I. Fake News (hard)

time limit per test: 5 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Now that you have proposed a fake post for the HC^2 Facebook page, Heidi wants to measure the quality of the post before actually posting it. She recently came across a (possibly fake) article about the impact of fractal structure on multimedia messages and she is now trying to measure the self-similarity of the message, which is defined as

where the sum is over all nonempty strings p and is the number of occurences of p in s as a **substring**. (Note that the sum is infinite, but it only has a finite number of nonzero summands.)

Heidi refuses to do anything else until she knows how to calculate this self-similarity. Could you please help her? (If you would like to instead convince Heidi that a finite string cannot be a fractal anyway – do not bother, we have already tried.)

Input

The input starts with a line indicating the number of test cases T ($1 \leq T \leq 10$). After that, T test cases follow, each of which consists of one line containing a string s ($1 \leq |s| \leq 100\,000$) composed of lowercase letters (`a-z`).

Output

Output T lines, every line containing one number – the answer to the corresponding test case.

Example

input
4 aa abcd ccc abcc

output
5 10 14 12

Note

A string s contains another string p as a substring if p is a contiguous subsequence of s. For example, `ab` is a substring of `cab` but not of `acb`.