Problem I. Sum of Squares of the Occurrence Counts

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	1024 mebibytes

For two strings S and P, let the value $f(S, P)$ be the number of occurrences of P in S. For example, $f(\text{“}\texttt{ababa}\text{”}, \text{“}\texttt{aba}\text{”}) = 2$, and $f(\text{“}\texttt{aaaaa}\text{”}, \text{“}\texttt{aa}\text{”}) = 4$.

For a string S, let the value $g(S)$ be the sum of squares of the occurrence counts in S for all possible non-empty strings. More formally, $g(S) = \sum \left(f(S, P)^2\right)$ for all possible non-empty strings P.

You have given a string of length n: $S = c_1 c_2 \ldots c_n$. Let $r_i = g(c_1 c_2 \ldots c_i)$. Calculate the values r_i for all i from 1 to n.

Input

The first line contains the string S which consists of lowercase English letters. The length of S is between 1 and 10^5 letters, inclusive.

Output

Print n lines. The i-th line must contain the integer r_i.

Examples

standard input	standard output
aaa	1 5 14
pqpq	1 3 8 16
stssts	1 3 8 16 25 41