

# Subprime

Problem ID: subprime2

There is an open math problem: Is every non-negative integer a substring of at least one prime number when expressed in base ten?

A positive integer is a prime number if it is greater than one and not a product of two smaller positive integers. Integer  $a$  is a substring of integer  $b$  if it is equal to an integer derived from  $b$  by deleting zero or more consecutive digits of the most and least significant digits of  $b$ . For example, 123 is a substring of: 123, 56123, 123789, 50182312365, 41237912123.

Given two integers  $l$  and  $h$  along with an integer  $p$ , you are to check how many primes between the  $l$ th smallest prime and the  $h$ th smallest prime (both ends are inclusive) contain a substring that equals  $p$ . We are interested in substrings that may include significant leading zeroes, and thus  $p$  may have leading zeroes. A prime shall be counted only once even if the integer  $p$  occurs more than once as its substring.

For example, consider  $l = 1, h = 10$  and  $p = 9$ . This is a search from the 1st smallest prime (2) to the 10th smallest prime (29) for any prime containing the substring "9". There are 2 such primes: 19 and 29.



Image by Marina Shemesh

## Input

The first line of input has two integers  $l$  and  $h$  ( $1 \leq l \leq h \leq 10^5$ ). The second line has a sequence of 1 to 6 digits giving the integer  $p$ , which may be zero or have significant leading zeroes.

## Output

Output the count of prime numbers in the given range that contain  $p$  as a substring.

Sample Input 1	Sample Output 1
1 10 9	2
Sample Input 2	Sample Output 2
500 1000 43	26
Sample Input 3	Sample Output 3
1 1000 00	10