In the enthralling landscape of a cryptography competition, where intellectual curiosity permeated the air and the bu
ual cryptography competition event dominated conversations. As the competition drew near, whispers circulated ab
upcoming challenge. Rumors hinted at the creation of an enigmatic contributor that had piqued the curiosity of all p

Amidst the anticipation and excitement, you, a budding cryptography enthusiast, found yourself captivated by the al
this cryptic creation was none other than your mysterious crush.

With the competition drawing near, the cryptic algorithm was revealed, leaving participants scratching their heads in
unravel the hidden message within. Determined to seize the opportunity and impress not only the cryptography co
e intricate layers of this amalgamation of three different ciphers.

Little did you know that the pursuit of unraveling the cryptographic enigma would lead you to unexpected twists, int
ious mind behind the challenge. The atmosphere of the competition echoed with whispers of anticipation, and the c
nded the boundaries of individual participants, bringing together brilliant minds from different corners of the cryptic

About the algorithm:

The given algorithm is a product cipher, combining the strengths of Playfair, Vigenère, and Columnar Transposition c

Playfair cipher: Employing the Playfair cipher involves the generation of a key table derived from a given keyword. Th
each digraph undergoes the Playfair encryption process. This step serves as the initial layer in our product cipher, in
Vigenère Cipher: The Vigenère cipher introduces an additional layer of complexity. Utilizing a chosen keyword, it is re
f this extended keyword and the original plaintext occurs through the Vigenère square, resulting in a transformed cip
raphic puzzle.
Columnar Transposition Cipher: The third and final layer involves the Columnar Transposition cipher. The Vigenère c
specified columnar transposition key. Reading the columns of this grid in the order dictated by the key produces the
product fashion contributes to the overall robustness of our cryptographic algorithm.
Please refer to the following three links for a detailed explanation with examples for the specified algorithms:
Playfair cipher: https://privacycanada.net/playfair-cipher/
Vigenère Cipher: https://privacycanada.net/classical-encryption/vigenere-cipher/
Columnar Transposition Cipher: https://privacycanada.net/columnar-transposition-cipher/
NOTE:

In the Playfair cipher, the convention we follow here is to exclude 'I' and 'J' from sharing the same cell, and 'J' is remo
For the columnar transposition cipher during encryption, if the last row has empty cells, they should be filled with th
It's important to note that the decryption process for these adjustments will need to be considered and implemente
Input Format

The input consists of 4 lines where:

The first line contains the key for the Playfair cipher.
The second line contains the key for the Vigenere cipher.
The third line contains the key for the Columnar Transposition cipher.
The fourth line contains the ciphertext to be decrypted.
Constraints

It is to be assumed that in the outputs generated by the Playfair and Vigenère ciphers, none will contain the alphabe
n be attributed solely to the application of the columnar transposition cipher.
The input strings will pertain to the language {A-Z}.
You are not allowed to use libraries like cryptography available in python.
Output Format

Print the plaintext in uppercase string format.

Sample Input 0

```
TRICIPHER
CODEHELP
FINAL
GXTWVSYXQP
```

Sample Output 0

TESTCODE