



## 3026 - Period

Europe - Southeastern - 2004/2005

For each prefix of a given string  $S$  with  $N$  characters (each character has an ASCII code between 97 and 126, inclusive), we want to know whether the prefix is a periodic string. That is, for each  $i$  ( $2 \leq i \leq N$ ) we want to know the largest  $K > 1$  (if there is one) such that the prefix of  $S$  with length  $i$  can be written as  $A^K$ , that is  $A$  concatenated  $K$  times, for some string  $A$ . Of course, we also want to know the period  $K$ .

### Input

The input file consists of several test cases. Each test case consists of two lines. The first one contains  $N$  ( $2 \leq N \leq 1\,000\,000$ ) the size of the string  $S$ . The second line contains the string  $S$ . The input file ends with a line, having the number zero on it.

### Output

For each test case, output *Test case #* and the consecutive test case number on a single line; then, for each prefix with length  $i$  that has a period  $K > 1$ , output the prefix size  $i$  and the period  $K$  separated by a single space; the prefix sizes must be in increasing order. Print a blank line after each test case.

### Sample Input

```
3
aaa
12
aabaabaabaab
0
```

### Sample Output

```
Test case #1
2 2
3 3

Test case #2
2 2
6 2
9 3
12 4
```

---

Southeastern 2004-2005