100$.
3. (70 points) No additional restrictions.

   In the last subtask, the score you receive depends on the number of queries made. Let q be the number of queries made. Then your score is:

   - 0, if $q > 100$.
   - 50, if $80 \leq q \leq 100$.
   - $50 + (80 - q)$, if $60 < q < 80$.
   - 70, if $q \leq 60$.