

Project Euler #129: Repunit divisibility

This problem is a programming version of [Problem 129](#) from [projecteuler.net](#)

A number consisting entirely of ones is called a repunit. We shall define $R(k)$ to be a repunit of length k ; for example, $R(6) = 111111$.

Given that n is a positive integer and $\gcd(n, 10) = 1$, it can be shown that there always exists a value, k , for which $R(k)$ is divisible by n , and let $A(n)$ be the least such value of k ; for example, $A(7) = 6$ and $A(41) = 5$.

The least value of n for which $A(n)$ first exceeds ten is 17.

Given n , compute $A(n)$.

Input Format

The first line of input contains T , the number of test cases.

Each test case consists of a single line containing single integer, n .

Constraints

$$\gcd(n, 10) = 1$$

Test files #1-2:

$$1 \leq T \leq 20000$$

$$1 \leq n \leq 10^6$$

Test files #3-6:

$$1 \leq T \leq 100$$

$$1 \leq n \leq 10^{13}$$

Output Format

For each test case, output a single line containing a single integer, $A(n)$.

Sample Input

```
2
7
41
```

Sample Output

```
6
5
```

Explanation

As mentioned in the problem statement, $A(7) = 6$ and $A(41) = 5$.