OJ 10219

Find the ways!

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An American, a Frenchman and an Englishwoman had been to Dhaka, the capital of Bangladesh. They went sight-seeing in a taxi. The three tourists were talking about the sites in the city. The American was very proud of tall buildings in New York. He boasted to his friends, "Do you know that the Empire State Building was built in three months?".

"Really?" replied the Frenchman. "The Eiffel Tower in Paris was built in only one month!" (However, The truth is, the construction of the Tower began in January 1887. Forty Engineers and designers under Eiffel's direction worked for two years. The tower was completed in March 1889.).

"How interesting!" said the Englishwoman. "Buckingham Palace in London was built in only two weeks!!".

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At that moment the taxi passed a big slum (However, in Bangladesh we call it "Bostii"). "What was that? When it was built?" The Englishwomen asked the driver who was a Bangladeshi.

"I don't know!", answered the driver. "It wasn't there yesterday!".

However in Bangladesh, illegal establishment of slums is a big time problem. Government is trying to destroy these slums and remove the peoples living there to a far place, formally in a planned village outside the city. But they can't find any ways, how to destroy all these slums!

Now, can you imagine yourself as a slum destroyer? In how many ways you can destroy k slums out of n slums! Suppose there are 10 slums and you are given the permission of destroying 5 slums, surly you can do it in 252 ways, which is only a 3 digit number, Your task is to find out the digits in ways you can destroy the slums!

Input

The input file will contain one or more test cases.

Each test case consists of one line containing two integers n $(n \geq 1)$ and k $(1 \leq k \leq n)$.

Output

For each test case, print one line containing the required number. This number will always fit into an integer, i.e. it will be less than $2^{31} - 1$.

Exemplo de entrada e saída

Entrada	Saída
20 5	5
100 10	14
200 15	23

Solução em $O(n)$

- O número de dígitos D de um inteiro x em uma base $b > 1$ é dado por

$$D = \lfloor 1 + \log_b x \rfloor$$

- O coeficiente binomial pode ser escrito como

$$\binom{n}{k} = \frac{n!}{(n-k)!k!} = \frac{n \times (n-1) \times \ldots \times (n-k+1)}{k \times (k-1) \times \ldots 2 \times 1}$$

- Combinando ambas expressões, com $m = n - k + 1$, obtemos

$$D = \left\lfloor 1 + \sum_{i=m}^{n} \log_{10} i - \sum_{i=1}^{k} \log_{10} i \right\rfloor$$

Solução em $O(n)$

```cpp
int solve(int n, int k)
{
    auto logn = 0.0, logk = 0.0;

    for (int i = n; i > n - k; i--)
        logn += log10(i);

    for (int i = 2; i <= k; i++)
        logk += log10(i);

    int ans = (int) floor(logn - logk + 1);

    return ans;
}
```