Digits

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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:

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

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`. There are at most 10 000 values of x_0 and the size of the input file is at most 2 MB.

Output

For each value of x_0, output the corresponding value of i.

Sample Input 1

```
42
5
END
```

Sample Output 1

```
3
2
```

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