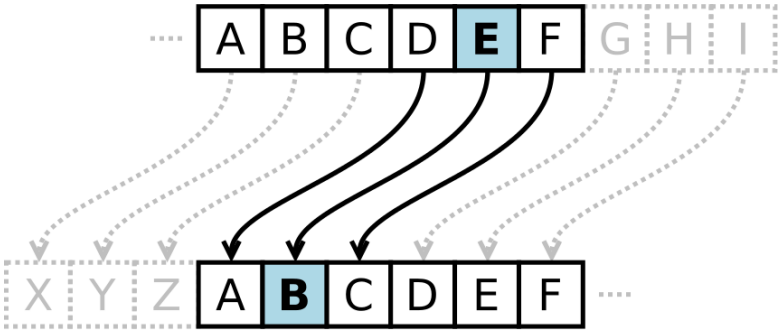
Caesar Cipher

The **Caesar Cipher**, also known as a shift cipher, is one of the oldest and simplest forms of encrypting a message. It is a type of substitution cipher where each letter in the original message (which in cryptography is called the plaintext) is replaced with a letter corresponding to a certain number of letters shifted up or down in the alphabet.

For each letter of the alphabet, you would take its position in the alphabet, say 3 for the letter 'C', and shift it by the key number. If we had a key of +3, that 'C' would be shifted down to an 'F' - and that same process would be applied to every letter in the plaintext.

In this way, a message that initially was quite readable, ends up in a form that cannot be understood at a simple glance.



For example, here's the Caesar Cipher encryption of a full message, using a left shift of 3.

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Plaintext:
THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG

Ciphertext:
QEB NRFZH YOLTK CLU GRJMP LSBO QEB IXWV ALD
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As unreadable as the resulting ciphertext may appear, the Caesar Cipher is one of the weakest forms of encryption one can employ for the following reasons:

- The key space is very small. Using a brute force attack method, one could easily try all (25) possible combinations to decrypt the message without initially knowing the key.
- The structure of the original plaintext remains intact. This makes the encryption method vulnerable to frequency analysis - by looking at h ow often certain characters or sequences of characters appear, one can discover patterns and potentially discover the key without having to perform a full brute force search.

The Caesar Cipher can be expressed in a more mathematical form as follows:

$$E_n(x) = (x + n)\ mod\ 26$$

In plain terms, this means that the encryption of a letter **x** is equal to a shift of **x + n**, where **n** is the number of letters shifted. The result of the process is then taken under modulo division, essentially meaning that if a letter is shifted past the end of the alphabet, it wraps around to the beginning.

Decryption of the encrypted text (called the **ciphertext**) would be carried out similarly, subtracting the shift amount.

$$D_n(x) = (x - n)\ mod\ 26$$

First used by Julius Caesar, the Caesar Cipher is one of the more well-known older historical encryption methods. While you certainly wouldn't want to use it in today's modern world, a long time ago it might have done the trick.

Website : https://learncryptography.com/classical-encryption/caesar-cipher