Project Euler #128: Hexagonal tile differences

This problem is a programming version of Problem 128 from projecteuler.net

A hexagonal tile with number 1 is surrounded by a ring of six hexagonal tiles, starting at "12 o'clock" and numbering the tiles 2 to 7 in an anti-clockwise direction.

New rings are added in the same fashion, with the next rings being numbered 8 to 19, 20 to 37, 38 to 61, and so on. The diagram below shows the first three rings.

By finding the difference between tile n and each its six neighbours we shall define $\text{PD}(n)$ to be the number of those differences which are prime.

For example, working clockwise around tile 8 the differences are 12, 29, 11, 6, 1, and 13. So $\text{PD}(8) = 3$.

In the same way, the differences around tile 17 are 1, 17, 16, 1, 11, and 10, hence $\text{PD}(17) = 2$.

It can be shown that the maximum value of $\text{PD}(n)$ is 3.

If all of the tiles for which $\text{PD}(n) = 3$ are listed in ascending order to form a sequence, the 10th tile would be 271.

Find the kth tile in this sequence.

Input Format

The first line of input contains T, the number of test cases.

Each test case consists of a single line containing a single integer, N.

Constraints

Excluding the sample input, there are 8 test files.

For $1 \le i \le 8$, the ith test file satisfies:
$1 \le T, k \le 10000\cdot i$

Output Format

For each test case, output a single line containing a single integer, the requested tile.

Sample Input

```
1
10
```

Sample Output

```
271
```

Explanation

As mentioned in the problem statement, the 10th tile is 271.