

Problem B. Believer

Input file: *standard input*
 Output file: *standard output*
 Time limit: 2 seconds
 Memory limit: 512 mebibytes

Do you believe in dragons? Imagine that one of them wakes you up at night and asks the following:

Let's consider sequences of positive integers $a = \langle a_1, a_2, \dots, a_k \rangle$.

Let $f(a, x)$ be the number of occurrences of x in a . For example, $f(\langle 1, 4, 1, 1 \rangle, 1) = 3$.

Let $c(y)$ be the number of ones in the binary expansion of y . For example, $c(13) = c(1101_2) = 3$.

Let $b(a) = \sum_{i \in a} c(f(a, i))$. For example, $b(\langle 1, 4, 1, 1 \rangle) = c(3) + c(1) = 2 + 1 = 3$.

For the given value of n , find the maximum value of $b(a)$ over all sequences with $\sum_{i=1}^k a_i = n$.

What would you answer?

Input

The first line of the input contains a single integer t ($1 \leq t \leq 10^3$) — the number of test cases.

Each of the next t lines contains a single integer n ($1 \leq n \leq 10^{18}$).

Output

For each test case in order of input, output a single integer — the answer to the problem.

Example

standard input	standard output
2	3
7	10
42	

Note

In the first example test case, one possible sequence with $b(a) = 3$ is $a = \langle 1, 4, 1, 1 \rangle$.