Recursive sequences

Bernie wishes to impress his math teacher with a new theorem. He observes some sequences which satisfy a recursive relation

$$a_{n+2}=2a_{n+1}-a_n+2$$

Each sequence of his concern starts with number $a_1=1$, but the second numbers differ. Bernie thinks he found a nice rule, which he wants to check. He thinks that no matter what the number a_2 is and no matter which n he chooses, one always can find an element of the sequence which equals $a_n a_{n+1}$.

You can help him in his investigations by finding required elements.

Input

There is K ($1 \le K \le 1\,000$) lines of standard input. Each consists of two integer numbers a_2, n ($2 \le a_2 \le 1\,000$, $1 \le n \le 1\,000\,000\,000$) separated by spaces.

The line K+1 will contain two zeros, which shouldn't be processed.

Output

Write out K lines of output - one for each testcase. For each testcase the line should contain the smallest positive integer m such that $a_m=a_n a_{n+1}$ or the number 0 if such an m doesn't exist.

Example

Input:

```
2 1
2 2
2 4
3 5
0 0
```

Output:

```
2
4
14
26
```

Scoring

For solving this problem you will score 10 points.