Problem E. Multiply by 2, divide by 6

Time limit 1000 ms
Mem limit 262144 kB

You are given an integer n. In one move, you can either multiply n by two or divide n by 6 (if it is divisible by 6 without the remainder).

Your task is to find the minimum number of moves needed to obtain 1 from n or determine if it's impossible to do that.

You have to answer t independent test cases.

Input

The first line of the input contains one integer t ($1 \le t \le 2 \cdot 10^4$) — the number of test cases. Then t test cases follow.

The only line of the test case contains one integer n ($1 \le n \le 10^9$).

Output

For each test case, print the answer — the minimum number of moves needed to obtain 1 from n if it's possible to do that or `-1` if it's impossible to obtain 1 from n.

Examples

Input	Output
7 1 2 3 12 12345 15116544 387420489	0 -1 2 -1 -1 12 36

Note

Consider the sixth test case of the example. The answer can be obtained by the following sequence of moves from the given integer 15116544:

1. Divide by 6 and get 2519424;
2. divide by 6 and get 419904;
3. divide by 6 and get 69984;
4. divide by 6 and get 11664;
5. multiply by 2 and get 23328;
6. divide by 6 and get 3888;
7. divide by 6 and get 648;
8. divide by 6 and get 108;
9. multiply by 2 and get 216;
10. divide by 6 and get 36;
11. divide by 6 and get 6;
12. divide by 6 and get 1.