

A googol written out in decimal has 101 digits. A googolplex has one plus a googol digits. That's a lot of digits!

Given any number x_0 , define a sequence using the following recurrence:

x_{i+1} = the number of digits in the decimal representation of x_i

Your task is to determine the smallest positive i such that $x_i = x_{i-1}$.



Input

Input consists of several lines. Each line contains a value of x_0 . Every value of x_0 is non-negative and has no more than one million digits. The last line of input contains the word 'END'.

Output

For each value of x_0 given in the input, output one line containing the smallest positive i such that $x_i = x_{i-1}$.

Sample Input

```
42  
END
```

Sample Output

```
3
```