Longest Continuous 1

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

There is a sequence of binary strings $s_0, s_1, s_2, \ldots$, which can be defined by the following recurrence relation:

- $s_0 = \texttt{0}$
- $s_i = s_{i-1} + b_i$

Here b_i means the binary form of i without leading zeros. For example, $b_5 = \texttt{101}$. And $s_{i-1} + b_i$ means to append string b_i to the back of s_{i-1}.

s_0	s_1	s_2	s_3	s_4	s_5	...
0	01	0110	011011	011011100	011011100101	...

Let's use p_k to denote the prefix of $s_{10^{100}}$ of length k. Now given k, please calculate the length of the longest continuous `1` in p_k.

Input

The first line of the input contains one integer T ($1 \le T \le 10^4$), indicating the number of test cases.

For each test case, the only line contains one integer k ($1 \le k \le 10^9$), indicating the length of the prefix.

Output

For each test case, output one integer in a single line, indicating the length of the longest continuous `1` in p_k.

Example

standard input	standard output
4 1 2 3 4	0 1 2 2