The perfect base

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	256 megabytes

Arthur, the archaeologist, has been studying Egyptian pyramids for over 84 years and has recently discovered what he thinks are plans for an unbuilt pyramid that would be the biggest one! He managed to translate one of the expressions that would refer to the area of the base of the pyramid, and he wants to confirm if this value is a perfect square, that is, if there is an integer value that multiplied by itself results in the value of the expression. The expression is well formed and composed of digits and operations of *(multiplication), ^(potentiation) and ! (factorial).

The numbers present in the expression vary from 1 to 999999, that is, there are no more than 6 digits in a row and no number starts with the digit 0. Note that the values that make up the expression have a limit, but the result of the expression does not have this limit and can be extremely large. Another restriction is that in the expression the character ! can only appear immediately after a number. The precedence of the operations is the same as usual for mathematics, that is, first comes factorial, followed by potentiation, followed by multiplication. For example, the expression "2!^3^4!*8^5" is valid and is equivalent to the following version with parentheses "((2!)^(3^(4!)))*(8^5)". The expressions "0!*2", "42**13", "2^", "10!!" and "1000000" are not valid, and therefore cannot appear in the entry.

Arthur understands a lot about pyramids but not much about mathematics and has always relied on the FoxramBeta computational tool to deal with his problems of this nature. Unfortunately even for a simple and short expression like the one described above, the tool cannot compute its value. That's when the human brain beats the machine (still). Prove that your intelligence is still superior to that of computers and write a program that receives an expression like the one in Arthur's problem and prints "S" if it is equivalent to a perfect square or "N" otherwise.

Input

The first and only line contains a string s of size n ($1 \leq n \leq 10^6$) and is composed of digits (from 0 to 9) and the characters ^, * and !. The expression is well formed as described in the statement. Let the i-th number present in the expression be x_i, then $1 \leq x_i < 10^6$. The character ! does not appear two or more times in a row.

Output

Print one character. "S" if the expression is equivalent to a perfect square or "N" otherwise.

Examples

standard input	standard output
2!^3^4!*8^5	S
2!^3^4!*8^6	N
10000	S
999999^2	S
5!*6!*3!	S
42!	N