Problem H

Prime Topology

Alice was in her graduate-level topology class when she learned that there exists a *topological* proof of the fact that there are infinitely many prime numbers.

Topology, of course, is the mathematical study of topologies.

A topology can be defined as a collection of sets which are suitably well-behaved under set union and intersection—these are called the *open sets*. For the topological proof to work, we need to define a topology on the integers, called the evenly-spaced integer topology.

Anyway, Alice wasn't following along and couldn't understand any of this, so she decided to ignore all of it and doodle something completely unrelated in her notebook instead.

Let $U_n = \{1, 2, 3, \ldots, n\}$. A subset $S \subseteq U_n$ is called *prime-spaced* if it satisfies the ff.:

- For all *distinct* $a, b \in S$, we have that $|a - b|$ is prime.

An integer n is prime if $n > 1$ and n has no positive divisors other than 1 and itself.

For example, suppose we take $n = 6$, and so $U_n = \{1, 2, 3, 4, 5, 6\}$.

- The empty set is (vacuously) prime-spaced.
- $\{1\}$ is (vacuously) prime-spaced.
- $\{1, 6\}$ is prime-spaced, because $|1 - 6| = 5$, which is prime.
- $\{1, 5\}$ is **not** prime-spaced, because $|1 - 5| = 4$, which is **not** prime.
- $\{1, 3, 6\}$ is prime-spaced, because all of $|1 - 3|$ and $|1 - 6|$ and $|3 - 6|$ are prime.
- $\{1, 2, 4\}$ is **not** prime-spaced, because $|1 - 2| = 1$ which is **not** prime.

Given positive integers n and k, how many prime-spaced subsets of size k are there in U_n (modulo 104206969)? Also, there will be T independent test cases per file.

Input Format

The first line of input contains a single integer T, the number of test cases. The descriptions of the T test cases follow.

Each test case is described by a single line containing the two space-separated integers n and k.

Output Format

For each test case, output a line containing the answer for that test case.

Constraints

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$1 \leq T \leq 2 \times 10^5$ $1 \leq k \leq n \leq 10^7$

Sample I/O

Input	Output
3 5 2 6 3 10000000 10000000	5 2 0

A completely useless fact

Let X be any (possibly empty) collection of prime-spaced subsets of U_n. Then, $\bigcap_i X_i$ is also guaranteed to be a prime-spaced subset of U_n.

The above fact has nothing to do with this problem, nor with topology. It is completely useless.