Project: Cipher Generator

A substitution cipher is a simple way of encrypting messages. The idea is that each letter in a message (called the plaintext) is replaced with different letter in the encoding (the ciphertext). Many newspapers carry a puzzle feature called "Celebrity Cipher." The puzzle is to decode an obscure quote from a famous person that has been encrypted using a substitution cipher. You are to write a program to help generate such puzzles.

Here is an example puzzle:

![Celebrity Cipher Puzzle]

Notice that the actual quotation is written using only uppercase letters. Also, there is a "Clue" near the bottom of the puzzle that provides the mapping for one of the letters of the puzzle.

Cipher Object

Your program will be based on a Cipher object that manages the process of creating the substitution cipher and allows for encoding and decoding of messages as well as providing "Clues" for putting together a puzzle. Here is a brief outline of the class:

```python
import string

class Cipher:

    LETTERS = [ch for ch in string.ascii_uppercase]

    def __init__(self):
        ''' Creates a new random cipher
        note: a cipher is a mapping of uppercase characters into uppercase characters where each character maps to a unique character and no character maps to itself
        '''
```

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def encode(self, plaintext):
    '''returns an encoded version of plaintext
    note: uppercase letters are encoded, all others remain the same'''

def decode(self, ciphertext):
    '''returns a decoded version of ciphertext
    note: uppercase letters are decoded, all others remain the same'''

The Cipher object will maintain two dictionaries, one that maps plaintext characters to ciphertext (an encoding dictionary) characters, and one that maps ciphertext characters to plaintext characters (a decoding dictionary). You can initially generate a cipher "key" by making a copy of self.LETTERS and using the shuffle function from the random library to generate a random permutation of the letters. Then corresponding positions in LETTERS and key provide the plaintext and ciphertext characters, respectively.

Main Program

Your main program should create a cipher and then allow the user to enter some text to be encoded with the cipher. It should then print out the ciphertext and also print a "clue." The clue is provided by selecting 1 character at random from the ciphertext and printing out the mapping for that character (see the clue in the puzzle above).