Project Euler #202: Laserbeam

This problem is a programming version of Problem 202 from projecteuler.net

Three mirrors are arranged in the shape of an equilateral triangle, with their reflective surfaces pointing inwards. There is an infinitesimal gap at each vertex of the triangle through which a laser beam may pass.

Label the vertices A, B and C. There are 2 ways in which a laser beam may enter vertex C, bounce off 11 surfaces, then exit through the same vertex: one way is shown below; the other is the reverse of that.
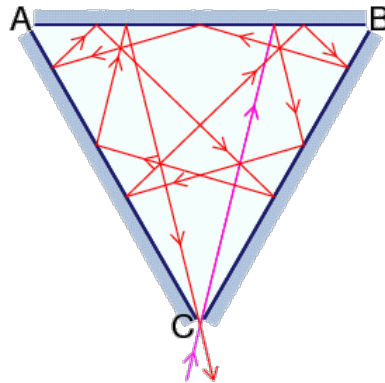
There are 80840 ways in which a laser beam may enter vertex C, bounce off 1000001 surfaces, then exit through the same vertex.

In how many ways can a laser beam enter at vertex C, bounce off n surfaces, then exit through the same vertex?

Input Format

First line of each test file contains a single integer Q which is the number of queries per this file. Q lines follow each containing a single integer n_i that is the corresponding number of surfaces laser beam should bounce off.

Constraints

- $1 \leq Q \leq 25$
- $1 \leq n_i \leq 2 \times 10^{18}$

Output Format

Output exactly Q lines with the answer for the i-th query on i-th line.

Sample Input 0

```
2
11
1000001
```

Sample Output 0

```
2
80840
```