

Binary representation

Here's a easy and direct question. Find the number of 1's in the binary representation of a number N such that $N \leq 10^9$.

Input

The first line contains the number of testcases t ($0 \leq t \leq 100$), followed by the numbers. Each number can be ($-10^9 \leq N \leq 10^9$). Use unsigned long as your data type.

Output

The number of 1's in binary representation of each number.

Example

Input:

5
3
12
7
9
5

Output:

2
2
3
2
2