CCO '13 P6 - Repetitivity

Time limit: 4.5s **Memory limit:** 1G

Canadian Computing Competition: 2013 Stage 2, Day 2, Problem 3

Any string of length n has 2^n subsequences, which are the strings obtained by deleting some subset of the characters. But these subsequences may not all be distinct. For example, the string `zoo` has only 6 *distinct* subsequences:

- the subsequences `z`, `oo`, and `zoo` appear only once,
- the empty subsequence appears only once,
- and the subsequences `o` and `zo` each appear twice.

Suppose a string S has k distinct subsequences, and that the i^{th} one appears f_i times. Then the *repetitivity* of S is defined as $\sum_{i=1}^{k} f_i^2$. For example, the repetitivity of `zoo` is

$$1^2 + 1^2 + 1^2 + 1^2 + 2^2 + 2^2 = 12$$

Input Specification

Each test case contains a line containing the string S (with length at most $10\,000$), followed by a line containing a single integer M ($2 \leq M \leq 10^9$). You may assume that S only contains characters with ASCII codes between 33 and 126 inclusive (these are all printable, non-whitespace characters).

For test cases worth 20% of the points, you may assume that S will be at most 20 characters long.

Output Specification

The output should consist of a single line, containing the repetitivity of S, modulo M.

Sample Input 1

```
zoo
10
```

Output for Sample Input 1

```
2
```

Sample Input 2

```
@#$%
1000000
```

Output for Sample Input 2

```
16
```