

# Project Euler #26: Reciprocal cycles

## Problem Statement

This problem is a programming version of [Problem 26](#) from [projecteuler.net](#)

A unit fraction contains 1 in the numerator. The decimal representation of the unit fractions with denominators 2 to 10 are given:

$$\begin{aligned}\frac{1}{2} &= 0.5 \\ \frac{1}{3} &= 0.(3) \\ \frac{1}{4} &= 0.25 \\ \frac{1}{5} &= 0.2 \\ \frac{1}{6} &= 0.1(6) \\ \frac{1}{7} &= 0.(142857) \\ \frac{1}{8} &= 0.125 \\ \frac{1}{9} &= 0.(1) \\ \frac{1}{10} &= 0.1\end{aligned}$$

Where  $0.1(6)$  means  $0.166666\dots$ , and has a 1-digit recurring cycle. It can be seen that  $\frac{1}{7}$  has a 6-digit recurring cycle.

Find the value of smallest  $d < N$  for which  $\frac{1}{d}$  contains the longest recurring cycle in its decimal fraction part.

## Input Format

The first line contains an integer  $T$ , i.e., number of test cases.  
Next  $T$  lines will contain an integer  $N$ .

## Output Format

Print the values corresponding to each test case.

## Constraints

$$\begin{aligned}1 &\leq T \leq 1000 \\ 4 &\leq N \leq 10000\end{aligned}$$

## Sample Input

```
2
5
10
```

Sample Output

3
7