A. Split the Multiset

time limit per test: 1 second
memory limit per test: 512 megabytes

A *multiset* is a set of numbers in which there can be equal elements, and the order of the numbers does not matter. For example, $\{2, 2, 4\}$ is a multiset.

You have a multiset S. Initially, the multiset contains only one positive integer n. That is, $S = \{n\}$. Additionally, there is a given positive integer k.

In one operation, you can select any positive integer u in S and remove one copy of u from S. Then, insert no more than k positive integers into S so that the sum of all inserted integers is equal to u.

Find the minimum number of operations to make S contain n ones.

Input

Each test contains multiple test cases. The first line contains the number of test cases t ($1 \le t \le 1000$). Description of the test cases follows.

The only line of each testcase contains two integers n, k ($1 \le n \le 1000, 2 \le k \le 1000$).

Output

For each testcase, print one integer, which is the required answer.

Example

input

```
4
1 5
5 2
6 3
16 4
```

output

```
0
4
3
5
```

Note

For the first test case, initially $S = \{1\}$, already satisfying the requirement. Therefore, we need zero operations.

For the second test case, initially $S = \{5\}$. We can apply the following operations:

- Select $u = 5$, remove u from S, and insert $2, 3$ into S. Now, $S = \{2, 3\}$.
- Select $u = 2$, remove u from S, and insert $1, 1$ into S. Now, $S = \{1, 1, 3\}$.
- Select $u = 3$, remove u from S, and insert $1, 2$ into S. Now, $S = \{1, 1, 1, 2\}$.
- Select $u = 2$, remove u from S, and insert $1, 1$ into S. Now, $S = \{1, 1, 1, 1, 1\}$.

Using 4 operations in total, we achieve the goal.

For the third test case, initially $S = \{6\}$. We can apply the following operations:

- Select $u = 6$, remove u from S, and insert $1, 2, 3$ into S. Now, $S = \{1, 2, 3\}$.
- Select $u = 2$, remove u from S, and insert $1, 1$ into S. Now, $S = \{1, 1, 1, 3\}$.
- Select $u = 3$, remove u from S, and insert $1, 1, 1$ into S. Now, $S = \{1, 1, 1, 1, 1, 1\}$.

Using 3 operations in total, we achieve the goal.

For the fourth test case, initially $S = \{16\}$. We can apply the following operations:

- Select $u = 16$, remove u from S, and insert $4, 4, 4, 4$ into S. Now, $S = \{4, 4, 4, 4\}$.
- Repeat for 4 times: select $u = 4$, remove u from S, and insert $1, 1, 1, 1$ into S.

Using 5 operations in total, we achieve the goal.