C. Maximum splitting

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

You are given several queries. In the i-th query you are given a single positive integer n_i. You are to represent n_i as a sum of maximum possible number of composite summands and print this maximum number, or print `-1`, if there are no such splittings.

An integer greater than 1 is composite, if it is not prime, i.e. if it has positive divisors not equal to 1 and the integer itself.

Input

The first line contains single integer q ($1 \le q \le 10^5$) — the number of queries.

q lines follow. The $(i+1)$-th line contains single integer n_i ($1 \le n_i \le 10^9$) — the i-th query.

Output

For each query print the maximum possible number of summands in a valid splitting to composite summands, or `-1`, if there are no such splittings.

Examples

input
1 12
output
3

input
2 6 8
output
1 2

input
3 1 2 3
output
-1 -1 -1

Note

$12 = 4 + 4 + 4 = 4 + 8 = 6 + 6 = 12$, but the first splitting has the maximum possible number of summands.

$8 = 4 + 4$, 6 can't be split into several composite summands.

$1, 2, 3$ are less than any composite number, so they do not have valid splittings.