Problem I. From Modular to Rational

Input file:	*standard input*
Output file:	*standard output*
Time limit:	6 seconds
Memory limit:	256 mebibytes

This is an interactive problem.

Someone picked a positive rational number $x = p/q$ where $1 \le p, q \le 10^9$. You may ask at most 10 queries of the kind "`?` m", where $10^9 < m < 10^{12}$ and m is a prime number. For each query, you will get the number y such that $y \equiv pq^{-1} \pmod{m}$. You have to guess the number x.

Interaction Protocol

The first line of input contains a single integer t, the number of test cases ($1 \le t \le 10^5$).

For each test case, you may ask at most 10 queries. Each query should be one of two types:

1. "`?` m", where $10^9 < m < 10^{12}$ and m is a prime number,
2. "`!` p q", where $1 \le p, q \le 10^9$, meaning that the answer is equal to p/q.

It is guaranteed that the number x in each test case does not change during testing.

Example

standard input	standard output
3 1 500000004 2	 ? 1000000007 ! 1 1 ? 1000000007 ! 2 4 ? 1000000007 ! 2 1

Note

In the example, you deal with $x = 1/1$, $x = 1/2$, and $x = 2/1$, while always taking $m = 10^9 + 7$.

As you may see, it is not necessary to have $\gcd(p, q) = 1$ as long as $1 \le p, q \le 10^9$ and $x = p/q$.