

Problem H

Mining a

Time limit: 2 seconds

Memory limit: 1024 megabytes

Problem Description

Blockchain technology is used in many digital currency systems, such as Bitcoin and Ethereum. In this technology, distributed users share a common list of records (called the chain), and a user has the right to add a new record to the chain by solving a mathematical problem. This process is called *mining*. The *i*-Taiwan company has developed up a new digital currency system, called the ICPC (I-taiwan Coins for the Public Currency). In the ICPC system, its mathematical problem for mining is as follows. Given positive integer n , the problem asks one to find the largest integer a such that

$$\frac{1}{n} = \frac{1}{a \oplus b} + \frac{1}{b}, \text{ for some positive integer } b$$

where $\oplus$ is the bitwise exclusive-or operator. For example, for $n = 12$, its solution is $a = 145$. In this case, $b = 13$ and thus $a \oplus b = 145 \oplus 13 = 10010001_2 \oplus 1101_2 = 10011100_2 = 156$. Accordingly,

$$\frac{1}{a \oplus b} + \frac{1}{b} = \frac{1}{156} + \frac{1}{13} = \frac{1}{12} = \frac{1}{n}.$$

You are an ambitious programmer, and you want to mine a lot of digital coins from this system in a short time. Please write a program to find the largest a for each n in order to earn the rewards from ICPC.

Input Format

The first line of the input file contains exactly one positive integer T that gives you the number of test cases. In the following T lines, each line corresponds to one test case and specifies the integer n .

Output Format

For each test case, output the largest number a in one line.

Technical Specification

- $1 \leq T \leq 20$
- $0 < n \leq 10^7$

Sample Input 1

```
3
6
7
10
```

Sample Output 1

```
45
48
101
```

Sample Input 2

```
3
1
2
7777777
```

Sample Output 2

```
0
5
60493819864864
```