E - Eventually Periodic Sequence

Input: `periodic.in`

Output: `standard output`

Given is a function $f : 0 \,..\, N \to 0 \,..\, N$ for a non–negative N and a non–negative integer $n \leq N$. One can construct an infinite sequence $F = f^1(n), f^2(n), \ldots, f^k(n), \ldots$, where $f^k(n)$ is defined recursively as follows: $f^1(n) = f(n)$ and $f^{k+1}(n) = f(f^k(n))$.

It is easy to see that each such sequence F is eventually periodic, that is, periodic from some point onwards, e.g. $1, 2, 7, 5, 4, 6, 5, 4, 6, 5, 4, 6, \ldots$ Given non-negative integer $N \leq 11000000$, $n \leq N$ and f, you are to compute the period of sequence F.

Input

Each line of input contains N, n and the description of f in postfix notation, also known as Reverse Polish Notation (RPN). The operands are either unsigned integer constants, N or the variable x. Only binary operands are allowed: `+` (addition), `*` (multiplication) and `%` (modulo, i.e. remainder of integer division). Operands and operators are separated by whitespace. The operand `%` occurs exactly once in a function and it is the last (rightmost, or topmost if you wish) operator and its second operand is always N, whose value is read from input. The following function:

```
2 x * 7 + N %
```

is the RPN rendition of the more familiar infix `(2 * x + 7) % N`. All input lines are shorter than 100 characters. The last line of input has $N = 0$ and should not be processed.

Output

For each line of input, output one line with one integer number, the period of F corresponding to the data given in the input line.

Sample Input

```
10 1 x N %
11 1 x x 1 + * N %
1728 1 x x 1 + * x 2 + * N %
1728 1 x x 1 + x 2 + * * N %
100003 1 x x 123 + * x 12345 + * N %
0 0 0 N %
```

Sample Output

```
1
3
6
6
369
```