Map1e

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	1024 megabytes

Given a positive integer N, define the repunit $R(k)$ as the number consisting of k ones, i.e., $R(k) = \underbrace{11\ldots1}_{k}$.

Find the largest positive integer k such that $R(k)$ is a divisor of N, and output k.

Note that $R(1) = 1$ divides every positive integer, so the answer is at least 1.

Input

The first line contains a positive integer T — the number of test cases.

The next T lines each contain a positive integer N (with no leading zeros).

$1 \le T \le 5 \times 10^5$, $1 \le |N| \le 10^5$, $\sum |N| \le 5 \times 10^5$, where $|N|$ denotes the number of decimal digits of N.

Output

Output T lines, each containing a positive integer k.

Example

standard input	standard output
3 1221 99 7	3 2 1

Note

In the first example, $1221 = 111 \times 11$, so $R(3) = 111$ divides N. $R(4) = 1111$ does not divide N, so the answer is 3.

In the second example, $99 = 11 \times 9$, so $R(2) = 11$ divides N. $R(3) = 111 > 99$, so the answer is 2.

In the third example, 7 is not a multiple of 11, so the answer is 1.